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C O N T E N T S

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APPLE FOLIAR SURFACES IN FUNCTION OF FOLIAR FERTILIZER APPLICATION.

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Abstract

In the period that the 2008- 2010 years we studied the influence of foliar fertilisation application device development and yield in apple foliage. The study took varieties: Golden Delicions, Florina and Idared 8 years old, grafted on M26 rootstocks. Distance of planting is 4x2 m as fertilizer to the foliage was 46% Urea in concentration of 0,4% to 1,2%in different stages of fruit development, Polyfeed (N19P19K19) at a concentration of 0,1% and $CaCl_2$ (0,5%-0,7%).The results showed that the use of foliar fertilisation stages provide conditions conductive to the growth of leaf area. The Golden Delicious variety is increased leaf area by 12,6% to 40,1% Idared variety, and 23,5% Florina variety is compared with control variant 21,4%- 26,3 thousands m^2/ha.

Key words**:** *Apple, Golden Delicious, variety,*

INTRODUCTION

In accordance with agro-industrial development strategy for the 2006- 2015years is expected to gradually replace the existing orchards, groves exhausted with productive potential of a new type based on advanced technologies for the production of fruit. [1, 2]
Foliar fertilisation, chemical and manual thinning fruits have a significant contribution to maintaining the physiological balance between growth and fructification and increasing the quantity and quality of fruit. [3]
Through proper nutrition through fertigation or foliar and made interventions on green shoots growing to create a balance between the fruit bud differentiation and their enjoyment that leads to consistent and quality output. These technical measures must be complemented by loads of fruit after binding rate setting fruit.

MATERIAL AND METHODS

The investigations were conducted during the 2008- 2010 years in the apple orchard S.A.'Zubresti', district Straseni planted with trees 1 year old. The plantation establishment was carried out in spring 2003 with fruit varieties Golden Delicious, Idared and Florina grafted on M26 rootstock. The distance of planting trees is 4 x2 m. Trees are driven by rows crown zone located from north to south.
The investigation on the development of the foliar fertilization in apple orchard is made stationary through research methods, field and laboratory. The variants are located in 4 repetitions each randomized trees in 32 variants. Agro-tehnical measures in the orchard are made in accordance with agro-technical guidance in force. Soil is maintained as field work by conducting an annual ploughing in winter and as needed or 3-5 cultivations. Urea 46%breast was used in different concentrations on fruit development stages. Solution consumption is 1000 litres per hectare. (Table 1).

Table 1 Scheme of experience.

Foliar fertilization performance period	Nutrient Concentration%			
	V1(control)	V2	V3	V4
Urea 46% active substance				
After flowering (75% of flowers have fallen).	Water	0.4	0.5	0.6
When fruits have the size of a peanut (fruit diameter reached 10-12 mm).	Water	0.7	0.8	0.9
When fruits have the size of a walnut (the fruit had reached 25-30 mm in diameter).	Water	1.0	1.1	1.2
Polyfeed (N19:P19:K19)				
When fruits are ripe state. (20-30 July).	Water	0.1	0.1	0.1
Calcium chloride ($CaCl_2$)				
With 2030 days before harvesting the fruit.	Water	0.5	0,6	0,7

RESULTS AND DISCUSSIONS

Following foliar fertilisation application (Table 2) with chemical fertilisation I 2008 at Golden Delicious variety the leaf area per hectare was in variant control of 14,1 thousand m^2/ha. The largest leaf area recorded 19,4 thousand m^2/ha value in variant 4 and that 17,7 thousand m^2/ha in variant three.

In 2009 the leaf surface in all variants have increased due to application of foliar fertilizers of different concentrations from 0,4%- 1,2% (Urea 46%N). The largest leaf area per hectare in 2009 was registered on the variety Golden Delicious in variant 4 with 20,6 thousand m^2/ha and the lowest in control variant with 16,7 thousand m^2/ha. Leaf area per hectare in variant 2 and 3 at Golden Delicious variety in 2009 were respectively 17,4 – 18,7 thousand m^2/ha.

In 2010 in second variant the leaf area was 24,8 thousand m^2/ha. The largest area was in variant 4 where the leaf area increased by 25 % to 2009 and amounted to 27,2 thousand m^2 to hectare.

The Idared variety, in 2008, leaf area was in variant control a 9,3 thousand m^2/ha, and the variant 4- 13,7 thousand m^2/ha or 47,3 % more than in variant control.

At Idared variety in 2009, leaf area increased significantly from 2008 and in control variant was more than 15,2 thousand m^2/ha, which constitutes 63,4% more than in 2008.

Following foliar application of foliar surface treatments significantly increased in all variants and comprised in 17,7 thousand m^2/ha to 21,4 thousand m^2/ha. Following applications of foliar fertilizer treatments (Urea 46%N) increased leaf area, and in variant 2 where Urea 46% concentrations was 0,4: 0,7%: 1,0%: leaf area was of 17,7 thousand m^2/ha.

The largest leaf area was recorded in variant 4 where the previous year 2008 increased by 43% and comprised 20,9 thousand m^2/ha.

Table2.The influence of foliar fertilisation on the leaf surfaces at Golden delicious, Florina and Idared varieties.
(M26 rootstock, planting distances 4x2 m S.A. 'Zubresti'. 2008-2010)

variant	Leaf area per unit of area thousands m^2/ha		
	2008 year	2009 year	2010 year
Golden Delicious			
1	14,1	16,7	21,4
2	15,1	17,4	24,8
3	17,7	18,7	26,4
4	19,4	20,6	27,2
$DL_{5\%}$	0,53	1,76	0,63
Idared			
1	9,3	15,2	21,2
2	10,5	17,7	21,5
3	11,3	21,4	22,2
4	13,7	20,9	35,8
$DL_{5\%}$	0,96	2,33	1,07
Florina			
1	12,7	18,3	26,2
2	16,3	18,9	27,3
3	16,7	19,6	30,7
4	17,0	19,8	33,8
$DL_{5\%}$	1,49	2,68	1,11

In 2010 the leaf surfaces has a smaller difference between the variants and the lowest index was recorded in variant control and second variant was at 21,2 to 21,5 thousand m^2/ha respectively.

The largest leaf area in 2010 at Idared variety was registered in variant 4 with 35,8 thousand m^2/ha. m^2/ha). Following foliar spraying with chemical fertilisation breast Urea 46% N.

Difference between the variants is large and is from 16,3 thousand m^2/ha in variant 2 and up to 17.0 thousand m^2/ha in variant 4.

The Florina variety leaf area in 2008 was the lowest recorded in variant control (12,7 thousand

In 2009 the leaf surface showed higher values in variant control Florina varieties and it was 18,2 thousand m^2/ha.As in the previous year in the three variants where they were applied foliar fertilizers (Uree 46%N), leaf surface were higher that control but between variants were not so substantial were 19,6 thousand m^2/ha.

In 2010 the Florina varieties observe a more pronounced difference between the variants compared with the study years 2008 – 2009. The lower leaf surface was recorded in control variant of 26,2 thousand m^2/ha. The largest leaf area was recorded in the index of variant 4 with 33,8 thousand m^2/ha. In second variant there 27,3 thousand m^2/ha to 20,7 thousand m^2/ha in variant three.

CONCLUSIONS

Following foliar fertilisation application (Table 2) with chemical fertilisation I 2008 at Golden Delicious variety the leaf area per hectare was in variant control of 14,1 thousand m^2/ha. The largest leaf area recorded 19,4 thousand m^2/ha value in variant 4 and that 17,7 thousand m^2/ha in variant three.

At Idared variety in 2009, leaf area increased significantly from 2008 and in control variant was more than 15,2 thousand m^2/ha, which constitutes 63,4% more than in 2008. Following foliar application of foliar surface treatments significantly increased in all variants and comprised in 17,7 thousand m^2/ha to 21,4 thousand m^2/ha. Following applications of foliar fertilizer treatments (Urea 46%N) increased leaf area, and in variant 2 where Urea 46% concentrations was 0,4: 0,7%: 1,0%: leaf area was of 17,7 thousand m^2/ha.

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CURRENT STATUS, PRIORITIES AND ACTIONS NEEDED IN THE RURAL AREAS OF THE ROMANIAN NORTH EAST REGION OF DEVELOPMENT FOR SUSTAINABLE DEVELOPMENT

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Abstract

Consists of six counties, NE Region is the largest developing region of Romania in terms of population, but also one of the poorest developing regions in the European Union, situated on the second smallest position in terms of GDP per capita. This article aims to provide an assessment of the current state of development of regions, focusing on the rural component, and a prioritization of needs and actions to be undertaken to overcome the current difficulties. The research method involves the processing and interpretation of data obtained in the field research and the statistical sources by using sustainable development indicators used at national and European level. The research result indicates development of agro-tourism and non-agricultural activities as solutions for socio-economical problems of the region in the rural areas. The developing of this region, can be assured in the near future by improving the infrastructure of the region, which will assure the support of increasing investments in the rural areas and the development of economical activities, based on reach cultural heritage of the region.

Keywords: *rural, regional development, North East Region*

INTRODUCTION

The North East Region of Development is the largest developing region of Romania in terms of population, but also one of the poorest developing regions in the European Union, situated on the second smallest position in terms of GDP per capita. The North East region of Romania is distinguished by an important tourism potential (such as Bucovina) their economic developments being influenced by the use of this potential. At regional level, except Bucharest, whose situation is special, economic growth followed a west-east direction, proximity to western markets acting as a powerful driver of growth. Although statistical data shows some variation over time due to local factors and it may be noted that economic growth has had a significant geographical component, underdeveloped areas being concentrated in the north - eastern border with Moldova, and South, along the Danube. The North - East supplies about 12% GDP. In structure, agriculture has one of the region large contribution to regional gross domestic product (about 15%), situated slight over national average (about 13%). As regarding the industry, the main production are coal, crude oil, natural gas, gasoline, diesel, yarn and synthetic chemical fertilizers, cement, paper and paperboard, timber, wood furniture, cloth, sugar. The share of this sector in gross domestic product regional level is well below the national average. In the industry, the largest share has manufacturing, followed by the electricity industry, gas and water and mining. Construction participates with a share close to the national level (5.5% versus national average: 6%). Regarding the services

in this region is noted that a high percentage of GDP has education, health and social care, public administration and defence (about 13%), which ranked it first in a top of national regions of development. Also, an important contribution at GDP has trade, hotels and restaurants (10%), transport storage, real estate and communications (9%), services rendered by enterprises (11%). The North – East Region of Development is contributing with 15.1% of total employment in the country, while is holding the highest employment rate in agriculture, 42.7%, followed by services: 33.7% (18.8% services commercial and 14.9% services social) and industry and construction by 23.6%. Underdevelopment appears to be strictly correlated with unemployment and the predominance of rural activities and the inability to attract direct foreign investment [1]. Rural development and planning problem is one of the most complex themes of the contemporary world, because, in essence, means achieving a balance between economic, environmental and socio-cultural conservation of countryside of the country, on the one hand and trend of modernization of rural life, on the other hand [2]. Adaptation strategies specific to rural communities in Romania, and implicitly in the North East region of development, were empirically grounded on a traditional natural and economic potential, promoting endogenous opportunities with social visibility [3]. The roles and positions of a region and its actors are constantly changing providing opportunities for new future paths: a region must be sensitive to those changes. Therefore, one cannot overstress the comprehension of the changing techno-economic paradigm. It is also important to learn from the past, compare what has been done in other regions, and try to do some benchmarking [4]. Of the more than 100 indicators of sustainable development identified by the European Union's statistical office, EUROSTAT, eleven are regarded as the most representative and enlightening in characterizing the degree of development at national or regional level.

MATERIAL AND METHODS

The main preliminary materials used in order to identify current status, priorities and actions needed in the rural areas of The Romanian North East Region of Development were the statistic database provided by Romanian National Institute of Statistics and The Regional Development Plan 2007-2013 for The North East Region. Elaboration of this analyse is also based on field research documentation in the region as part of a national research project conducted by the authors of this paper. The selected sustainable development indicators are part of The Sustainable Development Indicators (SDIs) used by EUROSTAT. The methodology is using diagnostic analysis of sustainable rural development social and economic aspects in the region of development, in order to identify existing resources and how they are recovered now.

RESULTS AND DISCUSSIONS

The range of indicators that can be calculated to indicate the sustainable development is unfortunately limited, since non-existent in some cases of sufficiently expressive statistical series highlighting evolutionary trends. At the European level are calculated: growth rate of real GDP per capita, as indicator for socio-economic development of a region; resource productivity, as indicator of sustainable consumption and production; population at risk of poverty or exclusion for the social inclusion issues; employment rate of older workers, relevant for demographic changes; healthy life years and life expectancy at birth, by gender as image of public health; greenhouse gas emissions and share of renewable energy in gross final energy consumption, to reveal the climate change and trends in energy consumption; energy consumption of transport relative to GDP, calculated as the ratio between the energy consumption of all types of transport (road, rail, inland navigation and aviation, including commercial, individual and public transport, with the exception of maritime and pipeline transport) and GDP, as indicator of sustainable development; fish catches taken

from stocks outside safe biological limits as indicator of natural resources and also common bird index as indicator of the population abundance and the diversity of a selection of common bird species associated with specific habitats; official development assistance as share of gross national income, as indicator of global partnership [5]. The indicator calculated for Romanian regions of development reveals an improvement on the gap to the national level, reflected in terms of interregional disparity index of gross domestic product per capita between regions and the region with a minimum amount – The North – East Region of development. There is a slight reduction in this gap, as a result of the higher regional economic growth in less developed regions. This can be seen also, if we analyze for example the evolution of wages in this region versus national average.

Table 1 Average monthly wages, region gape (comparative with national level) (euro)

No	Indicators	2005	2006	2007	2008
1.	National average monthly wages	206.1	240.5	268.6	303.1
2.	North East Region average monthly wages	183.1	213.8	239.9	273.5
3.	Gap of region, to the national level	88.9	88.9	89.3	90.2

Source National Prognosis Commission 2008

The development indicators used to identify the current level of regional sustainable development in rural areas in North Eastern Region of Romania were: GDP growth rate per capita, GDP per capita, evolution of employment rates, evolution of average number of workers, ILO unemployment rates, and net average monthly wage in real terms as indicators of socio-economic development.

Table 2 Evolution of the main socio-economic indicators for the North East Regions, 2005-2008

	Indicator	2005	2006	2007	2008
1.	GDP growth in real terms	2.2	5.6	6.6	6.4
2.	GDP per capita – euro	2517	2998	3407	3826
3.	Evolution of employment rates	-0.6	-0.5	-0.3	0.0
4.	Evolution of average number of workers	+0.6	+1.2	+2.2	+3.2
5.	ILO unemployed rates %	6.8	5.9	5.8	5.7
6.	Net average monthly wage in real terms	22.3	13.7	12.3	13.4

Source: National Prognosis Commission, 2010

Even there is an increase of GDP between 2005 and 2008 - this is still well situated under national average. At region level it was seen a slight increase of average number of workers. For the rural areas of the North East Region of Development, the indicators show a worrying development trend of the labour market in the rural areas. Only the rate of people employed in the services has increase in the rural areas since 2000.

Table 3 The labour market evolution in the North East region – the rural areas.

No	Labour market	SMU	2000	2008	2008 2000 %
1.	Economically active population in rural areas	1000 persons	1345	1046	77.7
2.	Employment in rural areas, of which:	1000 persons	1306	1025	78.5
3.	a) Workers in agriculture	%	80.8	75.6	93,5
4.	b) Workers in industry and construction	%	9.1	12.1	93.5
5.	c) Services	%	10.1	12.3	121.8
6.	ILO unemployed	1000 Persons	39	21	53.9
7.	Activity rates in rural areas	%	80.5	68.4	84.9
8.	Employment rates in rural areas	%	77.7	66.8	85.9
9.	ILO unemployment rate	%	2.9	2.0	68.9

Source: INSSE, Romania 2010 (selection dates from 2008)

As regarding the agro-tourism potential of the region, it is to mention the existence of around 200 agro-tourism units. There is a lack of coordination of marketing efforts and promotion which should be made by agro-tourism associations and agro-tourism institutions. This led to unsatisfactory presentation of agro-tourism products and has been an important factor leading to low number of tourists and a reduced average length of stay compared with national averages. In order to realize future growth in the share of the agro-tourism sector, are needed to promote joint actions in order to create a unified and efficient coordinated regional system of information, organization and promotion in terms of tourist attractions in the rural areas.

CONCLUSIONS

Lowering the number of employees in rural areas in the North East region of Romania have to be stopped by developing activities to exploit the region's natural and cultural heritage. Promoting agro-tourism services and development of non-agriculture by setting up micro enterprises may be solutions for the perpetuation of Romanian villages in this region. Local customs and traditions have to be the main source of attraction to promote agro-tourism. Micro-enterprise creation and development of existing non-agricultural sector in rural areas can result in reduced dependence on agriculture. Motivating youth to stay in rural areas can be achieved by encouraging business initiatives, especially in the services field. Also supporting the activities of traditional crafts and other activities can lead to retention of older persons and to avoid social exclusion.

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STUDIES REGARDING MANAGEMENT OF SOWING, SPRINGING AND FORMATION OF PRODUCTION ELEMENTS AT PREMIUM AND DURUM WHEAT KINDS BELONGING TO PROBSTDORFER IN THE SOUTHERN PART OF ROMANIA

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Abstract

This research aims at establishing relashionship between density when sowing, density of ears and productivity elements at premium grains, including durum, for the purpose of reducing the sowing doses and, correlatively, to reduce the farmer's costs, according to the rules of dematerialization of economy and of reducing input values in food production. The studies done in the Southern part of Romania demonstrate that when soils are ecologized and well preserved, the quantity of seed/ha in premium grains can be reduced even under 100 kg/ha. This is possible because the soils have a big capacity of tillering, which increases with the decreasing of the density when sowing. In the same sense and correlatively, the density of ears easily decreases, but the yield is compensated by the increase of the number of kernels within the ear and the increase of the mass at a thousand kernels. By using an appropriate management when sowing, at least 300 lei/ha could be saved, with a positive impact on the farm's economy.

Keywords: *premium kinds, seed, sowing, springing, efficiency*

INTRODUCTION

Romania did not make much progress in the fight to win the agricultural technological competition, including the cereals area, where technologies seem to be more simple. One of the big errors encountered is related to sowing mangement. Most of the Romanian farmers, out of habit, or by routine or even ignorance are sowing a too big quantity of seed/ha, i.e. a high density. Usually 250-300 kg/ha are recommended, regardless of the tillering capacity of species. In this way, at an average price of the C1 seed of 1,5 lei/kg, the costs for 1 ha wheat reach 450 lei, i.e. over 100 euro. Despite the research results, some companies recommend such big quantities out of the selfish reason to sell more seed. The changing of the mentality, from one empirical, harmful, into one based on the results of research is not an easy one in Romania, especially when lacking the consultancy, which was recently destroyed in Romania. The researches, both Romanian and foreigners are under intimidation pressure, difficult to understand in a genuine democracy. However, Bîlteanu (1974) [3] shows in his basical work that between densities of 300-500 germinal kernels/m^2 there is no significat difference in none of the experimental stations in Fundulea group. Or, at 300 germinal grains/m^2 we need only 100 kg seed/ha for a small MTG (mass at one thounsand grains), and maximum 145 kg/ha for big kernels.

Other researches coming from the western world recommend the density of 300 wheat kernels/m^2 on soils well prepared where the springing coefficient is 0,7, or around it. At 500 germinal kernels/m^2 the quantity of 168 kg is reached for small seed and 274 kg/ha for big seed (Agridea 2007) [1]. On the other side, the population of sprung plants does not correlate at all with the coming yield. Sarker

et al., 2009 [6] show that for kinds less developed, a density at springing between 199 and 206 sprung plants leads to 417-484 plants/m^2, a number of ears between 304 - 321, a number of kernels in ear between 52 - 53, a MTG of 47 - 49 and an yield of grains of 3,81 - 4,5 to/ha. The variation coefficient (C_V) was 18,38% (big, but normal for sprung plants), which stabilized under 5 and around 5% for the other parameters. The increase of the sowing dose from 100 to 160 kg/ha did not bring yield increase. The decrease of the dose to 80 kg/ha did not significantly decrease the yield when compared to 100 kg/ha (C_V under 7%, i.e. very good).

Also, in *Cultivar* magazine, issue July-August 2009 [4] Galtier A. announces yields of 8 - 10 to wheat/ha, with only 120 germinal grains/m^2 and a dose of 54 kg/ha, on a surface of 140 ha, on which the respective farmer succeeds in saving 4114 euro, by the means of the so-called precision sowing in which the soil tillage and the sowing equipment play an important role. Between the farmer Antoine Riviere from France who uses as seed only 0,6% of the level of his yield, and the manager Popescu I. from Romania who uses 250 kg/ha seed and a report of 10%, there is a huge difference which must be corrected by professional education, civic education and a change in mentality with the exclusion from the system of the „experts" of any kind who, by ignorance, put out of balance and entropically disorient the agriculture and the farmers.

MATERIAL AND METHODS

We worked on two locations - Calomfireşti, Alexandria, şi Modelu, Călăraşi, in checking lots with Premium kinds and quantities of seed between 80 - 200 kg/ha, achieveing at springing a number of plants between 150 and 450. Types of soils were: heavy chernozem, on clay at Alexandria, and easy carbonated chernozem on loess at Modelu. Soils were ecologized by our specific methods, Berca M., 2008 [2]. Samplings were done in the big parcels, and the following indicators were determined: sprung plants, number of tillering, number of grains in the ear, MTG and theoretical yield, calculated based on yield elements. Multiple correlations statistical calculation was used. Results were presented as tables and diagrams.

RESULTS AND DISCUSSIONS

Table no. 1 presents the average yield components for several Premium kinds (Josef, Capo) as well as for the two locations Modelu - Călăraşi and Poroschia - Alexandria. Results are the following:

1. The number of tillers decreases significantly with the increase of the density of sprung plants from 3,1 at 150 plants/m^2 to 2,0 at 450 plants/m^2.
2. The percentage of tillers earing is 84% at 150 plants/m^2 and easily decreases up to 80% at 450 plants/m^2. Percentage decrease is insignificant.
3. The number of kernels in ears significantly decreases with the increase of plants and ears, and also the MTG.
4. The yield remains constant between 200 and 350 sprung plants/ha, respectively between 550 and 710 ears.

Table 1. Premium kinds yield components (Josef şi Capo) - average for locations Modelu - Calaraşi and Poroschia - Alexandria 2008 - 2010

No. of sprung plants	No. of tillers	No. of ears	No. of kernels/ ear	MTG	Theoretical yield
150	3	410	39	51	8154
200	3	505	38	50	9595
250	3	615	36	47	10405
300	2,8	670	34	44	10023
350	2,3	710	32	43	9769
400	2,1	720	30	42	9072
450	2,0	720	30	42	9072
DL 5% =	0,3	55	5	7	1350

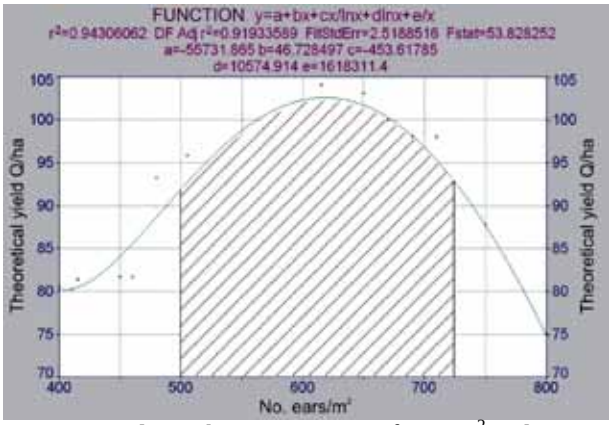

Fig. 1. Correlation between numer of ears/m^2 and Premium wheat yield, optimal conditions

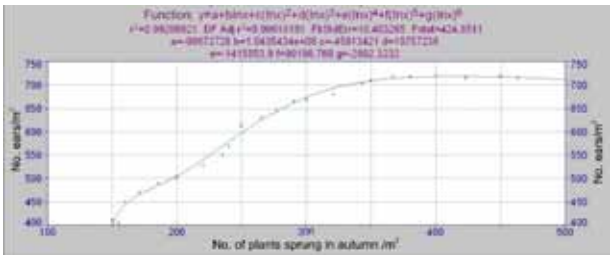

Fig. 2. Correlation between the number of sprung plants and number of plants at harvest

Figure 1 presents the correlation between the number of ears and the Premium wheat yield in optimal conditions. Inherent losses with stress factors, including those during harvest were not taken into account. The diagram shows that the maximum yield is got at abt. 620 ears/m^2, but the differencies between 550 and 750 ears/m^2 remain within the limits of variation coefficients. As figure 2 shows, the maximum number of ears is got at 416 plants/m^2: y max = dx (fx) = 416 (derivative of Ist order of the function in figure 2). In fact, over this limit a big consumption of energy takes place within the system. Many ears are being formed, but no more harvest. So we have two results:

- No. maximum of ears = 718 at 416 sprung plants - yield = 9250 kg/ha
- Optimal amount of ears = 615 at 260 sprung plants - yield = 10400 kg/ha.

Our experiments demonstrated that by the increase of the number of the sprung plants from 260 to 416 only a modification of the yield components of the kinds is taking place, with a big energy consumption, but to the yield detriment. This thing, benefic to the farmers, needs to be taken into attention by the experts within agricultural area, which remained blocked on the theory *1 kernel sowed = 1 ear*, in this way harming the agricultural production, especially the farm's efficiency. The other yield's components get arranged by the ears density. The MTG (mass of one thousand grains) is adequate according to the kind between 450 and 650 ears/m^2, after which it suddenly decreases, worsening the yield quality.

Fig. 3. Correlation between the number of ears and MTG at Premium kinds, 2010

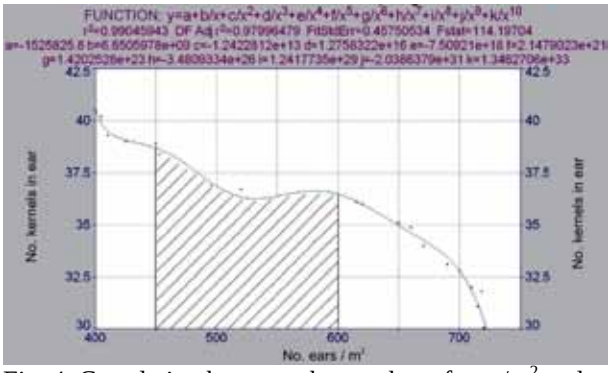

Fig. 4. Correlation between the number of ears/m^2 and the number of grains in ear, Premium wheat, Alexandria

The number of kernels in ear remains within normal limits between 450 and 600 ears/m^2, after which it is suddenly decreasing, affecting the yields level.

Repeating, these results are got in conditions of ecologized soil. I_S = 3,5 - 4,5, in which the quality of tillage and maintenance were of a very high level (see also figure 5).

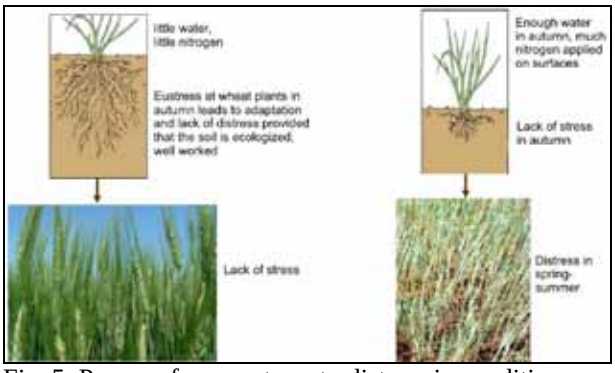

Fig. 5. Passage from eustress to distress in conditions when soil ecologization and right technologies were not applied at wheat

For those farmers and their consultants or experts who cannot afford a minimum of technology, the increase of the seed, fertilizers and other inputs not only is not helping them, but is leading them slowly toward the failure of their own farms. In the case of Auradur kind (Durum wheat), there is a positive correlation between the quality of soil works and the quality of springing (figure 5) which shows, by one side the good quality of the soil, and on the other side the extremely high variation (C_V = 40%) only in the Southern part of the country for abt. 170 determinations. However, they got the density leading to big yields, but with too big amounts of seed and surely less economic efficiency. During the autumn of 2010, as they were not well advised, many farmers made tillage outside the optimal period and also of bad quality.

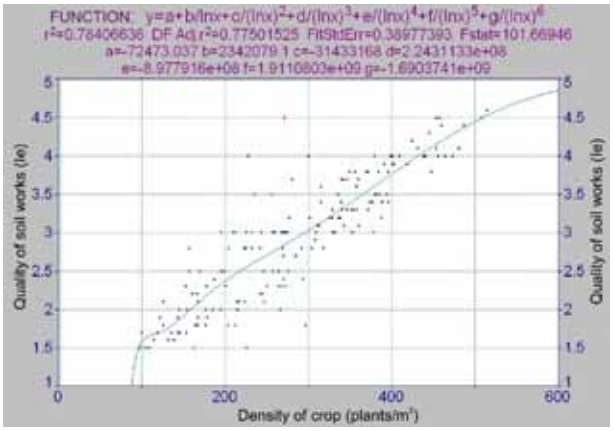

Fig. 6. Correlation between the density of springing and the quality of soil works (I_e) - Auradur 2010


Photo 1. Sowing model at Agrototal Prod


Photo 2. Unincorporated seed at Agroproiect Hârşeşti


Photo 3. Worked in rough soil at Spicul Tunari

The biggest mistakes made by farmers in the autumn of 2010 were:

1) In 100% of cases they have sowed outside the optimal period, which technically cannot be excused. Statements like: *„it will work also later”*, *„warm weather will come again”*, are not scientifically valid but with yield losses at most of the kinds. It's about losses due to decrease of daytime („photoperiodisme”) which nobody takes into account. This and other similar things are reasons why Romania does not exceed the average country yield of 2500 kg/ha compared to 5500-6000 kg/ha in the rest of E.U. Besides production losses we cannot neglect the huge amounts of humus lost by oxidation or soil lost by erosion.

2) The second big mistake was the inadequate soil tillage, with unappropriate machines, unadjusted, so that nobody can state how many grains have been put into the soil.

3) As far as sowing is concerned we can distinguish:

a. Very superficial sowing, or seeds let on the surface in big quantities (see photos Agrototal Prod Com., Agroproiect Harşeşti, Algap, Spicul Tunari) and many others, where one can see also the unappropriate soil tillage (photos 1, 2, 3, 4).

b. Very deep sowing. Generally, modern common wheat kinds, (Premium kinds) as well as Durum - in this case Auradur are sowed at 3-4 cm. Too deep sowing at Agrorep Ţăndărei (photo 5) allowed the field mouse to destroy the plants even before springing, the places around the galleries remaining without plants.

Photo 4. Sowing in soil wich was not worked and at very big depth at Agrorep Ţăndărei

Photo 5. Very dense crop at Longin Şerbăneşti

Photo 6. Irregular sowing and irregular springing at SC Acvila Măcin

We already showed that there were farmers who got with the same seed up to 450 plants/m^2 (photo 6). This is a too big density, which exhausts the resources of soil in autumn as well as the energetic resources of plants. The eustress is eliminated and roots are smaller than plants. A drought in spring can induce a harmful distress, hopefully this will not show up. It is the case of Longin Şerbăneşti and Agrovera Buzescu.

CONCLUSIONS

1. Researches made with Premium wheat kinds, Probstdorfer origin, demonstrate that normal productions can be obtained with 100 - 120 kg seed/ha, when 500 - 650 ears/m^2 can be obtained and a theoretical yield of 9500 - 10400 kg/ha.
2. Decrease of seed dose up to 80 kg/ha can take place on soils very well ecologized and with a precision technology, existent in very few farms. But this is possible without production decrease.
3. Density at springing cannot be considered an indicator to evaluate the yields on the interval 120 - 400 sprung plants/m^2.
4. Density of ears, number of kernels/ear, the weight of kernels in ear and MTG are yield calculation elements according to the relation:

$$Pkg/ha = \frac{Dsp\_x\_nr.\text{kernels}/ear\_x\_mtg}{100}$$

5. Technologies must be oriented towards optimization and stabilization of these indicators and not of others, which are useless.

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THE PREMISES OF ECOLOGICAL AGRICULTURE DEVELOPMENT IN THE REPUBLIC OF MOLDOVA

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Abstract:

The article approaches in a systemic and logical way the theoretical concept of premises for the development of ecological agriculture within market relations. Besides these, the article presents certain considerations regarding mechanism functioning and ecological agriculture development in the Republic of Moldova. Agriculture represents the main economic sector in Moldova and has always played a very important role in state economy. In this context, agriculture must make valuable contributions to state's economic development. Ecological agro-alimentary production is a method of sustainable development in agriculture, which allows the efficient resolution of a number of social, environmental economical and political problems.

Keywords : Ecological agriculture, Ecological monitoring, Ecological production, Ecological products.

INTRODUCTION

National concept of ecological agriculture, production and marketing of ecological and genetically unmodified food products is elaborated on the basis of the Decree no. 1287-II from December 29, 1999 issued by the President of the Republic of Moldova [1]. Unlike the conventional agriculture, ecological agriculture follows the principles of a biotechnology excluding the technologies of industrial origin, and relying exclusively on natural ecological processes. The production activity in ecological agriculture develops using organic fertilizers, cultivating leguminous crops used in crop rotations, controlling diseases and pests using integrated ecological methods, totally excluding the chemicals produced by industry (fertilizers, pesticides, stimulants) and giving up any application of genetic engineering.

MATERIAL AND METHODS

The role of this agricultural system is to produce healthier food, more suitable for human body's metabolism, but also in correlation with environmental conservation and development, using various methods, procedures and techniques. In order to achieve the purpose, there were used the following methods: observation, centralization, grouping, table method, comparative method, data analysis method and specialized literature consultation.

RESULTS AND DISCUSSIONS

What is ecological agriculture? Ecological agriculture (which is also classified as organic or biological agriculture) is a modern method of growing plants, fattening livestock and producing food by using those methods and technologies that are very close to the laws of nature – it doesn't use fertilizers and synthetic pesticides, growth regulators and stimulants, hormones, antibiotics and intensive systems of animal breeding [4]. In this regard, ecological agriculture differs fundamentally from conventional agriculture. The process and procedures of obtaining ecological products are regulated by strict rules and principles of production, which begin from taking into consideration the quality the land must have and up to the effective achievement of the final product. The process of transition from conventional to the ecological agriculture is not a short one. This transition is gradual, going through a transitional period, called "conversion period". This is the period when farmers have at their disposal time to

adapt their business management to the rules of ecological agriculture.

Ecological agriculture is developing worldwide. It is practiced on all five continents, on an agricultural area of about 26.5 million hectares. At the same time, the market of ecological products has the share of 2.5 - 3% from the total of agricultural products [2]. Some of the main objectives regarding the development of ecological agriculture in the Republic of Moldova are the following:

- performing the evaluation and feasibility study on Moldova's premises to implement the technologies to obtain ecological and genetically unmodified agro-alimentary products;
- drafting national legislation and standards in accordance with international standards in this area;
- elaborating eco-pedological indices necessary to delimit the lands that are suitable to obtain and produce ecological agro-alimentary products;
- implementing the systems of crop rotation, fertilization and anti-erosion protection of soil according to the ecological agriculture standards;
- planting varieties and hybrids with biological plasticity, resistance to diseases and pests;
- integrated monitoring of all segments within the system of ecological agriculture and production of ecological and genetically unmodified food products.

According to the report of the Food and Agriculture Organization of the United Nations (FAO) and World Health Organization, the ecological development of agriculture, natural resources and ecological balance are recognized as priority sectors to solve the problem of global sustainable development. Public health and food safety are directly proportional to the quality of food and natural resources. Ecological agro-alimentary production represents a way of sustainable development in agriculture, which allows the efficient resolution of a number of social, ecological and economic problems. [5]:

a) social level:
- promoting a healthy alimentation and obtaining the agro-alimentary production on the basis of traditional conditions and experience;
- ensuring food safety and agro-alimentary products quality;

b) ecological level:
- environmental protection;
- protecting, preserving and increasing soil fertility;
- development and use of correct models of animal husbandry;
- conserving natural resources;

c) economic level:
- meeting market needs with ecological agro-alimentary products;
- recommending an alternative source of economic development for rural areas;
- elaborating an agricultural form favorable for national economy.

In order to achieve sustainable development of the agro-ecological sector and to improve the competitiveness of ecological products both on local and export markets, there was elaborated a table that shows volume increase of ecologically certified vegetal products on the period 2009-2015 [2] (table 1).

Table1. Prognostic regarding volume increase of ecologically certified vegetal products.

	Measuring unit	Years	
		2009 (real)	2015 (prognostic)
Total quantity (of which:)	tones	24546	98488
Cereals	tones	13860	31460
Oleaginous and proteic	tones	4146	16450
Beekeeping products	tones	10	75
Fruits (cherries, sweet cherries, apricots)	tones	280	750
Berries, mushrooms	tones	450	850
Other crops	tones	5800	48903

Thus, the main mentioned indices are the following: volume increase of ecological agro-alimentary products destined for local market development and penetration of export markets with similar products. In the next figure we present a forecast concerning the increase of ecological products marketing for the local market.

Pedo-climatic conditions of the Republic of Moldova are favorable for cultivating a wide range of agricultural crops having both ecological and biological value (vegetables, fruits, grapes, ethero-oleaginous plants etc.). Thus, the efficient use of existing priorities: fertile and productive soil, moderate use of synthetic chemical plant protection products and related technologies, gives the possibility for Moldovan traditional agriculture to create conditions for the development of ecological agro-alimentary products. For our country, the ecological agro-alimentary production and its marketing represent a real chance of penetrating foreign markets that are oversaturated with products from conventional agriculture and lack ecological products. Stimulated by the regulations issued by Moldovan Government, the interest of local farmers as well as of economic agents for the ecological agro-alimentary production has increased. The ecologically certified areas for ecological agro-alimentary production, constitute about 11 000 ha, and its volume is estimated up to 30,590 tones. The premises of ecological agriculture development in the Republic of Moldova are the following:
1.Ecological conditions of the Republic of Moldova are favorable for the cultivation of a wide range of valuable agricultural crops (horticultural, ethero-oleaginous, etc...).
2.Soil surface with a high productive potential and a great self-purification capacity ensure high and qualitative yields of the listed crops.
3.Satisfactory quality of water resources allows applying irrigation without the danger to pollute the soils and crops or to cause land degradation, and ensures a high quality of the agricultural production.

Crops protection against diseases and pests can be ensured by the implementation of predominantly ecological integrated systems. The national scientific and technical potential is able to provide the necessary scientific support to obtain and produce ecological products.

On December 17, 2010, the national brand "Ecological Agriculture – Republic of Moldova" (photo 1) was officially presented. It will be applied only to those agro-alimentary products that are compliant with the rules of ecological production. The national brand "Ecological Agriculture – Republic of Moldova" is used for labeling and presentation of ecological products and it is applied only to those agro-alimentary products that were inspected and certified throughout the production cycle by inspection and certification bodies authorized by the Ministry of Agriculture and Food Industry.

Photo1: "Ecological Agriculture – Republic of Moldova".

The advantages of ecological agriculture in the Republic of Moldova are the following:
- air, water and less contaminated agro-alimentary products;
- safe working conditions for farmers;
- biodiversity;
- fertile and healthy soil;
- reduced soil erosion;
- efficient use of water;
- nutritional quality of the ecological products;
- environmental protection;
- reduced use of non-renewable resources;
- reduced farmers risks;
- protecting future generations;

As disadvantages of ecological agriculture in the Republic of Moldova we can mention:
- low yields;
- the cost for ecological products valorification is higher than the one for conventional products;
- necessity to support ecological agriculture;
- ecological products are often suspected to be toxic;
- certain agricultural products sometimes lack

organoleptic characteristics (appearance, taste);
- existence of false ecological products on the market;
- control and certification process must be improved;
- lack of research and extension systems for ecological agriculture.

CONCLUSIONS

Ecological agriculture makes a great contribution to long-term economic development and plays an important role in improving environmental conditions, soil preservation, water quality improvement, biodiversity development and nature protection. In order to develop the agro-ecological sector and to improve the competitiveness of ecological products on the export markets, the following conditions must be identified and implemented:

1. establishing and maintaining the value chain by orienting the production and sales towards primary products and processed products as well as promoting local ecological products for export;
2. implementing the elaborated legislation for this sector in order to enhance the control system using additional measures meant to oversee the inspection and certification bodies and therefore to improve the quality of exported products;
3. creating an appropriate system of production, processing and marketing for the ecological products designed to meet the needs of internal and external markets;
4. promoting the export of local ecological products by developing the research activity;
5. improving professional training of all the actors involved in the ecological sector;
6. creating organized groups of producers to enlarge the production and market.

Strategically, the qualitative objective of this sector consists in positioning the ecological agriculture at the heart of national agriculture, as a basis for long-term development of rural areas.

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SIZE AND CHARACTERIZATION OF AGRICULTURAL HOLDINGS IN ROMANIA REPORTED IN EU - 27

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Abstract

The main segment that ensure food resources - agriculture, has an essential role in economic development through agricultural production are the source of food for mankind continues to rise, the boom conditions of the poorest countries, and also the raw material for a series of industries: food industry - 90%, light industry - 70%, chemicals - 20%. Currently, 60% of Earth's population ensures its existence directly from the practice of agriculture. Agricultural development is conditional on decisive differences in geology, topography, climate and natural resources and the diversity of regional activities, infrastructure and social customs. According to statistics, the paper shows the evolution of agriculture in Romania to the EU-27 reported, through the evolution of agricultural holdings and land used by them.

Keywords**:** *agriculture, farm, area, Romania, EU-27*

INTRODUCTION

Along with our country's accession to the European Union, began the process of aligning the Romanian agriculture to the Common Agricultural Policy (CAP).
Equipped with which Romania joined the European agriculture and the demands imposed on agricultural statistics were presented at the Structural Survey of Agriculture (SAA), the National Institute of Statistics, in 2005.
Thus we conclude that Romania's agricultural potential is much higher than the global agricultural potential, but it is annihilated by excessive fragmentation of property, more than 4.2 million farmers owned an average of 2.3 ha and this is broken into parcels that can not make a modern agriculture.
In Romania, agricultural area is 0.65 ha per capita, a total of 14.7 million ha, classifying us in the first six countries in Europe, and the arable land is in 5th place, with an area of 0, 45 ha per capita, being the second largest agricultural producer in Central and Eastern Europe after Poland.
Academician Cristian Hera says that these statistical data on arable agricultural land in Romania reveal that agricultural potential agro practicable under the conditions used in countries with developed agriculture can provide food for a population three times larger than that of our country.

MATERIAL AND METHODS

To characterize the size and structure of agricultural holdings in Romania and EU-27 was used comparative analysis of statistical data, using the following indicators: European Size Unit (ESU) used agricultural area (UAA).
The period analyzed is 2003 - 2008, which is found in recent publications of EUROSTAT, the information is processed and interpreted in terms of quality and quantity.
Documentation was another method used to prepare the present work.

RESULTS AND DISCUSSIONS

Romania has about 14.7 million ha of agricultural land, almost 9.4 million ha of arable land. With a 61.7% share of the total agricultural area, Romania is ranked first in the European Union.

In Table 1, it is noted that in 2009 the main share is owned by the agricultural land (61.70%), so that our country has a rate of 8.15% of the EU-27.

Table 1. Distribution of land use categories in 2009

Use category	Area, 2009	
	thousands ha	%
Farm Land	14.709,3	61,70
Forests and other forest land, of which:	6.740,9	28,28
Forests	6.314,9	26,49
Construction	685,7	2,88
Roads and railways	390,1	1,64
Water and ponds	849,9	3,56
Other areas	463,2	1,94
Total	23.839,1	100

Source: National Statistics Institute (INS), Romanian Statistical Yearbook, 2009

In Romania, the major issues are the subsistence farms that slow the performance of the agricultural sector.
Approx half of the farmland is worked on subsistence farms, which maintain the overall agricultural efficiency at a low level. Currently, (July 2010) approximately 3.5 million farms have less land per hectare, which prevents them from accessing EU funds.
Romanian agriculture performance is slower due to fragmentation of property in small parcels (less than 3 ha), which requires merging them in farms with larger areas, being able to switch to an agriculture performance.
In Romania's case, the number of agricultural holdings has declined in the period 2003 - 2007, with more than one third (28.5%), while EU-27 level was 1.4% lower in 2003, while 2007, the reduction was 7.8% (Table 2).
From the total number of holdings, in Romania, only 846.300 reach to the point of an European economic community (ESU).
The European economic size unit (European Size Unit – ESU) is the generic definition, given to an agricultural economic holding dimension and its determinate as an amount of the products between the standard gross margins, calculated by type of agricultural area/or animal species and the planted areas/or number of animals.

Table 2. Number of holdings

Specification	Holdings (> ESU) (thousands)		
	2003	2005	2007
UE-27	7932,4	7822,7	7310,8
Romania	1211,8	1236,0	866,7
	Evolution of the number of holdings (%)		
UE-27	- 1,4	-6,5	-7,8
Romania	2,0	-29,9	-28,5

ESU represents the economic potential of an agricultural holding
Under European regulations, 1ESU = 1200 Euro.
If before 1989, Romania was one of the countries with one of the largest agricultural holding dimensions, after 1989, it became one of the countries with the smallest dimension. In 2007, the physical dimension of agricultural holdings was 3.5 ha, our country being in the last but one place UE – 27, average size of farm being 12.6 ha.
In the hierarchy of EU countries, Romania is basically starting from last place and this not only because of the physical dimension but because of economic dimension, which in 2007 was 1 ESU for each farm, while at the opposite, in Holland, its 111 ESU.
The physical dimension of agricultural holdings refers to the average agricultural area used (AAU).
It indicates the level of concentration of the AAU and represents an important factor to the agriculture development.
The total of AAU EU-27 was approximately 160 million ha, representing over one third of the European territory in 2007.
It was relatively stable, recording a slight drop – 0.5%, during 2003-2007, due to the accession of new EU member states and in compensation, these countries had new economic and political advantages, where PAC incentives for agriculture have intensified land use (Table 3).

On the other hand, other new member states, such as Romania, have had the opposite trend, and AAU dropped 10.6 % due to restructuring in the agricultural sector.

Table 3. Utilized agricultural area per farm, 1000 ha (AAU)

Specification	AAU (1000 ha)		
	2003	2005	2007
UE-27	161633	161633	161633
Romania	10624	10624	10624
	Evolution of AAU (%)		
UE-27	0,1	-0,6	-0,5
Romania	-2,7	-8,1	-10,6

The privatization and the redistribution of agricultural land still have a negative effect on agriculture.

Table 4. Numerical characterization Farms, EU – 27

Agricultural holdings	2005	2007
	UE-27	UE-27
Total (1000)	7822700	7310800
Size of holdings (% of total)		
< 5 ha	48,0	48,2
5 < 20 ha	27,3	31,7
20 < 50 ha	12,8	13,0
>50 ha	11,9	7,1
Total	100	100

At EU level - 27 (Table 4.) 7,310,800 of the total agricultural holdings recorded in 2007, a total of 6.4 million small farms have been under a threshold of one ESU.
Almost half, 48% of them have been identified in Romania, as subsistence farms. More than one third of the total were a little higher than the ESU and were found in Poland (15.4%) and Italy (18.9%), while in Romania a rate of only 11.9 %.
Cereal grains are grown on the largest area in Romania and also at European level, this being reflected at the productions level (Table 5. and Table 6.).
In Romania in the year 2009, cereal production declined by about 10% over 2008, registering a slight decline in the EU - 27. Industrial crops, especially oilseeds, are in second place as a share of cultivated area (14.4% in 2008), after grain.

Table 5. Production of main crops, 2008 (1000 t)

Specification	Cereal	Sugar beet	Canoa	Sunflower
UE 27	311.506	101.469	18.879	6.964
Romania	16.799	784	682	1.159

Table 6. Production of main crops, 2009 (1000 t)

Specification	Cereal	Sugar beet	Potatoes	Sunflower
UE 27	295.842	114.138	62.595	28.769
Romania	14.934	685	4.011	1.753

Oilseeds production has also encountered wide variations between 2008-2009, production at European level increasing from 6.964 million tons in 2008 to 28,769,000 tons in 2009.
In Romania, in 2008 production increased by 45% compared with year 2007.
Another crop which recorded modest growth of production in 2009, was the potato, 1.4%, which led to a significant increase in its price in 2010.

CONCLUSIONS

1. Almost half (48%) of small farms in the EU-27, are subsistence and have been identified in Romania;
2. Our country has a rate of 8.15% of the EU-27, 61.70% of the total, owned by agricultural lands from EU-27;
3. In Romania, agricultural area per capita is 0.65 ha, ranking 6th place in Europe, the same position as Spain (0.65 ha SAU per capita);
4. After 1989, Romania has become one of the countries with the smallest physical size of agricultural holdings, in 2007 physical size being 3.5 ha, our country being on the penultimate place in the EU-27;

5. Average area of farms in EU - 27 is four times higher than in Romania, which is an average of 12.6 ha.
6. Due to restructuring in the agricultural sector and the redistribution of land by the owners, the agricultural area used in our country decreased by 10.6%.

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NATIONAL IMPLEMENTATION OF EUROPEAN FUNDS IN THE CONTEXT OF SUSTAINABLE DEVELOPMENT

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Abstract

Article seeks to demonstrate the priorities it has the Common Agricultural Policy and the impact that the European Agricultural Guidance and Guarantee Fund had at national level. CAP was one of the most important and essential elements of the EU's institutional system. Its objectives are set out in Article 39 of the Treaty of Rome: increasing productivity, ensuring a fair standard of living of the agricultural population, to stabilize markets, to ensure security of supply, ensuring the rational consumer food prices. This article recognizes the need to take into account the desire to reduce farming costs, increase economic welfare and increasing their interest in gradual adjustments to make timely adjustments otherwise required by the European Community.

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Keywords*:* agricultural policy, economic funding, increased competitive, financial solidarity

INTRODUCTION

Agricultural policy is a set of principles, means and methods of action through which the overall objectives of state for agriculture [1]. Agricultural policy is, on the one hand, a fundamental component of economic policy and on the other hand, more than this, because it includes social policy measures [2].
Agricultural policy involves explicit manifestation of the will of the public about major social forces in agriculture and food; there is a community of interests between social groups over the issue of food security, formulation and application of clear principles and guidelines on agricultural development, consonant with the general policy state.
Basically, two types of problems justify government intervention:
- Food security issue when the solvent demand growth rate exceeds the rate of output growth, leading to economic imbalances manifested by large increases in prices and social unrest;
- The issue of farmers' income, when the rate of output growth exceeds the growth rate of demand for agricultural products, leading to significant reduction in agricultural prices;

Protecting agriculture is claimed by the need to ensure stability in agricultural markets. Competition mechanism is not balancing agricultural market and even less, can not stabilize it in the long term.
The economic cases for agricultural policy are the following aspects [3]:
• Equity argument that refers to long-term poverty alleviation in rural areas, low agricultural prices in the long term, high rate of output of agricultural labour;
• Efficiency argument concerns the need to increase productivity, ensuring food security of Europe, the stabilization of agricultural markets;
• foreign trade argument supporting the need for a flow of European trade in agricultural products and exporting countries' willingness to ensure the certainty of placement of their products on the world market;
• Market failure argument on the following issues: instability of agricultural prices, the reduced mobility of production factors in agriculture and the cyclical nature of agricultural incomes (low long-term investment).
Agricultural policy objectives can be broken down by criteria:

- Efficiency: the allocation of resources between sectors (mobility of factors of agricultural production), resource allocation within the sector (farm structure), division of labour between regions, the international division of labour, inter-temporal allocation (incentives for technical progress), the influence of externalities (environmental and other common property);
- Stability: stable consumer prices, output prices stable, ensuring supply to meet demand, balance of payments balance;
- Distribution: between economic groups (farmers, producers of capital goods, consumers, taxpayers), between households (social needs) between regions (regions lagging behind, international development assistance, food aid) between present and future generation (non-renewable resources);
- Economic freedom: liberal agricultural law, competitiveness policy (strengthening the competitive position of agriculture).

Agricultural policy uses a broad set of legal instruments, administrative, institutional and financial. By intervening in agriculture, the government wants [4]: to optimize the correlation between property forms and attributes of ownership, antitrust regulation, restrictive practices in the suppression of entry and exit to / from the market and monopolies, increase Paretto efficiency through changes of consumption and/or production of agricultural goods, restriction of undesirable effects created by moral hazard, asymmetric information and adverse selection, optimal redistribution of income from agriculture in the economic actors.

Agricultural policy instruments are instruments with implications at farm level (measures regulating property relations and stimulate the farms, paying farmers compensation for price-difference between guaranteed and market price support, subsidies on products, subsidies for purchase of inputs, subsidized interest loans, grants for the purchase of land, purchases of farm machinery, set-aside programs, premiums paid for land taken out of culture), instruments governing the efficient functioning of markets (establishment of buffer stocks to State by buying interventionist institutions create pricing, improving market transparency, optimizing the position of producers on the market, restricting joint event of increased concentration), instruments governing foreign trade relations (customs duties, levies, VAT or pay compensation for currency)[5].

Agricultural policy reflects the present and future interests of the nation's agriculture and food security.

MATERIAL AND METHODS

Since the establishment of the European Economic Community on 1 January 1958, Rome, agriculture was considered a priority in the "common market", due mainly shortfalls of the population with food, which usually imports growing more expensive in the ex-European and increasing tensions between the interests of farmers show Western European countries. Concrete reasons that led to the decision to achieve a common agricultural policy were [6]:

• The need to stabilize the agricultural supply while the need for predictability of agricultural prices;
• The gap in growth of income of farmers and urban employment;
• The need to stabilize the farming population in rural areas to reduce pressure on the labour market and reduce urban unemployment.

Agricultural policy is one of the first common policies adopted in the Western European market and has maintained its importance over the decades that followed. It is estimated that 90% of the agricultural market regulations, the decision lies with the Member States but not the European Union bodies.

Common Agricultural Policy began operating in 1964, when they took the first steps towards standardization of prices.

On the basis of the common agricultural policy are three fundamental principles [7]: creating and maintaining a single common market and prices (single market in agricultural products move freely), respect the concept of Community preference (in the agricultural trade preference for goods produced within Community products buyers must pay an additional cost non) financial

solidarity (Member States participate together in setting up resources and benefiting from the CAP expenditure).

CAP objectives [8] are set out in Article 39 of the Treaty of Rome: increasing efficiency in agriculture, fair standard of living for farmers, agricultural markets stabilization, secure supplies of agricultural products, and reasonable prices for consumers.

Common Agricultural Policy is built around two pillars: the Common Market Organizations and Rural Development [9].

Pillar I: Common market organizations are a complex system of rules and mechanisms governing the production, trade and processing of agricultural products in EU countries. This pillar aims at achieving the objectives of the CAP. To implement joint measures to regulate markets, the Community have the following instruments: prices, market intervention (storage), financial, production quotas, border protection.

Pillar I aims to: increase agricultural productivity by promoting technical progress and rational development of production (in terms of sustainable development), ensuring a satisfactory standard of living (fair standard of living) for those who work in rural areas, providing plenty of bids (safety supply), to ensure reasonable prices for consumer food safety (food should be safe for consumption).

Pillar II: Rural development - involves a set of structural measures aimed at the harmonious development of rural areas. CAP's rural development component has gained increased attention by the Commission after drafting the strategic document Agenda 2000, becoming the second pillar. Accompanying measures relate to early retirement, organic farming, the exploitation of disadvantaged areas and the modernization and diversification measures involving investments, to improve marketing and processing, involving young people in rural areas, training, conservation of forests. Pillar II aims to:

• Axis 1: Increasing competitiveness in agriculture and forestry;

• Axis 2: Improving the environment and countryside;

• Axis 3: Diversification of rural economy and improving quality of life;

• Axis 4: Leader.

The main reforms of the CAP were: McSharry reform (1992), Reform Agenda (2000) and Fischler reform (2004) [10]. Implementation of these reforms has been that since 1993 the share of total CAP expenditure in the budget to fall substantially so in 1999 they represented only 54% of the total EU budget expenditure on agriculture and the trend remained downward reaching 44% in 2003.

RESULTS AND DISCUSSIONS

Common agricultural policy measures are financed from the Community budget through the European Agricultural Guidance and Guarantee Fund (EAGGF). Fund creation was intended from the outset, the EEC Treaty (Article 40). In practical terms, the Fund was established in 1962, which gives the formal legal basis by Council Regulation EEC 25/1962, as amended by EEC Regulation 728/1970 and EC Regulation 1258/1999. EAGGF Constitution is the concrete principle of solidarity, the financial stress, which involves sharing of the common measures.

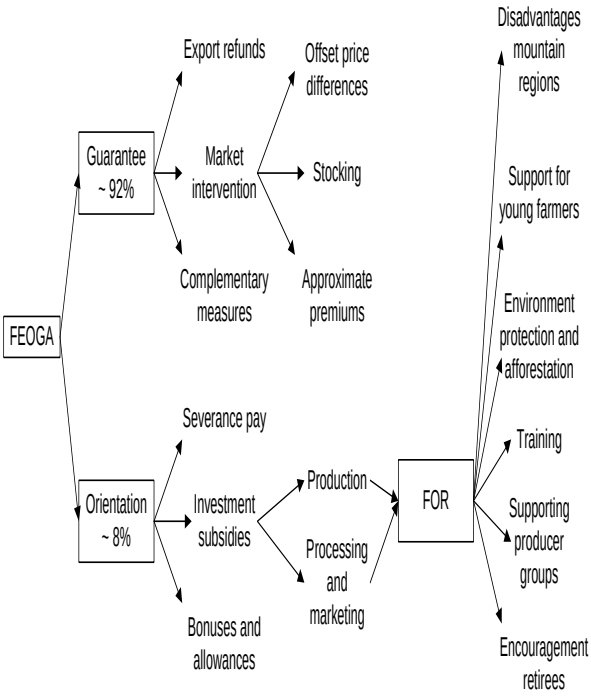

Fig. 1. FEOGA structure

Source: author's proposal

In fact, this means that some countries subsidize agriculture in some other countries. In general, countries are net contributors and those who want the current reform of the CAP to reduce agricultural spending.

In 2007-2013 the European Union grant provides financial assistance to Romania through structural three instruments: the European Social Fund (ESF), European Regional Development Fund (ERDF) and Cohesion Fund (CF).

Separately, the Common Agricultural Policy has its own instruments for balanced development in rural areas. Since 2007, Romania has benefited from funding by two pillars of the CAP: Pillar I (direct payments per hectare to farmers, export subsidies, market intervention prices) and Pillar II (financing and co-financing of rural development and of Agriculture).

Pillar I funds are managed by Agenda Pay for Rural Development and Fisheries. Overall, pillar I amounts are subsidies for Romanian agriculture European and Pillar II funds are practically amounts of European investment in agriculture and rural development in Romania. The largest sums will go to Pillar II.

Related budget projection Pillar II Fund for Agriculture and Rural Development (EAFRD), is worth 7.5 billion Community contributions for the period 2007-2013, of which 2.308 billion Euros for 2007-2009. The 7.5 billion Euros will be distributed on four development priority: competitiveness and development of agriculture and forestry (50% of funds), environmental protection and deprived areas (25%), improved quality of life in rural areas and diversification of economic activity rural (22.5%), supporting strategies promoted by local groups and communities (2.5%). In 2007 have been allocated 698 million Euros, of which 249 million Euros for axis I and 174.5 million Euros each for axis II and III. The money will be spent under the National Rural Development Plan, which implements the National Strategic Plan through a set of measures grouped under the four axes of the strategy and national priorities. The new National Plan will continue to finance SAPARD investment type (in particular for the restructuring and modernization of farms, agro-food sector and forestry), while providing new types of investment and financing. Allocations for 2007-2013 are grouped as follows:

• **Axis 1**: competitiveness of agriculture and forestry (50% of total funds) - a value of 3.5485 billion Euros. It aims to improve the performance of farms and processing units, application of new technologies, including biofuels and the production of new products, land consolidation, development and agricultural modernization, supporting transformation in semi-subsistence farm holdings economically viable adaptation imposed rules;

• **Axis 2**: Improving the environment in rural areas (25% of total funds) - a value of 1.7744 billion Euros. It seeks to maintain the population engaged in agriculture and forestry in mountainous areas, to avoid loss of agricultural land where agriculture is practiced extensively in mountain areas that have high cultural and natural value.

• **Axis 3**: the quality of life in rural areas and diversification of rural economy (22.5% of funds) - a value of 1.5968 billion Euros. It follows that, in addition to the diversifying non-agricultural activities and rural tourism similar to those hitherto SAPRAD, and measures to implement the renovation of villages, rural infrastructure and rural trainers.

• **LEADER program** (2.5% of funds) - a value of EUR 0.1774 billion, supports the training and support public-private partnerships at the local level, developing and promoting local development strategies.

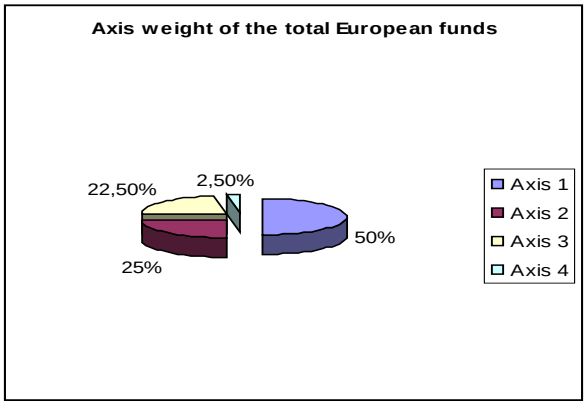

Fig. 2. Axis weight of the total European funds
Source: Authors proposal

Romania has access to 3 European funds until March 2013 plus financing from the state budget:

Table 1. European funds

European Agricultural Guidance and Guarantee Fund (EAGGF)	Euro 7.63 billion total financial allocation for implementing measures to support agriculture
European Agricultural Fund for Rural Development (EAFRD)	The total financial allocation of 9.97 billion Euros to finance the National Rural Development Programme and supplement sources for direct payments
European Fisheries Fund (EFF)	Total financial allocation 307 million Euros to finance the Fisheries Operational Programme (FOP)

Source: Goncearu, H., Voicu, R., Agriculture financing for integration process of Romania in EU, Bucharest, 2009

Ministry of Agriculture and Rural Development has received from the European Union over 1.2 billion:

♣ 531 million Euros from EAGGF payment scheme;

♣ 37 million market measures (31 million Euros for vineyard conversion, 2 million for the restructuring of the sugar factories, 2.3 million for milk, crop insurance and producer groups vegetables and fruit, 0.7 million and export, milk for schools);

♣ 472 million Euros from the EAFRD for LFA payments, agri-environmental measures (high value natural meadows, traditional agricultural practices, green crops, additional payments on the surface;

♣ EUR 171 million accessed from the Program SAPRAD.

CONCLUSIONS

1. EAGGF remains below the lowest structural fund traditional, accounting in 1994, about 50% of Social Fund and one third of Regional Fund.
2. If for the period 2000-2006, the share of total EAGGF-O EAGGF funding is about 10% for financial year 2007-2013 is the future trend of gradual increase observed in the role and financial support given to this area.
3. Do not forget the fact that resources are EAGGF Member States 'contributions, regardless of who will benefit more than agriculture expenditure. EAGGF is part of the general Community budget, whose funding is essentially determined by the economic situation of each Member State. This financial solidarity between Member States rich and less rich is one of the fundamental principles of the Community and indispensable condition for acquiring a greater degree of economic and social balance within the Union, a goal which always plays an important role in agricultural policy.

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CEREALS PRODUCTION EVOLUTION IN BRAILA COUNTY – BACKGROUND FOR ESTABLISHMENT OF CEREALS CLUSTER

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Abstract

The research results will be applied in the production of the Braila county, on a main sector of this pedo- climatic zone of cereals .Cereal production in Braila county had an uneven trend over the period analyzed, climatic conditions, quality of germinal material and compliance of cultivating technologies has a decisive influence. The minimum was recorded in 2007, when production fell by 293,000 tons over the previous year and peak in 2005 (over 740,000 tones). The structure of cereals production has changed in favor of wheat, barley and two-row barley and at the expense of maize. Of the total production of cereals, wheat represented 26.5% and 67.1% maize; in 2009 the wheat share increased to 37.1% and corn fell to 39.5%.

Keywords *: production, grain, farm, barley, rye*

INTRODUCTION

In the applicative research on one of the largest grain macrozone in Romania, it was intended to analyze the production of cereals from Braila county and study on the potential of grain production in the mentioned area, for creating a cluster.

MATERIAL AND METHODS

The study is part of the project "Research on the development of Romanian agribusiness clusters", and at its base were the documentation and field studies conducted in the county, the amount of information resulting from research carried out involving their synthesis through different and multidisciplinary collection, processing and analysis methods and techniques.

RESULTS AND DISCUSSIONS

Braila County has created and creates a propitious framework for cultivation of cereals, the soil and climatic conditions forming the basis of achieving a satisfactory production, sometimes exceeding forecasted production.

The soil and climatic conditions of the county, the yield and economic efficiency depends on the restoration and operation of irrigation systems and crop rotations, introduction and enforcement.[1]

Cereal production had an uneven trend over the period analyzed, climatic conditions, quality of germinating material and compliance culture technologies has a decisive influence. The minimum was recorded in 2007, when production fell by 293,000 tons bellow the previous year and peak in 2005 (over 740,000 tonnes). (Table 1). The structure of grain production has changed in favor of wheat, barley and two-row-barley and at expense of maize. Thus, in 2005, of the total production of cereals, wheat represented 26.5% and 67.1% maize, the wheat share in 2009 increased to 37.1% and corn fell to 39.5% . (Figure 1).

Average productions evolutions for grains during 2005-2009 ranged from 3.21 tonnes / ha in 2005 and 2.60 tonnes / ha in 2009 to wheat, the barley and two-row-barley from 2.23 tonnes / ha in 2005 and 2.93 tonnes / ha in 2009, and in terms of maize the average productions were between 5.10 tonnes / ha in 2005 and 2.71 tonnes / ha in 2009. (Table 2 and Figure 2).

Table 1. Total cereal production in the county of Braila and in the development region, by ownership [2], [3]

Main crops	Ownership	Development region and county	Years				
			Year 2005	Year 2006	Year 2007	Year 2008	Year 2009
			MU: Tonnes				
Cereal grain	Total	South-East Region	3653175	2856533	1095330	3319866	2558846
-	-	Braila	741967	580819	287495	611560	556445
-	Private sector	South-East Region	3546452	2827595	1077598	3286385	2539520
-	-	Braila	732549	577526	284714	604035	548863
-	Of which: individual holdings	South-East Region	2336361	1979007	551781	1730681	1356965
-	-	Braila	479275	338893	111738	195674	182488
Wheat and rye	Total	South-East Region	1188927	934512	531285	1793049	1066838
-	-	Braila	196705	194242	135389	271487	206922
-	Private sector	South-East Region	1150322	921353	521284	1777046	1058057
-	-	Braila	191290	192256	133633	267878	203421
-	Of which: individual holdings	South-East Region	595814	427028	188306	759862	412467
-	-	Braila	72455	63643	48611	59749	47060
Rye	Total	South-East Region	385	434	53	697	577
-	-	Braila	:	:	1	1	365
-	Private sector	South-East Region	385	412	45	681	569
-	-	Braila	:	:	1	1	365
-	Of which: individual holdings	South-East Region	332	243	6	343	141
Wheat – total	Total	South-East Region	1188542	934078	531232	1792352	1066261
-	-	Braila	196705	194242	135388	271486	206557
-	Private sector	South-East Region	1149937	920941	521239	1776365	1057488
-	-	Braila	191290	192256	133632	267877	203056
-	Of which: individual holdings	South-East Region	595482	426785	188300	759519	412326
-	-	Braila	72455	63643	48611	59749	47060
Common wheat	Total	South-East Region	1188254	933434	531232	1789752	1060840
-	-	Braila	196705	194242	135388	271232	205425
-	Private sector	South-East Region	1149649	920297	521239	1773765	1052541
-	-	Braila	191290	192256	133632	267623	201924
-	Of which: individual holdings	South-East Region	595194	426741	188300	759519	412152
-	-	Braila	72455	63643	48611	59749	47060
Durum wheat	Total	South-East Region	288	644	:	2600	5421
-	-	Braila	:	:	:	254	1132
-	Private sector	South-East Region	288	644	:	2600	4947
-	-	Braila	:	:	:	254	1132
-	Of which: individual holdings	South-East Region	288	44	:	:	174
Barley and two-row-barley	Total	South-East Region	205152	149369	133975	360040	373681
-	-	Braila	37083	36470	32421	78886	90988
-	Private sector	South-East Region	200783	146447	130856	353050	368506
-	-	Braila	36405	35918	32044	77737	89227
-	Of which: individual holdings	South-East Region	94520	63143	50896	137019	125895
-	-	Braila	18411	12196	4923	20151	23987
Barley	Total	South-East Region	59786	26644	46000	168721	205286
-	-	Braila	9588	10471	18421	47881	60489
-	Private sector	South-East Region	57616	25631	44776	165185	201887
-	-	Braila	9507	10458	18281	46892	59034
-	Of which: individual holdings	South-East Region	27750	6522	10251	51253	49160
-	-	Braila	3314	1955	1454	5978	10810
Hop	Total	South-East Region	:	:	:	22	:
-	Private sector	South-East Region	:	:	:	22	:
Oat	Total	South-East Region	29262	27862	13132	28755	19178
-	-	Braila	1808	1407	924	1203	779
-	Private sector	South-East Region	26286	25635	12620	26758	17777
-	-	Braila	1231	1323	888	994	509
-	Of which: individual holdings	South-East Region	20357	21934	10712	22668	15581
-	-	Braila	1231	1079	354	347	329

Maize	Total	South-East Region	2220085	1734962	396874	1097187	1053286
-	-	Braila	498361	339970	100984	226620	219703
-	Private sector	South-East Region	2159390	1724383	392855	1089286	1049513
-	-	Braila	495613	339344	100418	224574	217719
-	Of which: individual holdings	South-East Region	1625456	1466143	300197	809206	801521
-	-	Braila	387178	261595	57843	114483	111016
Sorghum	Total	South-East Region	148	451	150	1124	1870
-	-	Braila	:	84	103	970	1446
-	Private sector	South-East Region	148	451	142	1124	1870
-	-	Braila	:	84	103	970	1446
-	Of which: individual holdings	South-East Region	98	138	3	523	246
-	-	Braila	:	18	3	448	96
Rice	Total	South-East Region	7410	8087	17467	31631	38094
-	-	Braila	7410	8087	17467	30902	36393
-	Private sector	South-East Region	7410	8087	17454	31631	38061
-	-	Braila	7410	8087	17454	30902	36360

Figure 1. Cereals production structure in Braila county in 2005-2009

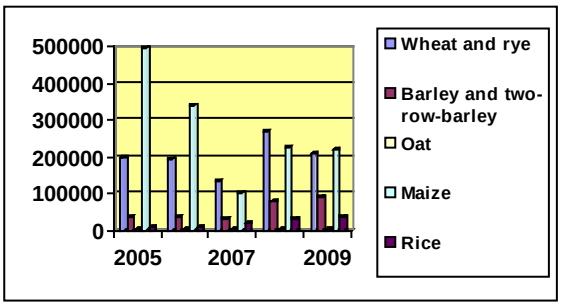

Figure 2. Average productions evolution for wheat, maize, barley and rice in Braila county

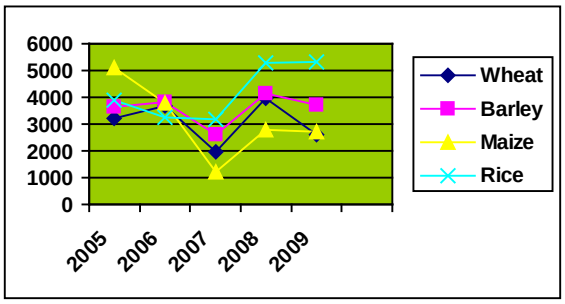

Table 2 . Average production per hectare for the main crops in Braila county and the development region, by ownership [3], [4]

Main crops	Ownership	Development region and county	Years				
			Year 2005	Year 2006	Year 2007	Year 2008	Year 2009
			MU: Kg/ ha				
Cereal grain	Total	South-East Region	3501	3152	1121	3034	2279
-	-	Braila	4152	3641	1590	3401	2788
-	Private sector	South-East Region	3494	3157	1118	3034	2275
-	-	Braila	4201	3654	1593	3395	2779
-	Of which: individual holdings	South-East Region	3589	3149	938	2710	2107
-	-	Braila	4479	3446	1165	2368	1983
Wheat and rye	Total	South-East Region	2997	3004	1423	3572	2141
-	-	Braila	:	3691	1962	3950	2603
-	Private sector	South-East Region	2997	2996	1418	3572	2135
-	-	Braila	:	3711	1969	3949	2590
-	Of which: individual holdings	South-East Region	2923	2755	1204	3538	1917
-	-	Braila	:	2800	1823	3201	1904
Rye	Total	South-East Region	1645	1607	296	3004	1855
-	-	Braila	:	:	91	250	3411
-	Private sector	South-East Region	1645	1585	276	3068	1890
-	-	Braila	:	:	200	250	3411
-	Of which: individual holdings	South-East Region	2213	1653	67	2618	1484
Wheat - total	Total	South-East Region	2998	3005	1424	3572	2142
-	-	Braila	3207	3691	1962	3950	2602
-	Private sector	South-East Region	2997	2998	1419	3572	2136
-	-	Braila	3242	3711	1969	3950	2589
-	Of which: individual holdings	South-East Region	2924	2756	1205	3538	1917
-	-	Braila	3025	2800	1823	3201	1904
Common wheat	Total	South-East Region	2998	3006	1425	3572	2146
-	-	Braila	3207	3691	1962	3951	2612
-	Private sector	South-East Region	2997	2998	1420	3572	2140
-	-	Braila	3242	3711	1969	3950	2599

-	Of which: individual holdings	South-East Region	2924	2757	1205	3538	1919
-	-	Braila	3025	2800	1823	3201	1904
Durum wheat	Total	South-East Region	3600	2862	:	3399	1534
-	-	Braila	:	:	:	3432	1577
-	Private sector	South-East Region	3600	2862	:	3399	1455
-	-	Braila	:	:	:	3432	1577
-	Of which: individual holdings	South-East Region	3600	1760	:	:	523
Barley and two-row-barley	Total	South-East Region	1896	2281	1163	3227	2216
-	-	Braila	2232	2693	1571	3499	2929
-	Private sector	South-East Region	1908	2277	1161	3235	2212
-	-	Braila	2303	2720	1585	3509	2929
-	Of which: individual holdings	South-East Region	2028	2078	1012	3172	2072
-	-	Braila	2728	2218	655	2760	2565
Barley	Total	South-East Region	2238	2833	1632	3893	2880
-	-	Braila	3636	3834	2601	4142	3725
-	Private sector	South-East Region	2264	2816	1623	3912	2880
-	-	Braila	3695	3836	2613	4159	3730
-	Of which: individual holdings	South-East Region	2234	2314	1214	4036	2522
-	-	Braila	3594	2519	805	3659	3948
Hop	Total	South-East Region	:	:	:	489	:
-	Private sector	South-East Region	:	:	:	489	:
Oat	Total	South-East Region	1589	1716	643	1824	1201
-	-	Braila	1714	2010	643	2168	1795
-	Private sector	South-East Region	1589	1711	652	1833	1184
-	-	Braila	2234	2064	679	2516	1885
-	Of which: individual holdings	South-East Region	1675	1742	665	1800	1211
-	-	Braila	2234	2310	346	2377	2179
Maize	Total	South-East Region	4299	3404	863	2409	2451
-	-	Braila	5107	3779	1203	2787	2712
-	Private sector	South-East Region	4271	3413	861	2405	2450
-	-	Braila	5115	3782	1202	2773	2699
-	Of which: individual holdings	South-East Region	4189	3411	825	2203	2260
-	-	Braila	5116	3760	953	2039	1923
Sorghum	Total	South-East Region	1721	1555	586	2294	1946
-	-	Braila	:	4421	696	2449	2221
-	Private sector	South-East Region	1721	1555	577	2294	1946
-	-	Braila	:	4421	696	2449	2221
-	Of which: individual holdings	South-East Region	3267	1366	1500	2135	1651
-	-	Braila	:	2571	1500	2207	1391
Rice	Total	South-East Region	3816	3235	3176	5184	5362
-	-	Braila	3900	3235	3176	5274	5304
-	Private sector	South-East Region	3816	3235	3182	5184	5366
-	-	Braila	3900	3235	3182	5274	5308

CONCLUSIONS

The study highlights area of influence and the productive potential that can be influenced by the operation, in the future, of cluster units. The objectives of these clusters should be targeted on the one hand, by taking appropriate measures to increase grain production at a level close to the productive potential of the region and thus to ensure the competitiveness of grain production and on moreover, by reducing the climate impact on obtaining production.

ACKNOWLEDGEMENTS

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INCREASE ENVIRONMENTAL PERFORMANCES IN LIVESTOCK FARMS BY USING BIOGAS

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Abstract

Biogas production in Romania has been a growing concern at the end of the past century. Anaerobic digestion to produce and capture biogas is a process driven by the decomposition of moist organic matter, which takes place in indoors, in controlled environmental conditions, in the absence of molecular oxygen and light. Through anaerobic digestion, microorganisms decompose organic matter, releasing a series of metabolites, including methane and carbon dioxide. Cellulose is the main component of organic matter resulting methane by bioconversion. Dry basis, this represents 12-23% in fresh manure of ruminants and 6-10% in poultry and swine manure. Obtaining methane from organic waste in such a farm has a double quality - animal manure treatment, resulting in reduced water, soil, air pollution and energy production for farm or for market.

Keywords *: biogas, fermentation, environment, pollution, management.*

INTRODUCTION

Research conducted in the first half of the twentieth century have made essential clarifications on methane production by anaerobic fermentation and set up the fuel gas production at the plant level by this process applied to plant and animal residues in agriculture. With the development of molecular biology in recent decades, deepen knowledge regarding methanogenic bacteria, leading to the development of biotechnology to industrial scale production of fuel gas, called biogas, in order to increase yields and reduce the cost.

MATERIAL AND METHODS

Research and technological development issues for the production of biogas from animal manure, especially cattle and pigs, has focused in improving existing technologies that use discharged hydraulic manure as a raw material from industrial animal breeding complexes or solid manure from household-type operation system. Another direction is to develop technologies for systems in which manure is disposed of by scraping, no industrial water consumption.

RESULTS AND DISCUSSIONS

The first attempt of capitalization of animal manure for biogas was done in 1975 at Tomeşti - Iasi swine research complex, in collaboration with the Institute of Animal Nutrition Balotesti, then was founded in S.C.C.C.P. Peris first pilot station semi-industrial type of biogas from pig manure, with a capacity of 580 m3/day biogas. After 1982, other stations started using pig manure at December 30 in Giurgiu County, at I.S.C.I.P. Caracal, Codlea, Roman, A.E.I. Pecineaga. [1]

After 1990, interest in biogas from recycled organic materials from livestock and food industry, by anaerobic fermentation decreased, as compared with most countries where this interest is growing.

Using anaerobic digestion to produce and capture biogas is a process driven by moist decaying organic matter, which takes place in an enclosed, controlled environmental conditions, in the absence of molecular oxygen and light. Through anaerobic digestion, microorganisms decompose organic matter, releasing a series of metabolites including methane and carbon dioxide. Gas mixture composed of methane (up to 80%) and carbon dioxide (minimum 20%), which occur with small amounts of hydrogen (H_2), hydrogen sulfide (H_2S), mercaptans, water vapor and traces of ammonia (NH_3), nitrogen (N_2), indole and skatol is biogas.

Cellulose is the main component of organic matter resulting methane by bioconversion. This represents 6-10% of dry pig manure. Large quantities of cellulose found in trash from animals raised on litter.

In Table 1, shows the quantity of biogas possible to get from various organic materials.

Table 1. Quantities of biogas from animal manure

Source	Nature of organic material	Biogas l/kg D.M.	Content of methane (%)
Zootechnics	Pig manure	480	60,0
	Cattle manure	260-280	50-60
	Sheep manure	320	65

It is clear that anaerobic digestion is a complex process of recycling energy and elements stored in no-value organic waste, but characterized by a high potential for impairment of environmental quality. Anaerobic digester technologies provide solutions for animal manure processing residues from agricultural and livestock farms, with beneficial effects on the environment, on the one hand, help in obtaining material benefits from the use of final products (mainly biogas), with effects on decreasing costs and increasing farm income.

In Table 2 is shown the potential to generate biogas from manure of different animals.

Table 2. Biogas generation potential of different animal manure

Specification	Milking cows	Fattening cattle	Fattening pigs	Laying hens
Fresh undiluted manure with urine (l/1000 kg live weight per day)	82	60	65	53
The amount of biogas produced:				
- m^3/1000 kg live/day	3,28	2,89	2,62	6,21
- m^3 / l undiluted manure	0,040	0,048	0,040	0,117
- m^3/m^3 fermentor/ day	1,1	1,3	1,1	1,3

Requirements for protecting the environment through proper waste processing in general and those from agriculture and animal husbandry in particular, contained in the legislation of each country and especially in the regional organizations and concerns increasingly to find alternative sources of energy, have led to the commissioning of equipment for the production of biogas by anaerobic fermentation of organic wastes from livestock farms.

The main elements that support the anaerobic digestion contribution at environmental protection are:

• Reduce odors that damage air quality and disturb neighbors; through the technology, odors are greatly reduced because the volatile organic acids, the source of odors, are consumed in the process of fermentation by anaerobic bacteria.

• Reduce water and land pollution - the product of fermentation, predominantly liquid product, is a uniform and more controllable than untreated manure. High ammonia content allows better use as fertilizer and physical properties facilitate handling and administration on the soil. Handled properly, the liquid of fermentation

reduces the possibilities of water and land pollution.

• Reduce pathogens - warmed fermentators dramatically reduce pathogen populations in a few days. Fermentation tanks isolate bacteria, which die before storage or administration on the soil.

• Reduce air pollution and noise - another aspect that shows the contribution of this technology to protect the environment relates to the use of biogas as a fuel for cars engines, as an alternative to classic fuels and environmentally efficient. Noise produced by biogas engines is lower than diesel engines and fumes and smoke emissions are reduced.

Biogas can be used to the heating farm system (heating and hot water centrals gas-fired based), to action generators for electricity, or other applications; also an important economic product is the organic compost, used as organic fertilizer to obtain fodder, valued for its lack of pathogens (due to sterilization through the anaerobic fermentation) and high nutrient content.

Anaerobic digestion technology is already well confirmed in general to treat organic waste and animal manure in particular. Biogas obtaining and use can increase profits while improving environmental conditions.

Maximizing farm resources in this manner can become essential for a certain level of competitiveness and can be a solution for environmental protection in animal husbandry. Also, the diversification of the use of biogas can create new jobs in the projecting, manufacture and operation of power generation plants, leading to the progress of agriculture.

Worldwide, the major developed countries in America and Europe, in recent years, have increased concerns regarding recycling of animal manure from livestock farms, through anaerobic digestion. The main goal pursued is to develop obtaining energy and systems of green crops, with low cost.

Development of anaerobic fermentors and energy production visibly accelerated in recent years. Factors that influence the demand for this market are:

• continuous increase reliability and safety of anaerobic fermentors through the successful development of the purge systems in the last decade;

• farmers growing concern for environmental quality;

• the growing number of local and state financial support to the development of these systems;

• new policies at state level to develop clean alternative energies.

In Romania, large-scale development of technologies for obtaining biogas through anaerobic
fermentation, especially in breeding farms, is hampered by the relatively high investment costs involved in a modern facility in the context of difficulties encountered and the small profits made by livestock farmers.

Considering these aspects, the initiation of joint programs of M.A.R.D. aimed at helping
farms to implement technologies for obtaining biogas by anaerobic digestion of animal manure through grants and other facilities and designing a system for publicizing these programs and counseling, would be particularly useful and effective.

CONCLUSIONS

We conclude the benefits of implementing these systems and of biogas production and operation:

• higher capitalization of organic waste and manure, the substrate being an excellent fertilizer, after biogas extraction, the organic matter is decomposed and minerals can be found in more accessible forms for plants;

• economic and ecological management of manure and organic waste, in compliance with relevant provisions of the European Union;

• by producing electricity and heat, the unit can provide energy independence, achieving, in the same time, savings or revenue;

• Net energy replace conventional fuel that produce CO2;

• destruction of pathogens and parasites reduce the risk of spreading disease between animals or between animals and humans;
• fermentation liquid, practically odorless, absorbs quickly into the soil and contains most of the nitrogen, phosphorus and potassium in raw manure.

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REASONS FOR LAND RE-PARCELLING AND LAND CONSOLIDATION MECHANISM FOR PRIVATE FARMING IN THE REPUBLIC OF MOLDOVA

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Abstract

The paper examines the case for market-driven land consolidation using data from several recent surveys in the Republic of Moldova. We show that, in the individual sector, larger farms consume less of their output and attain higher levels of commercialization. Larger individual farms thus have higher revenues from commercial sales and generate higher family incomes. Farm augmentation accordingly makes a positive contribution to the well-being of the rural population. The extent of parcel consolidation is directly correlated with the relative efficiency of farms: consolidated family farms are more efficient than those with fragmented holdings. Hence, land consolidation leads to better economic performance of family farms.

Keywords **:** *land consolidation, land market, fragmentation, family farms, Republic of Moldova.*

INTRODUCTION

The distribution of land to the rural population led to dramatic changes in the structure of land use by farms of various organizational forms. Particularly notable is the shrinking share of former state and collective farms and a corresponding increase in land used by the individual sector. The traditional collective farms practically disappeared during the last decade, as many of them were privatized or liquidated and others registered in new legal forms.

The creation of so-called "peasant farms" was one of the main objectives of land reform, and this objective has been fully achieved. However, the small size of the peasant farms, whose holdings are furthermore split into several disjointed parcels, raises considerable concerns about their long-term viability and has led to an intense public debate regarding the impacts of fragmentation.

In this paper we examine how the two dimensions of fragmentation – small farm sizes and large number of parcels per farm – affect farm productivity and family incomes. We also review the development of land markets in Moldova, as buy-and-sell transactions and land leasing provide obvious mechanisms for market-driven consolidation of fragmented holdings.

The paper is organized as follows: we start by presenting the survey evidence regarding the positive impact of consolidation on farm efficiency and rural well-being. We then proceed to describe the development of land market transactions based on survey data. A separate section describes the formal land consolidation effort in Moldova and presents some preliminary results of the 2008 land consolidation pilot project. Some concluding remarks are given at the end.

MATERIAL AND METHODS

The analysis relies on several farm and household surveys conducted between 2003 and 2008. The latest in the series of surveys (referred to as the 2008 ASM survey in what follows) was conducted in July 2008 covering about 600 households and peasant farms from four villages spread across the country and about 80 corporate farms from 30 districts. Financing was provided by the Academy of Sciences of Moldova under the State Project "Developing of economic mechanisms of land consolidation".

RESULTS AND DISCUSSIONS

Land reform contributed to significant structural changes in Moldovan agriculture. A recent survey conducted in 2008 (2008 ASM survey) accordingly covered the three main farm types that characterize the agriculture in Moldova today: household plots, peasant farms, and corporate farms. The household plot is usually situated close to the house, but not always. When the plot is situated outside the village, it is practically impossible to distinguish it from the land of a peasant farm. The privatized land outside the village is considered a peasant farm (regardless of whether it is officially registered or not). Many people have chosen to lease out their land allotments outside the village to corporate farms or peasant farms, and to continue cultivating only their household plot. These specific aspects have been taken into consideration in our sample design.

Table 1. Size distribution characteristics for farms of different types, in ha*

	Households (n=135)	Peasant farms (n=477)	Corporate farms (n=76)
Min-max range	0,10-0,75	0,76-18,40	3,2-4224
Mean size	0,37	2,61	851
Median size	0,30	2,16	529
Interquartile range	0,30-0,51	1,58-3,02	240-1071
Lower 10%	0,10	1,23	100
Upper 10%	0,68	3,98	2400
Number of parcels	3	6	

* Farm size expressed by land in actual use.

Source: 2008 ASM Survey.

The three farm types surveyed span a wide range of farm sizes (Table 1), and we use our survey data to examine how farm sizes affect farm efficiency.[1] Households and peasant farms combined constitute the so-called individual sector, as opposed to corporate farms. There are distinctive differences between the individual and the corporate sectors, while the two components of the individual sector – household plots and peasant farms – are much closer to one another by size. Still, there is no overlap between the interquartile ranges of these types of farms, which means that all three types of farms are significantly different by size. Thus, corporate farms are much larger than peasant farms, while the latter are larger than household plots. Also, peasant farms being larger are more fragmented: 6 parcels compared to only 3 on average for households.

Evidence of higher efficiency and productivity of larger, consolidated holdings would be a strong argument in favour of mass re-parcelling of fragmented family farms in Moldova. Previous studies [3; 6] have revealed an interconnection between efficiency and farm size, demonstrating that small family farms are more efficient than large corporate farms. The 2008 ASM survey investigated mainly the effect that fragmentation of holdings into multiple parcels has on farm performance.

The advisability of reducing the number of parcels in a farm of a given size through land consolidation emerges from the negative correlation between the number of parcels and technical efficiency across farms as calculated by the stochastic frontier algorithms (SFA). Our survey reveals a clear negative relationship between productivity and the number of parcels held by the operator. Our calculations show that the productivity (technical efficiency) decrease as fragmentation (i.e., the number of parcels in a farm) increases. The negative relationship between productivity and fragmentation is statistically significant by all standard measures. This new result reinforces earlier findings, which showed that two partial productivity measures – farm income per hectare and farm income per worker – decreased with fragmentation as measured by the number of parcels per farm [3].

Table 2: Linear regression analysis of farm revenue versus farm size and number of parcels*

Independent variables	Estimated coefficients	t value
Land used, ha	**1.977**	10.81
Costs, lei	0.432	6.39
Number of parcels	**-0.654**	-6.93
Employees, workers	1.376	5.20
Age of head of family	0.121	3.52
Intercept	-5.405	-2.72
R-square	0.788	
Number of observations	193	

* Dependent variable: farm revenues from sales
Source: 2008 ASM Survey.

One of the major arguments in favour of land consolidation is based on the hypothesis that

[1] Following Lund (1983), we use the land holdings as a measure of farm size.

farmers with consolidated holdings have higher incomes and their family well-being is considerably higher than for farms with fragmented holdings.

Linear regression analysis shows that farm revenue from product sales increases with farm size (land used) and decreases with the number of parcels operated by the farmer (Table 2). The important result here is that number of parcels has a negative effect on farm income when we control for other variables (the negative regression coefficient is significant at $p < 0.05$). Hence, consolidation, in the sense of reducing the number of parcels, makes economic sense for peasant farms and households in Moldova. Other statistically significant factors affecting farm income are farm costs and the number of workers employed: larger revenues are generated by larger farms, which, in addition to more land, involve higher total costs and more workers.[2]

Consolidation affects not only farm productivity, but also the standard of living of rural families. One of the major arguments for re-parceling is the hypothesis that land consolidation increases farm income by raising the degree of commercialization, i.e., the share of output sold.

Family farms in Moldova are generally viewed as subsistence operations. Indeed, fully 80% of farms in the survey are smaller than 3 ha, reporting sales of less than 10% of their output. The share of output sold clearly increases with farm size. Thus, the commercialization rate of farms smaller than 1 ha is almost zero and these very small farms can be regarded as pure subsistence operations. On the other hand, farms larger than 5 ha can be regarded as practicing commercial farming: they sell more than 30 percent of their output. This is consistent with the results observed in other transition countries [5]. The level of commercialization increases with farm size: while small farms use all they produce for family consumption, the output of larger farms exceeds the family needs, creating a marketable surplus.

Moreover, our survey revealed that the second dimension of land fragmentation, namely the number of parcels held by an operator, also affects the level of commercialization. As the number of parcels per ha, i.e. the level of fragmentation increases, the commercialization rate decreases. Family farmers operating one consolidated plot sell about 30 percent of their output, whereas those with highly fragmented holdings sell less than 5 percent of the output. Thus, farmers with consolidated holdings have a higher marketable surplus, which is conducive to creating a higher farm income and thus increasing their families' standard of living. Also, consolidated farms are much larger than fragmented farms. Consolidated farms have 3,6 ha on average, compared to 1 ha and less for highly fragmented farms (6 parcels and more). These results suggests that relatively large consolidated holdings stimulate commercial farming, while small fragmented plots lead to subsistence operation, with farm output used entirely for family consumption.

Larger farm sizes generally lead to a higher standard of living of rural families. A comfortable standard of living is associated with a much larger farm size than lower standards of living. Peasant farmers reporting a comfortable standard of living in the 2005 World Bank survey [3] have 11 hectares on average, compared with less than 5 hectares for farmers whose families are in lower standard of living categories – poverty, when family income is not sufficient to buy food, and subsistence, when family income is sufficient to buy food and daily necessities (the difference between farm sizes is statistically significant at $p < 0.01$). The standard of living of peasant farmers is thus an increasing function of farm size, as is commonly observed in farm surveys in other transition countries.

The results from the afore-mentioned survey show that the probability of being in the highest standard of living increases with farm size, while the probability of being on the lowest "poverty" level, when family income is not sufficient to buy food, sharply decreases

[2] A similar study in Ukraine [5] noted a decrease of income with the age of the family head. In Moldova, on the other hand, the age of the head of family had a positive effect on farm revenues.

with farm size.[3] These results provide the ultimate support for land consolidation policies and hence the need to encourage land market development.

In Moldova land reform based on equity principles transformed all rural residents into small landowners as almost one million hectares of agricultural land was distributed to over 600,000 people. Among this multitude of smallholders, many remain inactive for various reasons (age, health, non-farming jobs, etc.). Mass distribution of small plots to individuals requires development of land market mechanisms to enable land to flow from less efficient to more efficient users, allowing farmers to adjust the size of their holdings. Land market is the only effective way to satisfy the new demand for land on the part of those who want to enlarge their farms.

One of the main objectives of land market development is the creation of viable family farms by transferring land from less efficient landowners to the most efficient farm operators or managers. The main mechanisms of land use transfer based on market principles are buying and selling of land and land leasing.

In July 1997 new procedures for sale and purchase of land[4] removed the basic restrictions to the development of functioning land markets and 1997 can be regarded as the year of birth of the land market in the Republic of Moldova.

Both the number of transactions and the transacted area grew rapidly. About 40 000 ha of agricultural land changed ownership in 400 000 transactions between 1999 and 2008. Despite the impressive growth, this constitutes only 2 percent of the agricultural land in Moldova (2 million ha).

Buy-and-sell transactions are also becoming more acceptable among individual farmers. In 2008, about 10% of peasant farmers reported that they had bought land, while 15% reported selling land. These are respectable market participation rates, although they are far below the participation rates for corporate farms. Our investigations show that the average size of a corporate farm that bought land is about 10% larger than the average size of a corporate farm that did not buy land. Similar trends are observed for peasant farms and household plots, which were 10%-20% larger than family farms that did not buy land. This might indicate that the development of land markets through buy-and-sell transactions has a positive effect on farm sizes and contributes to farm enlargement and hence to land consolidation.

Despite these generally positive developments, the role of buy-and-sell transactions in land consolidation so far seems to be marginal compared to the role of the widespread leasing arrangements.

The results of several recent surveys in Moldova [2; 9] indicate that about half the small landowners created in the process of land reform do not farm their land and lease it to other operators. In this context, it is necessary to note that Land lease relations are governed by the Law on Agricultural Land Leasing passed in 2003. It tries to strike a balance between the interests of the operator and the socio-economic guarantees required by the landowner. The law clearly describes the formal part of the lease process and includes a detailed description of the lease agreement. In general, the spirit of the new law is restrictive. In particular, term limits are stipulated. The lease payment is set at not less than 2% of the administratively prescribed normative price of land, without linkage to the actual market price, which is generally much lower.

Table 3. Participation in land leasing

		Households	Peasant farms	Corporate farms
Leasing out	% of respondents	92	16	4
	Farm size, ha	2,1	3,2	1117
	% own land	100	99,3	100
Leasing in	% of respondents	0	5	71
	Farm size, ha	0,0	4,7	826
	% own land	100	69,7	28,2
Use own land only	% of respondents	8	78	17
	Farm size, ha	2,5	2,7	1159
	% own land	100	100	100

Source: 2008 ASM Survey.

[3] The probabilities of achieving a given standard of living were obtained in a multinomial logistic regression with the three-level standard of living as the discrete dependent variable and farm size as the continuous covariate.

4 Law on Normative Price of Land and Procedure for Sale and Purchase of Land: Law No. 1308 – XIII from 25.07.1997.

However, such limitations are not effective, because the lease payments are typically negotiated as a share of the harvest and their equivalent value is higher than the stipulated minimum percentage.

The lessees are mainly corporate farms, which largely rely on leased land: 72% of land used by corporate farms is leased (Table 3). Peasant farmers also act as lessees, but to a much smaller extent than corporate farms: they generally cultivate owned land with some leased land mobilized to increase their original endowment. As we see in Table 3, peasant farms leasing in land are substantially larger than farms that rely on own land only.

Household plots, contrary to corporate and peasant farms, do not lease in land. Table 3 demonstrates a sharp dichotomy between household plots as supply side players and commercial producers (peasant farms and corporate farms) as agents of the demand side in land markets. Households actually use less than 20% of their holdings (0.4 ha out of 2.5 ha in total). The rest is leased out. Analysis of leasing participation rates in Table 3 shows that 92% of households lease out land and none leases in land. At the other extreme, 71% of corporate farms lease in land and virtually none leases out. Peasant farms occupy an intermediate position: they act as both lessees and lessors, yet their supply side role clearly predominates: only 5% of peasant farms lease in land while 16% lease out.

Additional evidence that leasing in is used as a mechanism for augmentation of farm size is provided by household plots. The few families that lease in land operate larger household plots than families farming exclusively their own land and those only leasing out land.

Table 4. Grouping of household plots by land leasing strategies

	Farm all owned land	Lease out	Lease in
Number of respondents	391	202	24
Percent of respondents	63	33	4
Own land, ha	2,6	2,7	3,2
Used land, ha	2,5	1,1	4,1
Wish to enlarge, ha	3,3	3,3	6,6
Number of family members	3	2	4
Age of head of family	53	57	49
Age of spouse	50	51	41

Source: 2008 ASM Survey.

Moreover, families that lease in land are larger than families using only their own land and those leasing out a portion of their land: 4 members compared to 3 and 2 respectively. Thus, families with insufficient labor prefer to lease out their land, while families with more members available for farm work prefer to extend their own area by leasing in land from others. Moreover, families leasing in land are younger than families in the other two groups, which again positively affects labor availability.

What reasons do the individual farms, mainly households, give for leasing out land? In the 2005 World Bank survey, 40% of lessors put the blame on insufficient labor, while difficulties with access to purchased inputs and credit (or money in general) ranked next. In aggregate, reasons associated with the normal functioning of markets are cited by 78% of the households in the 2005 survey as responsible for their decision to lease out land. It may be argued that these individuals would tend to farm the land on their own if the missing or distorted markets were corrected. This conjecture is supported by the observation that respondents who attribute leasing to market imperfections express a desire to increase their plot size by a substantially greater factor than respondents who lease out because of physical deficiencies of their land [3].

Health and age are important factors in the decision to lease out for pensioners and elderly people. In one survey conducted in 2003 [2], 80% of the pensioners and 70% of landowners older than 60 cited health and age as main reasons for leasing out their land. In another 2003 survey [8], the highest percentage of landowners who intended to lease out their land (36%) were 60 or older.

Table 5 summarizes the answers of the heads of individual farms in the 2008 ASM survey regarding the reasons for leaving some parcels of their land uncultivated. We have included in this sample farmers and household plot operators who lease out land, as well as those who cultivate only a part of their holdings, without leasing out the rest.

Lack of fuel, fertilizers, and other purchased inputs, as well as poor land quality are not

reported as serious obstacles by the respondents. Lack of working capital and low profitability are considered as very serious constraints among those who do not cultivate all their land. The most important single reason is insufficient labor, cited by about 30% of the respondents. This is consistent with the observation that smaller families lease out land, while larger families lease in (Table 4).

Table 5. Reasons for not cultivating the entire available land in individual farms

	percent of respondents
Insufficient labor	**28,7**
Lack of machinery	12,1
Lack of fuel	4,2
Inputs not available	5,2
No money	**24,2**
Land of poor quality	3,1
Not profitable	**20,4**
Other reasons	2,1
Total	**100**

Source: 2008 ASM Survey.

Although lack of machinery is cited by 12% of respondents, it is not as vital as, for example, in Ukraine, where this constraint is reported by 26% [4]. This difference in the perception of machinery constraints is presumably attributable to the small size of peasant farms in Moldova (2,7 ha compared with 146 ha in Ukraine), which can be worked manually by the family members. Larger farms in Moldova have the option of renting machinery from machinery stations or from collective farms.

Lease payments in Moldova exist in three forms: cash, in-kind, and mixed payments. Payment in-kind is the most prevalent form, used by over 80% of the respondents [2].

The lease payments for different farm types are shown as follows:

Table 6. Lease payment for farms of different types

	Households (lease out)	Peasant farms (lease in)	Corporate farms (lease in)
% leasing	44	9	66
Average leased, ha	1,83	2,92	669
Payment, lei/ha			
mean in kind	943	745	1040
mean in cash	1449	1431	783
mean total	1137	1276	1105
Median	1000	839	803

Source: 2008 ASM Survey.

The median varies between 800 and 1000 MDL per hectare, while the mean is 1100-1300 MDL per hectare per year, being more sensitive to outliers than the median. Corporate farms do not exercise their power in local land markets and do not push the lease payments to a much lower level. According to the 2008 ASM survey, the payments by corporate farms do not differ substantially from those reported in the individual sector.

Another attribute of lease agreements is the lease term. Long-term lease relations build the trust between the owner and the lessee, motivating the latter to invest in more effective utilization of the land. Our results indicate that long-term leasing is not widespread in Moldova. Corporate farms are the only category of farms that sign long term lease agreements: about 5% of the farm managers concluded agreements for 10-30 years. As a rule, these long-term lessees also develop a processing activity. For example, wineries prefer to conclude lease agreements for a term of 30 years in order to plant new vineyards, which require significant investment. Therefore, they need stability in the system of lease relations.

Short term lease agreements for a term of 1-3 years prevail in peasant and corporate farms: about 80%-90% of respondents. Household plots prefer to lease out their land for a medium term: 80% of respondents lease out their land for a term of 6-10 years.

CONCLUSIONS

1. Land consolidation through land market development has a positive effect on farm efficiency. A clear negative relationship was observed between productivity and the number of parcels held by the farmer. An additional argument in favour of land consolidation is that farm revenue from product sales increases with farm size and decreases with the number of parcels operated.

2. Consolidation affects not only farm productivity, but also the standard of living of rural families, by raising the degree of commercialization and thus contributing to higher family income. Larger individual farms attain a higher level of commercial sales, because they consume a substantially smaller proportion of their output than the very small farms. Also, as the number of parcels per ha increases, the commercialization rate decreases.

3. Farms leasing in land, as well as those that bought land are larger than farms that rely on their own land only. The prevalence of short-

term lease agreements is an obstacle to land consolidation as it discourages investment by lessees in land improvement and infrastructure.

4. The common approach to land consolidation in Moldova is individual or market-driven consolidation, which relies on land market transactions – mainly leasing at the present stage.

5. Consolidation of small fragmented parcels into contiguous holdings is preferred by both farmers and landowners. However, land consolidation should be carried out on a voluntary basis in accordance with market principles.

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THE ADAPTABILITY OF THE ECONOMY OF THE REPUBLIC OF MOLDOVA TO THE REGIONALISATION PROCESS VIEWED THROUGH AGRO FOOD COMMERCE

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Abstract

In this scientific article I will analyse the regionalization process of the Republic of Moldova adapted through the ecological agro-food commerce, which in their turn represent the good safety and it is the consumer's major demand of European Union.European markets ask strictly that the agro-food products being not only qualitative, but also inoffensive for their health. The fact is proved by the existence of 80000 of fresh fruit and vegetable producer from 80 countries, GLOBALGAP certificated, which realize export operations in the European Union Countries, the certification according the HACCP and ISO, standards are also recognized systems in the food stuff industry as efficient approaches in getting qualitative products, in assuring the appropriate hygiene and some production technique witch will bat, in the end, to an appropriate safety of food products. In the republic of Moldova over 100 enterprises had been certified according to the ISO international standards demands, the certification becoming a special demand for the realization of export operations and for the development of the relations with prestigious partners.

Keywords: *commerce, agriculture, standard, agro-food products.*

INTRODUCTION

The agriculture of Republic of Moldova traverses a hard stage of reforms, of reorientation to the public property towards the market relation, sassed on the private property. The reformation of the national agriculture is accompanished of the integrationist processes of the globalization of international trade change. [1]
The economical development level of the country is dependent in a measure of more and bigger than the capacity of this one to absorb rapidly and effectively that is new and performant in the achievements of other countries, of the competence in putting in value the globalization effects and the result of the integration in the world economy.
In order to promote the adjustment of the national agriculture to the regionalization processes, to the requirements of the international trade organism, to the Common Agrarian Politics and European union, to the norms of the Common Market is necessary a thorough study. Especially this study is the objective of this article.

MATERIAL AND METHODS

The aspiration of the corresponding research of Moldova Republic economy in the regionalization process and in the trade with agricultural food products it is utilized a series of methods and proceedings as a method of analyzing, comparison, analogy and synthesis that allowed the essential investigation of the theme and the wording of some conclusions that e consider will present interest for the economical science. The analysed period in this study is 2002-2009. the investigations were effectuated on the basis of the BNS data as well as of the Agriculture Ministry and Food Industry of Moldova Republic, were elaborated and statistically interpreted, the histograms construction and conclusions of these ones.

RESULTS AND DISCUSSIONS

From the oldest times the agriculture constitutes a vital domain of the non activity. [2] In our days, it continues to be practically the single feeding source and at the same time

a significant market of sale of products of this one. Certainly, the relative importance of the agriculture differs of one country to another, of a group of countries to other, but in maintains itself as a principal branch in the states including in the very developed ones. The experience of the last decades demonstrated very clearly that the global economical problems of the development generally can no be solved doing abstraction of agriculture in particular.

The modernization of the national economies does not affect the political, social and economical importance of the agriculture though we have assisted to the reduction of its weigh in the total population occupied in the national production too.

Our accent on this work is localized both on the trade with agricultural foods products in the EU countries and of the role of this one in the adaptability of the national economy in the region process. Indifferently if we accept or refuse the process of region it is sufficient obvious the fact that this phenomenon exists, "the regionalization is a reality" of our days. Moldova Republic should to adapt and interfere with the regionalising processes and I consider that this process is "inevitable" and "irreversible". [1]

It is nearly sure that the waves of the trade with agricultural products favoured the expansion of the industrialization too they had direct/indirect positive influences on the flowering increate of the national economy. [3]

The trade with agricultural food products between Moldova Republic and the states E.U. in the last decade constantly a increased. The exposition of the Republic of Moldova in the period of 2002-2009 years raised by about 3 times, recording 218103,7 thousand USD in 2009 (in 2002 - 71645,7 thousand of USD). At the exposition prevailed the commercial transactions with vegetal products, fats and animal oils or vegetal ones, food products and raw or processed skins.

The exportations, of vegetal products except being 2004 year recorded constant increases but not stable. In 2004 year, is remarked a diminution of the exportation with approximate by 1/3, because of the severe drought effects registered in this year on the productivity and productions of the principal agricultural cultures. From the vegetal product a bigger weight at the export, dealing: fruits, and seeds and oleaginous fruits, industrial and medical plants, straw and forages.

The fruits exportations recorded increases in value expression on the all period of 2002-2008 years. But the weight of these ones in the total of exportations of the Republic of Moldova decreased from 9.1 percent in 2002 to 6.9 percent in 2008 and 4.4 percent in 2009. It is necessary to mention that in 2009 the fruits exportations were reduced with 11 millions USD in comparison with 2008.And so, despite of the fact that at a series of vegetal products the element *ad valorem* of the tax of importation in European Union is free of charge on the basis of ATP (The Autonomous Commercial Preferences). (fig.1)

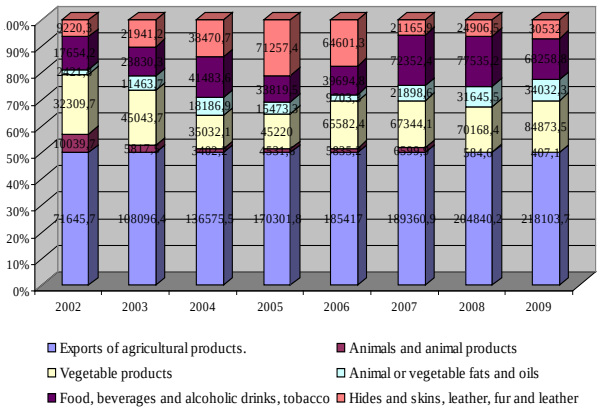

Fig.1. The exportations histogram in the EU countries on the groups of waves according to the Harmonized System, thousand USD.

The exportation of the wares from the waves group "seeds and oleaginous fruits; industrial and medical plants, straw and forages, registered an essential increase the latest year. The exportation with such products in 2009 increased with 73 percent in comparison with 2008, and 3 times comparatively with 2002 year. The weight of the wares exportation from this group in the total of the Moldovan exportations varied from 1.4 percent in 2004 ton 4.1 percent in 2003 and respectively 5.8 percent in 2002 year.

The cereals exportations in EU have a weight in the exportations structure of Moldova Republic that varies from 0.3 percent in 2008 to 7.8 percent in 2003.

These ones are not stable and are strongly influenced by the variation of the productivities and total productions of the cereals cultures, and also of region offer.

The exportations in the states of EU of the goods from the groups living plants flower products, vegetables plants roots and nutritive tubercle, coffee, tea species and mates, mill products, malt, starch, lakes rubber, resin and other saps and vegetal extract and material for knitting and other products of vegetal origin have a weight under 0.5 percent in the exportations total.

The *exportations* of living animals and animal products were greatly recorded during 2002-2003 years. If in 2002 the weight of these ones in the total of Moldovan exportations constituted 5.5 percent, then in 2008-2009 they balanced around the o figure. In this period there were drastically reduced the exportations of the goods from the group of products "milk and dairy products", eggs, natural honey, from 9798.3 thousand USD or 5.4 percent in 2002 up to 123.5 thousand USD in 2009.

The wares exportations from the groups "living animals", "meat and comestible entrails", "fish and crustaceous molluscs and other aquatic invertebrates" and other product of animal origin", in this period of time they stagnated. The exportations stagnation of animal product is due to in great measure of the absence of a consistent offer for exportation from the part of the animal sector. The decapitalization of the sector and the diminution of the livestock of animals during the last decade influenced negatively the productivity and productions oh this branch. In this time, the zoo technical sector was submitted to some damaged changes in the process of the agriculture reformation.

The slow rhythm of development of this sector is influenced by a lot of factors among which we just we wile mention the following:

1.Over 90 percent from the animal livestock is concentrated in the farms of physical persons and peasant farms (of farmers);

2.The cultures for forage have an insignificant weight in the structure of agricultural foundations;

3.The state adopts in the zootechnical sector policies of pour and incoherent sustaining.

The peasant farms from the zootechnics became monopolistically, that involve certain risks on a short and middle term. The hoar exportations of the agricultural products from the zootechnics recorded the latest years is one of the consequences of these structural changes.

The exportations of vegetal products in the State of EU in contrary increased, hanks to the fact that it exists a constant demand to a series of Moldovan products, nuts, sunflower seeds and tobacco, rapes etc. On the other hand, are noted the timid repercussions of the commercial regime of the Autonomous Commercial Preferences for Moldova.

Similarly as in the case of the exportations of the food agricultural food products in the states of EU, the importations from the European Union constantly increased but with a more rapid rhythms. (fig.2) in the structure of importations of the food products dominates alcohol beverages and vegetal products. Thus, the importations of products from the sector "food products; alcoholic and in alcoholic beverages; tobacco" increased of 78865.9 thousand USD in 2008.

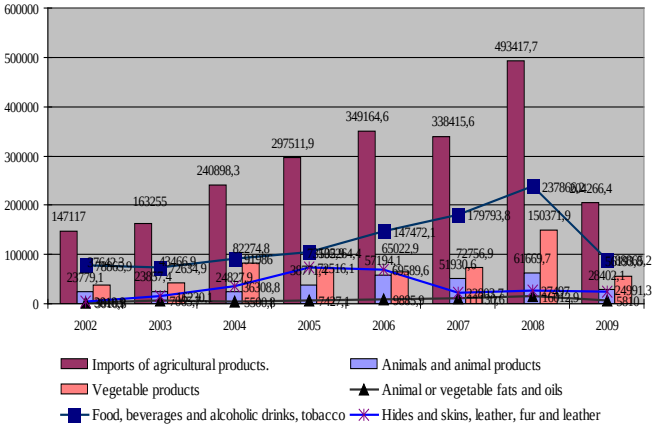

Fig.2. The importations histogram in the countries EU by groups of wares according the Harmonized system, thousand USD.

The import of products of the sector "living animals and animal products" had nearly similar evolutions, framed in an upward trend, starting with an import value of 23779.1 thousand USD registered in 2002 and continuing with 61669.7 thousand USD in 2008 year.

The import of products from the sector "vegetal products" increased from 37642.3 thousand USD in 2002 up to 150371.9 thousand in 2008, but those of "fats and animal and vegetal oils" from 3010,8 thousand USD in 2002 up to 16012.9 thousand USD in 2008. The importations of goods from the products sector raw leather, tanned leather, furs and products from these ones had a diverse evolution. These ones increased from 3818.9 thousand USD in 2002 up to 72516.1 thousand USD in 2005, that then to fall in dark, up to 27497 thousand USD in 2008. In 2009 the importations of agricultural food products from the majority of the goods groups crumbled recording a reduction of about 2.5 times.

CONCLUSIONS

The export potential of the Moldavian agriculture is insufficiently explored. At present it exists a great disparity between the system of agricultural production of Moldova Republic and European countries that occupy key positions in the production of agricultural products and in the agro-food trade. The middle productivities in agriculture are 2-3 times smaller than the registered averages in the west – European countries.

The recent general tendencies of the evolution of the middle productivities and total productions in the animal and vegetal sectors are influenced by the insufficient utilization of the productions natural resources, human and material resources. The agrarian sector from Moldova Republic for two decades has known a strong recapitalization. The consumption of chemical and natural fertilizers for agriculture in the Republic of Moldova corresponds to the similar indexes recorded in the developed countries in 50^{th} years.

The agricultural food products which demonstrated their export potential during the years are those having an added increased value, such as: the wines strong alcohol beverage, the fruits, vegetables, nuts and also the productions of cereals and technical crops, as would be the seeds of sunflower und oil prepared from them, rape seeds and not in the last turn and the ecological agricultural food products the development of witch is stile at the beginning of way. The exportations of the Republic of Moldova towards the markets from European Union and other industrial countries are limited not only concerning the conformation with the quality requirements and food security but also because of the absence of the competitiveness of these ones of these ones. At present the productivities in the local agriculture are much more under European average, and in comparison with some states member of EU they are more reduced by 2-3 times.

For increasing of the export potential of the agro-food sector it is proposed:

1.The correlation between the developing politics of the food agricultural sector and the sartorial policies (land, market, fiscal, trade, credit and of investments);

2.The diminution of the excise tax to the food agricultural products including VAT for stimulating the consumption, products offer and the increase of the competitivity of the local products;

3.The reformation of the subvention system according with the foresights of the system. Conception of the subsidization of the agricultural producers for 2008-2015 years.

4.The moderation of the agrarian sector by technical equipment of the agricultural entities, irrigation extension, the maximisation of agricultural foundations structures and the extension of the spectrum of agricultural crops cultivated in our country, the creation of the supply unities with modern and qualitative inputs for agriculture the liberalisation of the importations of agricultural input in order to increase of the products and average productivities.

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ECOLOGICAL AGRO-FOOD PRODUCTS OF THE REPUBLIC OF MOLDOVA – KEY TO INTERNATIONAL MARKETS AND STABILE COMMERCE

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Abstract

Traditionally for the Republic of Moldova, the agriculture sector continues to be primary basic sector of the economy, where the active population is proximately 40%. There were made some key objectives during the period of prevision reforms that, in spite of these objectives, showed that the balance of the exterior commerce of the Republic of Moldova registered, during the last decade, a clear diminishing tendency, fact that demonstrates an unpleasant evolution of the economy as a whole. The export of the organic food products of the Republic of Moldova is preponderantly oriented to traditional sale markets of the Community of Independent States (CIS), and, less, on the Unique Intern Markets, because, at present, the fact exposed to a great risk is the export in these countries. Diminishing the export to the agro-food countries is influenced by a great number of factors, including also the reduced competitiveness of local agricultural products on the local and extern sale markets, due to the safety and quality inappropriate to the growing demands required by these markets.

Keyword: *Unique Intern Market, Products competitiveness, export-import, quality.*

INTRODUCTION

According to Food and Agriculture Organization of the United Nations (FAO) and World Health Organization's (WHO) report, ecological substantiation of agriculture, natural resources and environmental balance are recognized as prior sectors for solving the problem of global sustainable development. Also, it is mentioned that food security and population health are directly proportional to food quality and natural resources which they depend on (soil, water, air, light, genetic resources, etc.).

MATERIAL AND METHODS

For the purpose of an adequate analysis of commerce with organic food products of Republic of Moldova, it is used a series of methods and proceedings as: analysis, comparison, analogy and synthesis, which allowed researching the topic essence and drawing some conclusions which I consider will present an interest for the sustainable development of the country. In this study, the analyzed period is 2005-2009. The researches were done based on the Office of National Statistics data, as well as on the Ministry of Agriculture and Food Industry of the Republic of Moldova data; the data were also processed and statistical interpreted, the drawing of circular diagrams and of histograms, as well as drawing their conclusions.

RESULTS AND DISCUSSIONS

Agriculture is the main economical sector of Republic of Moldova, and it always has played a very important role in the state economy. In this context, agriculture must bring valuable contribution in the state economical development.

Organic food production is a sustainable development modality in agriculture, which allows the efficient solving of a series of social, ecological, economical and political problems. [1].

Ecological agriculture is in full development on the global scale. It is practiced on the all five continents, on an agricultural area of about 26,5 millions of hectares. At the same time from the whole agricultural products *the Ecological Products Market is 2,5 – 3 %.* [3]

International Market of ecological products is always on the increase. This element has contributed to the ecological agriculture development in the Republic of Moldova and to accelerate the export of agro food products.

For our country, organic food production and its trade is a real chance to penetrate the foreign markets, which are supersaturated with products from conventional agriculture and endure lack of ecological products. Encouraged by the legislation elaborated by the Government of the Republic of Moldova, the Moldavian farmer interest has increased, as well as of the economical agents concerning the organic food production.

Organic food production areas of the Republic of Moldova, ecologic certified, form about 11 thousand hectares, which volume is estimated at 30590 tones. [3]

Organic food production is at the global scale. It is practiced in about 154 countries from all the continents, on about 31 584 720 ha, out of which 42,9% in Oceania (Australia), 23,8% in Europe, 23,5 % in Latin America, 5,5% in North America, 2,8% in Asia and 1,6% in Africa.

In Europe, at present, there are cultivated about 7,6 millions ha with ecological crops, in about 178 940 farms, of which Austria 12 %, 9 %, Finland 7,22 %, Italy 6,86 %, Sweden 6,8 %, Greece 6,24 %, Denmark 6,2 %, Czech Republic 5,97%, Estonia 4,59 %, Slovenia 4,6 %, Great Britain 4,42 %, Germany 4,3 %. The world market of organic food products is about 3.1 – 4,3%.

Table 1. World Market of organic food products

Country	Sales in 2009 (thousands Euros)	Share of total Sales (%)
Germany	3100 – 3400	2,0 – 2,2
Great Britain	1750 – 2250	1,8 – 2,0
Italy	1450 – 1600	1,0 – 1,15
France	1340 – 1630	1,0 – 1,5
Switzerland	765 – 795	3,2 – 3,7
Netherlands	485 – 495	1,0 – 1,5
Sweden	450 – 470	1,5 – 2,0
Denmark	365 – 395	2,2 – 2,7
Austria	365 – 385	2,1 – 2,5
Belgium	230 – 260	1,0 – 1,5
Ireland	45 – 56	<0.5
Other European countries*	850 – 950	-

* Finland, Greece, Portugal, Spain, Poland, Norway, Hungary, Czech Republic, Estonia, Latvia, Lithuania, Romania, Bulgaria.

For the Republic of Moldova, organic food production and its commercialization represent a real chance to penetrate foreign markets which are supersaturated with products from conventional agriculture and endure lack of ecological products. The value-added to the ecological products production and commercialization, together with reduced expenses for their obtaining, allow the income increase amassed by rural communities for solving socio-economical problems in rural zones.

In such a way, the supporting of ecological agriculture promotion and development is a new fundamental element – a rural development policy, meant to encourage numerous rural initiatives, helping, in the same time, the farmers to reorganize their farms, to diversify the product range, as well as to penetrate in different markets. In the last years it increased the inner economical agent's interest concerning organic food production, confirmed by the areas and volume rise of this production. (Fig.1)

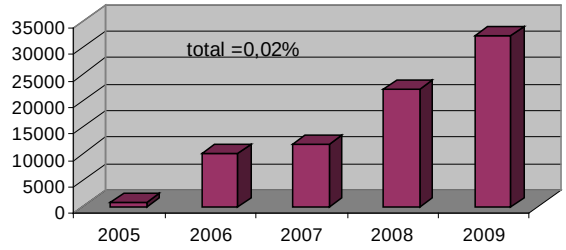

Fig.1. Dynamics of growth of cultivated areas after organic food production mode 2005– 2009

Soil and climate conditions of the Republic of Moldova are favorable for growing a large varieties of agricultural cultures with an ecological and biological value-added EBVA (vegetable, trees and wine growing, hetero-oil plants etc.) (Fig.2)

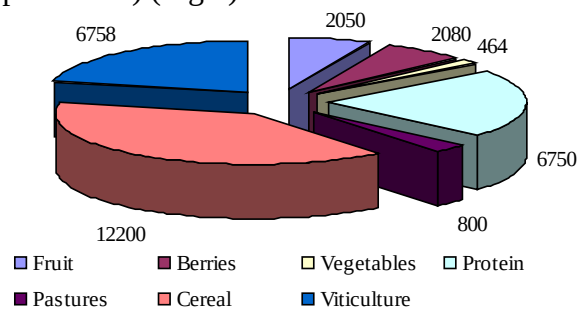

Fig.2. The structure of cultivated crops according to the organic food production mode, ha

Though, the efficient usage of priorities, fertile and productive soil, moderate usage of plant protection products of chemical synthesis and of related technologies, allow the traditional Moldavian agriculture to create conditions of development organic food production. In the same time, organic food production is a sustained form of production of food products without those of chemical synthesis usage (insecticides, fungicides, herbicides and mineral fertilizer), which are based on the maintenance of a fertile soil through its fertilization with organic fertilizers, crop rotation and balanced alternation of crops, as well as disease and pest control through biological methods.

The animal ecological production is based on animal health and the methods of farm management, which will prevent the necessity of a veterinary doctor.

Strategically, the qualitative purpose of the sector is the positioning of the ecological agriculture in the centre of the national agriculture, as a pivot for the sustainable development in the rural environment. The main purpose of EU agricultural policy concerning the rural development is the promotion and development of a compatible relation between agriculture and environment. [2]

Ecological agriculture has a main contribution to the sustained economical development and has an important role in the improvement of environmental conditions, soil preserving, water quality improvement, bio diversification and nature protection. Thus, promoting and developing the ecological agriculture could be a starting point in the rural economy and to make it viable through the extension economical activities with high value added and through generation of jobs in rural zones.

Quantitative purpose is to extend the cultivated zone through ecological methods and creating an inner market with ecological products. The republic of Moldova has great opportunities of ecological agriculture promotion and development due to an agricultural area of about 1.8 million hectares and of unpolluted soils.

At the same time, the qualitative purpose foresees the organic food production placement in the centre of Moldavian agriculture as a factor of its sustainable development. So, the main parameters which can be mentioned are the producers' growing number, as well as organic food production volume predestined for local market development and the penetration of markets at the exportation of these products.

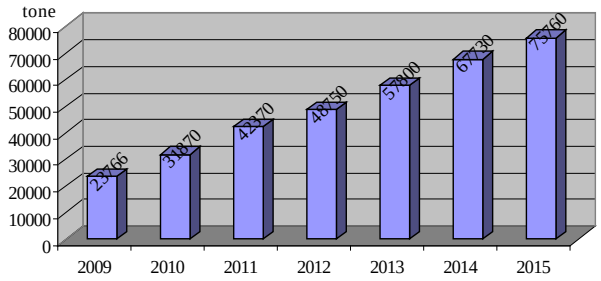

Fig.3. The forecast of growth of export volume of organic foods

For promoting the trade with foods it is necessary to apply the systems of organic food production and of alternative systems to conventional agriculture which differ through the reduction of industrial pressures on the ecosystem. It is necessary to mention from the beginning that in the globe poor areas which face serious problems of food safety, practically, we cannot talk about an alternative agriculture when even the traditional one does not function at the appropriate level.

For the Republic of Moldova the necessity of lifting the living standards through satisfaction with cheap foods oblige the intensification of traditional agriculture; and the European integration context impose the conversion to an alternative agriculture, by complying with the Community legislation.

In these conditions going on with the development of intensive agriculture by using all the possibilities in starting organic food production. Regardless of these two directions, the promotion of ecological agriculture implies the organization of a series of measures starting with the producer and ending with the consumer. It already has proved the beneficial influence of producers associations of ecological products which facilitates their production, processing and commercialization through local and international trade networks.

A contribution to this direction can be the traditional food products re-evaluation and

commercialization, for their realization the preparatory measures are easier.

It is necessary to mention the fact that, in the developing conditions of the Republic of Moldova, the ecological product, offered both by "supermarket" network as well as by local agricultural market, can bring important contributions to the increase of these products attractiveness. Also, it is no doubt the fact that for the considerable increasing of commerce with these products it is the certification of ecological food industry, which supplies public food in the republic.

For sustainable development of agro ecological sector and for improving ecological products competitiveness on the local and export markets it should be identify and implement the following measures:

- Recovery and development of ecological and biological value-added (EBVA) component at the national level, by the orientation of production to the consumers' demand, primary products commercialization and those intended for processing;
- Local market development, as well as promoting ecological products for exportation by covering the existing market niche, also identifying a new export market and consolidating the existing markets;
- Creating producers and processors associations for the production and markets extension.

The development system of organic food exportation consists in:

Direct export – the system in which the producer commits to make himself the export.

Indirect export – the system in which the producer designates an exporter to make a commitment concerning the exportation. Economical agents from agro food production may be part of the second system, even if they do not have the necessary logistics or are not enough informed about the existing links between the trade networks.

Ecological products exportations are designed for importing product enterprises or wholesale importers. It is very important to make the correct choice of commercial partner, because the enterprise success is specially based on importer's reputation, as well as on his ability to commercialize the product on that market. The chosen partner must offer, among others, correctness and professional integrity guarantees, because these human qualities are essential for duration and association success formed by exporter and importer.

CONCLUSIONS

For promoting and stability of foods trade on the national and international markets has been stated:

1.Ecological agriculture (organic) has been identified as one of the main branches of high value added sector from the Republic of Moldova with a high potential from the economical and export point of view.

2.Republic of Moldova has a number of favorable conditions for organic agriculture development: the proximity of the biggest consumer of organic products – EU, farming land with a low chemical, lack of harmful chemical industries, processing food industry relatively well developed, a high interest from outside and a developing the legislative framework.

3.For increasing the quality of export offers it is necessary to continue the implementation of quality management systems HACCP, ISO, EUROGAP in order to correspond to the European quality standards and food safety.

4.Maintenance of local offer of agricultural products implies the increasing the assortment of plant and animal production.

5.In order to diminish the existing gap between plant production and average outputs of cereal, technical, fruit and vegetable growing crops acquired from country with those registered in worlds' states, it is necessary to modernize these branches by technical endowment of agricultural entities, irrigation extension, optimization of agricultural establishment structures and the increase of the range of cultivated agricultural crops, creating the supply units with modern and qualitative inputs for agriculture and those of agricultural products collection.

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THE IMPLICATIONS OF THE BANK CREDIT OVER THE SUPPORTING MEASURES GRANTED FOR THE OLT COUNTY'S AGRICULTURE

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Abstract

The agricultural sector of Olt County has dealt with coarsened credit conditions, to which it has been added the existence of high interests and the requirement of difficult to provide guarantees (determined by the reduced value of plots). Furthermore, the serious floods have produced losses not only at the level of the cultivated fields, but also at the level of animal raising, where there have been registered animal losses and destruction of the provender storage houses. In this context the support granted from the state budget has been materialized in Olt County as a series of normative decrees. Simultaneously with the setting up of AIPA these supporting forms have been included in certain stipulations meant to facilitate the access of the subsidies to the rural beneficiary. Thus, the bank units granted credits based on the subsidies for areas that are to be received from AIPA. In this manner the bank product partially permitted the financing of the agricultural producers that benefit of direct subsidies for areas till the date when AIPA will make the full payment of these sums.

Key word: *rural, credit*

INTRODUCTION

For the rural environment's activities the problem of the credit's role presently represents the form and simultaneously the rural environment's development condition. Considered this problem the credit is involved in the rural activities in three main forms: credit for covering the personal contributions to different projects (for example SAPARD, The Farmer, FEADR); credits for the agricultural production where the beneficiaries are registered to in national normative decrees (The production agricultural credit law no. 150/2003); direct credits by the beneficiary's liability for the entire sum (considered one of the direct forms of the loaner-lender relationships).

MATERIAL ŞI METHODS

The support forms granted from the state budget to the Olt County's farmers by AIPA, except for the insurances and the vouchers, at a relatively constant number of applications, the sum granted in 2009 is +104,52% higher than in 2007;The vegetable sector annually registers an increasing number of applications, considering the comparison of 2009 to 2007, to which the accessed sum was amplified correspondingly (with 3,77 and respectively 3,26 times). The animal sector has the biggest weighing regarding the number of applications and the volume of the accessed sums. Thus, out of the total number of applications in 2007, these represented 91, 62%, and in 2009 the percentage was 99, 06%. The volume of the accessed sums, considered the total number per county, is also amplified, the percentage being 91, 62% in 2007 and 96, 62% in 2009. Moreover, one can also notice the existence of the fund grants for the administration of the animal waste. This effectively refers to the sums granted for the operations of disposing of the deceased animals, to which it is registered a number of granted funds and applications. It can also be mentioned that the insurances and the vouchers have been granted only for one year. Especially for the vouchers in 2008, this represented 90, 49% of the applications and

79, 47% of the granted sums when they were granted. The credits' intervention form, the FEGA and ERDF financing programs' systems represented a possibility of accessing the financing for the agricultural exploitation, as well as a system for knowing the receptivity of the potential beneficiary from the rural environment. As both FEGA and FEADR represent financing instruments set up by the European Union in view of implementing the CAP, the sums granted by these have been completed by increasing from the state budget. Thus, the national direct complementary payments – NDCP, are the payments that supplement those received by the unique scheme for area payment – USAP, out of the FEADR and national budgets.

RESULTS AND DISCUSSIONS

The Olt Rural Development and Agriculture Office (RDAO) took into consideration to support the agricultural credits for production by means of public funds. This supporting manner was set up according to the EC Treaty regarding the aids for agriculture, with the Agricultural production credit law along with other specific normative decrees. The beneficiaries for supporting the agricultural credits by means of public funds registered the agricultural producers and the integrators' categories. The financing source was the Agriculture Ministry and the state budget. The involvement of agricultural credits for production has a reimbursement period of time of up to 360 days since their granting. The credits have been designed according to the approvals and the reimbursement had to be integrally made at the time-limit stipulated in the financing contracts for the agricultural production. Knowing these conditions and considering the territorial area of the Olt County, it has been entailed the knowledge of the structure of the applications for payment aids. The undertaken analysis in this purpose pursued the number of applications and their substantiation, more exactly the agricultural production capacities that the solicitors have. It is mainly about the areas that the agricultural exploitations requesting payment aids have.

CONCLUSIONS

Considered the whole county, in the dynamics of the 2007 to 2009 years, one can notice an oscillating tendency of decreasing the number of applications (in 2009 there were registered -7, 06% fewer than in 2007 and an increase of +2, 52% compared to 2008), but an increase of the areas (the reference in 2009 is increased with +3.70% compared to 2007 and with +6.45% compared to 2008); At the level of the local centres the highest number of applications is held by Corabia 1st Centre and by Slatina 1st Centre, which accumulate together between 41.5% in 2007 and 41.3% in 2009 out of the total. Regarding the agricultural exploitations that are registered to these payment aids applications, it is relevant the situation of the 2007-2009 dynamics for the Corabia local centre (having 13.5-9.6% out of the total), Slatina centre (having 10.1-9.5% out of the total) and the Caracal centre (having 9.7-8.0% out of the total). Even though the number of these exploitations is between 407 and 498 during 2007-2009 (which represents between 0.8% and 1.0% of the total number of applications), the area is represented by a much higher percentage level (that is 43.2% in 2007, 49.2% in 2008 and 51.7% in 2009). Thus one can conclude that the county's overall tendency that the number of applications for aids is decreasing, considered that the total surface related to the solicitor agricultural exploitations is increasing. In the same time there is a developing tendency of both the applications for aids and the field surfaces of those exploitations exceeding an area of 50 hectares.

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RESEARCH ON DYNAMICS OF THE QUALITY PARAMETERS OF THE FLAVOURED WINES AND VERMOUTH TYPE WINES, OBTAINED FROM THE ITALIAN RIESLING WINE VARIETY

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Abstract

We analyzed the physical and chemical parameters (D^{20}_{20}, Alcool %, Total Dry Extract g/l, Free Sugar g/l, Unreducing Extract g /l, Total Acidity g/L $C_4H_6O_6$, Free SO_2 mg/l, Total SO_2 mg/l, for 9 wine samples, in order to emphasize the dynamics of the quality parameters of the flavoured wines and vermouth type wines obtained by adding hydroalcoholic macerates from plants to the Italian Riesling wine variety. Compared with the basic wine, we noticed the following dynamics of the tested quality parameters: the Density, Alcoholic Strength and Free Sugar increased significantly in vermouth type wines. The decreasing of Total Acidity has been significant in flavoured wines and distinct significant in vermouth type wines. The Free SO_2 increased and the Total SO_2 had smaller values for both types of wine. The Unreducing Extract decreased significantly in vermouth type wines and the Total Dry Extract increased very significantly for these wines. The addition of hydroalcoholic macerates from plants to the wine varieties changes the quality of wines.

Keywords **:** *Italian Riesling, quality parameters, hydroalcoholic macerates from plants, flavoured wines and vermouth type wines.*

INTRODUCTION

There is at the present moment a worldwide tendency to obtain a large variety of alcoholic beverages having different tastes, in order to satisfy the consumer's demands regarding both the odor, the flavour, and the nutraceutical properties. To this extent, the addition of hydroalcoholic plant macerates to the basic wines results in improving the organoleptic, physical and chemical properties of the flavoured wines **[1,3,4]**.

The aim of this paper is to highlight comparatively the changes of the quality parameters of the Italian Riesling wine variety, in the process of obtaining flavoured wine, namely the vermouth, by simply adding hydroalcoholic plant extract, as well as hydroalcoholic plant extract with other ingredients **[2]**.

The wine we used as basic raw material was produced in the crop year 2007, by SC OSTROVIT SA, in the Wine Center Ostrov. To the authors' knowledge, currently there are no significant studies on wines from the Vineyard Ostrov.

This leads to the idea that this category of wine can be an important future speciality research trend **[5,6]**.

The originality of this work resides in addressing issues relating to wine industry products which by their organoleptic, physical, chemical and nutraceutic properties are mentioned as functional foods.

MATERIAL AND METHODS

We determined qualitative parameters for the following wine samples: a sample of the variety Italian Riesling wine, vintage 2007, namely the basic wine, 4 flavoured wine samples (samples 1,2,3 and 4) obtained by the addition of hydroalcoholic extract (filtered plant macerate) to basic wine, and four vermouth type wine samples (samples 5, 6, 7 and 8), obtained via the addition of hydroalcoholic extract plus other ingredients (sugar, citric acid, ethylic alcohol) to basic wine. Two herbal blends recipes were used

for the preparation of hydroalcoholic macerates from plants: recipe I (16 plants: anise, cumin, thyme, yarrow, coriander, cloves, fennel, hyssop, rosehip, marjoram, mint, chamomile, nutmeg , wormwood, lemon balm, elder) and recipe II (fennel, rosehip, nutmeg, orange peel, lemon peel). The plants were macerated in alcohol 45% by volume (recipes IA and IIA), respectively 60% vol (recipes IB and IIB), in a ratio plant:alcohol of 10:1 **[2].**

Hydroalcoholic extracts were added to the Italian Riesling wine in a proportion of 1: 32.3, for obtaining flavoured wines, and 1:23.3 for vermouth type wines.

The following quality parameters were determined: D^{20}_{20}, (picnometric method STAS 6182/8-71) , Alcool content % vol (picnometric method STAS 6182/6-70), Total Dry Extract g/l (densimetric method STAS 6182/9-80), Free Sugar g/l (iodometric method 6182/18-81), STAS 6182/6-70), the Unreducing Extract g /l, Total Acidity g/l $C_4H_6O_6$ (metoda titrimetrica STAS 6182/1-79), Free SO_2 mg/l, Total SO_2 mg/l **[7,8].**

RESULTS AND DISCUSSIONS

Flavoured and vermouth type wines, obtained by own recipes, have changed their organoleptic properties such as layout, color, taste, flavor.

Tabular comparation of quality parameters was carried out for samples of the same wine variety, prepared by the same recipe from plants, using alcohol with the same strength, but using different procedures. Results highlighted the peculiarities of the wine variety, and the peculiarities of the varieties derived from it (flavoured wines and Vermouth).

Table 1 illustrates the results obtained by determining the main physical-chemical for Italian Riesling type basic wine, as well as and for the vermouth-type and for flavoured wine samples.

In Table 1 we can notice that the addition of hidroalcoholic plant extracts, as wel as the addition of the necessary ingredients to obtain vermouth wines, led to fairly significant changes of physical and chemical parameters, compared to the reference values of the basic wine.

Table 1

The physical – chemical characteristics of the aromatic wines and those vermouth types

Sample no.	Physical and chemical analysis: Sample type	d_{20}^{20}	Alcohol (vol %)	Total dry extract (g/l)	Free Sugar (g/l)	Un-reducing extract (g/l)	Total Acidity (g/l $C_4H_6O_6$)	Free SO_2 (mg/l)	Total SO_2 (mg/l)
Basic wine									
-	Italian Riesling	0,9932	12,6	25,3	3,3	22,0	6,03	31	158
Flavoured wines									
1.	Italian Riesling + Recipe I A (45 %alc)	0,9909	13,7	22,4	2,4	20	5,38	42	135
2.	Italian Riesling + Recipe I B (60 %alc)	0,9904	14,6	23,7	2,4	21,3	5,46	47	135
3.	Italian Riesling + Recipe II A (45 %alc)	0,9914	13,9	24	2,4	21,6	5,53	45	127
4.	Italian Riesling + Recipe II B (60 %alc)	0,9901	14,5	22,7	2,4	20,3	5,38	42	125
Vermouth type wines									
5.	Italian Riesling + Recipe I A (45%alc) + ingredients	1,0414	17	166,0	150	16	4,50	35	97
6.	Italian Riesling + Recipe I B (60%alc) + ingredients	1,0416	17	165,4	150	15,4	4,50	37	102
7.	Italian Riesling + Recipe II A (45%alc)+ ingredients	1,0417	17	166	150	16	4,50	35	100
8.	Italian Riesling + Recipe II B (60%alc)+ ingredients	1,0414	17	166	150	16	4,50	35	100

The flavoured wines had slightly lower **Density** compared to the Italian Riesling variety of wine selected for processing, as density is influenced by the addition of alcohol. All vermouth samples showed a higher density, compared to basic wine, due to the addition of sugar and citric acid.

The **Total Dry Extract** parameter decreased for all flavored wine recipes, and increased very significantly in vermouth type wines, compared to the basic wine of the Italian Riesling variety. The value of this parameter is influenced by the Free Sugar.

The evolution of the **Unreducing Extract** parameter highlighted a less significant decrease in flavoured wines and more pronounced decrease in vermouth wines.

The value of the **Total SO_2** parameter decreased in a less significant manner in flavoured wines and in a more significant manner in vermouth type wines, while for the Free SO_2 parameter, the values increase in a less significant manner for both categories of wines produced by us.

The parameters responsible for the quality of the wine, which mainly determine its taste, are: the Alcoholic Strength, Free Sugar and

Total Acidity. The flavouring of the wine, as well as its transformation to vermouth, change these parameters.

Figure 1 shows the dynamics of the **Alcoholic Strength** parameter, in the Italian Riesling basic wine, compared to the flavoured wines and the vermouth type wines, prepared by the two recipes.

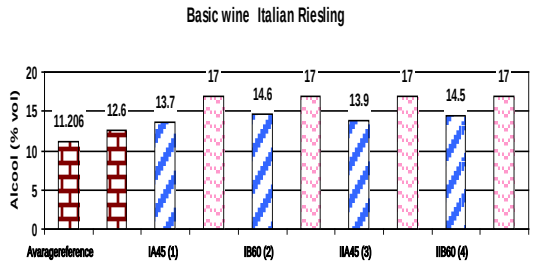

Fig. 1 The alcoholic concentration of flavoured wines and of vermouth type wines prepared from the Italian Riesling grapes variety

The addition of hydroalcoholic plants macerates to the Italian Riesling variety increased the Alcoholic Strength up to 14.6% vol in flavoured wines and up to 17% vol in all samples of vermouth.

Figure 2 illustrates the evolution of **Free Sugar** parameter in both flavoured and vermouth wines made from Italian Riesling.

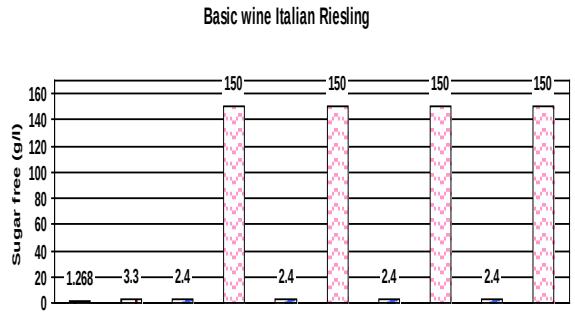

Fig. 2 The Free sugar of flavoured wines and of vermouth type wines prepared from the Italian Riesling grapes variety

A significantly higher concentration of Free Sugar was observed in basic wine, compared with the average of the variety. The Free Sugar concentration in flavoured wines (2.4 g / l for all recipes) decreased compared to the basic wine value, but increased compared with the average reference rate. The sugar concentration increased in Vermouth type wines to 150 g/l for all samples.

Total Acidity varies in both flavored wines and vermouths, compared to the values associated to the Italian Riesling variety reference wine (Figure 3).

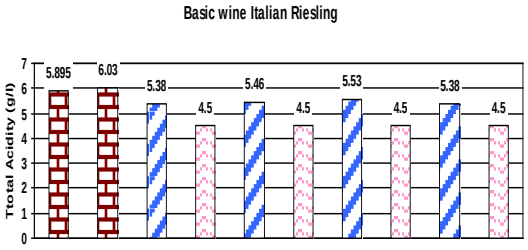

Fig. 3 The Total Acidity of flavoured wines and of vermouth type wines prepared from the Italian Riesling grapes variety

Flavoured wines and vermouth type wines obtained from the Italian Riesling variety showed a lower Total Acidity than the average reference value and lower than basic wine value. Also, all wines of vermouth type had lower Total Acidity than the flavoured wines.

CONCLUSIONS

1. The Density of flavoured wines was lower, and the density of vermouth wines was higher, compared with density value of reference wine;

2. The Total dry extract increased very significantly in vermouth type wines, about 6.5 times compared to the value of the reference wine.

3. The Unreducing extract decreased to 6.6% in Vermouth, compared to basic wine values.

4. The Alcoholic Strength increased little significantly in flavoured wines and significantly (by about 35%) in vermouth type wines.

5. The Free Sugar has increased very significantly in vermouth type wines, compared to the reference wine, due to the addition of sugar, according to the recipe.

6. The Total Acidity decreased slightly significantly compared to the reference wine

in flavoured wines, and decreased by almost 25% in vermouth type wines.

7. Free SO_2 and **Total SO_2** levels decreased in drinks with nutraceutical potential. The values dropped significanly especially in vermouth type wines.

To conclude, flavoured wines and vermouth type wines have different qualitative features, compared to the wine they are produced from. Hydroalcoholic plant extracts, added to the reference wine, decisively changed some quality parameters, granting these products nutraceutical potential.

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DAIRY SECTOR IN THE FUNCTION OF RURAL DEVELOPMENT IN MONTENEGRO

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Abstract

Dairy sector is one of the most important factors for the development of livestock production, which gives the largest contribution to the agricultural economy in Montenegro. The aim of the paper is analysis of dairy sector in the period 2006 -2009 as well as its possible improvements in rural areas of Montenegro, based on available natural, human and material assumptions. We used the statistical data for the respective year, and the Household Budget Survey. Also, we used data from annual reports of services in agriculture and dairy laboratories. Description method is applied in the paper. In accordance with the results of the analysis it was concluded that the dairy sector is the strongest in the central part of Montenegro.

Keywords **:** *dairy sector, rural development, Montenegro*

INTRODUCTION

Agriculture is an activity which is not to be perceived only from the GDP development aspect, but also from the aspect of rural development, from ecological aspect, as support to the tourism development, etc… Montenegro, as the newly constituted European country, relies its economic development to great extent on agriculture, with total share in GDP of 7.6% in 2008 (in 2001 the share amounted to 10.9%). [4] Livestock production gives the highest contribution to the agricultural economy of Montenegro and its role is significant due to the fact that ruminants (cattle and sheep) use pastures for their feed, which participate in total agricultural area with around 68%. [4]. Despite the fact that animal husbandry significantly contribute to the sustenance of population, dairy sector still is not significantly developed. Out of total volume of milk produced by farmers in Montenegro, only 20-25 % are being purchased by domestic dairy plants which through their processing satisfy up to 45% of domestic market demand for milk and its processed products. Remaining volumes of milk are used for feeding calves, which are being sold at high prices, as well as for production of various types of cheese and sour cream. In the period 2000-2007 the dairy sector was evenly developed towards the increase of production and stabilization regarding the number of heads, while in 2008 and 2009 the disorder and reduction in production occurred. Total volume of milk processed in dairy plants in the period 2005-2008 was increased for around 20% and thereafter reduced for around 1.8 million kilograms in 2009. In any case, net balance was positive with the increase of 2 700 000 kg [4].

MATERIAL AND METHODS

When developing the paper, the data from the Statistical Yearbook of the Republic Statistical Office- Monstat were used for respective years. Moreover, the data from the annual reports of the Livestock Selection Service and the Dairy Laboratory were also used. The paper applies the method of description and the reached results are shown in the charts.

RESULTS AND DISCUSSIONS

On the basis of the annual reports of the Livestock Selection Service from 2008 and 2009, the differences can be noticed regarding the size of farms in the northeast part and rest

of the country, with the largest average size in the central part, more precisely in Niksic municipality (9 heads per farm) and the smallest of 2.3 heads per farm in Bijelo Polje. [2]. Number of cow and heifer heads in the period 2000-2005 recorded growth, whereas such number started decreasing in the period 2005-2009 with the difference of 900 heads, whereby 45% in the years 2007 and 2008 and 50% in the years 2008 and 2009. Europe (27 member states) recorded negative trend in 2000-2007 regarding the number of heads and farms, whereby the number of farms was decreasing for 11% every two years, and number of animals for 8%. Therefore, same as in Montenegro, number of farms is being decreased faster then number of heads, which indicates that the process of consolidation is still ongoing. [4].

In 2008, part of the livestock fund monitored by the Livestock Selection Service amounted to approximately 13.846 or 20% of total number of cows and heifers. Due to such cause, size of farms was significantly enlarged in the period 2001-2008, but number of farms with five or less heads was decreased (-900 farms), and number of farms with six or more heads increased (+258 farms). The highest growth percentage was achieved by farms with 15 or more heads, whose number increased 6 times (from 9 to 55). [4]. Average number of heads at farms in Montegro amounts to 3.8 where the highest average number is in Podgorica (4.5) and Niksic (4.1), more precisely in the central part of Montenegro. Changes in the average number of heads on farms had inclining trend in the last decade. Namely, the average number of breeders (cows and breeding heifers) increased from 3.0 to 4.2 within the period of 8 years, more precisely in the period 2001-2009. [4]. If data are compared with the EU (27 member states) data, great differences can be noticed. Average size of herd in Europe (27 member states) is 26 heads per farm, with many countries whose average exceeds 100 heads (Luxemburg 133, Netherlands 110, England 104, Czech Republic and Denmark 101). Montenegro, with its average of 3-4 heads per farm, is similar to Poland and Romania where large number of heads are bred on small farms. [4].

In the period 2006-2008 a slight decline of milk production occurred in Montenegro, Table 1. [5].

Table 1. Milk production in the period 2006-2008

Year	Total production of milk (000 kg)
2006.	177791
2007.	172656
2008.	160044

In 2008 the total production of milk was lower for around 13% in comparison to 2004 when the production amounted to 182486 kg.

The main characteristic of farms in Montenegro is the pronounced own processing of products, especially of milk. In the areas where there is no organized purchase of milk, all produced volumes are being processed at households, mainly into various types of cheese. If the volume of milk marketed to dairy plants is compared with the volume of own cheese production from cow milk, the reverse proportion can be noticed.

Monitoring the production results in dairy is being implemented by introduction of heads with the milk yield control. Cow milk yield control in Montenegro is performed in accordance with the rules of International Committee on Animal Record (ICAR). Table 2 shows an overview of the number of farms and cows included in this type of control [2].

Table 2. Number of heads and farms in the milk yield control

Region	Number of cows under control	Number of farms under control	Average number of heads at farm
Podgorica	750	98	7,7
Nikšić	**861**	66	**13,0**
Berane	373	103	3,6
Bijelo Polje	359	135	2,7
Pljevlja	370	72	5,1
Total	2713	474	5,7

The largest average number of heads in 2009 was achieved in the central region of Montenegro, more precisely in Niksic municipality. Table 3 shows results on milk yield of cows in respect to particular regions. [3]. The results shown in the Table 3 indicate that the best production results are achieved by the heads bred in Niksic municipality, where the farms with the highest number of

heads under milk yield control are. In this municipality, Holstein-Friesian breed traditionally prevail, which has the highest production.

Table 3. Results of milk yield in respect to regions

Area	Number of lactations	ML, kg	Milk fat		Proteins		M+P Kg
			%	kg	%	Kg	
Podgorica	367	6309	3,69	233	3,16	199	432
Nikšić	**467**	**6685**	**3,88**	**260**	**3,19**	**213**	**473**
Berane	304	4035	3,86	156	3,25	131	287
Bijelo Polje	204	3923	3,57	140	3,19	125	265
Pljevlja	280	4662	3,72	174	3,11	145	319
Average	1622	5407	3,77	204	3,18	172	376

In the area of Niksic municipality, farmers are being supplied with treber (by-product of brewery) for cattle feeding, which makes their production more productive in relation to other Montenegrin areas. Reasons for such good results in Niksic municipality are also to be sought in the fact that producers are interested to increase number of heads and production volume, since two dairy plants "Nika" and "Srna" are located in this municipality. Mentioned companies present example of good practice, since they had significant impact to the employment increase in this municipality. Thanks to the mentioned processing capacities, around 30% of produced milk volumes are being purchased, which is significantly higher than the Montenegrin average, which amounts to around 20%. The above stated shows that the results in line with the productivity in EU countries are possible with application of a proper combination of genetics, feed, infrastructure and market. In future, the increase of forage production at the local level is to be considered, whilst cultivation of high-protein crops and mechanization represent a base for sustainable development of dairy sector. Distribution of milk products has crucial role in income making for the entire dairy sector. Supply of dairy plants with milk is not regulated with appropriate binding contract. In Italy, for example, bank loans for farms are being approved on the basis of contracts with dairy plants and on the basis of delivered milk volumes. In addition, a problem is also the almost nonexistent records on the farm costs, therefore it is very difficult to review the structure of realized costs.

Sustainability of dairy sector is closely linked to its capacity to generate sufficient revenues and to maintain employment level in such sector. The weakest link in the entire chain is the farmer himself or milk producer. Namely, due to the small number of heads and its low productivity, the possibilities to generate incomes sufficient for the household are limited. On the basis of previously performed analysis, it may be concluded that producers reach the sustainability threshold only when number of productive heads exceeds 10 and reach 16 heads. Theoretically speaking, if processing is conducted at the farm itself and if cheese is being directly sold, number of heads necessary for reaching the sustainability threshold could be even lower. Such, purely theoretical consideration could also be realistic if farmers decide to establish joint processing plants, improve own products and share revenues and expenditures. In any case, there is bottom limit of around 4 productive heads, where production below this limit would be economically unsustainable. Moreover, it is to emphasize that Montenegro has production structure which is similar to the structure in Romania and Poland, but the milk purchase price in Montenegro is higher than in mentioned countries. For the sake of comparison, milk purchase price in Montenegro amounts to 0.33€/kg, while in Poland it amounts to 0.30 €/kg and in Romania is 0.32€/kg. If other European counties are taken into consideration, it is to remind that Italy recorded the highest milk price at farm in the last two years. It is to mention annual net income achieved at the livestock farms in EU as an important indicator for future development, Table 4.

Table 4. Net income at EU livestock farms (2007-€)

Country	Average size	Annual net income (€)	Income (€/cow)
EU 27	26	8.700,00	334
NL	110	46.500,00	422
BE	92	41.500,00	451
ITA	44	22.500,00	511
PL	8	1.600,00	200

The data from the above chart show that annual net income proportionally grows with the farm size. Particularly interesting is the ratio between income per head which grows in parallel with the herd size, where Italy is leading at the list of European countries despite the fact that farms in respect to their size are categorized as the group of medium-sized farms [1].

Previous development of dairy sector has significantly slowed down migration of population from northern areas towards central and coastal area of Montenegro. Considering that this sector is still under restructuring phase whose result should be the professional group of producers competent for facing the international competition, higher support of the banking sector, private investments and public sector is required. The policy on dairy sector development has to be linked with social policy, with particular reference to the improvement of school system in rural areas, living conditions of women and children, access to information and connections with rest of the world. Small and medium-sized farms should be developed according to the multifunctional model, where production and breeding of calves, milk, fruits and vegetables, as well as hospitality are to be consolidated in order to provide sufficient incomes. Social policy related to the school system and housing in remote areas, including retirement, have to be directed towards establishing of balance and creation of conditions for faster social-economic development.

CONCLUSIONS

1. In the period 2000-2007 the dairy sector was evenly developed towards the increase of production and stabilization regarding the number of heads, while in 2008 and 2009 the disorder and reduction in production occurred;
2. Total volume of milk processed in dairy plants in the period 2005-2008 was increased for around 20% and thereafter reduced for around 1.8 million kilograms in 2009;
3. The largest average size of farms is in central parts of Montenegro, more precisely in Niksic municipality where the highest number of heads under the milk yield control is and also the best results in milk production per head are achieved;
4. Reasons for realized good production results in the central part, more precisely in Niksic municipality, are due to the fact that in this municipality the Holstein-Friesian breed traditionally prevails. Moreover, in this municipality farmers are being supplied with treber (by-product of brewery) for cattle feeding, which makes their production more productive in relation to other Montenegrin areas. Producers are interested to increase the production volume, since two dairy plants "Srna"and "Nika" are in this municipality.
5. Previous development of dairy sector has significantly slowed down migration process of population from northern parts towards the central and coastal area.
6. The policy on dairy sector development has to be linked with social policy, with particular reference to the improvement of school system in rural areas, living conditions of women and children, access to information and connections with rest of the world.

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REMOTE SENSING FOR DETECTING AND DISTINGUISHING MOISTURE AND NITROGEN STRESS IN MAIZE

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Abstract

Remote sensing has been known as a robust technique in precision farming over the last quarter of the 20th century. It has been successfully used to asses many biophysical and biochemical properties of various crops. Detecting stress in crops at an early growth stage is important to limit crop reductions and therefore increasing productivity. Thus, remote sensing may be a valuable tool for precision farming in cereal production. This study was conducted to investigate the effectiveness of broad band and hyperspectral remotely sensed data to monitor biophysical and biochemical properties of maize (Zea maize L.) under moisture and nitrogen stress. A field experiment was conducted to (i) assess the influence of nitrogen and moisture stress on maize and the resulting spectral reflectance characteristics at the leaf and canopy scales (ii) assess the potential of vegetation indices derived from hyperspectral remotely sensed data to predict maize yield and (iii) investigate the potential of distinguishing moisture and nitrogen stress spectrally. The results demonstrated Strong significant correlations between crop yield and some vegetation indices. RVI, SAVI, OSAVI and R_{750}/R_{550} were found to be sensitive to maize grain yield ($r > 0.80$). The correlations with grain yield were found to be strongest at the flowering stage. Penalized Linear Discrimnant Analysis (PLDA) and Principle Component Analysis (PCA) demonstrated the possibility to distinguish between moisture and nitrogen deficiency stress.

Keywords **:** *remote sensing, reflectance, nitrogen deficiency, moisture, stress*

INTRODUCTION

Globally, water and nitrogen deficiency are considered as the main limiting factors that reduce crop productivity especially in arid and semi-arid regions. [1] investigated maize yield response to irrigation and nitrogen fertilization and concluded that maize productivity is highly dependent on irrigation supplies in particular in areas with water limited conditions. Drought and low soil fertility are the most stresses threatening maize production in eastern and southern Africa [2]. Nitrogen (N) is one of the most important elements affecting crop grain yield and is the most limiting nutrient in crop production as cropping practices become more intensive, other nutrients will likely become limiting as will [3]. When plants are subjected to nitrogen stress the first symptom tends to be yellowing of leaves. Using methods of plant-based measurements to detect crop status such as canopy temperature are time consuming and requires a huge number of observations to characterize a field [3]. Monitoring grown crops is mainly based on the traditional method of point sampling technique that is not efficient for large agricultural systems. Alternatively, remote sensing may provide a reliable technique for the early detection of crop stress. Concentration of photosynthetic pigments within the leaves tend to be the first parts of plants to respond to stress. Leaf pigments such as chlorophylls, xanthophylls and carotenoids strongly absorb light in the photosynthetically active portion of the electromagnetic spectrum [4] and therefore strongly affect the spectral reflectance characteristics of plant leaves and canopies [5]. Subsequently, the spectral reflectance characteristics of plant leaves and/or canopies can be used to monitor biophysical and biochemical properties of crops and thereby obtain a better understanding of crop health. Previous studies have documented the effectiveness of spectral reflectance indices derived from remotely sensed data for the detection of stress in vegetation. These include for example, the estimation of

chlorophyll *a* concentration [6] the identification of pest damage [7], salinity induced stress [8], nitrogen deficiency [9] and moisture stress [10]. In plants the concentration of chlorophyll in leaves is strongly related to N status. [11] employed in situ spectroscopy data to detect N deficiency in sugarcane and documented the effectiveness of this technique to predict sugarcane leaf nitrogen. Other studies demonstrated the ability to predict crop grain yield from remotely sensed data [12]. [13] reported that NDVI can be used to predict wheat yield at early stages, and specifically that NDVI at the milk-grain stage was well correlated to final grain yield of wheat. Others demonstrated the effectiveness of remotely sensed data to distinguish sources of stress [8] and [14]. Increased efforts are therefore needed to detect the effects of moisture and nitrogen deficiency stresses in maize to limit crop reduction. Published research focused mainly on the remote detection of moisture and nitrogen stress at the leaf scale. Measurements at the canopy scale are arguably important for evaluating the potential implementation of remote sensing in precision agriculture. The specific objectives of this research were to; (1) assess the relationship between maize grain yield and both moisture and nitrogen stresses (2) identify the optimum vegetation index to predict maize yield and (3) investigate the possibility of distinguishing moisture and nitrogen deficiency stresses spectrally.

MATERIAL AND METHODS

A field experiment of maize was conducted at North Eltahreer district, Bohaira Governorate in the summer season of 2009. Maize (single cross 10) was sown during the second week of May. The soil at this site is a sandy loam soil with low nitrogen concentration. Maize seeds were sown at a rate of 33000 seeds per feddan (ha = 2.38 feddan). Phosphor and potassium were applied to all plots at levels of 60 and 60 kg per feddan. The total amount of phosphorus and potassium was applied during soil preparation. Three different irrigation regimes at 75, 50 and 25% AW (available water) were used to subject plants to different levels of moisture stress. The control treatment received 90% AW and 300 kg N per fedda. Three different nitrogen fertilization rates of 0, 100, and 250 kg N per feddan were used to subject maize crop to different nitrogen deficiency levels. Different combinations of both moisture and nitrogen levels were also used. Nitrogen was applied in two equal doses; the first one after 45 days from sowing and the other just before flowering.

Reflectance measurements

An ASD (Analytical Spectral Device) FieldSpec hand held spectroradiometer with a 3.5° field of view (FOV) foropic was used to measure the spectral reflectance from plant canopies and leaves. The spectroradiometer was mounted at the end of a telescopic pole at a constant height of 2 m from the soil surface to maximize the scanning area and was increased to 2.5 at the flowering stage onwards. The instrument has a spectral range of 350-050 nm which was interpolated to a final spectral resolution of 0.5 nm. The spectra was smoothed by passing a 5 nm running mean filter over the spectrum and truncated between 400 and 900 nm. Reflectance spectra of plant canopies were collected regularly under solar radiation between 11:00 and 15:00 h GMT. Reflectance measurements were collected from early growth stages until harvesting. The instrument was calibrated to reflectance using a white spectralon reference panel. Ten spectra were acquired from each treatment and the mean spectral was calculated. Different crop properties were recorded at different growth stages concurrent with the acquisition of spectral reflectance. Maize grain yield was identified for each treatment at harvesting. The spectra were then used to calculate 15 different hyperspectral and broad band vegetation indices [8].

Statistical analysis

Minitab v15 was used to perform one and two way analysis of variance (ANOVA) to establish significant differences in maize responses to moisture and nitrogen deficiency stress. Data were checked for normality using Anderson-Darling method with a 95% significance level. The Pearson Product Moment correlation coefficient was used to test the association between different vegetation indices and crop yield. Simple linear regression analysis was used to derive regression equations to predict grain yield from reflectance spectra. To distinguish moisture and nitrogen deficiency stresses spectrally, the mean of ten scans collected from each treatment was calculated. This was repeated three times for different replicates and the overall mean for individual treatments was then calculated and used in the Principle Component Analysis (PCA) to explore differences in the spectral response from healthy and stressed treatments. Additionally, Penalized Linear Discriminant Analysis (PLDA) was also run using the mda package on the full spectra datasets to determine if spectral response of plants could be used to predict the source of stress (i.e. moisture or nitrogen deficiency).

RESULTS AND DISCUSSIONS

Effects of moisture and nitrogen deficiency stresses on maize grain yield

ANOVA analysis was used to assess the effects of both moisture and nitrogen deficiency on maize yield. The results illustrated in Figures 1 and 2 demonstrate that both nitrogen deficiency and moisture significantly affected maize grain yield. Moisture stress strongly reduced maize yield (R^2 =0.95; $p < 0.005$). The highest grain yield of 8.2 Mg/fed was recorded with the control treatment whilst the lowest grain yield of 1.4 Mg/fed was recorded with the treatment received 25% AW and 0 N. Nitrogen deficiency also significantly affected wheat grain yield. Significant decreases in maize grain yield were observed with increasing nitrogen deficiency levels. The grain yields fell to about 17% of the maximum value for maize when subjected to the lowest watering regime and the highest nitrogen deficiency level.

The regression analysis showed a significant linear relationship between maize grain yield and moisture regime ($R^2 \geq 0.90$; $p<0.005$) as shown in Figure 1. This indicates that yield reductions were highest in treatments with the lowest watering regimes (25% AW). A further significant linear relationship was found between maize yield and nitrogen deficiency levels ($R^2 \geq 0.97$; $p<0.005$) as shown in Figure 2 indicating that grain yield reductions were greater at the highest nitrogen deficiency levels. The results of regression analysis therefore demonstrated significant relationships between maize yield and both moisture and nitrogen deficiency for all trails.

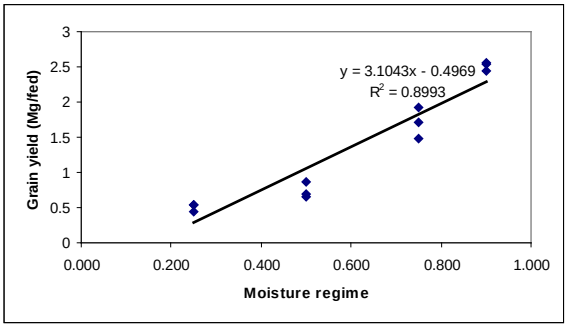

Fig. 1. The relationship between maize grain yield and moisture stress

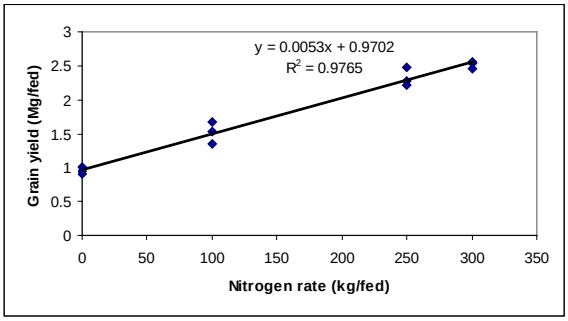

Fig. 2. The relationship between maize grain yield and nitrogen deficiency stress

Correlation between vegetation indices and maize grain yield

The 15 calculated broad band and hyperspectral vegetation indices demonstrated that some vegetation indices correlated strongly with the measured maize yield. The data collected throughout the growing season was ranked and used to identify the optimum index for predicting maize yield. The results demonstrated that, at 30 and 45 days, the coefficient of correlation was non-significant ($r < 0.30$) for all the tested vegetation indices. Table 1 details the coefficient of correlation between different vegetation indices and maize grain yield at different growth stages.

At 60 days after sowing, the majority of tested vegetation indices produced significant correlations with the measured grain yield. The coefficient of correlation increased gradually to reach a maximum at 90 days after sowing. The results also demonstrated that both hyperspectral and broad band vegetation indices provided similar correlations in most cases. RVI, SAVI and OSAVI were found to be the optimum indices for predicting maize yield. Figure 3 shows the relationship between RVI and maize grain yield. It is obvious that there is a linear significant relationship between them (R^2=0.79).

These results are in broad agreement with others [4] demonstrating that crop yield can be predicted before the maturation stage is reached. With respect to time, [14] concluded that measuring reflectance at the heading and the grain filling stages appear to be the most suitable time for selecting different genotypes for wheat yield. They also found that RNDVI, GNDVI and SR showed significant positive correlations with grain yield at the heading and the grain filling stages. [15] concluded that milk-grain stage was shown to be the most appropriate developmental stage for yield assessment. In contrast, other studies have demonstrated that the best time to predict wheat grain yield was recorded at maturation not at booting, heading, anthesis or milk-grain stages [16]. However, the work presented here at the canopy scale has shown that the flowering stage was shown to be the earliest optimum stage for predicting maize grain yield.

The results therefore suggest that remote sensing can provide a robust approach to predict crop yield at relatively early stages enabling appropriate management practices to be implemented to limit crop reductions and thus increase crop productivity. The in situ specrtroscopy measurements demonstrated the ability to detect stress in crops at a small scale and give a step forward to extrapolate the result at a large scale using different satellite platforms (high spatial and high spectral resolution satellite platforms).

Table 1. Coefficient of correlation for the relationship between vegetation indices and maize yield at different growth stages. Highlighted values are the strongest correlations

Index	Days after sowing				
	30	45	60	75	90
NDVI	0.05	0.18	0.41*	0.71**	0.83**
RVI	0.07	0.22	0.50**	0.73**	0.89**
SAVI	0.07	-0.04	0.42*	0.62**	0.89**
GNDVI	0.04	0.29	0. 59**	0.64**	0.83**
DVI	0.11	-0.13	0. 41*	0.72**	0.88**
SLAVI	0.03	0.18	0.41*	0.71**	0.83**
OSAVI	0.07	0.01	0.42*	0.72**	0.89**
RDVI	0.02	0.16	-0.37*	0.68**	-0.85**
SI	0.06	0.21	0.48**	0.73**	0.88**
IPVI	0.09	0.17	0.38*	0.48**	0.80**
R_{695}/R_{760}	-0.02	-0.27	-0.47*	-0.61*	0.84
R_{605}/R_{760}	0.03	-0.26	-0.52**	-0.58**	0.85**
R_{710}/R_{760}	-0.02	-0.23	-0.50**	-0.64**	0.87**
R_{750}/R_{550}	0.06	0.29	-0.60**	-0.68**	0.89**
R_{750}/R_{700}	0.01	0.20	-0.58**	-0.72**	0.85**

*Significant at 95%
**Significant at 99%

Fig. 3. The relationship between RVI derived from hyperspectral measurements and maize grain yield at 90 days after sowing

Distinguishing between moisture and nitrogen deficiency stresses

To distinguishing moisture and nitrogen deficiency stresses, the principle component analysis (PCA) was performed on full spectra collected at different growth stages and showed the possibility to distinguish both sources of stress. The PCA demonstrated that it was possible to distinguish most differences between moisture and nitrogen at the flowering and the grain filling stages onwards. As sown in Fig.4 there is a specific trend for both stressors to plot in separate quarters. The obtained PCA loading plots suggested that reflectance spectra in the visible part of the magnetic spectrum were the most strongly correlated with the level of stress. The NIR part also showed the possibility to distinguish between moisture and nitrogen stresses. To have a clear distinguish between these two stressors, the PDLA was also run on all spectra at different growth stages. The results demonstrated that the spectra collected at the canopy scale showed better distinguish between both stressors which in agreement with others findings (Wang et al. 2002; Elmetwalli, 2010). The PDLA demonstrated that it was possible to predict the source of stress in maize particularly for the spectra collected at the canopy scale. Table 2 detailes the results of the PDLA for the spectra collected at the flowering stage. The user's accuracy reached 100 % in 5 treatments out of eleven and over 50 % in two other treatments. Also, the producer's accuracy reached over 60% in seven treatments four of those a 100%. The training misclassification rate was 0.098 whist the prediction misclassification rate was 0.28. these results obviously demonstrate that the PDLA showed the ability to distinguish most differences between moisture and nitrogen deficiency stresses.

The results therefore showed the effectiveness of remotely sensed data to distinguish sources of stress (i.e. moisture, nitrogen deficiency) and resultantly take informed decisions to avoid crop reductions. The new satellite platforms such as VENUS and Hyperion (more than 200 bands) can therefore be used effectively to distinguish sources of stress at a large scale.

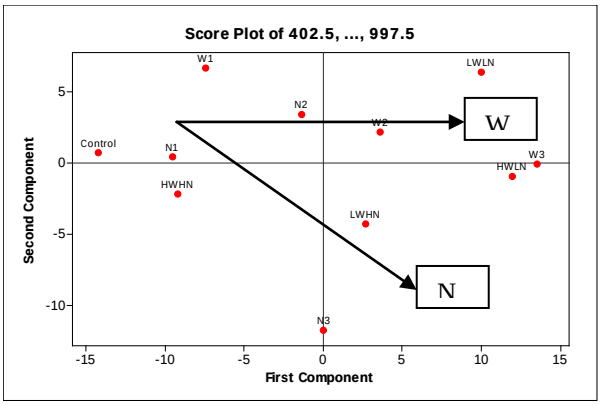

Fig.4. Score plot of PCA for whole spectra collected from control, moisture and nitrogen induced stressed maize canopies at 90 days after sowing (n=33).

Table 2. Confusion matrix for PDLA run on spectra collected from maize subjected to moisture and nitrogen deficiency stresses. Labels: C-control; W1-W3 high to low available water; N1-N3 high to low nitrogen rates; LWHN- low watering high nitrogen; LWLN- low watering low nitrogen; HWHN- high watering high nitrogen; HWLN- high watering low nitrogen

PDLA	Different treatmen											Total	r use's
	C	W1	W2	W3	N1	N2	N3	LWHN	LWLN	HWHN	HWLN		accuracy
C	4	1	0	0	4	0	0	0	0	0	0	9	0.44
W1	5	6	0	0	0	0	0	0	0	0	0	11	0.55
W2	0	0	0	0	0	0	0	0	0	0	0	0	0.00
W3	0	0	6	6	0	0	0	4	0	0	0	16	0.38
N1	0	0	0	0	7	0	0	0	0	0	0	7	0.00
N2	0	0	0	0	0	0	0	0	0	0	0	7	1.00
N3	0	0	0	0	0	7	0	0	0	0	0	8	1.00
LWHN	0	0	0	0	0	0	8	2	0	0	0	2	1.00
LWLN	0	0	0	0	0	0	0	0	5	0	0	5	1.00
HWHN	0	0	0	0	0	0	0	0	0	4	0	4	1.00
HWLN	0	0	0	0	0	0	0	1	2	0	6	9	0.67
Total	9	7	6	6	11	7	8	7	7	4	6	78	
Producer accuracy	0.44	0.86	0	1.00	0.64	0	1.00	0.29	0.71	1.00	1.00		
Training misclassification rate 0.098								Prediction misclassification rate 0.28					

CONCLUSIONS

The effectiveness of hyperspectral and broad band remote sensing data for predicting maize grain yield in response to moisture and nitrogen deficiency stresses was investigated in this study. It can be concluded that the flowering and grain filling stages are the optimum growth stages of maize to collect reflectance measurements to predict crop yield. The obtained results showed that the RVI, SAVI, OSAVI and R_{750}/R_{550} provided the optimum index to predict maize yield. The PCA and PDLA showed the potential to distinguish between moisture and nitrogen deficiency stresses. Additionally, hyperspectral data provided no advantage over broad band indices in these predictions. Consequently, broad band satellite-based remote sensing platforms with high spatial and spectral resolution capabilities would be well suited to predict maize grain yield in semi arid and arid environments. Here we demonstrated the novel potential of using remote sensing to detect nitrogen deficiency as well as moisture induced stress at the leaf and canopy scales.

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ECONOMIC RESOURCES – THE BASIC ELEMENT OF THE ECONOMIC POTENTIAL

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Abstract

The paper presents an analysis concerning the efficient use of economic resources in agricultural production.Economic resources by content, composition and aspect , they are heterogenous resources and as a result, they require a classification and hierarchisation. A criteria for resource classification may be used: origin, attitude on production and use. Based on their origin, resources are divided into large natural and economic resources.According to their attotude on production, theire divided into: operational resources and possible resouces and based on their use in production, resources are classified into : productive and unproductive resources. Land resources, labor resources, human capital and information resources in agriculture are the main elements of the production potential, which form its basis, and each element in the community as a whole characterizes the production potential.

Keywords: *resource, efficiency, land , assets, labor*

INTRODUCTION

The concept of resources or power resources are likely to display valued in its circumstance. After content, composition and resources are heterogeneous and, therefore the origin require systematization and classification. Classification criteria are the origin of resources, attitudes towards the production and use of character. After source resources are divided into two main categories-economic, as the attitude towards the production-function and potential use by the character generation and productive. Natural resources are a natural part of the community conditions and the main components of the environment.

It is used to meet production requirements and education. As a factor of production, natural resources include: farmland, forests, water and hydroelectric potential, hunting and fishing stock, non ferrous ores, crude oil, natural gas, coal, natural phenomena, etc..

Economic resources are the cornerstones of economic potential, by the company every step of the development of productive forces. Functional resources the active part of the basic resources, ready for use or taken over the economic cycle, it is processed as the essence in the productive forces of society, characterizing their strength.

Potential resources - resources discovered and now unused, but can be used in future. Size of all resources in reserve characterize potential possibilities of the society, its economic potential. Production resources are used directly in the manufacture of material goods, productive resources are used in non-productive sphere.

Agricultural production enterprise resources as natural origin are divided into economic and natural. The first group includes arable land, water and hydroelectric potential, hunting and fishing stock, natural phenomena, etc.. The second-labor resources, materials and financial.

After natural-resource content of production are heterogeneous. When they refer to natural resources, financial and working materials. Possessing general appropriation, or character of their production to consumption, they vary by functional role, we meet in the production of material goods. Because the production of material goods is only possible through the connection of the productive forces, the means of employment

and labor, so that they primarily represent the structure and production potential.

The structure of agricultural production potential is not exhausted with the types of data resources.

First of all, this is the fact that agricultural production is the main means of land. Productive base of land ownership as a means of production is soil fertility, which do not cover the correct use, but rather increases. Increasing land fertility can offset physical broadening of the boundaries of.

In agriculture, in all cases, when the production is directed to the processing of land to maintain or increase fertility, natural resources are represented as objects work. Earth appears in several qualities:

- first, as a territory, which are placed buildings, special buildings, rooms for cattle, to preserve resources and production materials;
- two turn-in due to fertility-like piece of agricultural production, moreover, that the working tool;
- among the three, being the object of ameliorative works and other works, aimed at raising the cultural, process and increase soil fertility, it is an object of labor.

Land must be represented in the potential production or characteristics not only quantitative but also qualitative.

The material resources of agricultural production is divided into two groups: fixed means of agricultural production, which operates in over several years and gradually transform its production through its effect on depreciation costs, assets and resources that are consumed in a cycle production.

Resources working-age population working, developing existing possessing the necessary physical, mental capacity and knowledge to work in social production.

Production resources, in the production process are not separate elements of productive forces but an organic system of interrelated elements, namely a set of production resources. Cumulative production resources is an organic system of interrelated elements of the productive force, which operates in the production process. After the composition of natural and material to them in personal and materials divide.

Providing opportunities characterize potential aggregate resource production and sound quality of their composition, the combination provides the optimal outcome and the use of production with minimum labor consumption and material living. Resources companies are added together to form the cumulative total income of higher territorial units: the district, economic zones, territorial unions. They are comparable both in space and time as.

Qualitative composition depends on the correlation between aggregate resource materials, labor and natural resources: the more the better their qualitative composition of the greater provision of resources, and vice versa.

Composition of production resources examined, with its characteristic features and functions, has the possibility of action Identification Manual of agricultural production to industries and regions completely separate and, therefore depleting potential production structure, an attempt to introduce additional factors to describe the production possibilities of business and regions can distort reality and lead to reduction or exaggeration of the production potential.

The result will be received distorted by incomplete records of production resources.

MATERIAL AND METHODS

The methodological basis of the average monthly wage dynamics research is the dialectical method. During the research and analysis for specific problems have been applied following methods:

1. Analytical
2. comparative
3. induction and deduction.

For the analysis served the National Bureau of Statistics data.

RESULTS AND DISCUSSIONS

One of the major factors of economic resources in agriculture is land. Land use

efficiency can be expressed - a system of indicators, so kind and value. With these indicators can be analyzed production of special crops.

Analyzing data from the table we see that in 2008 over 2007 in the household significantly increased the reported average yield per hectare for most crops grown in the house, due to favorable weather conditions that year were. Also the amount of milk produced increased to 100 ha of agricultural land, as well as live weight gains in cattle due to increasing household heads, as well as improving the forage base.

Table 1. Enhance economic efficiency of agricultural production in ETS 'Maximovca »

Indicators	*2007 year*	*2008 year*	*Deviations (+, -)*
fruit per hectare, q / ha			
- winter wheat	20,14	34,28	14,14
- spring cereals	10,31	18,81	8,5
- peas	25,20	10,88	-14,32
- corn	-	19,70	19,70
- corn silage, green chop	49,58	103,19	53,61
- Sunflower	9,50	18,16	8,66
- Root	-	181,40	181,40
- the perennial hay	25,44	26,27	0,83
- green mass of perennial plants	95,12	221,16	126,04
- Hay of annual plants	9,54	42,49	32,95
- green weight of annual plants	21,13	297,25	276,12
obtained from 100 ha of agricultural land, q			
- milk	283	295	12
weight gain in cattle	20,3	23	2,7
- won the 100 ha of agricultural land, q			
- wool	1,11	1,18	0,07
- milk	8,4	8,3	-0,1
- the live weight gain sheep	4,7	4,1	-0,6
- gained 100 hectares of arable land in live weight gain in swine, q	5,1	1,8	-3,3
It is global agricultural production, Lei			
in comparable prices:			
- from 1 ha of agricultural land	2377	4917	1284
- in a manufactured ha	2414	3718	1304
in current prices:			
- 1 ha of agricultural land	4917	5620	703
- in a manufactured ha	4995	5709	714
It is global income from agriculture, lei			
- 1 ha of agricultural land	1313	1328	15
- in a manufactured ha	1333	1349	16
- at a profit from the sale of manufactured hectares of agricultural production, lei			
- 1 ha of agricultural land	(763)	(328)	435
- in a manufactured ha	(775)	(333)	442
The level of profitability of agricultural production,%	0,25	-0,12	-0,37
Overall profitability,%	0,02	-0,01	-0,03

Analyzing data from the table we see that in 2008 over 2007 in the household significantly increased the reported average yield per hectare for most crops grown in the household, due to favorable weather conditions that year were. Also the amount of milk produced increased to 100 ha of agricultural land, as well as live weight gains in cattle due to increasing household heads, as well as improving the forage base.

Regarding the situation of value indicators, they also show a favorable dynamic than profitability. Proceeding from the information presented can be concluded that increasing the economic efficiency of agricultural production increased during the period analyzed. Are necessary for producing agricultural production inputs. Because participation in the process of production assets to create conditions for carrying out production. Economic efficiency of the use of production assets is determined by comparing their cost of production. To analyze the economic efficiency of using assets to ETS "Maximovca" will use the following.

Table 2. Analysis of economic efficiency of the use of production assets to ETS agricultural purpose "Maximovca»

Indicators	*2007 year*	*2008 year*	*Deviations (+, -)*
Capacity assets, Lei	35618044	46005121	10387077
It is a lion in fixed-purpose agricultural production:			
- Global agricultural production, Lei			
in comparable prices, Le	0,10	0,11	0,01
current prices, Lei	0,19	0,17	- 0,02
- Global income from agriculture, Lei	0,05	0,04	- 0,01
- Gross profit of achieving production agrilole	(0,03)	(0,01)	0,02
Return on capital goods,%	0,02	-0,01	- 0,03

Making an analysis of data in the table above, we can conclude that the economic efficiency of the use of production assets in the period analyzed is very low. In 2007 the lion fixed-purpose global agricultural production is 0.10 lei in comparable prices, and in 2008 to 0.11 lei.

Return on capital goods declined in 2008 to 0.03 p. p. compared with 2007. Explains the low level of efficiency is the fact that many of the fixed assets (participating in scientific activities of the enterprise) is not divided household activity data on their cost.

Labor resources is in itself a major factor of production, which ensures the rational use of agricultural production increase. Labor resources in agriculture have its specific features: - the effectiveness of their use depends largely on natural conditions - the company to weather and soil fertility. - The employment in agriculture, a seasonal wear, causing the disproportionate use of the work potential depending on the year, moreover, does not narrow specialization of workers engaged in the production process. In the table below we review the structure and organization providing labor resources.

Data in the table shows that virtually all categories of workers in manufacturing in enterprise analysis shows a negative deviation between the actual and the number of workers plan.

Table 3. EST analysis of the structure and ensure "Maximovca" with labor resources

ategories of workers	*Planned*		*Actually*		*deviations (+;-)*	
	people	share, %	*people*	share, %	*people*	shar e,%
A total of employees:	120	100	119	100	-1	-
Including:						
- Workers from the main activity, total	84	70	80	67	-4	-3
of which:						
- Employed in agriculture	73	61	67	36	-6	-5
- Specialists	11	9	13	11	-2	-2
- Workers from other areas	36	30	39	33	3	3

The largest deviation is observed between the number of workers employed in agriculture and plan effectively, making up 6 people. Therefore we conclude that every company is working with resources provided.

CONCLUSIONS

The problem of effective utilization of production potential in the treatment of complex should be investigated in accordance with which it is necessary to examine the phenomena and processes studied in terms of their characteristic quality, integrity, structure, functions, hierarchical and dynamic interconnections. Increasing efficiency in production potential is related to better use resources of all kinds of labor embodied in the continuous intensification, primarily fixed assets increasing production efficiency, improving efficiency of production capacity. As a feature of the Identification Manual potential of agricultural enterprises and regions, according to him, it is necessary to use their ability to ensure the production of a given volume and type of production. Land resources, labor resources, human capital and information resources in agriculture are the main elements of the production potential, which form its basis, and each element in the community as a whole characterizes the production potential.

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DEVELOPMENT AND EVALUATION OF A LOCAL OIL SEEDEXPLIER TO IMPROVE THE EXTRACTION EFFICIENCY

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ABSTRACT

In small-scale industries for dyeing and in medicines as anti-inflammatory substance. Seeds have been used as insecticide and oil extraction for fuel, soap and varnish production. Seed cake has been used as fertilizer, as solid fuel, or in biogas production. Non toxic varieties detoxified seed cake has been used as feed for animal. An local oil extraction machine used to extract different varieties of oil seeds developed and evaluated to increase the extraction efficiency and find the solution for the most problem of all oil press extraction machines that the high percentage of oil in cotton seed cake by use the press screw pitch of double flight , number of blades of 18 blades , development the machine head to control the clearance between machine head and press screw of 1, 1.5, 2 and 2.5mm, and studying the effect of press screw speed of 30, 60, 90 and 120 rpm on machine efficiency and final product quality.The optimum parameters and condition of machine were 32.43kg/h machine productivity, 88.10 kW h/ton energy requirement , 63.905 extraction efficiency, 11.08% oil extracted percentage, 6.51% oil percentage in cake, by using double flight press screw , clearance of 1.5mm, screw speed of 90 rpm and 18blades number .the obtained results were very important for oil extraction industries that use the oil press method for oil extraction.

Keywords: *oil, extraction, machine, energy efficiency*

INTRODUCTION

Total Egyptian oilseed production declined in 2009/2010 by about 11 percent from the 2008/2009 level. However, total 37 oilseed production is forecast to increase by percent in 2010/2011 due to the expected increase in cotton production. Cotton is the major oilseed grown in Egypt. It is produced primarily for fiber, with oil and meal production being of secondary importance. The government sells cottonseed to farmers, at 3.60 L.E/kg Egypt's annual oilseed crushing capacity is currently estimated at 1.8 million tons. About 60% of Egypt's crushing capacity is owned by public sector

Companies [1] Oil recovery from oil-seed is by one of four methods namely, the aqueous (or traditional) method, hydraulic pressing, screw pressing and solvent extraction. In the traditional method, the seed is ground into a paste, the paste is heated in boiling water and the mixture stirred. Periodically while it is being heated until the oil is seen floating on the meal-water mixture.

The mixture is then allowed to cool off during which time oil is scooped off the top of the mixture, [2]. [3] reported that oil can be extracted mechanically with a ram press, an expeller or even a wooden mortar and pestle, a traditional method that originated in India. Presses range from small, hand-driven models that an individual can build to power-driven commercial presses. The ram press uses a piston inside a cage to crush the seed and force out the oil. Expellers have a rotating screw inside a horizontal cylinder that is capped at one end. The screw forces the seeds or nuts through the cylinder with gradually increasing pressure. The seed is heated by friction and electric heaters or a combination of the two. Once the cap is removed, the oil escapes from the cylinder through small holes

or slots and the press cake, or meal, emerges from the end of the cylinder. Both the pressure and temperature can be adjusted for different kinds of feedstock

[4] reported that ,a model screw press was designed and fabricated. In the design of the screw press, the size of the screw material, the optimum shaft length for a given screw pitch, appropriate shaft speed, the tapering angle of the conical shaft, the maximum shaft, diameter and the inside diameter of the enclosing barrel were determined. A shaft speed of not more than 90 r.p.m was found to be suitable for working the screw press while the clearance between the shaft and the barrel was 3 mm. Quality evaluation of the product showed that the acid value, the specification number and the peroxide value of the oil obtained from roasted peanut were lower than that obtained from fresh peanut, implying that oil expressed from roasted peanut is of better quality to the oil.

[5] designed a simple pressing mechanism was carried out using a vertical screw that was rotated by a gear system through a 12 VDC motor connected to the solar PV panels. The press cylinder (Fig. 2) was made of a perforated 5mm thick mild steel cylinder with 10mm holes placed 5mm apart along its circumference. The cylinder was lined with a 2mm wire mesh on the inside. The frame was made up of four vertical solid mild steel rods of 50 mm diameters while the press base was made up of a 200mm_600mm_12.7mm mild steel plate and was designed for better stability under possible uneven surfaces in villages. An average specific energy of 36.55 and 20.35 W.h/kg was recorded for peanuts and coconuts, respectively, after 12 min of pressing.

The objectives of this study were:

[1] Development of a local oil seed extraction machine to improve the extraction efficiency.[2] Determine the optimum screw press pitch , and screw speed , number of blades, and the clearance between the screw end and machine head that affect on extraction efficiency.[3] Reducing the percentage of oil in produced cotton seed meal cake. [4] Reducing the power requirements of this type of machines.

MATERIAL AND METHODS

Materials:

The oil extraction machine manufactured in small workshop in Zagzag- El Sharkia , and evaluated in Agriculture engineering research institute (AEnRI) Giza. Cotton oil seeds harvested in season of 2009-2010 used in this study.

Specification of a local developed extraction machine:

The oil extraction machine consists of:

-Machine base: Machine base made from U shape steel bars has width of 50 mm , highest of 30mm, and thickness of 10 mm, the base has dimension of 1060 mm length, 350 mm width and130mm highest.(Fig 1)

-Feeding hopper: The feeding hopped of cotton seed made from steel sheet has thickness of 1mm and upper diameter of 140 mm and bottom diameter of 80 mm, the highest of feeding hopper were 130 mm.(Fig 1)

-Extraction barrel: the extraction barrel has cylindrical shape has 370 mm length, 80 mm diameter and 2mm thickness, the cylinder opening from the both sides the front end fixed with the extraction head, and the back end closed by bearing plate has diameter of 116mm, and thickness of 100 mm, there are 8 holes has diameters of 12 mm, for oil output (Fig 1).

-Extraction screw press: The extraction screw press, has length of 360 mm, 30mm diameters, 40 mm diameters in bearings section, and 33.5 mm pitch .the screw teeth has width of 10 mm, and teeth deeps of 12mm.(Fig 2)

-Extraction head: Extraction head has conk shape the big diameter were 116mm, and the small were 95mm, (Fig3).

- Power transmission and electric motors: The power transmitted from an electric 4 kW, 1400 rpm 3 vase. The electric motor shaft has pulley 120mm in diameter, connected with the screw pulley has diameter of 100 mm by rubber belt 17 inch.

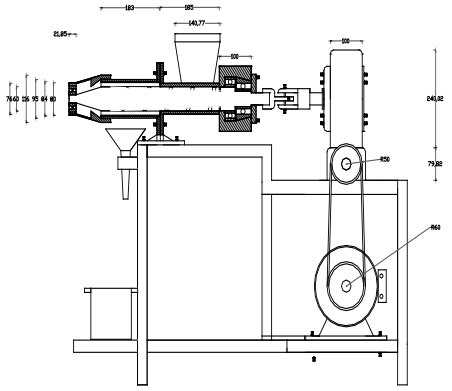

Fig.1.: Elevation of oil extraction machine

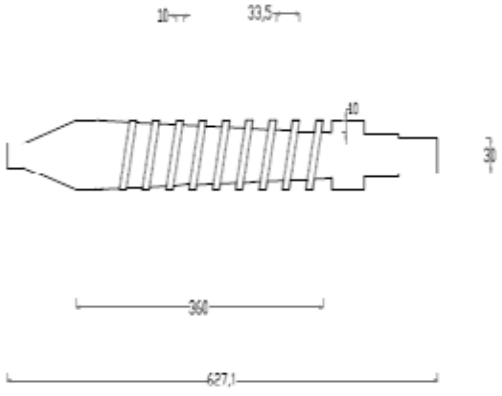

Fig. 2. Extraction screw press

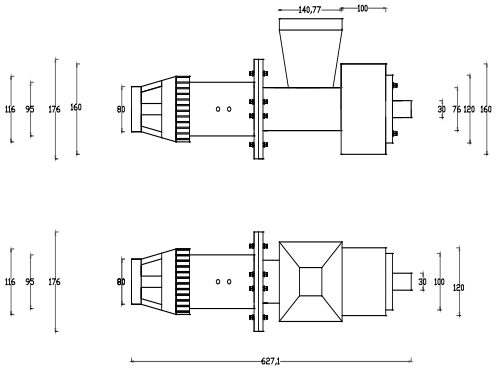

Fig.3. Extraction machine barrel and head

Methods:

An local oil extraction machine used to extract different varieties of oil seeds developed and evaluated to increase the extraction efficiency, by studying the effect off different operating parameters on machine efficiency and product quality such as:

1- Press screw pitch of double flight.
2-Number of blades of 18 blades.
3-Clearance between machine head and press screw of 1, 1.5, 2 and 2.5 mm.
4-Screw speed of 30, 60, 90 and 120 r.p.m.

Evaluation of extruder efficiency and product quality performance

1- Extruder production rate was measured for each treatment by taking sample for 2 min after 10 min. of extruder running at steady condition

2- Specific mechanical energy (SME), was calculated as the following relation:

$$Total\ consumed\ power, (kW) = \frac{\sqrt{3}\ \ I\ V\ \eta\ \ \cos\theta}{1000}$$

Where: I = Line current strength in amperes.
V= Potential difference (Voltage) being equal to 380 V.
Cos θ = Power factor (being equal to 0.84).
η= Mechanical efficiency assumed (90 %).

The energy requirement in (kW.h/Mg): was calculated by the following equation:

$$Energy\ consumed = \frac{P}{Q} = kW.h/ton$$

Where = The consumed power for mixing ration, kW.
Q = Machinery line productivity, Mg/h.

3- Extraction efficiency:was determined as per ASAE standards method DEC01(2000), at 3 replicates.

$$Efficiency\,(\%) = \frac{Wo}{Wi} x100$$

Where :Wo :oil mass after extcation (g),
Wi: oil mass in seed (g)

4- Oil extracted percentage:

$$oil - extracted\,(\%) = \frac{Wa}{Wb} x100$$

Where:Wa :Oil extracted mass (g),
Wb: Total sample mass (g)

5- Oil in cake percentage:

$$oil - cake\,(\%) = \frac{Wi - Wo}{Wi} x100$$

6- Product thickness: was determined by digital scale.

RESULTS AND DISCUSSIONS

Evaluation of oil press performance and product quality was carried out under the following items:

1- Oil press Productivity:

Productivity of oil extraction machine one of the most important aims for any industries witch affecting the final product cost. Data in (Fig. 4) indicated that, the machine productivity increased from 19.61 to 24.25, 27.70and 30.01 kg/h using 1 mm clearance, from 24.10 to 28.98, 32.43and 34.74 kg/h using 1.5 clearance, from 27.47to 32.35, 35.80and 38.11 kg/h. using 2 mm clearance and from 32.93 to 37.81, 41.26 and 43.57 kg/h. using 2.5mm clearance under 18number of blades and double flight screw.

The increase in machine productivity by increasing the screw speed from 30 to 60, 90 and 120 r.p.m could be due to the decrease in seeds retention time inside the expeller barrel, that increase the machine output in the time unit.

Data in (Fig. 4) showed that, expeller head the most important part in oil extraction machine witch controlling the machine productivity and extraction efficiency, it is indicated that increasing the clearance between the pressing screw and machine head from 1 to 1.5, 2and 2.5 mm increased the machine productivity from19.61 3to 24.1, 27.47 and 32.93 kg/h at screw speed of 30 rpm, from 24.25 to 28.98, 32.35 and 37.81 kg/h at screw speed of 60 rpm, from 27.7 to 32.43, 35.8 and 41.26 kg/h at screw speed of 90 r.p.m, and from 43.57 to 34.74, 38.11 and 30.01 kg/h at screw speed of 120 r.p.m.

The increase in machine productivity by increasing the head clearance from 1to 1.5, 2 and 2.5 mm could be due to the increase in machine opening area that decease the treatment consumed time.

2- Energy requirements :

Data in (Fig. 5) indicated that increasing the screw speed from 30 to60, 90 and 120 decreased the energy requirements from 139.618 to 118.436, 106.555 and 101.333 kW.h/Mg using clearance of 1 mm from 109.6891 to 95.847, 88.102 and 84.819kW.h/Mg using clearance of 1.5 mm, from 93.338 to 83.405, 77.182 and 75.232kW.h/ton.using clearance of 2mm and from 75.146 to 63.751, 65.153 and 68.995 kW.h/Mg using clearance of 2.5mm.

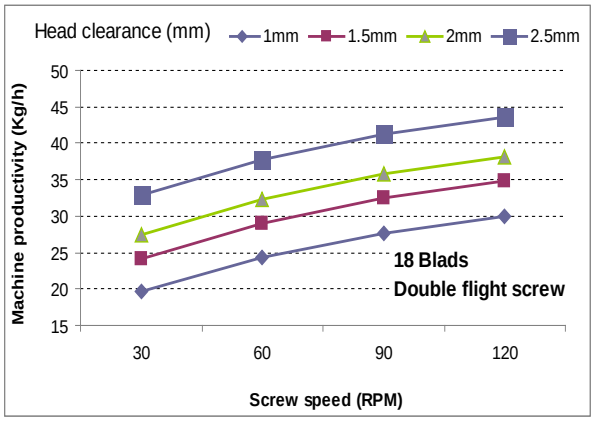

Fig.4. Effect of press screw speed and the clearance between the screw and machine head on machine productivity

The decreased in energy requirement by increase the screw speed from 30,60, 90 and 120 r.p.m could be due to the high increase in machine productivity with low increase in power consumed, that decrease the energy requirements.

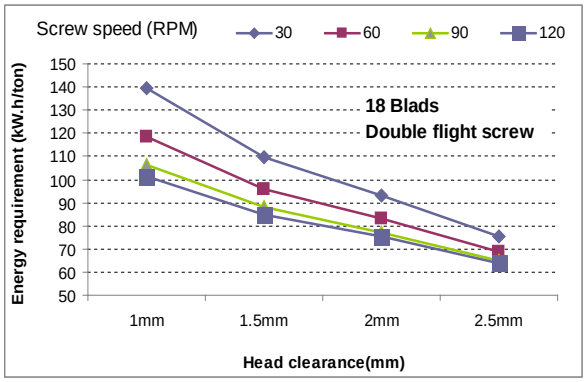

Fig.5. Effect of expeller screw speed, head clearance on energy requirements

While same (Fig. 5) showed that increased the head clearance from 1to 1.5, 2 and 2.5 mm deceased the energy requirements from 109.689 to 139.618, 93.338 and 75.146 kW.h/Mg using screw speed of 30rpm, from 118.436 to 95.847, 83.405 and 68.995 kW.h/Mg using screw speed of 60 rpm, 106.555 to 88.102, 65.153 and 77.182kW.h/Mg using screw speed of 90rpm

and from 101.333 to 84.819, 75.232 and63.751 kW.h/Mg using screw speed of 120 r.p.m. The decreased in energy requirements by increase the machine head clearance from 1 to 1.5, 2 and 2.5 mm could be due to the increase in machine productivity and the decrease in power consumed by the decrease in motor load.

3- Extraction efficiency:

Data in Fig (6) indicated that increasing the screw speed from 30 to 60, 90 and 120 decreased the extraction efficiency from 68.509 to 67.875, 66.376 and 65.569% using clearance of 1mm, from 66.030 to 65.396, 63.898 and 63.091% using clearance of 1.5mm, from 60.612 to 62.803, 61.304 and 63.321% using clearance of 2 mm and from 57.039 to 59.229, 57.731 and 59.748% .using clearance of 2.5mm. The decreased in extraction efficiency by increase the screw speed from 30,60, 90 and 120 rpm could be due to the decrease in treatment retention time by the high screw speed.

On another hand, data in (Fig. 6) showed that increasing the clearance between the pressing screw and machine head from 1 to 1.5, 2and 2.5 mm decreased extraction efficiency from68.509 to 66.030, 63.321and 59.748 % using screw speed of 30 rpm, from 67.875 to 65.396, 62.803 and 59.229% using screw speed of 60 r.p.m, from 66.376 to 63.898, 61.304and 57.731 % using screw speed of 90 r.p.m, from 65.569 to 63.091, 60.612 and 57.039 % using screw speed of 120 r.p.m.

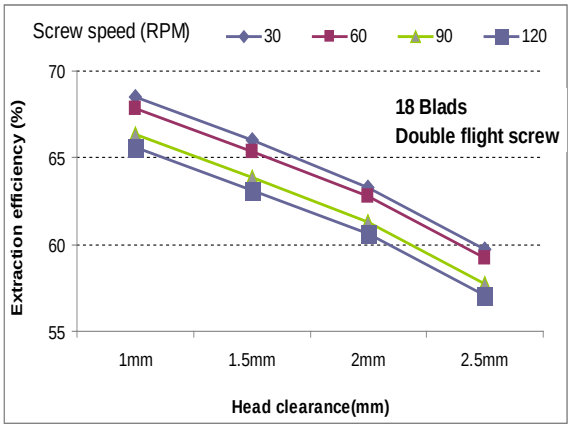

Fig.6. Effect of expeller screw speed, head clearance on machine extraction efficiency

4- Oil extracted percentage:

Data in (Fig.7) indicated that, the oil extraction percentage decreased slowly by increasing the screw speed from 30 to 60, 90 and 120 r.p.m, from 11.886 to 11.776, 11.516 and 11.376% using 1mm clearance , from 11.456 to 11.346, 11.086 and 10.946% using 1.5 clearance, from 10.986 to 10.896, 10.636 and 10.516% using 2mm clearance and from 10.366 to, 10.276, 10.016 and 9.896 %using 2.5mm clearance under 18number of blades and double flight screw.

The decrease in oil extraction percentage by increasing the screw speed from 30 to 60, 90 and 120 rpm could be due to the decrease in seeds retention time inside the expeller barrel, that lead to increase in oil mass comes out with the cotton meal.

Data in (Fig. 7) showed that, increasing the clearance between the pressing screw and machine head from 1 to 1.5, 2and 2.5 mm decreased the oil extraction percentage from11.886 to 11.456, 10.986 and 10.366%at screw speed of 30 rpm., from 11.776 to 11.346, 10.896 and 10.276 %at screw speed of 60 rpm, from 11.516 to 11.086, 10.636 and 10.016% at screw speed of 60 rpm and from11.376 to 10.946, 10.516 and 9.896%at screw speed of 120 r.p.m. The decrease in oil extracted percentage by increasing the head clearance from 1to 1.5, 2 and 2.5 mm could be due to the increase in machine opening area that decease the treatment consumed time, lead to increase the oil percentage in cotton meal.

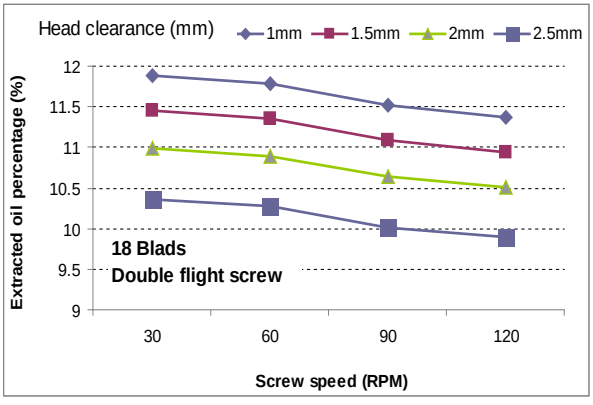

Fig. 7. Effect of expeller screw speed, head clearance on oil extraction percentage

5- Oil in cake percentage:

Data in (Fig.8) indicated that ,the oil in cake percentage increased by increasing the screw speed from 30 to 60,90 and 120 rpm ,from 5.71 to 6.22, 6.08 and 5.82 % using 1 mm

clearance, from 6.14 to 6.25, 6.51 and 6.65% using 1.5 clearance, from 6.61 to 6.7, 6.96 and 7.08% using 2mm clearance and from 7.23 to 7.32, 7.58 and 7.7% using 2.5mm clearance under 18number of blades and double flight screw. The increase in oil in cake percentage by increasing the screw speed from 30 to 60, 90 and 120 rpm could be due to the decrease in seeds retention time inside the expeller barrel, that lead to increase in oil mass comes out with the cotton meal.

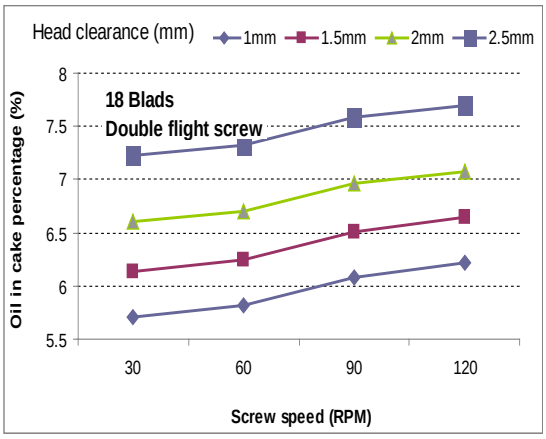

Fig. 8. Effect of expeller screw speed, head clearance on oil in cake percentage

Data in (Fig. 8) showed that, increasing the clearance between the pressing screw and machine head from 1 to 1.5, 2 and 2.5 mm increased the oil in cake percentage from 5.71 to 6.14, 6.61 and 7.23% at screw speed of 30 rpm., from 5.82 to 6.25, 6.7 and 7.32%at screw speed of 60 rpm, from 6.08 to 6.51, 6.96 and 7.58% at screw speed of 60 rpm and from 6.22 to 6.65, 7.08 and 7.7 % at screw speed of 120 rpm. The increase in oil in cake percentage by increasing the head clearance from 1 to 1.5, 2 and 2.5 mm could be due to the increase in machine opening area that 3-double flight screw increased the machine extraction efficiency decease the treatment consumed time, lead to increase the oil percentage in cotton meal.

CONCLUSIONS

The experimental results reveal that performance of the developed local oil press. Screw extraction machine was in the optimum region under the following conditions:

1- Screw speed of 60-90 rpm
2- Clearance between the screw and machine head of 1-1.5mm.

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STUDY OF SOME ENGINEERING FACTORS AFFECTING ON SEED COATING EFFICIENCY IN SEED PROCESSING TREATMENT

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Abstract

The present study aimed to evaluate the effect of some engineering factors involved in processes of corn and wheat seed coating. The engineering factors were speed of the coating pan, diameter of the spinner disk, slope of the coating pan and speed of the spinner disk. The studied seeds were corn and wheat. The results revealed that, the coating efficiency increased as the slope of coating pan increased up to 27.66 × 10^{-3} rad., then tends to decrease with higher angle of slope. Also, a significant coefficient of variation was found only with corn seeds. The coating efficiency increased as rotating pan speed increased up to 0.05592 m/s, then tends to decrease with higher rates of speed. The coating efficiency increased as disc diameter and/or speed increased.

Keywords*:* engineering factors, coating efficiency, processing

INTRODUCTION

Seed coating is considered one of the most important treatments applied to seeds after harvesting and before storing and/or planting. It aims in wide variety of objectives such as bacterial, viruses, insects, nematodes and fungicides application. In the field of farm machinery, seed coating is applied for improving geometric properties of seeds i.e. sizing and shaping of seeds to improve mechanical plant ability. Successful application systems should meet acceptable standards of coating efficiency where the target dose of coating material is applied, maintained on the seeds until planting, uniform coverage, minimize seed damage in addition to, the operation should be economically acceptable.

The critical processing variables that affect content uniformity and loading of active agent coated on tablets were studied. A good correlation between observed and predicted values for content uniformity and recovery was founded [1].

The effect of diameter and revolution speed of rotating disk on uniformity of mixing was studied by [2]. His results revealed that the numbers of revolutions are necessary for a uniform mixing of solids.

The uniformity of coating applied to large particles and tablets in rotating drum coating devices was investigated [3]. They conducted that, decreasing trends for circulation and surface times were observed with increasing drum speeds, drum loadings, and tablet size.

The spinning disc technique is an established industrial technique and there is commercially available equipment used sufficiently for preparing the seeds [4]. It is a technique to produce coatings of adequate quality. They mentioned that the movement of mixing drum and disk rotation speed must be adjusted to a suitable rate seeds stick together as the coating dries.

MATERIAL AND METHODS

In an endeavor to characterize the engineering factors contributed in efficient operation processes of seed coating, a research study was carried out at Gemmiza agricultural research station. To adjust the optimum operating circumstances, some of performing engineering inputs such as

agitator speed or coating pan speed, speed and diameter of the spinner disk and the coating pan slope were studied. Corn (*Zea Maize*) and wheat (*Triticum aestivum L.*) seeds were used as a material of study. Gustafson's Metered Slurry Treater, G17-Gross Bagger-SS-6 film coater was used, the sketchmatic diagrams for the machine is shown in (Fig.1). Corn and wheat seeds were treated by a fungicide, Sumi-eight WP 2% at a rate of 0.5 g of soluted active ingredient for one kg of seeds. The mass of the metered seed was controlled by placement of the counterweight, while the amount of the chemical metered was determined by the size of chemical cup. The engineering factors considered in this study were: speed of the coating pan (V), diameter of the spinner disk (D), slope of the coating pan (θ) and speed of the spinner disk (a). The treatments were arranged in split-plot design with three replicates, i.e;

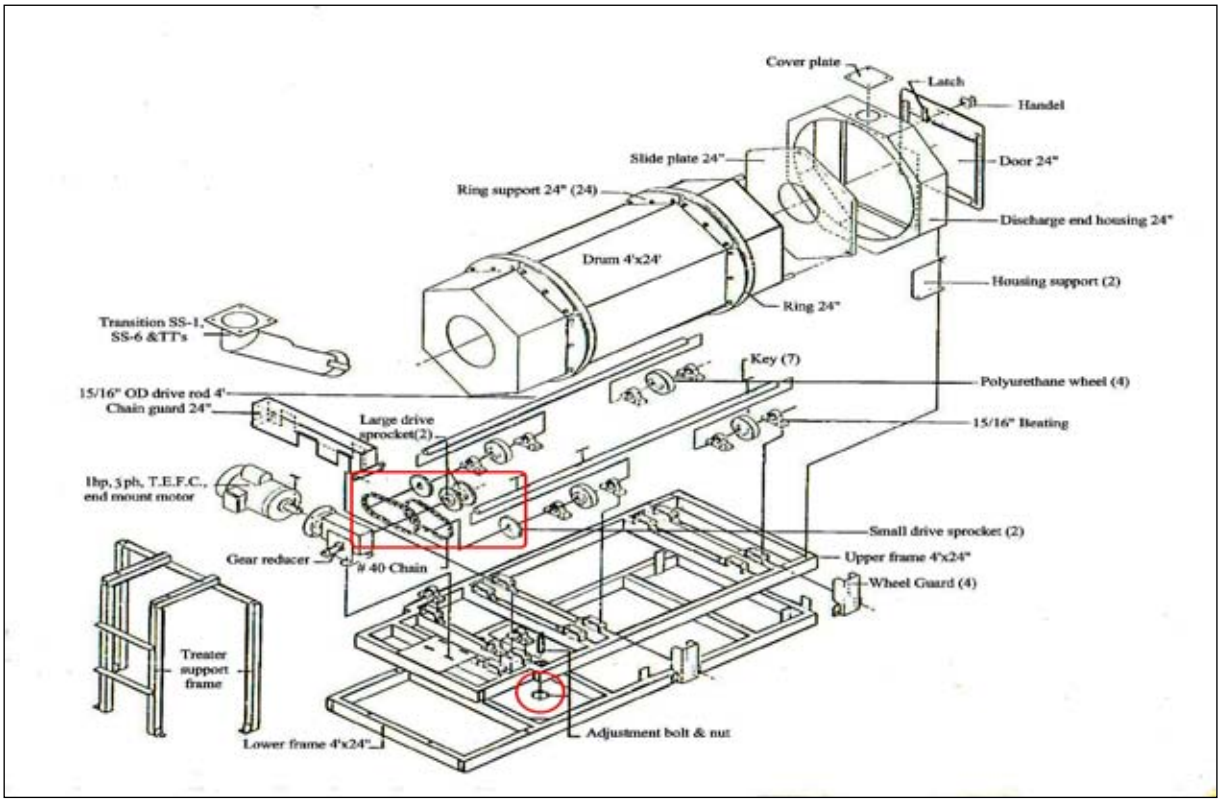

Fig.1. Sketchmatic diagrams for the machine

- Four rates of coating pan speed, 0.3728, 0.4660, 0.5592 and 0.6524 m/s were excluded where V_2 (initial speed) was considered as the control. These values of pan speed were controlled by adjusting the number of teeth of small drive cogwheel through changing the cogwheel teeth number. Three drive cogwheels of 18, 28 and 33 teeth were manufactured and replaced with the original sprocket, which has 23 teeth.
- Four degrees of coating pan slope were measured as angle between the pan and the horizontal fixed frame of the set. The angles were 9.043×10^{-3}(0º 31´ 5.19″), 18.086×10^{-3} (1º 2´ 10′) (control), 27.66×10^{-3} (1º 35´ 5.9′) and 36.71×10^{-3} rad. (2º 6` 12″).
- Four diameters of the spinner disk were trialed, where three disks of 13.5, 16.5 and 18 cm diameter were manufactured and replaced with the original disk (15 cm diameter). In addition, the manufactured disks were modified to be corrugated surface in the aim of efficient atomization for droplets of coating material.
- Four speed rates of spinner disk were obtained through manufacturing three drive pulleys of 7.5, 9.5 and 11.5 cm in addition to the original one that of 5.5 cm. These pulleys

were fixed to the spinner disk on the same shaft, which produced speeds of 1430, 1049, 828 and 684 r.p.m for 5.5, 7.5, 9.5 and 11.5 cm diameters respectively. The speed was measured using a hand contact Tachometer.

Coating efficiency (CE) was indirectly determined where the colour intensity of extracted solution of each treatment was compared to the intensity colour of original coating material following the colorimetric assay to determine the concentration of a substance that is in the solution. The determination of coating efficiency was carried out by a spectrophotometer.

Method description: A series of standard solutions were prepared. A standard solution is a solution in which the analyze concentration is accurately known (A series of dilutions of original coating material). The absorbance of the standard solutions (dimensionless) was measured and used to prepare a calibration curve. The points on the calibration curve yielded straight lines shown in (Fig. 2).

These extract of different treatments were analyzed. The data obtained from the standard are used to plot a straight line. The slope and intercept of that line provide a relationship between absorbance and concentration as follows:

Absorbance (A) = slope c + intercept (1)

The absorbance of the unknown solution (A_u), is then used with the slope and intercept to calculate the concentration of the unknown solution (C_u) according to [5] as follows:

$$C_u = \frac{A_u - \text{int}ercept}{slope} \quad (2)$$

Standard curve was plotted as concentration values of graded dilutions of the original solution of coating substance to spam all expected concentrations. After treating, a weight of 25 g of each treatment was shaked in 50 ml of distilled water for 30 minutes using a lab. Shaker. The extract ants of different treatments were analyzed. The absorbance of the unknown solutions was conducted with the calibration curve to determine the concentration of analyze. The concentration of the unknown solution, (C_u) was calculated as a percent of the colour of the original coating material.

In the present research, the seeds of corn and wheat were treated with a co-pest-fungicide mixed with coloured inorganic reagent at a rate of 0.022. The conception of this measurement is to measure how much coloured reagent reached the treated seeds under applied studying factors through measuring the intensity of coloured washing solutions of treated seeds by the spectrophotometer and establish a relationship between the absorbance of transmitted light and the concentration of coloured reagent in the solution. An intensely coloured solution should yield a higher absorbance and in turn, a higher coloured inorganic reagent, which means a higher coating efficiency. Five dilutions of initial coating solution were prepared. The apparatus was adjusted to zero using (re-distilled) water by setting it to 880 nanometers and zero percent transmittance, and then was used to measure absorbance of each working standard, starting with lowest concentration. The same procedure was followed to measure the absorbance of different samples of washing solutions of treated seeds as previously mentioned above in materials and methods.

RESULTS AND DISCUSSIONS

From the measured absorbance values of standard solution in the table the standard curve shown in (Fig. 2) was developed. A straight line was approximated through the data points using linear regression. The relationship of the approximated line is described as:

$$Y = a + bx \quad (3)$$

Where: Y: concentration (μg/l), and x: Absorbance of the light. A record of measured absorbance for each of five standard solutions is shown in (Table 1).

Table 1. Measured absorbance and concentration standard solutions

Absorbance	0.012	0.026	0.058	0.116	0.14
Concentration (µg/l)	0.10	0.22	0.60	0.80	1.00

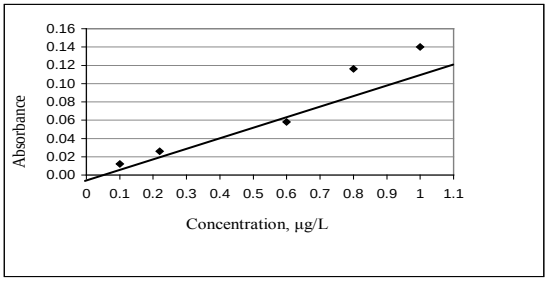

Fig. 2. The standard curve

Concentration = 776.14 × absorbance (4)

By applying the above Equation, the concentration of different samples were determined and referred to the initial concentration to measure the coating efficiency (CE) as a percent of original concentration.

-The effect of coating pan slope on coating efficiency:

The coating efficiency was increased as the slope of coating pan increased up to 27.66×10^{-3} rad., and then tends to decrease with a higher slope angle (Fig. 3). These finding may be understood on the basis that the higher slope value (36.71×10^{-3} rad.) may cause high acceleration of seed movement passing through the coating pan axial trip and does not permit enough time for seeds to be well mixed with the coating material.

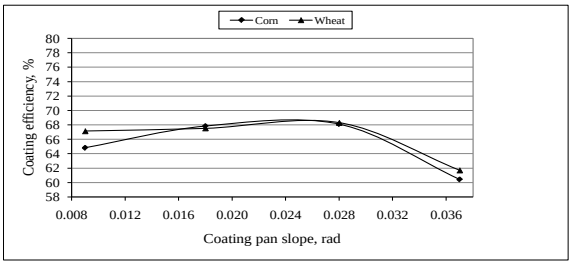

Fig. 3. The effect of coating pan slope on coating efficiency of treated seeds

-The effect of coating pan speed on coating efficiency:

(Fig.4) showed that, coating efficiency was increased as rotating speed of pan increased but this trend is observed only up to 0.056 m/s, and then tends to decrease with higher rates of speed. The results were found to be similar with the two treated crops. This may be interpreted as increasing rotating speed of pan could save a chance for coating material to be well mixed with seeds and produces a higher coating efficiency, but at higher speeds than 0.05592 m/s, the opportunity time for mixing is not enough for well coating.

-The effect of spinner disk diameter on coating efficiency:

The coating efficiency was increased by increasing the spinner disk diameter (Fig. 5). This may due to the increasing of the spinner disk diameter creates a narrow distance that seeds pass from the distance between the disk edge and the cone walls. This may give enough opportunity for seeds to receipt more coating material which means higher coating efficiency. The differences were obvious with corn seeds than those with wheat because the flat surface area of corn is greater than the flat surface area of wheat, so that corn seeds receipt a higher amount of coating material.

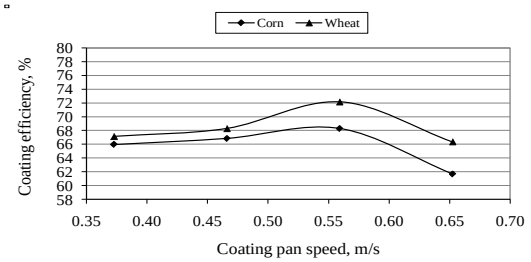

Fig. 4. The effect of coating pan speed on coating efficiency of treated seeds

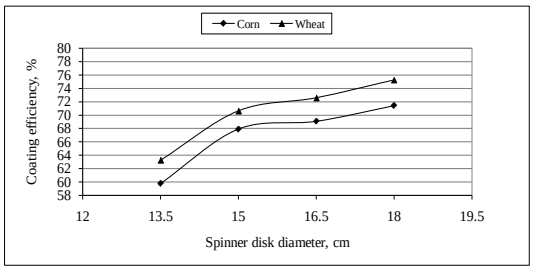

Fig. 5. The effect of spinner disk diameter on coating efficiency of treated seeds

-The effect of spinner disk speed on coating efficiency:

Fig. 6 illustrates that the clear differences were found between (a_1=684 and a_2=828

r.p.m) and a_4=1430 r.p.m. It non-significant between (a_4) and a_3=1049 r.p.m.

These results could be explained on the basis that higher speed of spinning disk leads to decrease the size of droplet of coating material and more efficient distribution on seed surfaces. These results were agreed with the results founded by [3].The disc rotation speed had the most significant effect on droplet size and predicted deposition efficiencies decreased as droplet size increased. The same trend of results was found with all of treated seeds.

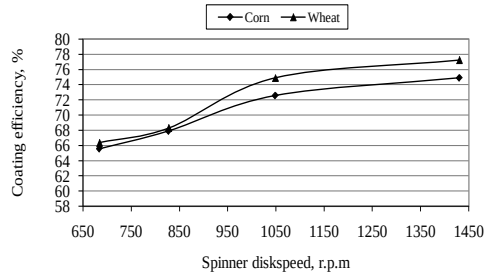

Fig. 6: The effect of spinner disk speed on coating efficiency of treated seeds

Regression analysis was performed to identify the best fitting relationship that represents the correlation between coating efficiency (CE) and different studied factors. (Tables 2 and 3) present the most representative equations for corn and wheat crops.

Table 2: The correlation between coating efficiency and the factors under study and determination coefficient (r) for corn

The relationship variables	The equation form	
	corn	
	CE	r
CE vs. Θ	CE=72.4067 - 267.508Θ	-0.8141
CE vs. V	$CE=72.4713\times(e)^{-0.1925V}$	-0.5281
CE vs. D	CE=-38.0166+38.186lnD	0.934
CE vs. a	$CE=37.4104\times(a)^{0.0971}$	0.9612

Table 3: The correlation between coating efficiency and the factors under study and determination coefficient(r)for wheat

The relationship variables	The equation form	
	wheat	
	CE	r
CE vs. Θ	$CE=70.1625\times(e)^{-2.5996\Theta}$	-0.6669
CE vs. V	CE=67.0829-2.9359V	-0.6113
CE vs. D	CE=-39.5995+39.9945lnD	0.963
CE vs. a	CE=18.4596+8.2266lna	0.9515

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EFFECT OF SOME OPERATIONAL FACTORS ON THE COSTS OF SEED COATING

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Abstract

The present research was carried out at the Station of Seed Processing in Gemmiza Agricultural Research [middle of the Nile Delta-Egypt] to costs evaluate under some operational factors involved in processes of corn and wheat seed coating. The results revealed that, increasing the angle of coating pan and speed pan rotation leads to less needed time for coating 1 ton of corn and wheat seeds and vice versa. Then, the operating costs were reduced from 15.94 L.E.Mg^{-1} to 10.53 L.E.Mg^{-1} under θ_1 and θ_4, respectively [one U.S. Dollar≈ 5.5 Egyptian pound, L.E in 2011]. On the other hand, it reduced from 15.61 L.E.Mg^{-1} to 11.31 L.E.Mg^{-1} under V_1 andV_4, respectively for corn. But in case of wheat, the operating costs were reduced from 17.36 L.E.Mg^{-1} to 12.68 L.E.Mg^{-1} under θ_1 and θ_4, respectively. And it reduced from 16.92 L.E.Mg^{-1} to 12.21 L.E.Mg^{-1} under V_1 and V_4, respectively. The effect of changing speed of spinning disc has not meaningful variation on the time needed for coating 1 megagram (Mg) of corn and wheat seeds.

Keywords: operational factors, seed coating, costs

INTRODUCTION

Seed processing is that segment of the seed industry responsible for upgrading seed, improving planting condition of seed, and applying chemical protects to the seeds. The seed coating process is considered over cost on the price of the seeds so the costs of this process are a signal of the operation efficiency.

The fixed costs include depreciation of the machine, interest on the investment, taxes, insurance and housing of the machine. The machinery costs include the fixed costs that include insurance, depreciation, interest cost, shedding cost, workshop cost, registration cost and implements. The second are the variable costs that include fuel or electric power, oil and grease, wearing parts, repair and maintenance and labor costs [1].

The total annual fixed costs can be calculated according to [2] as follows:

$$C_{os} = \frac{C_{oa}}{P_p} = (1 - S_v)\left[\frac{I_r(1+I_r)^{\tau_L}}{(1+I_r)^{\tau_L} - I_r}\right] + \frac{K_{tis}}{100} \quad (1)$$

Where:

C_{os} = specific annual fixed costs [L.E/Yr],
C_{oa} = total annual fixed costs [L.E/Yr],
P_p = purchase price of machine [L.E],
τ_L = economic life of machine [Yrs],
S_v = salvage value as fraction of purchase price, I_r = real annual interest rate [decimal], and
K_{tis} = annual cost of taxes, insurance and shelter as percent of purchase price.

K_{tis} could be assumed 2% of the P_p unless better data are available; S_v is often assumed 10% of purchase price referring to [3].

Repair and maintenance costs tend to increase with the machine size and complexity, and thus with the purchase price [P_p] of the machine. The following equation

can be used to estimate accumulated repair and maintenance costs [4].

$$\frac{C_{rm}}{P_P} = RF1\left[\frac{t}{1000}\right]^{RF2} \quad (2)$$

Where:

C_{rm}: accumulated repair and maintenance costs [L.E],

t: accumulated use [hr], and

RF1: ASAE repair factor = 0.23

RF2: ASAE repair factor = 1.80

The real interest rate defined as follows, [5]:

$$Ir = Ip\text{-}Ig/1+Ig \quad (3)$$

Where:

I_r = prevailing annual interest rate, decimal,

I_g = general inflation rate, decimal.

Electricity costs for any given operation, per ton can be calculated using the following equation [6 and 7].

$$C_s = P_L\,(Q_i/C_a) \quad (4)$$

Where:

C_s = per one ton electrical costs in L.E/Mg,

P_L = the commercial price of kWh=0.30 L.E

Q_i = electrical consumed by motor in kW/h,

C_a= effective machine production during the operation in Mg/h.

MATERIAL AND METHODS

Corn [*Zea Maize*] and wheat [*Triticum aestivum L.*] seeds were used as a material of study. Gustafson's Metered Slurry Treater, G17-Gross Bagger-SS-6 film coater was used. The operational factors considered in this study were speed of the coating pan [V], slope of the coating pan [θ] and speed of the spinner disk [a]. The treatments were four rates of coating pan speed, 0.3728, 0.4660, 0.5592 and 0.6524 m/s. These values of pan speed were controlled by changing the cogwheel teeth number. The angles of coating pan were 9.043×10^{-3} rad. [0º 31´ 5.19˝], 18.086×10^{-3} rad. [1º 2´ 10˝] [control], 27.66×10^{-3} rad. [1º 35´ 5.9˝] and 36.71×10^{-3} rad. [2º 6` 12˝]. Four speeds of spinner disk were obtained through manufacturing three drive pulleys of 7.5, 9.5 and 11.5 cm in addition to the original one that of 5.5 cm. These pulleys were fixed to the spinner disk on the same shaft, which produced speeds of 1430, 1049, 828 and 684 r.p.m for 5.5, 7.5, 9.5 and 11.5 cm diameters, respectively. The speed was measured using a hand contact Tachometer.

Electricity is available from public electricity board. However, a standby diesel generating set of 45 kW has been installed for meeting exigencies in the event of power shedding or failure.

Coating unit

Coating unit is an assembled unit represents the final step in seed processing operations. It consists of a steel rotating drum equipped with spinner disc and a unit for metering seed device for adjusting the doze of seed feeding plus a unit for pumping the treating material into rotating drum. The power source of the coating unit is two electric motors, one of 10.5 hp for rotating pan and another of 0.5 hp for pumping the coating material.

Labors, technicians and productivity

Usual daily productivity of the plant [without modification] is 20 Mg of corn processed seeds and 18 Mg of wheat processed seeds. This amount of seed is to be processed during a period of 12 h in one shift of 6 men. Actual time period for treating corn and wheat is 90 days/season.

The total costs

-Fixed costs that include purchase price [P_p], annual interest, taxes, insurance and shelter. Purchase price of the unit [as alone] is unknown. Therefore, it will be mentioned as P_p without definite currency value. Annual interest rate was assumed as 10% of purchase price, which was referred as P_p. Taxes, insurance and shelter were assumed as 2% of P_p.

-Variable costs that directly related to the amount of operation. It includes power, repair and maintenance and labour. The repair and maintenance were taken as 1% of the cost of the unit within actual operating time. Based on above information and assumptions, processing load and period available for processing, total cost of coating of corn and wheat seeds were estimated. Super clamp meter-300 k Japan case made

was used for measuring the current strength and potential difference. The consumed power [kW] was calculated according to [8] as follows:

$$\text{Total consumed power} = \frac{\sqrt{3}\,I.V.\eta.Cos\theta}{746} \qquad (5)$$

Where:

I = line current strength in amperes,

V = potential difference [Voltage] being equal to 380 V,

$Cos\ \theta$ = power factor [being equal to 0.84],

$\sqrt{3}$ = coefficient current three phase [being equal 1.73] and

η = mechanical efficiency assumed to be [90%].

The energy consumption in [kW.h/Mg] was calculated using the following equation:

Energy consumption = kW/W = kW.h/Mg

Where:

kW = consumed power to coat a unit weight of seeds under each treatment [kW],

W = machinery line productivity in Mg /h.

The efficiency of the motors was considered to be 90% [8], this means 12.94 actual horsepower. Considering 1 hp = 746 Watt, so, total needed electric power = 14.66×746 ≈ 10.94 kW/h. Electric power cost was informed from the holding company of electricity distribution by [0.3 L.E +10% as sales taxes], i.e., 0.33 L.E/kW. The consumed power [kW] was estimated by dividing the actual accounted energy consumption [kW.h] by the corresponding average productivity [Mg/h] and the difference in consumed power [kW] was calculated under all of studied factor.

Operating or variable costs include fuel or electrical power, oil and grease, labor, repair and maintenance.

In the present study, data collected from private sector owners, show that the labor cost could be considered as 40 L.E/labor per day, so the labor charge for man is simply this hourly rate multiplied by the operation time required for coating a mass unit of seeds under different treatments [in hours] by the hourly cost of labor. The labor wage rate was estimated by 40 L.E/12 h according to the station records, this means that one labor hour costs 2.00 and 2.22 L.E i.e., 12 and 13.33 L.E per Mg of corn and wheat, respectively.

To calculate the total repair and maintenance costs over the life of machine then dividing it by economic life of the machine in hours, the costs of repair and maintenance for one hour could be obtained, multiplying this cost by operation time in hours, actual repair and maintenance costs could be estimated per Mg.

Calculation procedures

The fixed costs were estimated based on the economical life of the unit (30 years). Corn and wheat treating processes expand for 90 days/season i.e., 90×12 h/day [one shift of 12 h/day] = 90×12 = 1080 h/season, that means: [20 Mg of corn/day] ×90 days = 1800 Mg/1080 h = 1.67 Mg/h, i.e. 1 Mg/36 minute or [18 Mg of wheat/day]×90 days = 1620 Mg/1080 h = 1.5 Mg/h, i.e., 1 Mg/40 minute.

Total annual fixed costs = 12% of purchase price [P_p]. Actual time period related to corn and wheat treating = 3/12 = 25 % of fixed costs, i.e., 12%/4 of purchase price [P_p] = 3% P_p. By the same manner, sets of calculating steps were made to estimate the portion of repair and maintenance costs.

RESULTS AND DISCUSSIONS

The costs of coating process were calculated under every treatment as represented in (Tables 1 and 2). Increasing the angle of coating pan and speed pan rotation leads to less needed time for coating one ton of corn and wheat seeds and vice versa (Figs. 1, 2 and 3).

The effect of changing all of diameter and speed of spinning disc has not meaningful variation on the time needed for coating one ton of corn and wheat seeds.

This may be attributed that, the most effective modification on productivity was the angle of coating pan and/or pan rotating speed. Also, from the data in Tables 1 and 2, it could be driven that the economical savings due to applied factors, where decreasing the angle of coating pan slope

from usual angle i.e., (18.086×10^{-3} rad.) to (9.043×10^{-3} rad.) leads to less productivity of the machine and by the way increased the costs by 13.45% for corn and by 12.22% for wheat. Increasing the angle of coating pan slope from (18.086×10^{-3} rad.) up to (27.66×10^{-3} rad.), the productivity of the machine increased and by the way decreased the costs by 16.80% for corn and by 6.27% for wheat while increasing the angle of coating pan slope up to (36.71×10^{-3} rad.) saved 25.05 % and 18.03 % of costs of corn and wheat, respectively.

With respect to the speed of pan rotation, it is observed that, decreasing the speed from usual one i.e., (0.466 m/s) down to (0.372 m/s), the time of operation increased and by the way the productivity of the machine decreased and the cost increased by 13.13% for corn and by 16.21% for wheat.

With respect to the diameter and spinning speed of spinner disk, the differences between different spinning disk diameter i.e. (13.5, 16.5, 18 and 15 cm) spinning disk speed i.e. (1430, 1049, 828 and 684 r.p.m).

These results lead to recommend the highest angle of coating pan slope and the highest speed of pan rotating. But this is not an absolute right because, in spite of the highest angle of coating pan slope and the highest speed of pan rotating saved more time and costs, the coating efficiency was decreased. So, from the economical point of view, θ_3 (27.66×10^{-3} rad.) and v_3 (0.5592 m/s) could be recommended as the highest coating efficiency (CE) was achieved.

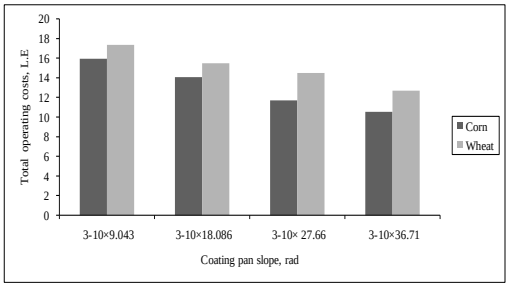

Fig. 1. Effect of coating pan slope on total operating costs

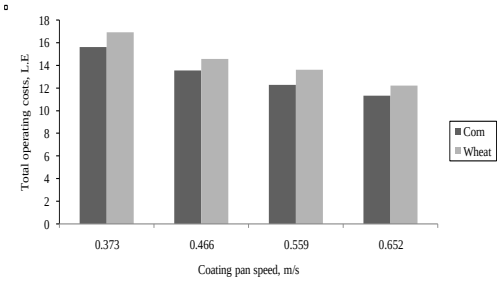

Fig. 2. Effect of coating pan speed on total operating costs

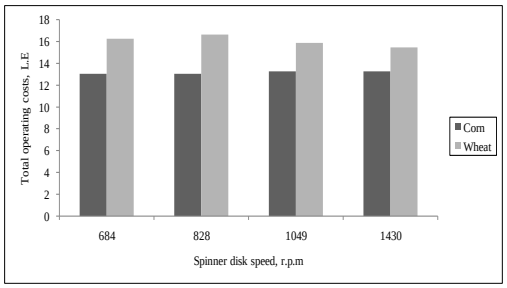

Fig. 3. The effect of spinner disk speed on total operating costs

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Table 1. Productivity of machine and total costs for corn and wheat under different angels of coating pan

Parameters		**Angel of coating pan**				
		Seed	θ_1	θ_2	θ_3	θ_4
Operation time (min./Mg)	Ref.	corn	36	36	36	36
		wheat	40	40	40	40
	After modification	corn	41	36	29.5	27
		wheat	45	40	37	33
Operating cost	Power req. (kW/Mg)	corn	6.59	5.79	4.75	4.34
		wheat	7.24	6.43	5.95	5.31
	Power cost (L.E/Mg)	corn	2.18	1.91	1.57	1.43
		wheat	2.39	2.12	1.96	1.75
	Labor req. (man/Mg)	corn	0.34	0.30	0.25	0.23
		wheat	0.37	0.33	0.31	0.27
	Labor cost (L.E/Mg)	corn	13.60	12.00	10.00	9.00
		wheat	14.80	13.20	12.40	10.80
	Rep. and maintenance (L.E/Mg)	corn	0.158	0.139	0.116	0.104
		wheat	0.172	0.153	0.144	0.126
Total operating costs (L.E/Mg)		corn	15.94	14.05	11.69	10.53
		wheat	17.36	15.47	14.50	12.68
Fixed cost (L.E/Mg)		corn	1.5%(Pp)	1.5%(Pp)	1.5%(Pp)	1.5%(Pp)
		wheat	1.5%(Pp)	1.5%(Pp)	1.5%(Pp)	1.5%(Pp)
Total (L.E/Mg)		corn	15.94+1.5%(Pp)	14.05+1.5%(Pp)	11.69+1.5%(Pp)	10.53+1.5%(Pp)
		wheat	17.36+1.5%(Pp)	15.47+1.5%(Pp)	14.50+1.5%(Pp)	12.68+1.5%(Pp)

Table 2. Productivity of machine and total costs for corn and wheat under different speeds of coating pan

Parameters		**Speed of coating pan**				
		Seed	V_1	V_2	V_3	V_4
Operation time (min./Mg)	Ref.	corn	36	36	36	36
		wheat	40	40	40	40
	After modification	corn	40	34.5	31.5	29
		wheat	44	38	35	32
Operating cost	Power req. (kW/Mg)	corn	6.43	5.55	5.07	4.66
		wheat	7.08	6.11	5.36	5.15
	Power cost (L.E/Mg)	corn	2.12	1.83	1.67	1.54
		wheat	2.34	2.02	1.86	1.69
	Labor req. (man/Mg)	corn	0.33	0.29	0.26	0.26
		wheat	0.36	0.31	0.29	0.26
	Labor cost (L.E/Mg)	corn	13.33	11.60	10.50	9.66
		wheat	14.40	12.40	11.60	10.40
	Rep. and maintenance (L.E/Mg)	corn	0.155	0.134	0.122	0.112
		wheat	0.167	0.144	0.135	0.121
Total operating costs (L.E/Mg)		corn	15.61	13.56	12.29	11.31
		wheat	16.92	14.56	13.60	12.21
Fixed cost (L.E/Mg)		corn	1.5%(Pp)	1.5%(Pp)	1.5%(Pp)	1.5%(Pp)
		wheat	1.5%(Pp)	1.5%(Pp)	1.5%(Pp)	1.5%(Pp)
Total (L.E/Mg)		corn	15.61+1.5%(Pp)	13.56+1.5%(Pp)	12.29+1.5%(Pp)	11.31+1.5%(Pp)
		wheat	16.92+1.5%(Pp)	14.56+1.5%(Pp)	13.60+1.5%(Pp)	12.21+1.5%(Pp)

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THE STRUCTURE OF ARABLE SURFACE CULTIVATED WITH CEREALS IN BRAILA COUNTY IN ORDER TO ESTABLISH A CLUSTER

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Abstract

This study refers to research results of The research project on the development of Clusters in Romanian agribusiness - Studies and analysis of cereals channel in the Plain Baragan, aimed at finding new organizational solutions which can be implemented in the agrarian economy, based on better collaboration between economic agencies, to produce competitive in terms of price and quality ,in a new European design of cluster.Braila county has favorable climatic conditions for cultivation of cereals, the yield and economic efficiency depends on the technologies employed and commissioning of the irrigation system. The area cultivated with cereals is 17.8% of the South-East Area of development of Romania, 98.95% of this area belonged to the private sector in the year 2009.
The area planted with wheat and rye grew by 29.6% in 2005 compared to 2005, and corn ranged from 54.6% in 2005 to 40.6% in 2009.

Keywords **:** *surface, cereals, wheat, corn*

INTRODUCTION

The paper aims to research the organization of rural agro-industrial activities, in the cluster concept. The research results will be applied in the production area bounded by Plain Baragan (Braila county), on a main sector of the cereals pedo-climatic zone.
The objective of this paper is to increase economic and social efficiency of Romanian agri-food sector, through creating and applying by the research and production of new organizational and managerial cluster solutions.
Braila county occupies a total area of 476,576 ha, of which over 349,000 arable hectares, which is 73.23% of the county area and 0.86% of total Romanian territory. Of the total arable area, cereals occupy 322,180 ha in the year 2009 and represents 18.55% of total South-East area.

MATERIAL AND METHODS

The study is part of the project "Research on the development of Romanian agribusiness clusters", and at its base were the documentation and field studies conducted in the county, the amount of information resulting from research carried out involving their synthesis through different and multidisciplinary collection, processing and analysis methods and techniques.

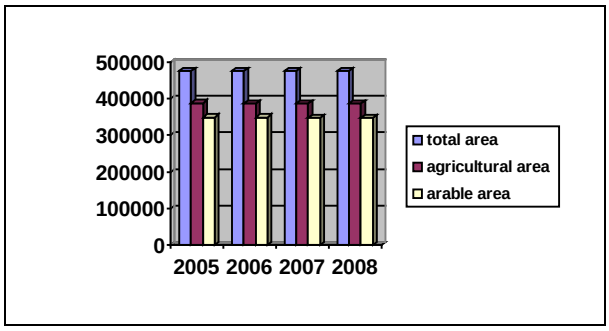
RESULTS AND DISCUSSIONS

In Braila county's agriculture, can meet the most simple production technologies, which applies only plowing, sowing and mechanical harvesting (which are specific to small agricultural producers, which hold up to 2-3 hectares of arable land) and up to modern technologies applying fertilization, pest and disease control, irrigation.[1]
As shown in Table 1, Braila county agricultural area represents 81.5% of total area. Of the agricultural area of 387,392 hectares in 2008, 349,089 hectares, 90.11% respectively, represent the arable one. An insignificant share is the area planted with meadows, vineyards and orchards, all amounting to 1% of the total area, in the year 2008.

Table 1. Braila county's agricultural area, by use (ha) [2]

Years	Total surface	Agricultural surface	Of which, by use				
			Arable	Pastures	Grassland	Vineyards	Orchards
2005	476576	388428	349515	33304	74	4805	730
2006	476576	388100	349401	33144	-	4825	730
2007	476576	387470	348899	33003	-	4817	751
2008	476576	387392	349089	33171	-	4492	640

Figure 1. Evolution of agricultural and arable area in Braila county (ha)



By analyzing Table 2, indicates that in the Braila county, cereals occupies an important place in the agricultural crops structure. Cereal production in the county is focused mainly on the cultivation of wheat, maize and barley.

During the period analyzed, respective 2005 - 2009, has tended to increase the share of area planted with cereals, partly because of their importance in food consumption pattern and in the economy of small farms, and on the other hand, these cultures being adapted to climatic conditions in the county.

Thus, the area planted with cereal grains in Braila county is 17.8% of surface area planted with cereals in South-East development area of Romania and has increased from 178,706 hectares in 2005 to 199,606 hectares in 2009, with a proportion of 11.7%. Of the total area cultivated with cereal grains in the county for the year 2009, 98.95% belongs to the private sector, and from this, 46.6% are individual farms.

Table 2. The area cultivated with cereals, by type of property in South-East Region and the county of Braila [3]

Main crops	Types of property	Development region and county	Years				
			Year 2005	Year 2006	Year 2007	Year 2008	Year 2009
			MU: Ha				
Total	Total	South-East Region	1636451	1555410	1585102	1707790	1736042
-	-	Brăila	313766	294258	319588	296505	322180
-	Private sector	South-East Region	1588086	1521745	1553644	1674299	1717613
-	-	Brăila	304623	290632	315155	292987	318680
-	of which: individual holdings	South-East Region	940593	1002373	900832	959327	968671
-	-	Brăila	166744	160679	162231	135315	153702
Cereal grains	Total	South-East Region	1043482	906085	977091	1094189	1122770
-	-	Brăila	178706	159517	180852	179815	199606
-	Private sector	South-East Region	1014917	895578	963786	1083339	1115780
-	-	Brăila	174358	158041	178756	177930	197513
-	of which: individual holdings	South-East Region	651023	628387	588304	638639	643904
-	-	Brăila	107007	98346	95938	82625	92023
Wheat and rye	Total	South-East Region	396661	311069	373338	501993	498202
-	-	Brăila	61341	52630	69016	68734	79481
-	Private sector	South-East Region	383885	307478	367530	497518	495481
-	-	Brăila	58995	51814	67860	67828	78529
-	of which: individual holdings	South-East Region	203809	154983	156381	214778	215175
-	-	Brăila	23956	22733	26669	18663	24712
Rye	Total	South-East Region	234	270	179	232	311
-	-	Brăila	:	:	11	4	107
-	Private sector	South-East Region	234	260	163	222	301
-	-	Brăila	:	:	5	4	107
-	of which: individual holdings	South-East Region	150	147	90	131	95
Wheat – total	Total	South-East Region	396427	310799	373159	501761	497891
-	-	Brăila	61341	52630	69005	68730	79374
-	Private sector	South-East Region	383651	307218	367367	497296	495180
-	-	Brăila	58995	51814	67855	67824	78422
-	of which: individual holdings	South-East Region	203659	154836	156291	214647	215080
-	-	Brăila	23956	22733	26669	18663	24712
Common wheat	Total	South-East Region	396347	310574	372737	500996	494357
-	-	Brăila	61341	52630	69005	68656	78656
-	Private sector	South-East Region	383571	306993	366945	496531	491780
-	-	Brăila	58995	51814	67855	67750	77704
-	of which: individual holdings	South-East Region	203579	154811	156243	214647	214747
-	-	Brăila	23956	22733	26669	18663	24712
Durum wheat	Total	South-East Region	80	225	422	765	3534
-	-	Brăila	:	:	:	74	718

-	Private sector	South-East Region	80	225	422	765	3400
-	-	Brăila	:	:	:	74	718
-	of which: individual holdings	South-East Region	80	25	48	:	333
Barley and two-row-barley	Total	South-East Region	108182	65497	115239	111585	168637
-	-	Brăila	16612	13545	20633	22547	31067
-	Private sector	South-East Region	105228	64318	112686	109144	166599
-	-	Brăila	15806	13204	20221	22151	30465
-	of which: individual holdings	South-East Region	46601	30392	50277	43194	60759
-	-	Brăila	6750	5499	7513	7301	9351
Barley	Total	South-East Region	26713	9406	28193	43342	71285
-	-	Brăila	2637	2731	7082	11559	16238
-	Private sector	South-East Region	25452	9103	27588	42221	70104
-	-	Braila	2573	2726	6995	11275	15827
-	of which: individual holdings	South-East Region	12423	2818	8444	12699	19490
-	-	Braila	922	776	1806	1634	2738
Hop	Total	South-East Region	:	:	:	45	:
-	Private sector	South-East Region	:	:	:	45	:
Oat	Total	South-East Region	18418	16234	20422	15761	15967
-	-	Braila	1055	700	1438	555	434
-	Private sector	South-East Region	16546	14986	19370	14600	15010
-	-	Braila	551	641	1308	395	270
-	of which: individual holdings	South-East Region	12156	12588	16104	12596	12862
-	-	Braila	551	467	1024	146	151
Maize	Total	South-East Region	516382	509590	460054	455514	429412
-	-	Braila	97578	89957	83934	81304	81019
-	Private sector	South-East Region	505590	505139	456272	452882	428221
-	-	Braila	96886	89725	83573	80986	80667
-	of which: individual holdings	South-East Region	388069	429760	363952	367364	354504
-	-	Braila	75680	69574	60726	56150	57740
Sorghum	Total	South-East Region	86	290	256	490	961
-	-	Braila	:	19	148	396	651
-	Private sector	South-East Region	86	290	246	490	961
-	-	Braila	:	19	148	396	651
-	of which: individual holdings	South-East Region	30	101	2	245	149
-	-	Braila	:	7	2	203	69
Rice	Total	South-East Region	1942	2500	5499	6102	7104
-	-	Braila	1900	2500	5499	5859	6861
-	Private sector	South-East Region	1942	2500	5486	6102	7093
-	-	Braila	1900	2500	5486	5859	6850

Figure 2. Evolution of cultivated area and cereals grain cultivated area

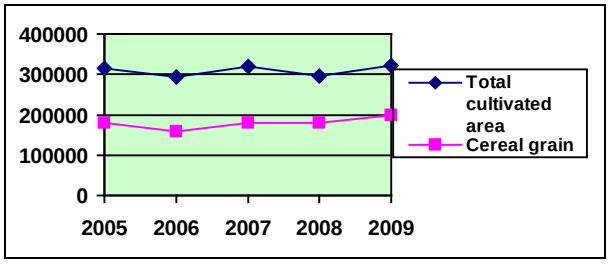
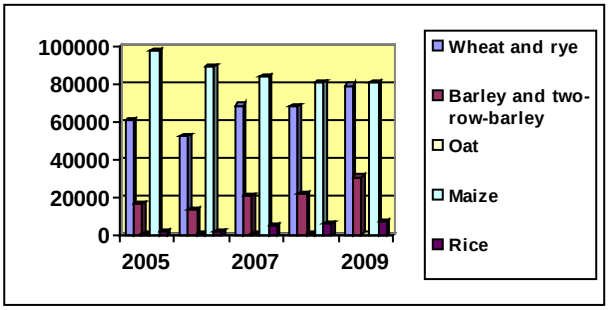


Figure 3. Evolution of cereal grain area structure



Regarding the evolution of area cultivated with wheat and rye, it grew by 29.6% in 2009 compared to 2005. The area planted with these grains is held, in the year 2009, the proportion of 98.8% by the private sector, that is 78,529 hectares.

Share of total grain maize cultivation ranged from 54.6% in 2005 to 40.6% in 2009, this culture is very important in the economy of small farms, both as a plant food and as feed. In fact, Romania is an important producer and consumer of corn.

A notable absence among cultivated cereals in Braila county by 2008 is the durum wheat, which is crucial for pasta quality, competitive for export and for this reason processors imported durum wheat, which they used as raw material. Since 2008, this cereal is introduced into the culture on an area of 74 hectares in the private sector, leading in 2009 to an area of 718 hectares in the sector. [4]

CONCLUSIONS

Regarding the structure of cereals growing areas in the county of Braila, one can see that it corresponds with the general characteristics of the area, the largest share occupying a land planted with maize, followed by wheat and rye. During the period analyzed, ie 2005 - 2009, has tended to increase the share of area planted with cereals, partly because of their importance in food consumption pattern in the economy of small farms, and on the other hand, these cultures being adapted to climatic conditions in the county.

ACKNOWLEDGEMENTS

This research work was carried out with the support of Agricultural Department of Braila and also was financed from Project PND II No.92111/2008.

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[3] x x x – National Institute of Statistics database
[4] x x x – Agricultural Department of Braila database

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SWOT ANALYSIS OF THE CEREALS CHANNEL IN BRAILA COUNTY

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Abstract

SWOT analysis of the cereals channel at Braila county enables us to define the requirements and directions for future development of the cereals channels at the level of analyzed county. In the analysis basis, were the field studies conducted in the county, and the volume of information resulting from studies and research have involved their synthesizing through various multidisciplinary methods and techniques for collecting, processing and analysis. From the cereals channel analysis in Braila county, will result the following: analysis of grain production, system analysis of the acquisition, storage and marketing of cereals production, grain handling system analysis and selling the products to consumers, keeping into account the weaknesses , strengths, risks and opportunities.

Keywords *: analysis, strengths, weaknesses, opportunities.*

INTRODUCTION

SWOT analysis is a management technique that is particularly used in strategic planning. It is commonly encountered in preparing business plans, in solving problems or making management decisions. SWOT is an acronym for Strengths, Weaknesses, Opportunities, Threats.
SWOT analysis is a way to examine the viability of the business by identifying strengths, weaknesses, opportunities and risks associated with the activity.
The method has been used in studies performed for NDP II No.92111/2008 Project - Research on the development of Romanian agribusiness clusters - Research and analysis on cereal in the Plain Baragan for analysis of cereal channel, in order to set up a profile cluster.

MATERIAL AND METHODS

SWOT Analysis of cereals channel in the Braila county considered: chain resources and internal capabilities (strengths, weaknesses) and external factors (opportunities and threats) in all its stages: agricultural production, product storage, processing, marketing and consumption.

RESULTS AND DISCUSSIONS

WEAKNESSES	***STRENGTHS***
STAGE OF AGRICULTURE	
Fragmented farmland and predominance of subsistence households, which affects their access to market [2]	Arable land has a significant share in the agricultural and soil quality, especially in the Southeast is favorable to cereals
Insufficient irrigation facilities and poor insurances system causes low yields per hectare, up to compromise culture	The possibilities of irrigation, although small compared with the period before 2005, but increasing in recent years is a favoring factor for agricultural crops
Costs of inputs for agricultural production are considerably higher, which threaten the level of agricultural prices, much higher than those in the	Reintroduction, in 2008, in culture, of durum wheat, which is crucial for pasta quality, competitive for export

EU market	
Insufficient own financial resources that determine farm to practice bad technology and therefore get lower production and higher costs	Structural flexibility in the farms, agricultural land being rented by efficient, big sized companies
Access to financial resources is limited because of high costs that exceed the economic power of most farmers, especially family households	
Low yields and instability of the annual production of cereals needed for domestic consumption as a result of agricultural techniques and technology used, outdated	
Often poor quality of cereals and of Romanian cereal products, caused by inadequate production or storage conditions	
Low prices received by farmers from traders and processors. They are usually at the expense of the agricultural sector due to low bargaining power of small farmers, lack of adequate storage capacity, the failure of the system of certificates of deposit and finally even worse because of the quality of grain produced in small farms, which usually less meet the modern technologies of cultivation	
The inability of small grain farmers are to improve competitive capacity on the market has the effect of loss of attractiveness for agriculture and lean towards its termination, towards renouncing at ownership over their land and move to other non-agricultural activities	
Insufficient capacity of the fleet of tractors and agricultural machinery	
STORAGE STAGE	
Poor access to information on storage charges	At county level there are significant storage capacity of agricultural production, with transport facilities
Reduced capacity to negotiate storage taxes and to support transport costs to big distance	
Major deficiencies in the use of storage capacity and in forming stocks in the years with high yields	
The space available for storage is not used to its capacity, largely due to the practice of high monopoly tariffs by depositories	
Some silage capacity requires investment on the modernization, especially the handling operations and reduce transportation and storage losses	
PROCESSING STAGE	
Insufficient modernization at mills	The existence of adequate processing capacity for the main cereal
Processing sector has high production capacity, less flexible and completely unused	
MARKETING STAGE	
Lack of marketing programs for farmers, knowing what and how they produce for market	By placing, Braila county, having port on the Danube, has access to markets located in the East, offering great opportunities of development of grain exports
Prices of agricultural products don't have a coherent foundation for determining their level	In a large part of the farmers is manifested the entrepreneurial spirit, their economic behavior expressing through successful and

	profitable business, that know a permanent extension
Domestic supply instability both quantitatively and qualitatively	
A weak organization of agricultural markets and the lack of information on domestic producers of export opportunities	
Poor cereal export structure where prevailing grain cereals (raw material) and a reduced profit margin	
Dominance in imports of processed products with high added value have increased in value terms the trade deficit	
Deficiencies in compliance with quality standards in all channel components	
CONSUMPTION STAGE	
Wheat consumption per capita is double comparing to the EU, due to the national pattern of consumption and especially low income of people who cannot provide a qualitative structure of the normal daily ration	
OPPORTUNITIES	***RISKS***
STAGE OF AGRICULTURE	
Opportunities to increase average yields per hectare of all cereal crops [1]	Decreases in crop by applying bad cultivation technologies
Initiate competitive business in agriculture, based on efficient cultivation of land through crop structure diversification and compliance cropping	Record harvest losses by sowing and harvesting outside the optimum ages
Encouraging foreign investment	Reduced cereal prices
	Difficulties in adapting to EU requirements
	A flawed business environment, characterized by bankruptcies, corruption, debt unrecovered
STORAGE STAGE	
Expanding cooperation between the farmers on the storage products line and increasing the influence on market	
PROCESSING STAGE	
Upgrade path processing procedures by investments	Processing capacity and technical and technological equipment can be damaged
	Vertical integration performed in large processing units that will dominate agricultural production, disadvantaging farmers
MARKETING STAGE	
Wide access of producers to cheep credits would give them possibility to postpone agricultural products selling, by a more favourable moment, reducing the pression of harvesting over market price, but also diminishing the state role in the activity of agricultural products trading for more effective support of agriculture with public funds	Marketing can focus beyond certain limits, which would lead to monopolies
Upgrade path processing procedures with investments	
A wider access to U.E. markets and Community financial funds	
Improving supply chain activities	
Increasingly recourse to transactions and use of modern tools of marketing	

CONCLUSIONS

From the SWOT analysis for cereal channel and baking products can be drown a number of conclusions as strengths, weaknesses, opportunities for improvement of work and risks that may arise from the cereal channel from Braila county. The general conclusion is the grain channel in Braila county presents instability and self-limited capacity in terms of market mechanisms. Hence the need for measures to improve economic competitiveness and performance of cereal through the establishment of profile clusters.

ACKNOWLEDGEMENTS

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IRRIGATION IN SERBIA - DEVELOPMENT CONDITIONS AND PERSPECTIVES

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Abstract

Land and water represent irrestorable natural resources. Every living creature on the Earth, including state, nation and entire economy of an area depend on these resources. Water, being one of basic natural factors for growth and development of all plants, participates in all basic processes in the lives of plants. Therefore, growth and development of plants depend mostly upon water content in the air and in the soil. Agricultural land surfaces with irrigation systems in Serbia, water springs used in irrigation systems and basic development perspectives on irrigation in our region are shown within this work. The results of the above mentioned statistical research show that irrigation hasn't been developed sufficiently in our region, but that it has perspectives on future development.

Keywords: *irrigation, soil, development perspectives*

INTRODUCTION

The characteristics of the climate in Serbian area are: temperate continental climate with the average annual rainfall of 734 mm which is around 65 billion of m^3 of water sediment. However, uneven spatial and temporal distribution of rainfall spans between more than 1500 mm in mountain regions and 550 mm in plain regions of Bačka and Banat. On the other side, lowest rainfall occurs in zones with the highest qality soil and in periods of vegetation, when strong need for water occurs.

Therefore, almost every year a dry period occurs (longer or shorter), disregarding the annual amount of rainfall. Droughts appear in different ways and sometimes reach large scales, and when they appear during critical phases of plants regarding water then most negative effects they have.

Deficit of soil moisture, which, in our climate conditions, expressive during summer months, appears not only in dry, but also in temperate wet years. Deficit of moisture amounts in average from 100-200 mm, rarely above 300 mm annually. Periods with very low rainfall lasting several years, particularly in the second part of vegetative period are characteristic of our climate conditions. Therefore, an intensive agricultural production followed by high and stable income isn't possible without an application of irrigation.

By irrigation, quantities of water necessary for normal growth and development of agricultural cultivities are enabled, in conditions when the amount of rainfall is insufficient or the distribution of rainfall is negative during vegetative period. Irrigation enables survival and life for plants in regions where long and permanent droughts occur, while in other regions it represents additional measure for achieving high returns and two harvests. In our country, whose characteristics are unstable climate with the amount and distribution of rainfall that varies from year to year, irrigation is a very important factor of growth and stabilization of agricultural production. The application of irrigation enables high production results, and the economy of investment in irrigation systems points at the priority which should be given to this measure of agricultural production. Namely, irrigation could stabilize food production, in other words increase food

production and induce development of cattle raising, light industry and other branches of economics. Within the structure of irrigation systems other structures are being built which could exert positive influence directly or indirectly on the development of agriculture and social standard.

Irrigation has wide area application and can be applied for various purposes. Beside the application aiming to moisturize soil, it is being applied for the purpose of fertirigation, frost protection, phytosanitary protection, soil desalination (removing salt from soil) and other. However, its basic use is for the purpose of adding water to soil in order to achieve optimal growth and development of agricultural cultivity, when during vegetative period there is an insufficient amount of water in the soil.

Although irrigation as a measure is almost as old as human civilization, it represents a modern measure which enables intensive way of using cultivable soil and high, stable and quality agricultural cultivities return and two harvests.

The use of soil together with the application of irrigation enables, first of all, wider choice of agricultural cultivities during vegetation, especially regarding early vegetables, then two harvests per unit of surface measurement and reliable and stable agricultural production that excludes variation. Therefore, nowadays irrigation has been observed not as production measure which should substitute or supplement insufficient natural rainfall, but as a remarkable factor related to more intensive use of agroecological and technical conditions. The application of this measure is no more being related to arid and semi-arid conditions, but the effect of irrigation is much more complex.

MATERIAL AND METHODS

In order to characterize irrigation and its development conditions and perspectives, the following indicators were used: Used agricultural land (total, thousand ha); Irrigated area (total, ha); Surface, Sprinkling, Leaking, Plowed fields and gardens, Orchards, Vineyards, Meadows (total, ha);

The period analyzed in this study is 2000-2009. The data, collected from Ministry of Agriculture, Forestry, Trade and Water Management. Also, authors use "Statistics Annuals of the Republic of Serbia"

RESULTS AND DISCUSSIONS

Current state of irrigation and its significance

Natural conditions in our country enable various soil use, in the form of plowed fields, vineyards, orchards, meadows, pastures and woods. There is about 8,8 million hectares of total available land fund in the Republic of Serbia, out of which there is 5,9 million hectares of land under cultivation, out of which 4,7 million hectares represent cultivable soil, more exactly 3,7 million hectares are plowed fields. However, not all cultivable soil is suitable for irrigation. 3,6 million hectares of cultivable soil is suitable for irrigation.

Large natural water currents in Serbia, like the Danube, the Sava, the Tisa and other, as well as DTD hydro system enable the amount of water necessary for irrigation, while other regional hydro systems and certain number of hydroelectric power stations must be prepared for that purpose. On the other side, considering that we live in the epoch of technological prosperity and industrialization and that one of natural resources - water - is a recipient of enormous quantity of wastewater and is exposed to numerous other sources of pollution as well, problems in evaluating the quality of water in order to use it for irrigation are fullyexpressed. There is a growing deficit of good quality water in nature, with a trend of its further aggravation. However, water from almost all water currents in Serbia still can be used for the purpose of irrigation, cautiously and with permanent control.

According to the percentage of irrigated soil in relation to the total soil suitable for irrigation, our country is far behind all neighbouring countries and is placed at the bottom of European scale. Current state of irrigation in Serbia is such that less than 1% of soil is intensively irrigated. The most frequent reasons for low level of use of already existing

irrigation systems are difficult position of agriculture, insufficient equipment related to additional measures of productions in households that have irrigation equipment and general insufficiency of financial resources for machine and irrigation system maintenance [Operative irrigation development program for the Republic of Serbia 2000-2005.].

Statistical data show that total irrigated area on the territory of Serbia (without Kosovo & Metohija) for the period from 2001-2009. was in average 27791.9 ha, out of which 4056.2 ha in Central Serbia and 23735.7 ha in Vojvodina (Table 1.). Plowed fields are mostly being irrigated, while less irrigated are orchards, vineyards and meadows.

Table 1. Irrigated area in the Republic of Serbia for the period from 2000-2009.

Years of research	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Average
The Republic of Serbia											
Used agricultural land (total, thousand ha)	5109	5112	5107	5115	5113	5074	5066	5053	5055	5058	5086.2
Irrigated area (total, ha)	26845	29688	37017	28072	21287	26845	25566	25763	26260	30576	27791.9
Surface	4828	5384	5940	4916	4596	4828	5437	3067	1571	1506	4207.3
Sprinkling	20964	23614	30220	22439	16243	20964	19647	22061	24172	28585	22890.9
Leaking	1053	690	857	717	438	1053	482	635	517	484	692.6
Plowed fields and gardens	24054	27852	35111	26250	19836	24054	24025	24339	25035	29781	26033.7
Orchards	2593	1730	1883	1550	1451	2593	1521	1204	924	728	1617.7
Vineyards	178	79	-	212	-	178	-	-	302	67	169.3333
Meadows	20	27	60	60	-	20	-	-	-	-	37.4
Central Serbia											
Used agricultural land (total, thousand ha)	3322	3324	3325	3322	3321	3316	3318	3305	3306	3311	3317
Irrigated area (total, ha)	5557	3746	4208	3014	3114	5557	3698	3675	4130	3863	4056.2
Surface	1326	873	232	434	342	1326	324	96	201	76	523
Sprinkling	3901	2660	3775	2496	2762	3901	3357	3398	3752	3589	3359.1
Leaking	330	213	201	84	10	330	17	181	177	197	174
Plowed fields and gardens	4345	3070	3782	2750	3040	4345	3524	3258	3784	3595	3549.3
Orchards	1145	649	366	144	74	1145	154	197	263	227	436.4
Vineyards	60	-	-	60	-	60	-	-	84	41	61
Meadows	7	27	60	60	-	7	-	-	-	-	32.2
Autonomous Region Vojvodina											
Used agricultural land (total, thousand ha)	1787	1788	1783	1794	1792	1758	1748	1748	1749	1747	1769.4
Irrigated area (total, ha)	21288	25942	32809	25058	18173	21288	21868	22088	22130	26713	23735.7
Surface	3502	4511	5708	4482	4254	3502	5113	2971	1370	1430	3684.3
Sprinkling	17063	20954	26445	19943	13481	17063	16290	18663	20420	24996	19531.8
Leaking	723	477	656	633	438	723	465	454	340	287	519.6
Plowed fields and gardens	19709	24782	31329	23500	16796	19709	20501	21081	21251	26186	22484.4

Orchards	1448	1081	1517	1406	1377	1448	1367	1007	661	201	1151.3
Vineyards	118	79	-	152	-	118	-	-	218	26	118.5
Meadows	13	-	-	-	-	13	-	-	-	-	13

Source: Statistics Annuals of the Republic of Serbia

For the purpose of irrigation we can use natural water currents (rivers), accumulations and lakes, groundwater and some other sources (Table 2).

Table 2. The use of water for the purpose of irrigation expressed in m^3

Years	The source of water used for irrigation				
	Groundwater	Water currents	Accumulations and lakes	Other	Total
2005	693	50911	2074	8	53686
2006	2140	84415	3087	378	90020
2007	914	86802	4675	-	92391
2008	2045	43333	3031	-	48409
2009	1280	38602	3595	-	43477
Average	1414.4	60812.6	3292.4	193	65596.6

Average data from the table for the period of the last several years registered in the Republic Bureau of Statistics show that natural water currents have mostly been used for irrigation - 92 % in average, accumulations and lakes 5%, groundwater 2.2%, while the remaining 0.8% go to the other sources of water used for irrigation.

The fact is that irrigation is very useful, but can also provoke unwanted effects on a large scale in land and raised plants. Their later elimination is often very complicated and expensive. Water is a distributor of many substances, some of which are useful, and some harmful, even toxic to plants. Exerting influence on soil, water used in irrigation exerts influence through soil on the plant, in other words on its height, quality and appearance and, consequently on the economy of production.

Regardless its source, water used for irrigation always contains certain ingredients in the form of dissoluble or sometimes indissoluble substance. Exactly quantity and nature of those substances in given ecological conditions determines the quality and use of water. Basic criteria in estimating the quality are analysis of chemical and physical characteristics. The quality of water used for irrigation is being defined from the aspect of its influence on growth and development of plants, its influence on soil characteristics, biological balance of soil and irrigation technology. Remains of some chemical compound could impede scooping water from its source and its drainage.

The quality of water for irrigation should be estimated from chemical, mechanical and microbiological aspect. Low quality of water could have as a consequence slow plant growth, deformed fruits and plants, and in some cases withering plants.

Water used for irrigation must be of satisfactory quality. Chemical, mechanical and biological structure is being estimated. Specialized institutions carry out detailed chemical analysis, giving reference for preparation and the way of use. If water from water currents and stagnant water is used, analysis is carried out quarterly, with the change of seasons, and if the source is unstable even more often.

Control of electrical conductivity of water EC and pH value is carried out daily. EC represents the quantity of salt, but nutrients also and pH represents acidity, or baseness. Water procession for the purpose of irrigation is an expensive treatment, worthwhile only for big structures.

Low quality of water could result in slow plant growth, deformed fruits and plants, and in some cases withering plants. High concentration of salt in water coud impede carring water from the root through a plant. Accumulation of salt results in leaves "burns".

The quality of water used for irrigation and its application depend on, beside natural factors, waste water from cities and industries which

are released into water currents. Pollution of recipients could have seasonal or permanent character, so therefore estimation of water quality should be based on the data about seasonal quality variation. Therefore once a month estimation of the quality should be carried out for elements that are under risk in concrete conditions.

Low and negative irrigation water quality could be improved by adding certain ingredients, or, in rare cases, by removing harmful ingredients.

Irrigation development strategy in Serbia

Agriculture as an economy branch represents a base of total economic and social development of our country. However, it is evident that growth of agricultural production couldn't even be imagined without irrigation development. Therefore it is understandable that irrigation development in Serbia represents one of priorities in agrarian politics of the Ministry of Agriculture and Waterpower Engineering. In that sense, during 2001. already certain activities regarding irrigation development planning and providing financial resources for the realization of those plans were carried out.

Considering large national significance of agriculture, irrigation development in Serbia couldn't only rely on foreign investors, but all potential domestic natural and financial resources must be activated. Having in mind the structure of our population and characteristics of land properties, irrigation development plans must be adapted to concrete conditions of Serbian land. Therefore it is significant that development of future irrigation systems should be planned in two basic technical directions, one of which would include construction of large systems, in areas of several thousand hectares (which now belong to public property plants), while the other would be related to smaller systems, in areas up to 100 ha.

One of the ways to provide financial resources for the construction of irrigation systems in Serbia included formation of special investment fund. This fund could be formed using already existing fiscal mechanisms. In that sense, one of the possibilities would be based on introduction of taxes on financial transactions, by which investment fund for irrigation development would be formed. The other alternative includes provision of urging resources for irrigation development within the Republic budget. It should be pointed out that formation of special investment fund for irrigation development in Serbia would certainly get agrarian population support (whose economic, social and political significance is certain). Based on the known physical and geographic characteristics of the region of Serbia and distribution, quantity and quality of land and water resources, plan of phase realisation of irrigation system would be created. It is understandable that irrigation systems which would give the largest and fastest results would be constructed first, which is very important from the aspect of conferring of a new approach to irrigation development.

Current status of irrigation in Serbia doesn't correspond to potential economic and social significance of this activity. Irrigation in our country is treated as an additional measure of stabilization of agricultural production, by which negative droughts effects are being neutralized. That kind of narrow understanding of irrigation, with campaign approach to irrigation, includes preservation of traditional agriculture and classical structure of production. Besides, in lots of cases, basic conditions for successfull irrigation application haven't been realized - redistribution of land and redistribution of fields, as well as property enlargement. Special problem lies in the domain of production organization and disposal of market surplus.

New, modern approach to irrigation, includes big changes in whole agrarian sector and state led agricultural policy. It is necessary to create a kind of frame that will rationally fit irrigation into the whole system of agricultural production and become an important factor of agrarian sector development. This approach also requires food industry and subordinate branches transformation. Intensive irrigation development with signifficant increase of agricultural production, requires an adequate adaptation of food industry structure. Only

that way it is possible to accomplish real economic effects and justify investments in irrigation system construction.
National irrigation development strategy could be realized through appropriate system measures of state led agricultural policy. In relation to that, it should be emphasized that strategy of intensive development includes a change in public attitudes towards agrarian complex. In a vision of Serbian development in future decades, agrarian complex should be placed where it belongs, considering natural and social conditions and level of development of our country.

CONCLUSIONS

Serbia has about 0,4 ha of plowed field per capita and that land fund has been reducing constantly. Sufficient quantity of food for the population should be provided on that small area. There are good conditions for irrigation intensification regarding land as well as available water. Therefore all conditions and posibilities must be activated to increase food production and irrigation is one of them.
Reached level of irrigation development in Serbia doesn't satisfy the needs of stable and efficient agricultural production. Irrigation wasn't put on the right place in our agriculture because every bumper crop year push it into the background. Irrigation systems constructed during the 70s and 80s have been neglected and are not working, so they are partly out of use, or they are not being used because of impossibility to invest on a larger scale into the production and insufficiency of interest because of disparity of prices and uncertain payment of finished products.
Strategic irrigation starting point in Serbia is that it shouldn't be treated simply as a measure of fight against drought and additional measure for stabilization of agricultural production in its current structure. Construction of irrigation systems should create economic and organizational frames within which the whole agricultural production with all following fields (cattle raising, procession, ransom, turnover, etc.) should be transformed in conformity with primary production through irrigation. The whole structure of food industry to the highest levels of finalization should be transformed and developed having in mind completely new resource, economic and production base that starts with irrigation in conditions of agricultural development.
Considering large national significance of agriculture, all potential domestic and foreign financial resources must be used. Having in mind the structure of our population and characteristics of land properties, irrigation development plans must be adapted to concrete conditions of Serbian land. Therefore it is significant that development of future irrigation systems should be planned in two basic technical directions, one of which would include construction of large systems, in areas of several thousand hectares (which now belong to public property plants), while the other would be related to smaller systems, in areas up to 100 ha. Construction of large irrigation systems would mostly lean on foreign financial resources (in the form of franchise or credit), while smaller systems would be financed by domestic resources.
With an application of irrigation it is possible to assure certain and high income of certain agricultural cultivities. However, experience and tradition related to irrigation on larger scales is missing which in a certain way slows down its application and expansion in larger areas. However, individual very successfull results points to the perspective of irrigation in our conditions.

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CRITERIA AND PRINCIPLES OF SUSTAINABLE DEVELOPMENT

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Abstract

In the context of ecosystem-ecoefficiency duality, sustainable development of society involve the care of humanity for its actual and future resources. Efficient use of natural, energetic, material and informational resources suppose both the responsible approach for the future generations and the intensifing of the sustainable economy working for the actual requirements satisfaction of the society. Work presents an unitary and coherent ensemble of the strategic and integrated management criteria and principles of the sustainable development in respect to the efficiency increase of the natural, energetic, material and informational resources.

Keywords*: duality, ecosystem-ecoefficiency, informational, strategic*

INTRODUCTION

The essence of durable development of the human society is given by the handling mode, future and actual, of its natural, energetic, material and informational resources, taking into account economic growth objectives and the assurance of quality of life and environment. Economic development is accomplished not only for the satisfaction of basic material needs, but also for supplying the resources for improvement of the quality of life in directions like health, education, and a good environment. A lot of economic development forms, appeal to the environment, in the sense that they use natural, energetic, material and informational resources (resources that are usually on the limit) and generate polluting products and environment deterioration. But, at the same time, there are many ways through which certain types of economic activities, can protect or improve the environment. These include efficiency methods for the usage of natural resources, energy, materials, information, technologies and improved management techniques, a better projection and marketing for the products, minimizing deterioration of the environment (non-polluting technologies, low consuming technologies, waste capitalization, biotechnologies), environment friendly agricultural practices, a better usage of land and constructions, improved transport efficiency.

MATERIAL AND METHODS

One of major challenge of sustainable development is to find ways to encourage the economic activities friendly with the environment and to discourage those activities which make major damage to the environment (air, water and soil pollution and also to the subsoil). Because the environment and its resources are shared between various users, for extending the protection and to save the resources, the collective activity is necessary.

Decisions must be taken on economic development taking into account the potential costs of pollution and damage to the environment, the value of resources which are consumed and by conversion the value of any environment improvements. …some time its difficult to establish which are the environment costs, what resources quantity can be used without affecting their regeneration and which benefits exist or will be provided as a result of a human action.

In terms of natural and energetic resources, the activities run on two principal directions: the rational use of natural resources by economic processing technology (waste

reduction and recycling) that reduce consumption and use of unconventional energy sources. In present the main idea is the rational use of natural and energetic resources, which has become an imperative of the present. Along with these, material and informational resources complete the assembly of sustainable development resources.

Besides the positive discount rate of elimination the present value criterion can be completed with other criteria like the sustainability. The sustainability criterion requires to fulfill the necessary condition for an equal access on the resources base for the next generations. Biodiversity represents a major necessary condition for a sustainable environment. Biodiversity means the diversity of species, ecosystems and first of all of genetic diversity in the interior of the species which guarantee the adaptable capacity. The greater the number of species that make up an ecological system (forming a community), the stronger the ecosystem to resist against environment damage. During the time elapsed since the formulation of sustainable development, a whole range of possible criteria was defined to formulate the sustainability thresholds.

Fundamental criteria of sustainable development established by European Community Commission since 1993 are the following:

• fully maintain the quality of life;

• maintaining ongoing access to natural resources;

• avoiding the permanent damage of environment.

The following year, in 1994, the Working Group sustainability from Salzburg, Austria, included in the group of criteria of sustainable development: the humanity and high quality of life and resources, the human survival, preservation or irreversible damage to natural resources exploitation, stabilizing within bearing capacity of ecosystems, preserve and technologies

•Integrated Management is the principle assumes a unitary and holistic approach to production, processing, transportation, distribution, use and storage processes, taking into account the lifetime cycle of all products

•Intergenerational Equity is a sine qua non requirement, according to which the present generation has the right to use and benefit from the earth's resources, with the obligation to take into account the long term impact of these activities and to sustain the resource base and the global environment for the benefit of the following generations

•The approach of the Lifetime Cycle of goods, services and technology, evaluates the consequences over the environment, generated by economic effects tied to different stages of processing and capitalization of the market products.

•Substitution assumes the replacement of some inefficient products and services, which are also a big resource consumer, with more efficient ones that also have less ecologic impact, and less harmful

•The "polluter pays" principle (or the concept of the internalization of external, marginal, costs) establishes the use of market mechanisms to make the polluters to fully pay the social and environmental costs of their activities, and also that these costs should be reflected in the prices and fees of goods and services.

•The internalization of positive externalities (external marginal benefits) aims at using a corrective subvention system, stimulants for the activities which generate marginal benefits for third parties, without these paying (research - development, environment protection, education, regional development, small and medium enterprises)

•Public participation assumes unrestricted access to information regarding the environment and its resources, with certain justified exceptions (business confidential information), the right of the public to participate in decision making in the environment and its resources domain and to take into consideration its consequences, the possibility to react for the involved parties from the civil society, the right to know ahead of time the possible environment risks.

•Private-public and public-private partnerships are based on the direct cooperation, inter and intra institutional, between stakeholders, represented by

authorities and public institutions, non-governmental groups, industrial groups and firms, networks of people and businesses , which can obtain, by accumulating personal expertise and efficiency, a superior added value for the suitability of economic growth at macro and microeconomic levels.

The principles of the criteria approach for strategic management of Romania's sustainable economic growth are in full consensus with the spirit and recommendations of the Rio Declaration, the 21 Agenda, Millennium Declaration and all other documents that are approved by consensus at world summits for durable growth. At a global scale there are sartorial approaches, regarding the criteria and principles for durable growth, from the point of view of its resources. A few criterias and principles of sustainable forests were formulated by the Canadian government since 1992.

The forest, as one of the most important natural ecosystems, reunites diverse complexes of plants, animals, soil, water and air, as a product of millennia of evolution and adaptation.

Sustainable forest management assumes the sustaining of its integrity, productive capacity, renewability and biodiversity, economic, social and cultural of the surrounding community.

RESULTS AND DISCUSSIONS

The question regarding the possibility for sustainable economic growth in Romania, can only have 1 answer "affirmative", conditioned by the fulfillment of some sine qua non requirements, which realization, as soon as possible, is a basic tool for success. The economic pylon for Romanian durable growth, independently and complemented by the social, ambient and cultural pillars, has a few objectives and priorities.

In the race to minimize economic and social delays in Romania and developed countries, the strategic management at macro, mezzo, and micro levels, will have to monitor and evaluate strategies and sub strategies of durable economic growth, that include the adequate ecologic factor, in a process of increase/decrease, differentiated by economic sectors, of branches, sub branches and products and services groups, in line with parameter evolution of internal and external future demand, for goods and services. Following this idea, the alignment with EU legislation and standards must be taken into consideration, and followed afterward. The enterprise of strategic and coordination activities for durable economic growth at a national level, at present, represents a concern of the majority of states which are in different stages of the elaboration, implementation, monitoring and evaluation of the national durable growth strategy process, following a recommendation from the World Summit for Durable Growth from Johannesburg (September 2002). Few states, at the moment, afford to not have durable economic growth strategy as a marker for the fundamentation of efficient, long term, decisions.

Efficientization of strategic management for sustainable economic growth in Romania, include a series of internal and external factors, connected to the deterioration of environment factors, the increase of extreme meteorological phenomenon's with social and economic implications on a large scale for a very long term, at a local, regional, national and planetary level. Following the rise in importance and the worsening of problems in durable growth, in the year 2000 a declaration was adopted at Fribergh (Sweden) regarding the promoting of Sustainability Science which proposes to substantially improve, even if limited, the interaction between nature and society, taking into account that in the last decades, the development direction of mankind is not sustainable, also the necessity for reconciliation of social evolution goals with the planets ecologic limits on a long term, giving special attention to the way in which the environment changes affect the society.

Although in Romania there are many strategies at a sectorial and sub sectorial level, which are connected to the sustainable economic growth (for example, the Romania Government Strategy for development of the information technology sector and the

national Strategy for the promotion of the new economy in the informational Society implementation), until now there is not strategy for durable development, for integrated management for natural, energetic, material and informational resources, that has been adopted by the government or parliament. From this point of view, Romania contrasts with EU member countries that implement strategies, parallel to the Durable Development Strategy, elaborated in 2001 and improved in 2005.

In the condition in which the time horizon for sectorial sustainable economic growth strategies does not go over the medium term, with the exception of a few, considering taking over the communitary acquis or other engagement on an international level (The Kyoto Protocol) strategic management in this domain should take the following into consideration.

-creating a feedback mechanism that includes monitoring, learning and adoption based on an integrated set of indicators that permit an in-depth analysis of the compatibility/tradeoff between economic, social and environment components, knowing that there can be no strategic management for something that cannot be measured;

-coordination between strategic objectives (including underlying measures) and consolidated, local and regional budgets, for longer periods of time (multiannual) so that durable growth strategies do not remain on peripheral positions or to be neglected, as it is happening in the present, in the case of Romania, and other countries, presuming a higher involvement of profile ministries.

-coordination and compatibility of objectives and programs at a macro and local levels (Local Agenda 21), so that macro, pro durable development, politics offer coherence and efficiency.

From the world experience analysis, regarding the types of durable growth strategy, the following categories stand out :

a) Comprehensive, multidimensional strategy, that incorporates, in a single document and process, the economic, social and ambient pylons of durable development, in conformity with the recommendations of the Agenda 21, on the national strategies for durable development, usually, most of the countries, developed and developing, have elaborated this type of strategy;

b) Durable development strategies on domains or problems (water, air, eco-efficiency, resources, informational systems) in which objectives and politics are established for a single domain in the context of the entire economy.

c) Sectorial durable development strategies (transport, health, education) that can be sub strategies to the national strategy

d)National economy development strategy, that integrates durable development in the way of direct inclusion of the ecologic aspects in the general development process of the country, from the point of view of mutual influence between different domains and environments.

CONCLUSIONS

In closing, we underline the necessity of elaboration and implementation of a durable economic development strategy for Romania, for a period of at least 20 years that takes into account resources, social, environment and cultural components of durable development, in the national and international context, of EU integration and globalization. Without such a strategy Romania will not show up in the statistics, analysis and UN and other international organization reports.

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CHARACTERISTICS OF THE AGRICULTURE OF FORMER COMMUNIST COUNTRIES IN EUROPE AND WORLDWIDE

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Abstract

The paper emphasizes the situation and evolution of average cereal productions, before and after the year of 1990, in Romania and in some former communist countries in comparison with European developed countries. Moreover, comparison analysis of the efficiencies is conducted on different continents and agricultural areas worldwide. To emphasize specific differences a series of statistical indicators have been determined, such as the annual average increase of yield per hectare, the average development rhythm of average production and the absolute increase per percentage increase.

Keywords **:** *historical gaps, cereal average production, average annual increase, average rhythm, production increase per percentage increase*

INTRODUCTION

The more than modest situation of the Romanian agriculture efficiencies has remote historical roots, the gaps being conserved from one historical period to another. The analysis of the evolution of the agriculture after the Second World War reveals some inconsistencies that require special attention (Table 1 and Figure 1).

Table 1. Average production for main cereal crops (kg/ha)

Area and period of time	Wheat	Maize	Barley	Oat
Old Kingdom (1901-1915)	1168.0	1118.7	972.0	868.7
Old Kingdom (1921-1937)	948.8	1029.4	852.9	813.5
Transylvania (1921-1937)	1142.9	1236.5	1029.4	1051.2
Bessarabia (1921-1937)	743.5	988.8	724.7	691.2
Bucovina (1921-1937)	1022.9	1114.1	1056.5	882.4
Romania (1950-1960)	1007.5	1142.0	1066	798.5
Romania (1961-1989)	2255.5	2707.2	2610.1	1124.6
Romania (1990 -2007)	2561.4	3105.5	2554.4	1544.6

Source: Statistic Yearbook of Romania, 1939/1940; FAOSTAT | © FAO Statistics Division 2009 | 30 November 2009

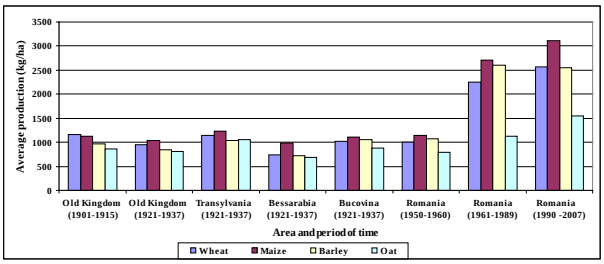

Fig. 1. Evolution of cereal average production in Romania

MATERIAL AND METHODS

There is doubt about the fact that the economic factor had an unbiased influence on the enlargement of the organizational framework for increased efficiency of the production processes in the former socialist countries as well. Its action has been hidden by the abusive administrative measures, which lead, in general, to an oversized process.

Motivation to work has been violated because of the interdiction of natural rights on land. In such situation, the organizational framework is the only factor that explains some incontestable accomplishments, respectively a favored organizational framework. The evolution of average cereal production on two periods of time: 1961-1990 and 1991-2007 has been considered as source of information.

Former communist countries, some European developed countries, world continents, and the worldwide situation were brought in the attention of investigating the average efficiencies.

Methodological instruments used in this study are the average values, the absolute differences of the average values, the rhythms and the absolute increase per percentage increase.

RESULTS AND DISCUSSIONS

Average efficiencies of worldwide cereal production and of some representative countries from different continents, confirm the fact that their evolution lead to a certain parallelism, with tendencies for conservation or for increasing the historical gaps. Some results are significantly relevant. For instance, the most spectacular increases of average efficiencies have been recorded in the case of the European developed countries and – as a paradox – in the case of former communist countries, while the countries from South America and Africa have recorded an increase below the world average.

The tendency for conservation and for emphasizing the gaps is numerically illustrated in a clear way, using the comparative analysis of the average production, the absolute increase of average production, the average annual rhythm and absolute increase per percentage increase of average production.

All these indicators confirm the fact that the most important factor in the evolution of the average efficiencies is represented by the historical component and the position held in the economic stratification worldwide (Table 2).

The evolution of cereal average production for the period of time 1990-2007 emphasizes more or less the same stratification of the analyzed countries (Table 3). It is notable that the former communist countries have been divided based on the way the agrarian structures have been conserved or not before 1989. The cases of Czech Republic and Slovakia are typical examples because of the conservation of the large size agrarian structures, which was based on a modern legislation.

Table 2. Hierarchy of different countries worldwide and geographic areas, based on indicators that characterize the dynamic of the average cereal production per hectare (1961-1989)

Average Production(kg/ha)			Average Increase (kg/ha)		
1.	United Kingdom	4449	1.	France	137
2.	France	4205	2.	Hungary	129
3.	Hungary	3727	3.	Greece	98
4.	Czechoslovakia	3493	4.	United Kingdom	96
5.	Bulgaria	3274	5.	Bulgaria	95
6.	Northern America	3273	6.	Czechoslovakia	91
7.	Greece	2506	7.	Northern America	60
8.	ROMANIA	2495	8.	ROMANIA	55
9.	Poland	2405	9.	Asia	53
10.	Europe	2050	10.	Poland	51
11.	World	1996	11.	Europe	50
12.	Asia	1897	12.	World	46
13.	South America	1678	13.	Portugal	44
14.	Turkey	1593	14.	Turkey	27
15.	Oceania	1347	15.	South America	27
16.	Portugal	1164	16.	Oceania	21
17.	Africa	1015	17.	France	137

Table 2. (linked to the above table)

Average rhythm (%)			**Increase per % rhythm (kg/%)**		
1.	Greece	4.01	1.	United Kingdom	43.84
2.	Portugal	3.88	2.	France	41.52
3.	Hungary	3.52	3.	Hungary	36.65
4.	France	3.30	4.	Czechoslovakia	34.47
5.	Bulgaria	2.93	5.	Northern America	32.43
6.	Asia	2.81	6.	Bulgaria	32.42
7.	Czechoslovakia	2.64	7.	ROMANIA	24.77
8.	Europe	2.47	8.	Greece	24.44
9.	World	2.31	9.	Poland	23.61
10	ROMANIA	2.22	10.	Europe	20.24
11	United Kingdom	2.19	11.	World	19.91
12	Poland	2.16	12.	Asia	18.86
13	Northern America	1.85	13.	South America	16.46
14	Turkey	1.69	14.	Turkey	15.98
15	South America	1.64	15.	Oceania	13.21
16	Oceania	1.59	16.	Portugal	11.34
17	Africa	1.50	17.	Africa	10.00

Source: FAOSTAT | © FAO Statistics Division 2009 | 30 November 2009 (period of time 1961-1989)

These two countries are to be found in the top of the hierarchy of cereal production, fact proved by the whole system of calculated indicators (Table 3).

Table 3. Hierarchy of different countries worldwide and geographic areas, based on indicators that characterize the dynamic of the average cereal production per hectare (1990-2007)

Average production (kg/ha)			Average increase (kg/ha)		
1.	France	6817	1.	Czech Republic	323
2.	United Kingdom	6791	2.	Slovakia	254
3.	Northern America	4942	3.	South America	118
4.	Hungary	4407	4.	Northern America	113
5.	Czech Republic	4302	5.	Portugal	108
6.	Slovakia	3937	6.	Greece	58
7.	Greece	3764	7.	Asia	49
8.	Europe	3189	8.	World	42
9.	Asia	3092	9.	France	31
10.	World	3018	10.	Europe	31
11.	Bulgaria	2991	11.	United Kingdom	31
12.	Poland	2962	12.	Hungary	17
13.	South America	2888	13.	Turkey	11
14.	ROMANIA	2796	14.	Africa	10
15.	Portugal	2526	15.	Poland	-2
16.	Turkey	2253	16.	Oceania	-36
17.	Oceania	1810	17.	ROMANIA	-91
18.	Africa	1257	18.	Bulgaria	-124

Table 3 (linked to the above table)

Average rhythm (%)			Increase per % rhythm		
1.	Portugal	3.85	1.	Czech Republic	384.49
2.	South America	3.68	2.	Slovakia	273.48
3.	Northern America	2.04	3.	United Kingdom	77.23
4.	Asia	1.40	4.	France	77.15
5.	Greece	1.37	5.	Northern America	55.44
6.	World	1.23	6.	Hungary	49.05
7.	Slovakia	0.93	7.	Greece	42.49
8.	Europe	0.86	8.	Europe	36.21
9.	Czech Republic	0.84	9.	Asia	34.67
10	Africa	0.68	10	World	33.87
11	Turkey	0.44	11	South America	32.11
12	France	0.40	12	Portugal	28.02
13	United Kingdom	0.40	13	Turkey	25.35
14	Hungary	0.35	14	Africa	14.25
15	Poland	-0.07	15	Oceania	-20.94
16	Oceania	-1.73	16	ROMANIA	-32.45
17	ROMANIA	-2.81	17	Poland	-32.57
18	Bulgaria	-3.60	18	Bulgaria	-34.54

Source: FAOSTAT | © FAO Statistics Division 2009 | 30 November 2009 (1990-2007)

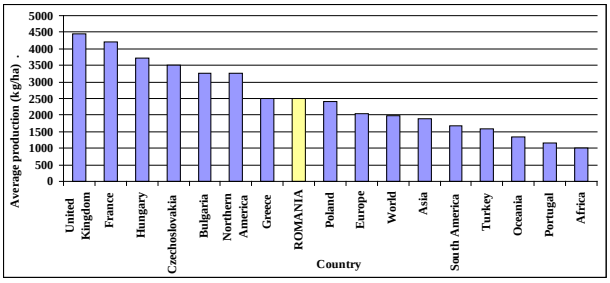

Fig. 2 Hierarchy based on the average production per hectare for the period of time 1961-1989

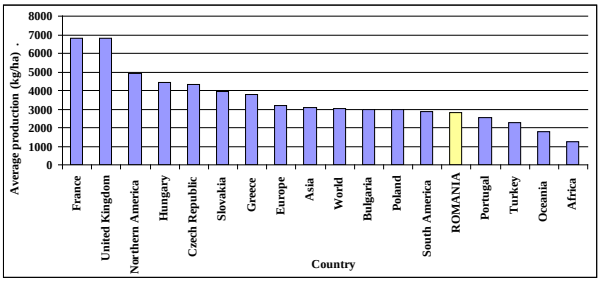

Fig. 3 Hierarchy based on the average production per hectare for the period of time 1990-2007

CONCLUSIONS

1. After 1961, Romania has recorded a significant increase of the average production per hectare. This is explained, mainly because of the organizational framework which was proper for using the mechanized technique and for promoting some modern production technologies. In the same period, Romania has started to use a relatively modern technique and a significant production of chemical fertilizers and of specific substances against pest and disease.
2. After 1990, a sensitive increase of cereal average production has been noticed; however the rhythms of increasing are way below those of traditional developed countries and other geographic area from the world. Thus, Romania is declassified in the world hierarchy of the average cereal production, falling from place 8 to place 14 in the hierarchy of the analyzed countries and areas. The main reason is the unstructured agriculture, the extreme split of agricultural land and the subsistence agriculture performed on the majority of the agricultural lands in the country.

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DIMENSIONS OF FOOD SOVEREIGNTY

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Abstract

The fact that we have become aware that in that world, globalization, events that are happening can be seen as "normal", such as the specialization of production in regions least expensive exports, imports of agricultural products prices below cost of production in the importing country, and the provision by various supranational organisms aid that allow rich countries to export at prices below their production costs ruining food sovereignty of all regions, has resulted in these few lines where we make some reflections on food sovereignty, and more specifically, we make some reflections on various aspects to consider, social, economic, cultural and political.

Keywords**:** *food sovereignty, dimensions*

INTRODUCTION

The deployment of economic globalization has led to the emergence of antagonistic processes from the action of social movements, since an alternative rural speech in which dynamics are incorporated, with increasing force, the various dimensions of agroecology. Since the late eighties a constant and forceful denunciation of the abuses of the peasantry and indigenous peoples by the multinationals, has been producing. These reports are developed by NGOs (as CLADES in Latin America and GRAIN in Europe), converging with social struggles against free trade. Indeed, it was in the first decade of the nineties of last century when the articulation of antagonism against globalization has acquired the nature of the "global dissent." It happened this fact by taking a parallel dynamic to the Movement Against the Europe of Maastricht and Economic Globalization (MAM) and the junction against the Multilateral Agreement on Investment (MAI). The articulation of these two fronts of economic antiglobalization, begins, in this period, to interfere with the plans of global neoliberalism forced to postpone the signing against the MAI. In these moments an agroecological proposal on different continents is light according to various authors (Sevilla Guzmán and González de Molina, 1993; Sevilla Guzman, 1997; Altieri, 1985)

It is in this context that the idea of Via Campesina as an international of agrarian social movements appears. In the meeting held in Managua in 1992 when different agrarian organizations, peasant and family agriculture (from the Central America, Caribbean, North America and Europe) during the Second Congress of the National Union of Farmers and Cattlemen (UNAG) of Nicaragua, analyzed the impact of neoliberalism in agriculture and rural communities. Thus, in Mons, Belgium, in May 1993, this global movement was formally established by the First International Conference of Via Campesina, being formulated the first statement of intent to protect the rights and interests of peasants, worldwide. The Second, Third and Fourth Conference of Via Campesina were subsequently held in Tlaxcala, Mexico (April 1996, which was first proposed the concept of Food Sovereignty), Bangalore, India

(September, October 2000) and Sao Paolo, Brazil (June 2004), respectively1. Through this dynamic articulation concepts were defined and were established public policy positions on trade and food sovereignty, agrarian reform and human rights, biodiversity and genetic resources, rural development and research, gender equity and sustainable agricultural practices.

On the other hand, MAELA (Movimiento Agroecológico de América Latina y el Caribe), an Agroecological Movement of Latin America and the Caribbean, was creeatred and in Pereira (Colombia), in 1998, a statement of principles which expressed its "opposition to the neoliberal model ... *to degrade nature and society"* was established. At the same time established as right of local organizations *"management and control of natural resources ... without relying on external inputs (chemicals and GMOs) for the biological reproduction of their cultures*", noting his "support for the promotion, exchange and dissemination of local experiences of civil resistance and creating alternatives for the use and conservation of local varieties "(MAELA, 2000, Perspectives of Latin American agro-ecological movement in the new millennium. Cochabamba, Bolivia: AGRUCO).

FOOD SOVEREIGNTY

It is in this dynamic articulation of antagonisms which is shaping the concept of "food sovereignty". Indeed, there is not in the abundant academic literature on the Economical and Political Sociology of the Global Agrifood System (which was characterized by Frederick Buttel, 2001) where that concept was set up, but in the areas of debate generated by the fractional civil society facing economic globalization. Thus, in the Conference organized in October 2000 in Bangalore, by the Via Campesina and the Coordinadora Latinoamericana de Organizaciones del Campo (CLOC) is designated as essential to fighting the concept of "food sovereignty", defined as the *"right of peoples to define their own agricultural policy and Food without 'DUMPING' to other countries"*". For Via Campesina, food sovereignty requires the existence of *"a healthy food production, good quality and culturally appropriate for the internal market"* which means *"to keep the food production capacity, based on a diversified farm production (biodiversity, productive capacity of land, cultural values, preservation of natural resources) to ensure the independence and food sovereignty of peoples"*.

Probably the most elaborate definition of food sovereignty was outlined as *"the right of peoples to define their own sustainable production, distribution and consumption of food, guaranteeing the right to food for all people, based on small and medium-sized production, respecting their own cultures and the rural modes, fishing and indigenous forms of agricultural production and agricultural marketing, and management of rural areas, where women play a key role. Food sovereignty must be settle on diversified production systems based on ecologically sustainable technologies"*.

The application of principle of food sovereignty causes some added effects and requires some prerequisites to be possible in fact its contents. The La Habana Forum described these effects and requirements as follows. Food Sovereignty:

(1) promotes economic and political sovereignty and cultural development of peoples;

(2) recognizes agriculture with farmers, indigenous and fishing communities with links to the territory; primarily oriented to meeting the needs of local and national markets; an agriculture considering central the human; an agriculture which preserves, values and promotes multifunctionality of rural and indigenous way of production and land management;

(3) involves the recognition and appreciation of the economic, social, environmental and cultural advantages of agriculture on a small scale, family farms, the rural and indigenous agriculture;

(4) implies the recognition of multi-ethnicity of nations and the recognition and appreciation of the identities of native

peoples. This also implies the recognition of autonomous control of their territories, natural resources, production systems and management of rural areas, seeds, knowledge and organizational ways;
(5) contains the guarantee of access to healthy and sufficiently food for all individuals, particularly for the most vulnerable sectors, as an imperative obligation of national governments and the full exercise of citizenship rights. Access to food should not be considered a form of assistance from government or a charity of public or private national nor international entities;
(6) requires the implementation of radical processes of integral Agrarian Reform adapted to the conditions of each country and region to enable farmers and indigenous – considering women with equal opportunities- an equitable access to productive resources, mainly land, water and forests, as well as the production media, financing, training and strengthening their management and interlocution capacities. Agrarian Reform must be recognized as an obligation of States in those countries where this process is necessary, within a framework of respect for human rights and as an efficient public policy to fight against poverty. The programs for the commercialization of land promoted by the World Bank are unable to replace the true Agrarian Reforms and do not solve the problem of access to productive resources for peasantry;
(7) knows that the international food trade must be guided by the supreme purpose of serving humans. Food sovereignty does not mean autarchy, full self-sufficiency or the disappearance of international agricultural and fishing trade (Text of the World Social Forum in Porto Alegre, 2002).

Food sovereignty is now a central topic in the regional and state World Social Forums that mobilizes certain sectors of civil society. This fact, combined with public sensitization to food generated by the multinational agro-food systems because of multiple food scandals, originate a new concept, integrated inseparably with the previous one: the responsible consumption.

In a broad sense, Agroecology has an integral dimension in which the socio-economic variables play an important role and since it seeks to understand the multiples ways of dependency that have historically been generated by the expansion of modernity and transmitted by industrialized agriculture. Agroecological strategy is intended to mark the rescue of those elements that, one hand in the social thought and on the other hand, in the processes with historical content, provide conceptualizations claiming equity without which it is impossible the correct appropriation of natural resources for food. Such is the case of the concept of Food Sovereignty, which emerged and developed into a dynamic of popular construction incorporated to the Agroecology as a popular epistemological basis or root. Schematically some of the components of Food Sovereignty concept, within the dimensions of Agroecology, are:

ECOLOGICAL AND AGRICULTURAL /LIVESTOCK/FOREST DIMENSION

The use of native seeds, the product of the historical co-evolution of local knowledge to the specific conditions air / water / soil / biodiversity of each agroecosystem, is the primordial element for agroecological management. In this sense, the *predial banks of seeds* and its articulation in networks for the development of a agricultural research of adaptation, inter-exchange and free movement inter-community is the beginning of food sovereignty. The fight against GMOs and the reporting of deterioration of people (chemical pollution diseases) and nature (physical and biological degradation of soil because of nutrient loss; pollution and other forms of atmospheric degradation; water pollution and effects on genetic resources and wildlife) is presented as an irrevocable action. The second step is the "*development and exchange of participatory technology"* together with the development of renewable energy sources for self-sufficiency.

SOCIO-ECONOMICAL DIMENSION

We need to develop an organizational infrastructure which makes emerge a global search dimension to improve the living standards of rural communities. Thus, it is possible to propose an endogenous development from participatory agriculture starting from the recognition of the need and / or the interest to work with local communities in the identification, design, implementation and evaluation of local agro-food systems from the socio-cultural identity of each community, to be the most appropriate method for resolving their problems. Epistemological rupture with the agro-food system dominated by multinationals comes from the experience gained in the last thirty years in Latin America, Africa and Asia in relation to farmers not only have extensive knowledge of their farming systems, but also are capable to manage tests and experiments both in the field of production and the circulation.

In addition the upgrading of local ways of governance of natural resources aims to create alternative markets at different levels of new agro-food processes where mechanisms to prevent the extraction of surplus appear, and where the interculturality participate as a design element.

SOCIOCULTURAL AN POLITICAL DIMENSION

The main importance of epistemological and ethical values in collective learning processes through which gives the co-production of agro-ecological knowledge on the basis of a trans-disciplinary approach makes what is generally referred as "*usage*" becomes in "*governance*" of the natural resources because this concept of "governance" is the means of societal and participatory transformation of the norms, rules and power relations that guide natural resource management in the context of the emancipatory projects of the social, rural and indigenous movements (Rist et al. 2006).

The political dimension of food sovereignty can only be developed through joint productive experiences with political projects that seek to levelling the inequalities generated in the historical process through the recreation of the organizational systems of multi-ethnicity of nations and accepted and valued potential identities of indigenous peoples to build their structures of power as defence and autonomous control of their territories, natural resources, production systems and management of rural areas, seeds, knowledge and organizational forms.

The concept of rural transformation we are proposing here, inside of the principles of agroecology, is based on the discovery, systematization, analysis and enhancement of the elements that eliminate the destructive effects of modernization to generate endogenous change strategies, through proposals participatory multicultural, defined from the local identity of exact etnoagroecosystem in which they should be inserted to get the governance of it.

Accepting the limitation of these initial insights, with this paper we want to begin to help in the construction, from the scientific thinking, of the correlation demanded by the peasantry and indigenous peoples in relation to food sovereignty.

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SUSTAINABLE DEVELOPMENT OF THE AGRI/FOOD SECTOR OF THE REPUBLIC OF MOLDOVA IN THE CONTEXT OF FOOD SECURITY ASSURANCE

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Abstract

The paper is aimed to present the state of food security problems in the Republic of Moldova during the period 2000 - 2010. It is based on the statistical data provided by Ministry of Agriculture and Food Industry, National Bureau of Statistics and FAOstat. The data have been processed into a set of food security indicators. The nowadays food security challenges in the Republic of Moldova have two major dimensions. The first dimension seeks to maintain and increase the country's ability to face the national food demands through assurance of the internal food production. The second dimension is related to the reduction of the increasing inequalities and expansion of the poverty among the majority of the population of the Republic of Moldova. In order to assure the sustainable development of the national agri-food sector it is necessary to implement measures for creation of a diversified and labor intensive farm sector and non-farm activities, integrated vertically and horizontally with other sectors of the national economy. Support of the public-private partnership programs with the intensive use of the rural labor force could solve some of chronic problems related to the food insecurity, unemployment and underdeveloped infrastructure. As a conclusion, the economic growth resulted from programs implemented will contribute to the rural poverty alleviation, and subsequently to the assurance of the sustainable development of the agri-food sector and national food security.

Keywords: agri-food sector, food security, risks, sustainability.

INTRODUCTION

During the last decades development of the agri-food sector as an academic and political subject has received a range of definitions. However it does not exist yet a common point of view with regard to the national policies adjustment to socio-economic changes that arises all over the world. [5, 6, 8]. More recent transnational land deals reflect an effect of the larger changing economic valuation of land and water and respectively of food security. [2, 3]

In this context, the paper presents an analysis of the state of food security in the country, identifies problems and policies for sustainable development of the agri-food sector.

MATERIAL AND METHODS

In order to characterize the evolution of food security the following methods were used: socio-economic analysis of the economic indicators; evaluation of the public policies impact over the agri-food sector and rural areas.

Developments in *per capita* food production and consumption, and the ratio of these indicators, were used to investigate the evolution of the countries' food security. The analysis focused on several most important food products (wheat, meat, milk and eggs). Proposed proactive food security policies were elaborated and coordinated with experts' opinion issued during the public discussions organized in the Republic of Moldova.

RESULTS AND DISCUSSIONS

Food supplying problems are created mostly by constraints in agriculture due to the limited availability of the agricultural land and water resources, but also because of the problems related to the storage, transportation and distribution of the agricultural products, as

well as expansion of the bio-fuel production. Increase of the rate of urbanization and diets modification also increment the global food products demand.

Traditionally the food security in many countries is assured from two sources: own food production and food imports [9].

In the same time became more evident a new paradigm of food security assurance. Particularly it is true for investing countries that procure agricultural land in underdeveloped countries that have a high bio-climatic potential. Often these investments are supported by governmental institutions from investing countries [2].

During the last years, countries as China, South Korea, Japan, Saudi Arabia and Kuwait are more and more interested to buy or lease for a long period agricultural lands as an attempt to satisfy the increasing internal food products demand.

According to the International Food Policy Research Institute (IFPRI), during the last five years underdeveloped countries have sold between 15 and 20 de millions of hectares of agricultural land. This area could be compared with the acreage of agricultural lands in France.

Procurement of the agricultural land in poor countries is not a new phenomenon, but this practice became most evident during the last years, what is confirmed by a significant increase of the number of such land a transactions.

At the global level there are a range of risks that could have a peculiarly severe impact over the food security of the vulnerable population, that have an increasing trend during the last years [1].

These encompass:

- Risk of high and volatile prices, that limit the food consumption of population, the quality of the diet, and general expenditures for health and wellbeing.
- Financial and economic shocks, that lead to reduction of working places, to more and of demand for agricultural products less accessible credits, and to the decrease.
- Impact of climatic changes, including the rise of incidence of adverse phenomena such as droughts and floods, over the decrease of yields in developing countries will amplify the food insecurity.
- Risks of occurrence of outbreaks of epidemics, epizootics and epiphytic probably will increase simultaneously with urbanization, globalization and climatic changes.

The food security instability at the global level influences negatively the supply of the population of the Republic of Moldova with local food products.

The nowadays food security challenges in the Republic of Moldova have two major dimensions. The first dimension seeks to maintain and increase the country's ability to face the national food demands through assurance of the internal food production, import of the food products that can not be produced efficiently in the country, and exports of products that have a comparative advantage.

The second dimension is related to the reduction of the increasing inequalities and expansion of the poverty among the majority of the households of the Republic of Moldova that is manifested by inadequate and unstable food supplies, lack of purchasing power, weak institutional support networks, weak food emergency management systems and unemployment.

In order to assure the sustainable development of the national agri-food sector it is necessary to implement measures for creation of a diversified and labor intensive farm sector and non-farm activities, integrated vertically and horizontally with other sectors of the national economy.

Agriculture is one of the key driving forces in shaping Moldovan landscape, nature and culture over centuries. Favorable climate and high quality soils historically have determined Moldova's agricultural specialization, particularly in the production of high value crops like fruits and vegetables. Agriculture contributed with about 8,4% of the country GDP in the year 2009. The total country GDP was of US$ billions 5,4 or US$1,5 thous. per capita in this year. About 33% of the active

population of the country was engaged in agri-food business in the year 2009, of which about 6% in large agricultural farms and about 5 % were employed in the food processing industry. The main agricultural products are grapes - 19%, grain - 18%, vegetables - 8%, sunflower seed – 6%, fruits - 5%, sugar beets - 1%, milk - 11%, pigs – 8%, poultry – 6%, beef – 2% [7].

Agriculture and food industry play the main role in the food security assurance. At present the competitiveness of the agri-food sector of the Republic of Moldova is insufficient and depends considerably on institutional and market risks.

Despite of the problems related to the transition period the food industry has maintained its importance. Thus food processing and beverage industry contributes with almost 51 % of the total processing industry production [7].

At present in this sector activates several hundreds of companies and specialized units. The most important companies are concentrated in domains of vine production, fruit and vegetables processing, meat production and processing and dairy production.

At the national level Republic of Moldova is food secure. It produces its main food products, exports its surplus food, and imports what it needs to meet its food requirements.

Food security indicators prove that in the Republic of Moldova the level of per capita food consumption have stabilized during the last years.

In the same time the nowadays level of consumption is much lower than in neighboring countries or in other East European countries. Taking into consideration just neighboring countries - Romania and Ukraine, one can see that in Ukraine the average per capita consumption of meat is with 60% higher. Per capita consumption of milk is 40% higher, while of eggs with 90%. Only consumption of the bread is at almost similar level. As about Romania, situation is to a large extent the same. Thus per capita consumption of meat is by 2.1 times higher, of the milk –with 60% and eggs with 90% higher than in the Republic of Moldova. Comparing with other European countries the difference is even more significant.

The reduced level of food consumption comparing with neighboring countries partially could be explained by decrease and instability of the agricultural and food production. Thus, taking as a point of reference the year 1995, the meat production decreased with 42%, milk with 9% and potatoes with 31%. During this period only the production of eggs and wheat has grown, with 10% and 54% respectively. However despite of this growth, the agricultural production is unstable and is influenced by a wide range of natural hazards and especially by draughts.

Thus the most significant reductions in the cereal production are linked with the negative impacts of droughts, the most recent being those from years 2003 and 2007 (see figure 1).

As a rule during the next years after the drought, significant decreases or stagnation of the animal production is registered.

The food sufficiency indicator can be calculated as a ratio between per capita food consumption and production.

Analysis of the official statistical data shows a significant decrease of this ratio if comparing the year 2009 with the 1995 for meat and milk. Only for eggs and wheat this ratio increased. Despite of low consumption of meat the food sufficiency indicator has a steady tendency of decrease starting with years 2000-2001. As one can see from the figure below the animal production in the Republic of Moldova hardly can cover even the local consumption. This is obviously evident in the case of meat production. Production of the milk is at the limit of covering local consumption. Only egg production is in surplus and can be the object of the export.

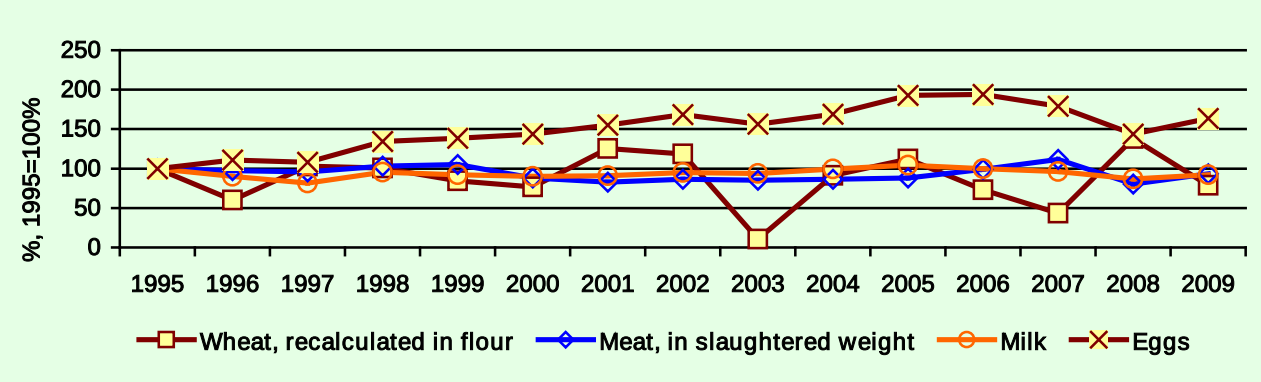

Fig. 1. Indicator of per capita production of the main food products in the Republic of Moldova, 1995-2009, 1995=100%

Similar tendencies could be observed for milk sufficiency ratio, but also for wheat production which in drought years reach a dangerous level that could affect the country's food security (see figure 2).

The most recent events on the international markets represent a real concern for developing countries.

Starting with the year 2010 the international prices for wheat are in a continuous growth [4]. This price spike is caused to a large extent by the effects of the devastating drought in Russia, but also by the interdictions imposed by governments of Russia and Ukraine for the export of cereals in order to assure the food security of these countries.

In these conditions it is rational to protect the internal markets from the price volatility on the international markets, but also from massive exports of cereals into neighboring countries. Administrative methods were applied earlier in Moldova in years 2004 and 2008. Restrictions for cereal exports imposed to food business operators from the Republic of Moldova permitted stabilization of the internal market of cereals and assured the country's food security. The nowadays situation encompass many similarities with the situation mentioned earlier, and this confirms the opportunity of measures undertaken.

Arguments *contra* these measures refers especially to:

- Income reduction of the agricultural farms that had happened in 2004 and 2008.
- Canceling of the cereal commercial contracts and resulted penalties imposed to farmers could affect the credibility of the food business operators and overall image of the country.

Food products price increase in neighboring countries has as consequence, rise of the exports of these products from the Republic of Moldova. In these conditions it is necessary to take urgent measures concerning the stabilization of internal market in general and especially of the cereal market.

The negative effect of the restrictive measures for the export of cereals, which were applied in 2011, will be smoothed due to the short duration of this ban that will last most probably until the next harvest period of this year.

Policy inadequacies and weak institutions undermine these efforts. In the short term this reduced the price spike for food in Moldova. On the other hand, prices paid to Moldovan farmers (farm -gate prices) during recent years were far below international prices. From the medium and long term perspective this is expanding the rural – urban differential with a very significant urban bias, resulting in out-migration of the rural workforce without an associated increase in rural productivity. Suppression of producer prices ultimately increases rural household food insecurity.

Diminishing country's vulnerability to risk factors and an integrated risk control can be promoted by applying a number of policies and carrying out certain actions: legislative, economic, environmental, social, etc. A necessary step is the inclusion into all strategic documents on the development of Moldova's social and economic system of measures of prevention, adaptation and mitigation of risks.

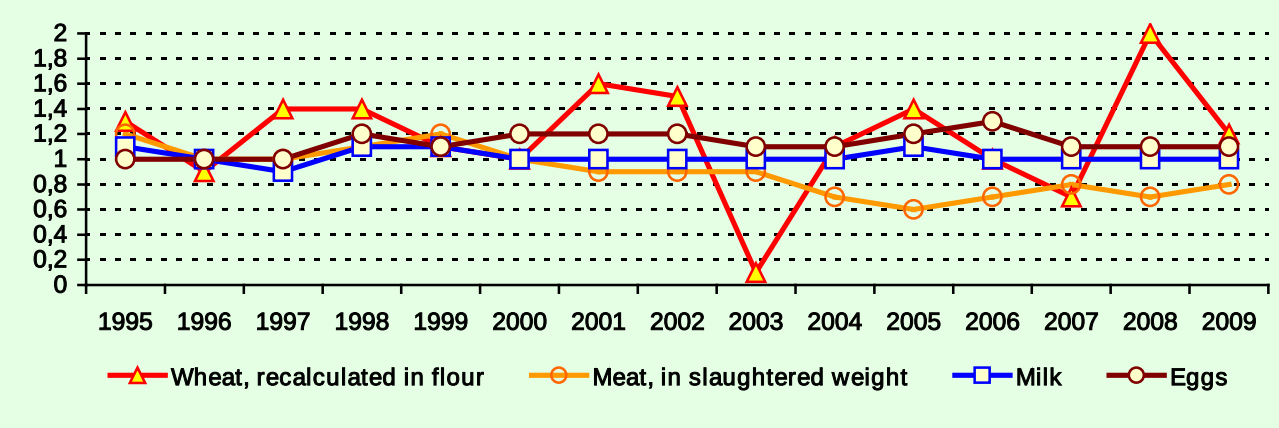

Fig. 2. The ratio between production and consumption of the main agricultural products per capita in the Republic of Moldova, 1995-2009

The state policy in the field of medium and long term food security assurance has to be effectuated according to following main directions:

- Development of the animal breeding and forage production sectors;
- Implementation of the advanced technologies for the processing of agricultural row material, and storage and distribution of the agri-food products;
- Improvement of the regulations mechanism for markets of agricultural and agri-food products in order to reduce price distortions on these markets and enhancement of the market infrastructure;
- Development of the scientific potential in the agri-food sector and support of the prospective scientific directions;
- Development of the education system for specialists from agri-food sector, including the rehabilitation and further development of systems for continuous training and improvement of the specialists in order to adjust their abilities to increasing requirements of the food security.
- Rehabilitation of the natural and ecologic potential.

The technological development shall include: a) research in the field of technologies for the production of flexible agricultural crops, new varieties types and hybrids, resistant to the severe weather conditions; b) the development of early warning and weather information systems, including for short and medium periods; c) innovations in the management of natural resources, including those intended for a more rational usage of irrigation, given an increase of the humidity deficit and an implicit drought incidence. It is also important to develop measures for the resource management at farm level, in order to reduce the risks related to changes of temperature, humidity and other specific climate conditions.

Additionally to the implementation of the policies that support directly agricultural farms by improving their technological endowment, actives and involvement in market processes, it is important to support measures that contribute to a more efficient utilization of the labor force and setting up links with other sectors of the national economy. For this reason should be considered the following policy interventions:

- Support diversified job creation through local economic development, including the growth of small and medium scale enterprises
- Support labor-intensive public-private partnership programs in rural areas to simultaneously address chronic problems of food insecurity, unemployment and poor infrastructure.
- Strengthen off-farm income generation.
- Strengthen access to rural credit facilities.
- Strengthen market systems, i.e. information, infrastructure, etc.

CONCLUSIONS

1.The high level of poverty of the rural population places this social group among the most affected by food insecurity.
2.At the global level, there are risks that could have during the proximate years a negative impact over the food security of the vulnerable groups of population of the Republic of Moldova.
3.In the agricultural sector can be observed a tendency for stagnation both in crop production and animal husbandry, as well as growing vulnerability to natural and economic risks.
4.Agricultural productivity growth, being stimulated by state investments in rural infrastructure, science and agricultural extension, irrigation, as well as adequate financial mechanisms could contribute directly to economic development and poverty reduction in rural areas.
5.It is important to assure the sustainability of the food security policies through their support by business, civil society, and public administration.
1. Food security policies have to generate, starting with implementation of initial stages, visible and benefic outcomes for population.

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SUSTAINABLE DEVELOPMENT OF THE AGRICULTURE AND AGRICULTURAL HOLDINGS - CONCEPTUAL DELIMITATIONS AND METHODOLOGY

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Abstract

The purpose of this paper is to the conceptual and methodological development of sustainable agriculture and agricultural holdings. Working methods used in preparing the article were the analysis and deduction. In the investigated materials the following results were reached: All countries have tried to promote agricultural development by financing the research activities, providing support services and other forms of stimulating production by providing subsidies. Sustainable development presupposes the insurance a balance between economic growth and environmental protection, and on this basis, meeting not only present but also the perspective of social development. With time, this concept of sustainable development and agriculture has entered a response to shortcomings of the full suite of conventional agriculture. The concept of sustainable agriculture has become a scale planetary circulation throughout the doctrine of Agricultural Economics. Sustainable agriculture can not be "pure ecological" because it must employ fully, but judiciously, chemistry and biology achievements to raise crop yields. As the important conclusions of this work, we might underline the following: the formation of sustainable agriculture is a long process and not least it is very difficult to implement because there are many contradictions. There are many barriers in adoption of specific practices and technologies of sustainable agriculture. One of the most important barriers is the fact that existing policies and programs sometimes contain conflicting objectives.

Keywords: *sustainable development, the conventional agriculture, agrarian economy, contradictory objectives*

INTRODUCTION

In the period passed after the elaboration of “sustainable development” concept and its first definition (Brudtland Report, 1987) it was trying a number of interpretations and additions. In consequence, different variants of sustainable development model and of transition strategy have been designed using, in the large majority of cases, a single main coordination representing: the financial sector (Beckerman, 1994); human population dynamics (Myers, 1993); replacing the economical growth with qualitative development or welfare growth (Parker, 1993); fixing, from ethical and moral point of view, the access to the natural capital resources and services of the members of present and future generations (Redclift M., 1993; Peterson M.J.; Peterson T.R., 1993; Pezzey J., 1992); agriculture, transports or tourism continued to maintain a strong sectoral character.

MATERIAL AND METHODS

The purpose of this study consists in the research of problems approach of “sustainable development” concept in the Republic of Moldova. The information concerning the importance of sustainable development has been gained after a detailed study, realized based on the scientific literature in the field, several periodicals and other sources. In terms of theoretical- scientific aspect, the article was realized in the context of complex and systematic approach of the economical concepts of sustainable development. Taking into consideration the complexity of the research, it was used an expanded arsenal of scientific methods to its realisation. In the present study were used the following methods and measuring techniques of the sustainable development importance in the Republic of Moldova.

It was found that both analysis and synthesis of studying the economic importance of sustainable development are based on studying and analysis of divided factors influence on the results, but the common influence of all factors over the results is the synthesis.

RESULTS AND DISCUSSIONS

The key coordinates of the sustainable development model are the followings:

I. Spatio-temporal organization of socio-economic systems (SSEce), their dynamics should be resized, redesigned and verified starting from known fact that they are viable for a long period if they constitute themselves as integrant parts of hierarchical organization the ensemble: geosphere - troposphere – biosphere.

II. The hierarchy of ecological systems as systems of life support represents "the context" and "the basin supply" with materials and powers of SSEce.

III. Natural capital (NC) or absorption basin of a macro-regional or global national socio-economic system consists of natural, semi natural and anthropoid network systems.

The natural capital with the above significance completely overlaps with the coverage area of the "biological and ecological diversity" concept.

Renewable and non-renewable natural resources and assured services by the NC components constitute essential factors in the goods and services production process by the economical subsystem or condition directly the structure, functioning and quality/health of human population.

I. The increasing number of human populations, the style and living standard, respectively, the SSEce "metabolism" intensity determine the their extent on special scale, the diversification mutual exchange channels and the density of material and energetic fluxes between them and the NC components.

II. For individual and global socio-economic systems to change the current courses and developing attractors with convergent trajectories to a sustainable development model; it is necessary to differentiate and to apply, in the process of developing policies and special strategies of growth, a set of rules to ensure:

- the absorption basin of each national socio-economic system to constitute itself in proportion to > 75% of its natural capital;
- the NC structure to constitute in proportion to > 50% of natural and semi natural ecological systems;
- the NC structure to preserve biological and ecological diversity, respectively the connectivity between its component categories;
- a utilization rate of renewable resources < than their renewed rate, the renewable resources absorption by socio-economic systems do not need to exceed the productive capacity of natural capital components;
- the utilization rate of available renewable resources to not lead to their exhaustion in a period of time less than 100 years;
- the dispersion channel diversity and the density flows of secondary and final products of socio-economic system metabolism dispersed in the environment should be < than "assimilation" capacity of natural capital, respectively to not exceed the retention capacity of troposphere;
- the deterioration rate of natural capital to reduce gradually, so that in the time horizon of 10-20 years the process to be strictly and efficient controlled, and the "environment debt" accumulation to be frozen.

III. The sustainable development model also requires a series of rules that refer to the structural and functional mode of socio-economic systems.

Restructuring and reshaping economic subsystem, so that it satisfies from structural and functional point of view the following conditions:

- the economic subsystem structure to be complement to the NC structure and productive capacity, respective to that of diversity, quality and level structures of non-renewable resources;
- the material consumption reduce in case of exhaustible raw materials, identifying

and using new materials and raw materials and mainly the technologies development and application to ensure the solid "waste" reuse and recycling;

The rate decrease of non-renewable energy consumption, of specific consumption and the gradual increase of alternative sources share, so that in the time horizon of 50-100 years to find viable solutions for the significant reduce of limiting effects of the resources depletion represented by fossil fuels.

IV. Differentiation and implementation of some effective policies to control the demographic processes that will allow in a period of 30-50 years not increasing the flocks of human populations by no more than 70-100% compared to current levels.

V. Gradual reduction of the development process of the genetic structure of human populations and their health along with the accumulated debt recovery concerning their "quality".

VI. The design, development and continuous improvement of social and institutional organization (also on the political level), namely of the social capital, so that to provide heterogeneous, flexible, coherent and efficient support for:

♦ phases ongoing assessment of co-development process of the complex of hierarchical systems represented by natural capital components on the one side, and by the socio-economic systems and gap and trend identification, on the other side; and of dysfunction between socio-economic systems, and between them and natural capital component;

♦ non-discriminatory and equitable access to evaluation results and effective participation of all members and social structures organised in the strategies and policies elaboration process concerning the co-development management;

♦ elaboration of alternative solutions and measures, namely of costs and long term benefits, as of condition insurance for effective participation of all social capital components in the negotiation process of individual or group interests and those of short and medium term from the long and very long perspectives of each socio-economic system;

♦ ensuring the majority support or, preferably, the consensus for long and very long term strategies and policies concerning the co-development management, namely the sustainable socio-economic development;

♦ broad debate and action plan approval on the long and medium term, namely the direct and indirect involvement insurance in the process of their materialization;

♦ development and improvement after the principles of complementarity, cost minimization, of institutional infrastructure for development process management of SSEce ó NC;

♦ support system establishment for assisting the elaboration process of strategies, policies and action plans concerning SSEce ó NC co-developing, and namely of already known infrastructure as "support system for sustainable development assistance" notion.

VII. "Cultural capital" conservation and development (including the ethno-cultural diversity), and of mechanisms for its access to and equitable use.

In this sense it must distinguish clearly the following categories of actions, which we consider are necessary to be designed and applied simultaneous and balanced.

- Conservation and efficient use of all cultural capital components created during the historical development of socio-economic systems and in particular of human populations, ethnic groups, or tribal formations' traditions and gained experience concerning the use, conservation and natural resources and natural environment sustainable management;
- System identification and knowledge development concerning productive and support capacity of all component categories from natural capital structure which form the absorption basin of each socio-economic system as well as the development of integrated monitoring systems of their dynamics;
- Design and development of information management systems for all categories of natural capital components and their integration in the "assistance support

systems of sustainable development" structure or in other words of mechanisms and interface for information access and use;

- Technological development in the sense of technical solution assurance for minimizing raw material and energy consumption, waste production and especially for fixed capital restructuration and resizing, of socio-economic system metabolism based on alternative results;
- Restructuring and development of standard and indicator system (including economic one) for more complete value assessment of all natural capital components from diversity and quality point of view, as well as those of stocks and resources and services regeneration rate and not the least for making such long and very long term assessment and putting the basis of an efficient and equitable management not only within the same generation, but also in the succession of generations;
- Improving and expanding the system rules and mechanisms to regulate and to ensure free and equal access, on the one hand to the resources and services produced by natural capital components, but on the other hand to the resources generated by cultural capital itself (spiritual values, moral, information, technologies, methods and ways to control and prevent human population's health deterioration, etc.) within the same socio-economic system but also among socio-economic systems.

Variable human population depends on natural growth and, in a complex sense, income for consumption.

Labour productivity can be affected by consumption and environment.

"Usefulness" or "social welfare" depends not only on consumption, but also on environmental conditions, this was called "ambient endanger".

In practice, the demarcation between ambient endanger and productivity effects is not always clear, because trading limits are variable. One of the severe economic crisis manifestations, firstly with a lack of strategy concerning the place and role of the agricultural scientific research in all its hypostasis, from protection and economical use of available natural resource base, to providing reliable and healthy food corresponding to sustainable agriculture, based on the modern ecological principles.

In the conditions were Moldova is too poor for being able to apply and develop sustainable agricultural practice with all its elements, it should at least be practiced a complimentary agriculture that will respect only few conditions such as:

-food security assurance;
-ensure some incomes a little sure for farmers;
-resource protection and improvement;
-human health ensuring and improvement.

To practice this type of agriculture it will be to realize a farm organization model based on sustainable development which includes: 1.practiced farming model; 2.applied technologies; 3.economic component; 4. social component.

Practiced farming model

To speak of a practiced sustainable farming model, the farm manager will take into account the crop zoning based on soil suitability and climatic conditions: temperature, precipitation, etc.

A sustainable model of practiced farming is that which allows the concentration of production. This sustainable model will not succeed on very small and dispersed areas. So, an essential condition is that of an optimal farm size creation.

If the size allows the production concentration and the farm manager will take into account the current market demand then the success is guaranteed.

Applied technologies

Applied technologies are a decisive factor of economic growth through qualitative progress which prints to other production factors. Technical production machine which stays at the basis of the current type of agriculture is based in its turn on the high energy consumption technologies, high consumption of non-renewable resources.

In the sustainable development vision is organically integrated the strategies regarding the formation of a performed system, that appeals to unpolluted and renewable sources, as for example the sun and wind energy etc.

So, as a substantial technical foundation of sustainable farms will be a new production technique and one of its main features consists in the technology practice. At present, on a large agricultural area of the Republic of Moldova is practiced an empirical agriculture. The only benefit of "horse" practiced agriculture is that of not using fossil fuels and thus to protect the resources. This can be considered an economic and even an environmental benefit only when it is made for own consumption, but when we talk about farms which produce for capitalizing on the market then it cannot be considered an advantage, especially from economic point of view taking into consideration the low labour productivity.

Economic component

Adam Smith, in his work "Natural wealth" (1776) warned that some natural elements, which have an unprized sociable utility (air, water, soil), have an insignificant value or no value in the framework of exchange documents between the producers and consumers. Natural resources were treated just as a nature gift and not as productive economic resources, in natural state, that implies prices and therefore have a certain price. The view that natural resourced would be unlimited and renewable in any conditions and which stay at the basis of the current economic growth type proved to be false and reflected in the expression of ecological disasters to which also assist today.

One way to fight against the old type of economic growth with negative influences on the natural environment is represented by "the cost internalization with environmental protection".

To determine the efficiency of farm activity will be calculated and supported the environmental costs starting from the "polluter pays" principle.

The "environmental accounting" idea has emerged during the years of '60s and '70s firstly theoretically (Berthrand de Jouvernel – 1968, Henry Reskin - 1975) and then in concrete forms through applications from Norway (1974), Canada (1977) and later in France.

The sustainable farm must take into consideration that any undertaken action and activity to be realized in the profitableness conditions.

Sustainable farm will achieve the following objectives:

- promoting economic development and profitability;
- internalisation of environmental costs;
- maintaining and income stability for farmers.

Social component

This component should reflect the link between the economic growth process and social finality, life quality and individual welfare. This includes a wide range of social activities, from providing vital needs and up to those that contribute to the formation and development of human personality.

The social component should reflect the obtained results of other components, results which can be seen best in the living standards.

Almost all countries give priority to maintaining farm income levels. Opinions start from the belief that a collapse of agricultural income would cause a massive of labour markets overloaded already. In fact, in the Moldova's situation, keeping farmers on their land, especially in the less favoured regions, would be in itself a desirable national goal.

To get good results the sustainable farm will be helped by providing managerial and financial consulting and through giving some important facilities to farmers.

Organization of some sustainable farms will increase the rural welfare, which is perceived when they register positive economic effects concerning economic and social phenomena which dominate the Moldavian village, such as:

- ♦ stopping the population migration from village to city by creating alternatives to motivate their existence and to stimulate action initiative to ensure the basic living needs.
- ♦ poverty combating;
- ♦ equity of opportunity;
- ♦ stimulation and diversification of services; the right for a better life, right to health, education and security.

A farm will have better chances to become sustainable if it becomes multifunctional. Next to production activity it also should develop the processing one and why not that of marketing. But equally important is that it to develop also agro-tourism, so that to obtain additional incomes.

Finally, the sustainable farm will ensure the following objectives:

- assuring food security;
- improving environmental quality and natural resource base;
- the most efficient use of limited and non-renewable resources;

improving life quality.

CONCLUSIONS

1. Any strategy for sustainable farm organization should be based on the existence of independence relationship between economic activity and its ecological implications.

2. Using the mathematical model for ecological agriculture which is a classic optimization model, which has a purpose function and many specific restrictions.

The aim of ecological agriculture is, as that of sustainable agriculture, functional of minimum – maximum type, where maximum function is the harvest (H), and minimum – secondary effects (SE) of technological activities. The harvest (H) is any realized product within an agricultural system. And the secondary effects (SE) represent any adverse change of agricultural system properties (i.e. increasing the amount of nitrates and heavy metals in soil, water and foods; reducing soil reserves of organic matter, arable layer thickness, labour force, etc.)

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MEASURING THE PHOTOSYNTHETICALLY ACTIVE RADIATION OF ILLUMINATION SOURCES AND GLOBAL SUN RADIATION USING THE MATLAB PROGRAM

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Abstract

The Earth's surface is continually illuminated with the flow of light energy from the Sun. Part of this energy is reflected from the atmosphere, and part is absorbed and through complex biochemical or physical processes is transformed into other forms of energy such as light, heat or the of biomass of plants. There are various ways to determine the amount of light energy reaching the Earth's surface. This contribution is oriented at measuring the Photosynthetically Active Radiation (PAR) using a semiconductor sensor implemented with a measuring converter and appropriate algorithms (MATLAB). It is also oriented at the possibilities of using of this circuit by projection of the adaptive illumination in covered areas.

Keywords **:** *MATLAB measurements, Photosynthetically active radiation PAR, PAR measurement using MATLAB*

INTRODUCTION

Solar energy is the essential input for our existence on Earth. Its influence on the planet is omnipresent. The production of energy forms which are necessary for life (biomass energy, dry mass of economically significant plants) or energies useful for the functioning of society all emanate from the sunlight radiation. Almost all kinds of alternative energy sources are direct or indirect effects of sunlight energy (wind energy, water energy, or energy of biomass).
The influence of light on plants growth, reproduction, and fruit production is vital. However the intensity of sunlight changes during the year as the result of the changing angle impact on the Earth's surface, as well as changes in intensity during the day caused by weather or by the Sun's position moving on the sky line. Nowadays the most common cause of decreasing sunlight intensity is smog emission in the vicinities of cities. The sunlight radiation is divided into three parts: direct, reflected and diffuse radiation. The diffuse radiation is caused by the diversion of the sun rays in the atmosphere by dust particles and water vapour.

Plants use the light spectrum area between 400 – 710 nm (figure 1., Photosynthetically Active Radiation - PAR). In the area between 750 – 1200 nm the plants reflect 40 – 60% of radiation. (KOSTREJ A KOL, 1992)

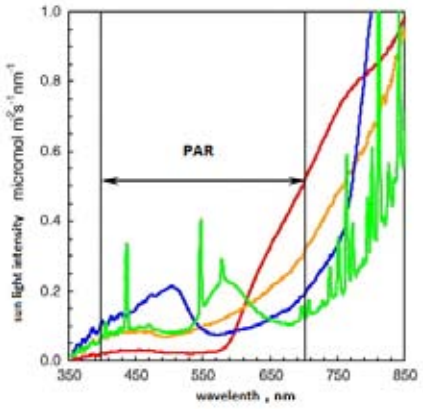

*Figure 1: PAR range for each color component of radiation. (**http://www.sciencedirect.com**)*

On the PAR assignation we can use the common equation:

$$PAR = 0{,}46 \times GR$$

PAR - Photosynthetically Active Radiation,
GR - Global radiation.

MATERIAL AND METHODS

For the PAR measurement we will use the calibrated sensor and MATLAB conversion which enable us to reach the results in appropriate units of radiation ($W.m^{-2}$). The illumination sensor was developed at the Department of Electrical engineering, Automation and Informatics of the Faculty of Agricultural engineering of the Slovak Agricultural University in Nitra. It is a semiconductor pyronometer based on a silicon photodiode with enhanced sensitivity in the shortwave spectral area (400 – 700nm) which is installed in the capsule under an interference filter. The filter does not transmit the radiation under 400nm and above 700nm in the whole area of diode sensitivity. The combination of correction filters and their thickness were designed using a computer program to ensure the minimal aberrance from the ideal course. The sensor is by calibration protocol loaded with a resistance R=3300 Ω. Then the voltage 1mV on the sensor output corresponds to a PAR radiation of 4, 32 $W.m^{-2}$.

The measuring board which ensures data collection from the sensor and additive thermometers was also developed at the department. It is based on a microcontroller communicating with a PC through an USB interface. A 24 bit delta - sigma analog to digital converter serves to convert the voltage value from the optical sensor. The microcontroller sends data from the thermometers and converter to the PC.

MATLAB

In the program MATLAB there are features which enable the receipt of data, their modification and their interpretation.

Function of reading the measured data

In the first step after the global variable declaration, the correct port on the suitable speed are configures. The fopen and fscanf commands open the port and receive data into variables *temperature 1*, *temperature 2*, *illumination*, all in hexadecimal form. In the next steps the *illumination* is converted into binary form and filled into a matrix with constant size 32 bits (the measuring board sends the result in sizes of 32 bits). The part of the matrix carrying the information about illumination intensity is converted into decimal numbers. The results after conversion are written into a file with name in the shape of date and time of measurement for reason of archiving.

Function for converting the illumination data

At the beginning, the function creates the 32 bit matrix and fills it with binary data converted from the hexadecimal received data. It performs the conversion to decimal numbers and consequently recounts it with constant, which represents the reference voltage value from A/D converter (1.22V). The method of calculation:

$$IL = \left(\frac{1{,}22}{2^{24}} * il\_dec \right) * 4320 \qquad [W / m^2]$$

IL – Illumination intensity after calculation
il_dec – The result after conversion from binary to a decimal digit number

Function to control sending data

The measuring board is designed so that, directly from MATLAB, it is possible to send controlling information into the actuating device and using PWM modulation to perform the required actuating intervention. This MATLAB function uses the fopen and fwrite commands similar to the *function of reading the measured data*. The measuring chain is designed in the MATLAB program extension – SIMULINK. Whole measurement use the functions described above. The measuring chain for the PAR measurement is shown in figure 2.

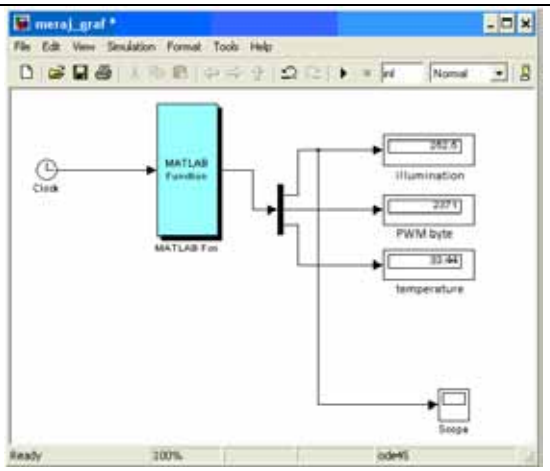

Figure 2: Measuring chain designed in program SIMULINK

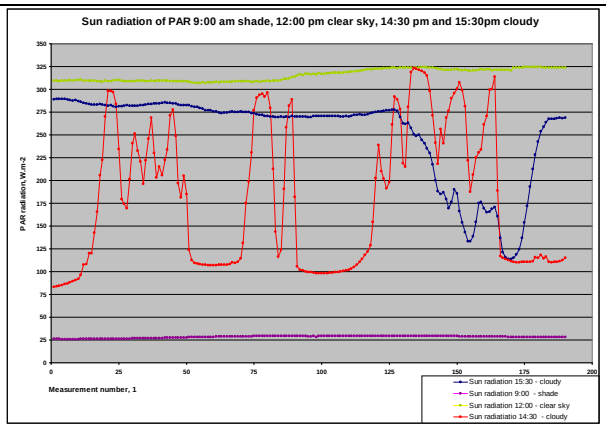

Figure 3: Courses of sunlight intensities measured at different times in the day

RESULTS AND DISCUSSIONS

Measuring the PAR of the sunlight

This measurement was made at the Department of Electrical engineering, Automation and Informatics of Faculty of Agricultural engineering of the Slovak Agricultural University in Nitra. Four parts of the day were chosen for the measurments. The measuring chain consists of the semiconductor pyranometer and temperature sensor which was placed 1 cm from the illumination sensor and from the measuring board described above. A Personal Computer with the MATLAB 2007 program with the extension SIMULINK was used for processing the results. The sensor was placed at 9:00 am in the building shade, at 12:00 pm in the direct sunlight. The measurements at 14:30 and 15:30 were done on the direct sunlight, but during a cloudy sky. Each measurement consists of 190 samples with a sampling time 1 second. The summary time of measurement was 3 minutes and 30 seconds. The courses of measured intensities are given in figure 3.

Measuring PAR of a halide bulb in dependence on the distance from the sensor

This measurement was realized for the purpose of finding out the dependence between measured PAR and the distance from the sensor. The bulb was placed on a movable holder with the possibility of setting the height in the range of 0 – 45 cm and in a parabolic lamp-shade which concentrates the illumination flow on the sensor figure 4. The measuring chain consists of the semiconductor sensor and measuring board cooperating with the PC. A halide bulb was used with parameters Voltage U=24V, power P=150W. The MATLAB function described above was used for the measurements. At the beginning of the measurement the lamp was placed 10 cm distance from the sensor. For each distance were measured 10 samples which were averaged after the measurements. The last measured sample was for a distance of 45 cm. Figure 5 shows the apparatus.

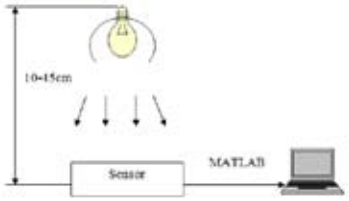

Figure 4: measuring chain for PAR measurements of the halide lamp

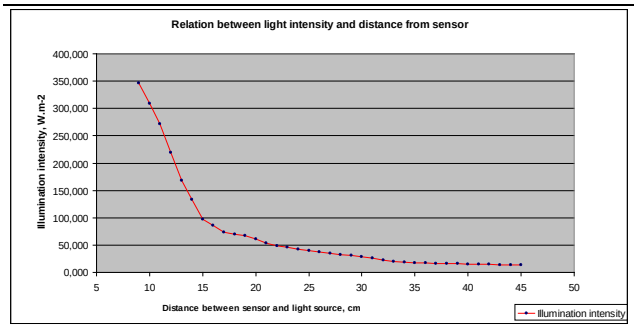

Figure 5: Relation of PAR intensity and distance from illumination sensor

Measuring PAR of halide bulb in dependence of power regulation in range 0-100%

This measurement showed the PAR dependence from power regulation of the halide bulb in the range 0-100% o. The MATLAB program enables the use of the measurement board and supplementary circuit to regulate the power in the range of 8 bits of PWM sensibility on the bulb. The PWM number (0-255) is sent from MATLAB into the board and regulates the luminosity of the light source.

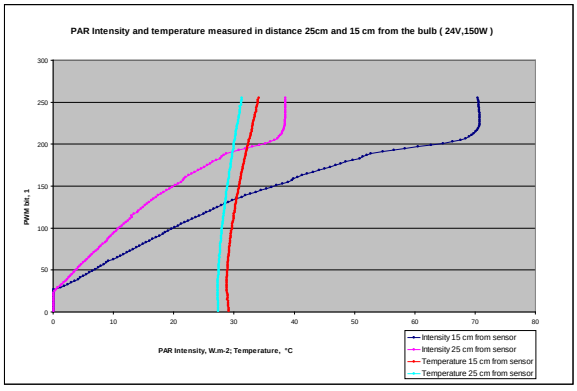

Figure.6: Relation between PAR and temperature, dependent from PWM bit (power regulation 0-100%) at distances of 15 cm and 25 cm from the bulb

This "shine" measurement is realized using the pyronometer and the MATLAB measurement functions. It was done for two distances 25 cm and 15 cm between the sensor and the bulb using the supply voltage U=24V and with the PWM step 2.

The same measuring chain is used as in the previous measurements. Measurement of the PAR and the temperature measurement at a distance of 1cm from sensor were used in both cases. The measured results are illustrated in figure 6.

CONCLUSIONS

From the results obtained by sunlight PAR intensity measurements it is clear that there are massive differences between intensities measured in the shade and in direct sunlight. It may be seen in figure 4 that the variance is almost decimal. An interesting difference is in the intensity of direct sunlight and the intensity measured during a cloudy sky. During cloudiness, the PAR value is around 100 $W.m^{-2}$, 1.5 – 2 times lower than in a clear day. From these results it may be concluded that during Earth surface illumination with diffuse components the amount of incident PAR is lower.

The PAR measurement depends on the distance between sensor and source. figure 5 suggests a massive PAR intensity reduction until the distance of 15 cm between sensor and light source is reached. After the PAR intensity of 100 $W.m^{-2}$ it falls until the intensity 13 $W.m^{-2}$ is reached at a distance of 45 cm. For the next research in models of greenhouse illumination and in the simulations the values reached by distances 20 cm – 25 cm (60 – 40 $W.m^{-2}$) will be interesting.

The measurements displayed on figure 6 illustrate PAR courses dependant on the fluently changed bulb power in range 0 – 100%. On these courses we can see the PAR intensity 0 $W.m^{-2}$ until PWM = 25 (approximately 9.8% of power). This is caused by the physical properties of bulb. From the PWM =27 the PAR rises almost linearly until the PWM=200 is reached. The end of course is steep and the bulb fiber is heated to maximal temperature PWM = 230 (90% of power). After this value the PAR changes only slightly. In a similar way can be characterized the measurement by the distance of 15 cm from the sensor bulb. Results from the light source power control measurements (actuating device) using PWM control are possible to use by regulating the illumination in covered areas (i.e. greenhouses).

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MONITORING OF GREENHOUSE GASES IN CALARASI COUNTY

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Abstract

This paper aims to highlight the aspect of air pollution responsible for the greenhouse gases identified in the county of Calaraşi among the pollutants covered by the Kyoto Protocol, in Calarasi county following emission inventories of greenhouse gases that contribute to climate change: carbon dioxide (CO_2), nitrous oxide (N_2O), nitrogen oxides (NOx) and methane (CH_4).Monitoring of greenhouse gases was made in the Environmental Protection Agency Calarasi, based on questionnaires completed by the operators.
Reducing emissions of greenhouse gases in the county of the previous year was due to methane gas supply expansion both in the city of Călăraşi, Oltenița and the city and connecting the gas distribution network of communities, increased energy efficiency the insulation of buildings, increased in rural areas with green spaces, road transport fleet modernization.

Keywords: *emissions, air pollutants, greenhouse gases, climate change, prevention, control.*

INTRODUCTION

During the United Nations Conference for Environment and Development, which took place at Rio de Janeiro on the 5th of June 1992, the Convention of the United Nations for Climate Changes was signed. The main objectiv of this convention is the stabilization of the concentration of the greenhouse gases in the atmosphere in order to avoid any antropogenic disturbance of the climatic system. In 1992, Romania signed this conention which was ratified by the Romanian Parliament through act no.24\1994. At Kyoto,on 11th of November 1997 a protocol was signed at the United Nations Convention containing the commitment of the nations regarding the limitation of the quantity and the reduction of greenhouse gases between 2008-2012 compared to 1989 with al least 5%. In the annex A of the Kyoto Protocol the list of the greenhouse effect is presented: carbon dioxide (CO_2), nitrous oxide (N_2O), nitrogen oxides (NO_x) and methane (CH_4) hidrofluorocarbide (HFCs), perfluorocarbide (PFCs), sulphur hexafluoride (SF_6).

During 2008-2012 Romania is due to reduce the emissions of the greenhouse gases with 8% compared to the reference year 1989. The direction 2003\87\CE, which establishes a scheme for the commerce with certificates for emissions of greenhouse gases, was transposed into HG 780 from 2006.

The evaluation of the impact on the environment was defined as a basic instrument in identifying and reducing the negative consequences upon the environment caused y human actions. It reflects a preventive approach of the environment management having as purpose lasting development. This evaluation tries to incorporate the planning for the environment from the first phases of the project for development in order to prevent and reduce the negative ecological impact on the planned activity.

"The National Plan for the Atmosphere Protection" has four objectives:

1. Maintaining a good air quality in the areas where the concentrations are under the legal limits.
2. Improving the air quality in the areas where the concentrations overpass the limits.
3. Taking the necessary actions in order to diminish and remove the negative impact n the environment, including in the cross-border context.
4. Accomplishment of obligations taken in during international conventions and participation at the international cooperation from this field.

Establishing the quantity of substances emitted in the atmosphere is a necessary and fundamental reference point in creating the politics for the environment protection and in monitoring some phenomena such as acid rains, air quality degradation, greenhouse effect, climate changes, reduction of the ozone layer etc.

The quantifications of these emissions in the atmosphere, usually called "inventary of emissions" is based on a set of specific rules which can have different forms.

The inventary of emissions is a quantitative and qualitative description of substance emissions in the atmosphere as results of human activities or natural sources.

An inventary of emissions must have some basic characteristics:

- the coverage degree, which means taking into consideration all the sources of emissions and information regarding the process.

-consistency, which means that the data obtained during a period should be homogeneous, based on identical methodological processes and on homogeneous data.

-comparability, which means that the inventaries must be accomplished using well established methodologies in order to assure the comparability of the results.

-transparency, which means that the information contained in the inventary should be sufficiently detailed so that those who are interested could have a full image of the activities from the inventary.

These characteristics allow the validation and verification of the processes of making the inventaries, that the methodological conformity of the data contained.

MATERIAL AND METHODS

This paper aims to highlight the aspect of air pollution in the Calarasi county, with its implications. To this end, we highlighted the main air pollutants produced by industry - identified in the county of specifying the quantities emitted per year and emissions of pollutants responsible for the situation of climate change.

The main activities generating greenhouse gases are: thermal power plants producing heat related commercial activities, industrial and residential, and distribution of fossil fuel extraction, using solvents, road transportation, agriculture and mobile sources other than road transport.

Impact of chemicals emitted into the atmosphere to the greenhouse effect may be:

- Directly - through emissions: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs);
- Indirectly - by the emission of: carbon monoxide (CO), volatile organic compounds non metallic (COVNM), nitrogen oxides (NOx), sulfur dioxide (SO_2), hydrochloric acid (HCl), ammonia (NH3).

Among the pollutants covered by the Kyoto Protocol, in the county of inventories following greenhouse gases: carbon dioxide, nitrous oxide and methane.

The Kyoto Protocol regulates pollutants besides the above-mentioned three groups of fluorinated gases, the so-called "F" gases hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride (SF_6).

Fluorinated gases (HFCs, PFCs and SF_6) are man-made chemicals used in many sectors and applications. Although fluorinated gases have properties to reduce the ozone layer, most of them have a high global warming potential.

HFCs are the most common group of fluorinated gases. They are used in different sectors and applications such as refrigerants in refrigeration, air conditioning and heat pumps, blowing agents, fire extinguishing agents,

aerosol propellants and solvents. PFCs are used, generally in the electronics sector (eg for cleaning silicon wafers), as well as cosmetic and pharmaceutical industry - but in a minor extent, and refrigeration as substitutes for chlorofluorocarbons - often in combination and other gases. In the past, PFCs were used as fire extinguishing and can still be found in older systems of protection against fire. SF_6 is used mainly as an insulation gas for arc extinction switching of high voltage distribution facilities as a cover gas in magnesium and aluminum.
In the F-Gas Regulation, specific obligations are defined types of equipment operators:
- Stationary refrigeration, air conditioning and heat pumps;
- Stationary and fire extinguishers;
- High voltage distribution installations;
- Equipment containing solvents.

In accordance with Order 524/2000, the Environmental Protection Agency has achieved in recent years Călăraşi emissions inventory in the county. Emissions calculation was made according to CORINAIR methodology, based on questionnaires received from the economic territory. CORINAIR methodology (Core Inventory of Air Emissions), recognized in Europe and internationally is created under the aegis of the European Environment Agency. It proposes a system that has:

- a guide of recommendations for air emissions, including methods for determining the source of each type of emission factors;
- a logical system that allows the creation of an inventory database by collecting and using various functions of analysis and information management;
- defining a reference system for broadcasters, the chemicals, fuels and various specifications, which are considered part of the classification of activities.

CORINAIR methodology, updated annually and published on the website of the European Environment Agency, provides information on categories of sources of emissions into the atmosphere, which generate technological processes and associated emission factors. As the implementation of continuous measurement of emissions of pollutants into the atmosphere, should be considered in the introduction of emission inventories of emissions achieved under continuous monitoring.
It should be noted that recommendations made by the CORINAIR are not binding, they are useful in the absence of more precise data.
According to the CORINAIR methodology, emission inventories may contain data on three types of sources: point, surface and linear.
- point sources - individual sources or exhaust channels characterized by high capacity consumption / production, geographical coordinates, etc. operating conditions.
- area sources - small point sources of pollution or more on an area basis, such as: county, area, scale EMEP (EMEP grid = grid size grid 50km x 50km belonging to the network developed by the Monitoring and Evaluation Program long distance transport of air pollutants in Europe).
- linear sources - road vehicles, rail, river transport, sea or air transportation.

Air pollutants emissions inventory involves:
- identification of emission sources on the three categories listed above;
- identify the characteristics necessary as quantifying emission sources of pollutants emissions into the atmosphere and their location;
- data collection;
- validation, verification data and emission inventories.

RESULTS AND DISCUSSIONS

In recent years, Călărasi Environmental Protection Agency monitored air quality in the area Călărasi by four automatic stations, continuously measuring the concentrations of sulfur dioxide, nitrogen oxides, carbon monoxide, ozone, particulate matter, volatile organic compounds, but also metals in the dust.
The four automatic stations and the area where they are located:

- a border station, located in the Chiciu area;
- an urban background station - in the Veterinary Medical Directorate;
- a traffic stop - in the Horizon area;
- an urban background station - in the Municipal Stadium.

Monitored pollutants, measurement methods, limit values, alert thresholds and criteria for locating information and monitoring points are established by national legislation on the protection of the atmosphere and are in accordance with the requirements of European regulations.

In Calarasi county were identified the following operators entering the trading scheme for greenhouse gas emission:

- SC COMCEH SA Calarasi
- SC DONASID SA Calarasi
- SC SAINT GOBAIN GLASS ROMANIA SRL Călărasi
- SC ZAHĂR SA Calarasi (bankruptcy)
- SC DONALAM SRL Călărasi

In the Calarasi county, all four operators are in business in 2009 called emissions permits for greenhouse gases. They obtained permits:

- SC COMCEH,
- SC DONASID,
- SC SAINT GOBAIN SA [7].

The main producers of greenhouse gases are in thermal plants which produce energy related to commercial activities, institutional and residential heat produced in industrial boilers and industrial combustion processes, industry, road transport.

The quantities of emissions of greenhouse gases (GHG) in the Calarasi county [7] in the period 2005-2009 (according to questionnaires received from the area), is as follows:

Table 1. Emissions of greenhouse gases (thousand tons) in Calarasi County

Total emission (thousand t)	**2005**	**2006**	**2007**	**2008**	**2009**
GES	268.77	277.58	249.539	345.10	261.23
CO_2	55,949	239.11	200.001	281.67	221.71
CH_4	110.52	36.49	39.320	58.947	37.247
N_2O	102.3	7.821	10.217	4.482	2.275

From the table it is observed that 2008 was one in which greenhouse gas emissions were maximum.

CO_2 fluctuations were quite large, almost five times lower in 2005 compared to 2008. Annual emissions of CH_4 and N_2O in the county in 2005 were considerably higher than in subsequent years. From the data, we observe a considerable reduction in annual emissions of greenhouse gases, especially that of N_2O, which almost reduced to a half, probably caused by the expansion of methane gas supply in the city Călăraşi, and in Oltenița city, such as connecting the gas distribution network of other localities (communes Modelu, Tonea, Dragalina, etc.) insulation of buildings, increased green spaces in rural areas, upgrading of road transport fleet. Nitrous oxide (N_2O) is a stable gas, only at 600 ° C, decomposes into N_2 and O_2 items. Nitrogen oxides are generated in large quantities of anthropogenic activities (mining copper, oil, nitrogen fertilizers and auto transport). It contributes to reduced visibility on roads, the smog formation. Nitrous oxide (N_2O) is a double harmful action: greenhouse gas (GHG) and gas that contributes to stratospheric ozone destruction. Most important anthropogenic sources of oxides of nitrogen production facilities are all fixed and mobile combustion processes taking place.

CONCLUSIONS

1. *Actions to reduce emissions of greenhouse gases*

National Allocation Plans (NAPs) determine the total quantity of CO_2 emissions that

Member States grant national companies, which can be bought or sold by companies. Each member state must decide how many emission allowances can be allocated for marketing in a certain period of time and how many will each receive certificates or manufactures combined. The first trading period was 2005 - 2007, the second is between 2008 - 2012, and the third period will begin in 2013. This way they want to limit CO_2 emissions from energy and industrial sectors by providing emission allowances.

2. *Implementation of the EU emissions trading greenhouse gas emissions in Calarasi County.*

EPA has developed specific activities Călărasi implementation of the Directive on emissions trading scheme for greenhouse gas [7]. For implementation at local level they have achieved the following activities:

a) collecting data and providing data necessary to accomplish the database for the National Registry of Greenhouse Gas.
b) participation in training organized by representatives of NEPA on the underlying data collection to achieve the National Inventory of Greenhouse Gases (INGES).
c) participation in working groups on climate change;
d) participation in meetings with experts in specific sectors, making field visits, depending on the specific sectors, for more accurate documentation of what activities / processes generating / sequestration by sinks of greenhouse gas;
e) participation in training organized by representatives of NEPA for analyzing action plans for monitoring and reporting greenhouse gas emissions for the commitment period 2008 – 2012;

f) Verification of documentation provided by operators in order to permit facilities that fall under GD 78012006 for the period 2008-2012. Participation in seminars on the implementation of the National Register of greenhouse gas emissions in Romania - organized by NEPA.

3. Reducing emissions of greenhouse gases in the county of the previous year, 2008, probably due to:

- extension of methane gas supply in the city of Călărasi, and in Oltenita city, as well as bringing the gas distribution network to other localities;
- increasing energy efficiency through insulation of buildings, both from its own sources and by accessing the Ministry of Regional Development and Tourism Program (program accessible at the City Hall and the cities Călărasi and Lehliu)
- growth areas with green spaces in towns;
- modernization of road transport fleet.

4. Although the responsibilities for action plans relating to the protection of the atmosphere are shared between governments, local Environmental Protection Agencies have the initiative to develop plans. If exceedances of threshold values should be taken:

• Identify causes and highlight them on the map;
• Inform the Ministry of the measures to be taken;
• Inform the local administrative authorities, plant operators and local public health authority;
• Issuance of measures to be taken by operators;
• Include action plans for environmental permits.

5. Pollutants from road traffic contributes to increasing quantities of greenhouse gases responsible for climate change resulting, among other things, to the aggravation and intensification of extreme weather events. Traffic emissions are directly related to its volume, the degree of wear of the motor and type of fuel used and the effects on human health depend significantly on these characteristics.

6. Automatic monitoring stations bring more accurate air quality data, allowing the proposal and measures more accurate and more effective in reducing pollution.

7. Local public administrative authorities should assist the implementation and implementation of action plans. It should also work with county police inspectorates and transport authorities that mobile sources of pollution are due to large concentrations. These authorities could take measures such as limiting the speed of vehicles in a given area and / or diversion of traffic and / or ban traffic in that area for a period of time.

8. If the main cause of stationary sources of pollution episodes, facilities operators (shareholders) must take suitable and effective measures to reduce air emissions. This could include reducing polluting activities, fuel substitution and / or temporary cessation of polluting activities.

9. Implementation and updating of databases of existing production facilities, technologies used, types and quantities of pollutants emitted, pollutant reduction systems etc. allow the creation, at any time, a real image could not be found of the situation in the air we breathe.

10. As measures to be taken for prevention, improvement and reduction in industrial pollution:
-monitoring of the environment;
-environmental factors and self laboratories equipped with modern equipment. In this respect we mention the SC DONASID SA an d SC SAINT GOBAIN SA Călăraşi and installation of self have made the chimney emissions.
-technological upgrading and maintenance;
-implementation of plans for compliance measures and action plan;
- refurbishment tehnological processes.

11. Transportation is not a major threat to air quality in Calarasi.

12. As can be seen from the situation presented above, Calarasi county territory does not have major problems of environmental pollution. In case of air pollution, few exceed the quotas allowed indicators, especially due to the fact that many industrial centers were closed.

13. The data relating to air quality monitoring network resulting from the last period, an improvement in air quality due to the diminished economic and enforcement activities by the majority of industrial units for technology and modernization programs.

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PRESSURES OF VARIOUS FACTORS OVER THE QUALITY STATUS OF SOILS IN CALARASI COUNTY

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Abstract

Soil polution is considered as a result of unhygienic habits or improper practice, due to the random removal and disposal of residues resulting from human activity, industrial waste or misuse of chemicals in agricultural practice. The paper under consideration land use categories of the county in recent years have highlighted the pressures on soil quality status of the following factors: fertilizer, plant protection products, heavy metals, etc. Agricultural areas have been studied recently and the situation monitored degraded and contaminated land in the county.Quality agricultural land includes both soil fertility, and conduct of other environmental factors to the plant. Quality classes of land to determine their suitability for agriculture. Soil quality is affected to a lesser or greater than one or more restrictions. Their harmful influences are reflected in the deterioration of soil characteristics and functions, in their ability bio, but also affecting the quality of agricultural products.

Keywords **:** *soil quality, pressure, degraded lands, waste*

INTRODUCTION

In recent years the role of the European Environment Agency, established with the aim to collect and disseminate comparative data for the environment has grown increasingly more. Initially having only an advisory role, it has now assumed an increasingly important one to adopt new measures and to assess the impact of decisions already taken. Currently, the emphasis is on diversifying environmental instruments, and in particular, introduction of environmental taxes (the "polluter pays" principal), the motivations of environmental and voluntary agreements. Calarasi county area is 5088 km^2, representing 2.1% of Romanian territory. The impact of agriculture in the county on the environment due to excessive use of chemical fertilizers, but also due to improper application of pesticides, herbicides, fungicides, insecticides. The impact of livestock is particularly strong, especially in farms that have no wastewater treatment plants. The risk of nitrate pollution of groundwater is high, due to their high solubility in water in the soil. Industry is focused primarily on county manufacturing activities. County branches are weighted in industry: food and beverage industry, metallurgy, clothing, manufacture of other non-metallic mineral products, manufacture of paper and paper products. The largest share has metallurgy, followed by food.

In view of their origin, the residues can be classified into:

- municipal waste resulting from the daily work of people in homes and public places;
- industrial waste coming from the various operations that may consist of raw materials, finished or intermediate composition and have a very varied, depending on the industries and the technology used (in the food industry - predominantly organic ingredients, while in the chemical industry, metallurgy, steel, mining - predominantly organic or inorganic chemicals);
- agricultural residues - breeding, raising and caring especially about animals;

Soil polluting elements can be divided into two categories:
-biological factors, represented by microorganisms (bacteria, viruses, parasites);
-chemical elements, which are mostly, such as organic.
The actual pollution of soil and groundwater can be reached when the harmful substances that reach the ground beyond the quantitative capacity of the soil to degrade these substances[1].
Evolution of different substances in the soil leads to the following directions:
- quality - a consequence of the persistence of toxins;
- quantitative - and washing soil acidification.
Both can cause serious soil problems and find their origin in industrial or agricultural installations in how private management objectives, houses, cultural and social objectives, or street traffic.

MATERIAL AND METHODS

The paper has taken under consideration land use categories of the county in recent years have highlighted the pressures on soil quality status of the following factors: fertilizer, plant protection products, heavy metals, etc.. Agricultural areas monitored were studied lately degraded situation and contaminated in the county.
The Laboratory of physico - chemical analysis of the Environmental Protection Agency conducted in 2009 Calarasi analysis of soil in two areas: industrial area the Oltenita and the Cuza Voda (traffic).
Quality agricultural land includes both soil fertility and the conduct of other environmental factors to the plant.
Quality classes of land to determine their suitability for agriculture. Farmland includes all land (including areas occupied by water), regardless of destination, under which title is held or public or private part.
According to data provided by the Department for Agriculture and Rural Development Călărasi [4], the land use categories in 2008-2009 are presented in the table below:

Table 1. Evolution of agricultural land distribution types of uses in the county of Calarasi

	Use category	**Area (ha)**				
		2005	**2006**	**2007**	**2008**	**2009**
1.	Arable	416030	416150	416150	414831	414784
2.	Pastures	5235	5101	5243	6098	6130
3.	Meadows grassland	134	134	-	-	-
4.	Vignaries	5120	5120	5119	5118	5118
5.	Orchards	177	191	184	191	191
Total agricultural		**426696**	**426696**	**426696**	**426238**	**426239**

We observe very small variations in the table these areas, with small decreases in agricultural land in the past two years. The cultivated areas in the Călăraşi county in the years 2008 - 2009 were:

Table 2. The cultivated areas in the county of in the years 2008 - 2009

Nr. crt.	Culture	Area (ha)	
		2008	2009
1.	Wheat and rye	1624116	159391
2.	Barley	30399	44200
3.	Oats	1461	4361
4.	Maize	78617	66291
5.	Shelling	3117	4682
6.	Beans	333	282
7.	Sunflower	65980	61260
8.	Rape	36582	40075
9.	Soybeans	4168	5487
10.	Herbs	138	172
11.	Potatoes	417	473
12.	Field Vegetables	2295	2485
13.	Forage crops	18960	16962
14.	Other crops	4409	4218

The cultivated areas have increased significantly in 2009 than those planted with wheat and rye - which have fallen considerably, those of corn grain and forage crops.
According to data provided by the Department for Agriculture and Rural Development Călărasi [4] herd dynamics in the same period was as follows:

Table 3. Dynamics of livestock in the county of Calarasi

	UM	2008	2009
Cattle	Nr.ends	30469	26015
Pigs	Nr.ends	114.779	105474
Sheep	Nr.ends	169.270	159863
Goats	Nr.ends	26820	30536
Horses	Nr.ends	14471	10510
Birds	Nr.ends	39355840	4359983

From the data, we see an increase in the number of goats and poultry, while in other

cases a decrease in sensitivity. Compared to the early 1990s, livestock has been reduced considerably in the units in the field, leading to decreased amounts of animal waste.

Slurry concentration was reduced in large warehouses as a result of the abolition of animal husbandry complexes in return for dispersal in several smaller warehouses and loading areas are located in smaller households or in the administration of municipal councils. During the 2008-2009 Calarasi county affected areas have been identified by livestock waste.

RESULTS AND DISCUSSIONS

Among the factors putting pressure on the state of soil quality we can include:
1.Fertilizers

According to data provided by the Department for Agriculture and Rural Development Călărasi [4], fertilizers used in recent years were: nitrogen, phosphate, potash, and natural fertilizers, the following quantities:

Table 4. Evolution of using chemical fertilizers in the period 2000-2009

YEAR	Chemical fertilizers used (tone active substance)			
	N	P_2O_5	K_2O	Total
2000	10369	4028	482	14879
2001	10141	2763	369	13273
2002	8941	2552	116	11609
2003	6138	1862	269	8269
2004	7133	2103	239	9475
2005	12790	5046	149	17985
2006	11206	3338	240	14 787
2007	13223	6108	214	19545
2008	13720	3579	346	17645
2009	13910	3036	366	17312

YEAR	$N+ P_2O_5+ K_2O$ (kg/ha)	
	Arable	Agricultural
2000	36	36,86
2001	32	32,76
2002	28	28,76
2003	20	20,47
2004	23	23,55
2005	43	44,03
2006	79	0
2007	87	0
2008	104	0
2009	102	0

According to these statistical data, we notice the increase of quantity of fertilizers used until the year 2002, the a slightly decrease, after that an increase of their quantity until 2008.

2. Phito-sanitary products

Department of Agriculture and Rural Development Călărasi [4] presented the situation of using plant protection products in recent years:

Table 5 Situation of using phito-sanitary products, in Călăraşi county

Year	TOTAL phito-sanitary products (tones)	Of wich: Insecticides tones	Herbicides tones	Fungicides tones
2000	258,24	19,78	175,45	26,97
2001	228,68	17,85	133,34	26,02
2002	165,72	25,16	113,81	24,24
2003	146,47	18,13	105,00	13,85
2004	177,45	20,13	135,20	15,90
2005	192,34	16,20	142,25	22,30
2006	239,34	28,60	165,70	29,32
2007	253,62	30,11	180,15	31,20
2008	168,89	9,86	108,64	47,39
2009	192.207	19.577	133.002	35.517

Year	TOTAL phito-sanitary products (tones)	Of wich: Insect fungicides tones	Insect acaroids tones
2000	258,24	36,04	-
2001	228,68	51,47	-
2002	165,72	2,50	0,01
2003	146,47	9,38	0,01
2004	177,45	6,20	0,02
2005	192,34	12,20	0,01
2006	239,34	15,70	0,02
2007	253,62	15,15	0,1
2008	168,89	3,00	-
2009	192.207	4.111	-

From the table it results that in the years 2000-2001, respectively 2006-2007 the highest quantity of phito-sanitary products in Călăraşi county was applied.

3. Soil pollution from the activity in the industrial sector (mining, steel, energy, etc.)

Large industrial areas that have ceased operation, can be considered problem areas. For example: the former steel mill Călărasi (SC SIDERCA SA), SC area TUROL SA Oltenita (foundry), the Central heating zone (CTZOltenita).

In 2009, the Laboratory of Physics -

Chemistry Environmental Protection Agency has conducted surveys of Calarasi soil quality in industrial areas in Calarasi Oltenita. Measurements were performed in two campaigns, the results being illustrated in the following table:

Table 6 The content of heavy metals in soils from industrial sites monitored in 2008-2009

Sampling site	Year	Pb (mg/kg dry subst.)	Cu (mg/kg dry subst.)	Zn (mg/kg dry subst.)	Cd (mg/kg dry subst.)
		0-10 cm	0-10 cm	0-10 cm	0-10 cm
SC DONASID SA Călărasi area	08	21.03	-	104.41	0.555
	09	15.625	-	36.695	0.55
SC SAINT GOBAIN SA Călărasi area	08	13.95	-	47.7	0.2
	09	24.335	25.43	22.04	0.142
Oltenița industrial area	08	16.62	-	26.905	1.39
	09	33.22	22.055	40.19	1.26

From the table we see that pollution from lead and zinc exist in all three sampling sites, in quantities exceeding the limits. Quality agricultural land includes both soil fertility, and conduct of other environmental factors to the plant. From this point of view, land is grouped into five quality categories differentiated by the average score of evaluation (Class I - 81-100 grade, Class V - 1-20 points).Quality classes of land to determine their suitability for agriculture. According to data provided by Soil and Agrochemical Studies Office Călărasi [4], the situation of employment land in the county is as follows:

Table 7. Assignment to classes and types of soils in Calarasi

Agriculture use	Class I	Class II	Class III	Class IV	Class V
	Ha (%of total use)	Ha (%of total use)	Ha (%of total use)	Ha (%of total use)	Ha (%of total use)
426230	12928 (3.03)	194911 (45.57)	177413 (41.58)	37599 (8.81)	4311 (1.01)

Seen from the table that most land in the county fall into Class II and III of use. Soil quality is affected to a lesser or greater than one or more restrictions. Their harmful influences are reflected in the deterioration of soil characteristics and functions, in their ability bio, but also affecting the quality of agricultural products.

The main restrictions on soil quality are:
• excess water from groundwater and surface water;
• secondary salinization;
• landslides;
• surface erosion;
• flooding;
• soil reaction and nutrient supply to the main (N, P, K)
• soil pollution

In 2009, the Laboratory of Physics - Chemistry has conducted surveys on soil quality near the main industrial areas and main traffic points in the county. The indicators were monitored: pH, following heavy metals: lead, nickel, cadmium, zinc, copper.

Table 8. Soil quality monitoring network in the county of Calarasi

Monitored points	**Type of area monitored points**
Drajna	Traffic
Lehliu	Traffic
Modelu	Traffic
Cuza-Vodă	Traffic
Saint Gobain Călăraşi	Industrial
Tenaris Călăraşi	Industrial
Oltenița	Industrial

Hot spots for land degradation

The data provided by Soil and Agrochemical Studies Office Călărasi situation contaminated land, degraded in the county of the types of pollutants is shown in the table below:

Table 9. The situation in the Călăraşi county of contaminated land

Polluant	**Pollutant affected area (ha)**
Lack of nutrients and matter	**4548**
Deficiency of N, K	**1500**
Oil pollution	**0.02**

In this situation we see fairly large area of contaminated land in the county.
Inventory of contaminated sites
In the county of the existing database according to the EPA Calarasi, are considered contaminated with:

a. Oil - thanks to the tank or pipe accidental following sites:

- Park 1 Ileana (6866,55 ha)
- Park 2 Ileana (2655,69 ha)
- Park 3 Ileana (2775 ha)
- PECO storage Calarasi (20816 ha)
- Oltenita boiler area (8365 ha).

b. tar, ammonia water, oil-absorbing powder, coke:

- Chemical-recovery plant Calarasi (469,180 ha) - a company in bankruptcy.

CONCLUSIONS

1. *Actions taken for ecological restoration of degraded lands and the improvement of soil quality*

Government Decision no. 1408/2007 on procedures for investigation and assessment of soil and subsoil investigation and evaluation procedures governing the pollution of soil and subsoil, in order to identify damage to them to liability for environmental and geological remediation. Among the cases in which the investigation and assessment of soil and subsoil are:
- the establishment of pollution dangerous to human health and the environment;
- development of environmental balance;
- establish environmental liabilities in case of changing the legal status of land where an activity was carried out environmental impact assessments.

It established the requirement for the economic operator or owner of land that leaving the impact on the geological environment, changing land use or activity, to conduct investigation and evaluation of environmental pollution.

2. Contaminated sites remediation projects in Calarasi County in 2009

Regarding the reconstruction of soils contaminated with hydrocarbons from Calarasi county in 2009 have been restored to agricultural land, using the method of biodegradation of petroleum hydrocarbons by selected microorganisms following inoculation of contaminated sites:
- Ileana Park 1-Park 2 (7750 mp)
- Injection pipeline route I 10 (4000mp)

3. Large areas of land affected by the presence of heavy metals in the county require remedial measures taken to reduce risk to human health and animals. Research internationally has shown that to treat soils contaminated with heavy metals, the most important research directions, we are treating the electric field, Phytoremediation, soil washing, solidification or stabilization. Of these only Phytoremediation is low cost. Phytoremediation of soil polluted with heavy metals is a process that is based on fitoextraction of heavy metals (extraction using suitable plant). The strategy of phytoremediation are a number of factors to be taken into account: the type and degree of soil pollution, plant selection, the treatment, agronomic techniques used, speed metal retention, transpiration rate, soil cleaning time, harvesting plant, the treatment of contaminated plant. Fitoextraction of heavy metals appears to be a promising method for effective, environmentally sound and cost-polluted soil. Compared with conventional remediation technologies in soil by fitoextraction of fitoremediations calls for the following:
- the cost fell, which may be considered a key factor in the process;
- do not generate additional pollutants,
- does not destroy the soil structure;
- aestheticly, giving the applicability of the process large areas of land located in polluted areas.

4. Studies made in the Black Sea Environment Programme revealed that 58% of total nitrogen and 66% of the total phosphorus in waters that reach the Black Sea from the Danube Basin, having as a share of Origin, 50 % agricultural activities, approximately 25%

municipal waste and only 10-13% of industrial activities. Calarasi County is located in the terminal basin of the river, so it is responsible for the pollutants that reach the Danube (especially by nitrates from agriculture infiltrated into groundwater).

5. Other ways to prevent and control soil pollution:
- collection of toilet waste in special containers (bins, containers) located in areas with the smallest movement and as well covered, for not being accessible to insects and rodents;
- appropriate landfill or waste treatment by neutralization, in order to reduce the danger that it may represent the human body;
- rational use of chemical fertilizers, soil productivity in order to decline chemicalization is recommended in combination with organic fertilizers, or can alternate their governance;
- controlled distribution of pesticides, since the abuse results in their accumulation in many food products (fresh pork, fresh ham, butter, beef brain, etc.).
- location, layout and supervision of various types of storage of hazardous substances.

6. In Calarasi county in 2009 were registered 36 businesses that organic farming approximately 8173.98 hectares in the vicinity of Borcea, Perişoru, Lupşanu, Dor Mărunt, Fundulea, Vâlcelele, Chirnogi, Lehliu, Dragalina, Ştefan cel Mare, Mănăstirea.
7. In Calarasi county, in 2009 there were 38 facilities that were subject to the Directive on Integrated Pollution Prevention and Control. These facilities are the main activities poultry and pigs, inorganic chemicals - aluminum sulphate production, paper industry, ferrous metallurgy, glass, obtaining biofuels, obtaining technical gases.

8. Sustainable use of soil can be achieved through a system of organizational measures, appropriate works - from legal provisions, economic incentives, continuing with production management, agricultural land affected by recovery and limiting destabilizing factors (which require vigorous intervention investment in ecological restoration).

9. The purpose of environmental protection is keeping the ecological balance, maintaining and enhancing the natural factors, the development of natural values and ensure better living and better workforce for current and future generations.

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THE INNOVATION SYSTEMS– CONCEPTS AND PERSPECTIVES

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Abstract

The agricultural sector of many countries is changing in response to new market opportunities and productivity requirements, new resource management problems, and new roles assumed by public, private, and civil society actors. In this context, the pace of change and level of uncertainty can be considerable. Support to agricultural research and extension systems is necessary but not sufficient to expand the capacity for innovation in agriculture. New ways of enabling innovation are required to deliver economic growth and reduce poverty.

Keywords **:** *agriculture, innovation, development*

INTRODUCTION

Through its explicit attention to development outcomes, the innovation systems concept offers a new framework for analyzing the role of science and technology and its interaction with other actors to generate goods and services. Based on this analysis, an intervention framework has been designed that identifies common weaknesses in innovation capacity in commonly encountered situation, provides principles (as opposed to prescriptions) for intervention, and provides examples of options for intervention.
The innovation systems concept provides a framework for inclusive, knowledge-intensive agricultural development, but more experience is required before the contours of a truly pro-poor, pro-environment, and premarket innovation system can be defined fully.

MATERIAL AND METHODS

This study originated with the proposition to explore new ways of thinking about interventions that could promote agricultural development by better enabling the innovation process. One lesson is that universally applicable blueprints do not exist.
Development practitioners must be willing to work with emerging concepts and must recognize that the interventions that they are planning will evolve while they learn.
The findings of the study reveal that an innovation system approach can promote the integration of poverty and environmental issues into sector development planning by altering the roles and interactions of actors in the public sector, the business community and civil society.

RESULTS AND DISCUSSIONS

The latest index was published in March 2009. To rank the countries, the study measured both innovation inputs and outputs.
Innovation inputs included government and fiscal policy, education policy and the innovation environment. Outputs included patents, technology transfer, and other R&D results; business performance, such as labor productivity and total shareholder returns; and the impact of innovation on business migration and economic growth.

1. Research is an important component, but not always the central component of innovation

Knowledge created by research is a fundamental building block of an innovation system.

The path to using that knowledge successfully in an economy depends, however, on the time and place at which it enters the innovation system.

The knowledge created through research can be spatially and/or temporally separated from the innovation system where it is used. This point leads to another key finding and echoes a similar observation from the manufacturing sector, which is that innovation often involves organizational, institutional, managerial, marketing, or design changes that require special expertise and skills.[1]Apart from expertise, successful innovation depends on an array of other conditions, such as the availability of market knowledge, venture capital or other forms of credit, training opportunities, collaborative mechanisms, and policies to enable sector development. Given these requirements, one of the main constraints to innovation is weak interaction between entrepreneurial activity and research.

Table 1. List of the twenty largest countries (as measured by GDP) by the International Innovation Index

Rank	Country	Overall	Innovation Inputs	Innovation Performance
1	South Korea	2.26	1.75	2.55
2	United States	1.80	1.28	2.16
3	Japan	1.79	1.16	2.25
4	Sweden	1.64	1.25	1.88
5	Netherlands	1.55	1.40	1.55
6	Canada	1.42	1.39	1.32
7	U. Kingdom	1.42	1.33	1.37
8	Germany	1.12	1.05	1.09
9	France	1.12	1.17	0.96
10	Australia	1.02	0.89	1.05
11	Spain	0.93	0.83	0.95
12	Belgium	0.86	0.85	0.79
13	China	0.73	0.07	1.32
14	Italy	0.21	0.16	0.24
15	India	0.06	0.14	-0.02
16	Russia	-0.09	-0.02	-0.16
17	Mexico	-0.16	0.11	-0.42
18	Turkey	-0.21	0.15	-0.55
19	Indonesia	-0.57	-0.63	-0.46
20	Brazil	-0.59	-0.62	-0.51

Source: Global_Innovation_Index

Research is an important source of knowledge for innovation, but it serves principally as a complement to other knowledge and other activities. Many countries have an urgent need to develop the other elements of the innovation system, particularly more extensive patterns of interaction and the attitudes and practices that support interaction. Once research is better integrated into this wider set of activities, it will become clearer where research capacity is limiting and where it needs strengthening.

This way of thinking reflects a shift in the kinds of interventions that are required. Rather than supporting activities and actors in isolation, such as research and research organizations, or supporting the generation of outputs, such as agricultural knowledge and information, emphasis should be placed on supporting outcomes that lead to sustainable development through agricultural innovation systems .

2.In the contemporary agricultural sector, competitiveness depends on collaboration for innovation

The context of agriculture is continuously evolving. New regulations, consumer preferences, competitors, pests and diseases, climate change, and human health problems are just some of the changes that agricultural systems may face.

Different sources of knowledge are needed to deal with these challenges, which require dense networks of connections.

Information may come from public research organizations, technical services in the public and private sectors, development agencies, as w ll as other entrepreneurs or producers. Many problems cannot be solved by the producer alone; they often require changes in different segments of the value chain. Quality improvement, for example, is as much about production as about postharvest innovation, and it may require collaboration between growers , assembly agents, warehousers, exporters, and shipping agents .[2]

Such collaboration is even more important when a sector wants to build a national brand image, which may even require collaboration among competing exporters. Companies need

to collaborate to compete, and governments need to be a nurturing partner in this process.

3.Social and environmental sustainability are integral to economic success and need to be reflected in interventions

The need to integrate social and environmental concerns can be viewed in various ways.

The supply chain and social and environmental sustainability. In many sectors, smallscale farmers are the production base for an industry, whereas other sectors (rely heavily on the natural resource base. Creating a sustainable sector requires attention to the "triple bottom line": interventions and policy support must be pro-poor, pro-environment, and pro-business. Attention to social concerns is not important merely to create or sustain a production base. Socially and environmentally irresponsible modes of production are no longer politically defensible. They carry and heighten the risk of civil uprisings, terrorism, and other kinds of economic disruption.

The poor and market sensitivity to social and environmental concerns. Social and environmental concerns increasingly are embedded in consumer preferences in global markets. Ethical and green trade is becoming a mainstream consumer concern in many markets. Companies and governments need to interact with actors engaged with these agendas (mainly civil society organizations) [3] .

Dealing with social and environmental issues may require new types of expertise and insights into the social structure, asset base, and functions of farming communities, which can guide interventions to bring these communities into innovation systems as partners. It is important to realize that different types of farming communities can exist in the same region or country, and they have varying levels of interest in, capacity for, and resources to link with the other actors of an innovation system.

A rule of thumb is that farming communities with a good asset base and access to markets often are more inclined to associate with highly specialized, large-scale, intensive staple crop or livestock production systems, or with innovation systems for high-value products driven by agribusiness interests. Farmers with little land but good links to markets are interested in diversifying production. They may be more inclined to become partners in innovation systems focusing on high-value, low-volume products, especially if sufficient scale is achieved by forming producer groups. Public-private partnerships can be very instrumental in engaging these farmers in profitable enterprises. At the other end of the spectrum are smallscale,resource-poor farmers in marginal areas, where the public sector has a central role to play in supporting social and human capacity building as well as economic activities such as the provision of new breeds and seeds to enhance productivity . From an innovation systems perspective, the priority is to collaborate with facilitators and expert groups who possess deep knowledge of the farming communities and can provide skills and other resources to bring farmers within the real of the innovation system and adapt institutional arrangements to ensure that farmers—like all other stakeholders—are represented fairly.

4.The market is not sufficient to promote interaction; the public sector has a central role to play

Even when competitive incentives to innovate are very strong, they are not always sufficient to bring together all of the actors needed for innovation to function or to reach sufficient scale. The public sector's role is important in four ways [4]:

1. To improve patterns of interaction between all relevant players.
2. To provide and enforce an enabling regulatory framework for the differentiated product markets.
3. To support small-scale farmers in becoming partners in innovation systems and adding value to their assets and skills (for example, through public-private partnerships).
4. To provide financing and infrastructure to bring inventions to market (science parks) or to reach a sufficient share of the global market.

5.Interventions are essential for building the capacity and fostering the learning that

enable a sector to respond to continuous competitive challenges

Dynamic and coordinated interaction among actors in an innovation system often is frustrated by a range of deeply entrenched attitudes and practices that originated when research through a linear process of technology transfer was seen as the main driver of innovation, or when the main source of competitiveness was considered to be low cost (rather than innovation). Such attitudes and practices cause even agile sectors to stall.

The ability to respond quickly to change is an increasingly important element of innovation capacity. For this reason, capacity-strengthening interventions require a major focus on measures that foster strong patterns of interaction and build coordinated action to respond to continuously changing competitive and other challenges. [5] New types of skills must be developed if organizations are to learn from their own and others' experience of coping with change in a highly uncertain environment. This effort may involve new initiatives (such as technology forecasting or scenario planning) and organizational processes (such as communities of practice to capture tacit knowledge in organizational learning) that can promote knowledge management, sharing, and learning to respond to change effectively.

6. The organization of rural stakeholders is a central development concept. It si a common theme in innovation systems development and in numerous agricultural and rural development efforts.

The organization of rural stakeholders is a common element of value chain approaches and community-driven development. Given that investments in organization extend across most development efforts in agriculture (the corollary in irrigation, for example, is the water user associations), they offer important possibilities for synergy with agricultural innovation efforts. Organization can foster two capacities that rural stakeholders tend to lack: the ability to articulate and gain a hearing for their demands, and the ability to negociate.[6]Investing in rural organizations thus tends to make agricultural innovation systems more effective. Agricultural organization does not substitute for technology, but it improves the ability to articulate and communicate needs for particular kinds of technology, and it increases the likelihood that technology is used.

7. A wide set of attitudes and practices must be cultivated to foster a culture of innovation

Interaction is only one (albeit important) practice to promote innovation. Innovation capacity is sustainable only when a much wider set of attitudes and practices comes together to create a *culture of innovation,* including a wide appreciation of the importance of science and technology in competitiveness; business models that embrace social and environmental sustainability; attitudes that embrace a diversity of cultures and knowledge systems and pursue inclusive problem solving and coordination capacity; institutional learning as a common routine; and a forward-looking rather than a reactive perspective. In the medium to long term, the development of these types of attitudes and practices will be critical to economic performance[7].

8. The enabling environment is an important component of innovation capacity

The innovation systems concept pays attention to the enabling environment as an important promoter of innovation capacity. This environment often influences how the actors in a sector can put their knowledge to use. The case studies, however, suggest that often the range of actors and the attitudes and practices in a sector constrain the development of sustainable innovation capacity, despite the existence of an enabling environment (for example, an intellectual property rights regime)[7]. This finding suggests that policy interventions (for an enabling environment) may often be ineffective if they are not accompanied by efforts to change the prevailing attitudes and practices.

The second conclusion related to the enabling environment is that the ability to agree on the innovation challenges of a sector is much greater when effective value chain coordination is in place. It is thus more feasible to link policy support and innovation

efforts and to focus on those enabling activities that actually support innovation. This point once again confirms the importance of sector-coordinating bodies.

CONCLUSIONS

The innovation systems concept makes two fundamental contributions to designing development interventions.

First, it recognizes that initial conditions in a particular country, as expressed in the typologies, largely define how capacity development should be designed.

Second, the innovation systems concept emphasizes that interventions should not focus first on developing research capacity and only later on other aspects of innovation capacity. Instead it suggests that research capacity should be developed in a way that from the beginning nurtures interactions between research, private, and civil society organizations. In other words, countries with research systems may have the potential to leapfrog into more dynamic systems of innovation.

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AGRI-ENVIROMENTAL PAYMENT ISSUES IN ROMANIAN AGRICULTURE

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Abstract

Agri-environment payments are designed to support sustainable rural development and to meet society's demand for environmental services. The present paper aims to draw attention to issues relating to the payment terms for package 1 and 2 of agri-environmental measures regarding the pastures. Therefore were analyzed payment conditions for the two packages. The analysis shows that through these measures could be encouraged also farmers who do not have animals and by default the pastures will not be used and valued according to the norms of the packages 1 and 2. Thus several proposals have been made to avoid these shortcomings.

Keywords**:** *Agri-environment payments, control, pastures, LSU, Romania*

INTRODUCTION

Literature state that Europeans view the countryside and to some extent the natural environment too as man-made, therefore farmers are subsidized to pursue traditional practices and maintain pastures on lands that would otherwise abandoned [1] (i.e. to follow agri-environment measures).

Agri-environmental measures are diverse, however each measure has at least one of two broad objectives: reducing environmental risks associated with modern farming and preserving nature and cultivated landscapes on the other hand [4].

As can be concluded from the main objectives, in EU agri-environment measures are designed to encourage farmers to protect and enhance the environment on their farmland. This measure provides payments to farmers if they carry out some agri-environmental commitments.

These commitments involve not just the application of usual good farming practice. Farmers sign a contract with the administration and are paid for the additional cost of implementing such commitments and for any losses of income (e.g. due to reduced production) [4].

The agri-environment payments are co-financed by the EU and the Member States.

Therefore the aim pf the present paper is to draw attention to some issues related to the payment terms for package 1 and 2 of agri-environmental measures. Package 1 of the Measure 214 refers to pastures with high natural value and package 2 refers to traditional agricultural practices [5].

MATERIAL AND METHODS

In order to characterize the situation of agri-environmental payments for the pastures, were used the information published in the guide of the Measure 214. More concrete were analyzed the access conditions for payments for the first two packages of the measure.

RESULTS AND DISCUSSIONS

The Romanian agricultural land represents around 14.741 thousand hectares. The main utilization of agricultural land are: arable land (63.9%), pastures (22.8%) and hay lands (10.2%) [3]. Also it is known that pastures have the biggest gravity in the mountain agricultural surface [2]. Therefore the agri-environmental payments for pastures have the purpose to encourage farmers to protect and enhance the environment on their pastures.

With respect to these payments, the requirements for the first package "Pastures with high natural value" are:

- is forbidden to use chemical fertilizers
- the use of organic fertilizers is allowed up to maximum 30 kg N a.s./ha
- the use of pesticides is forbidden
- mowing will start only after 1st of July mowed grass must to be removed from the parcel within maximum 2 weeks
- grazing will be performed with maximum 1 LSU (livestock unit) per hectare
- flooded grasslands will not be grazed sooner than 2 weeks after the waters retreat
- is forbidden to plough and roll on the parcels under commitment
- no sowing, however some derogation are permitted

For the second package "Traditional agricultural practices" can apply only the farmers who applied for the first one too. The management condition in this case is to not use at all the mechanization, with the exception of animal drawn machinery.

Regarding the management conditions for the first package some problems could occur when about the animals to graze the pastures:

- First, there is a condition for a maximum LSU/ha, however there is no requirement for minimum LSU/ha, therefore could be encouraged farmers who do not have animals.
- Second, in the case of mountain pastures should be encouraged farmers to graze with animals that adapts well to these conditions. The dairy cows have low production, and the hygiene conditions for milk are hard to control.
- Third, the control over the farmers' activities covers only 5% of the commitments.

CONCLUSIONS

The agri-environmental payments are welcome for the farmers in the context of maintenance of biodiversity; however there could be done some improvements regarding the accessing terms for the measures and the methods of implementation and control.

Thus some proposals could be done:

1. To regulate a minimum of LSU/ha also, considering 0.3 LSU/ha, as it is regulated by law for the pastures rented from the local administration.

2. Further, it should find a better method to check if the farmer holds the animals declared or are only on the paper and to not allow these animals for other contracts of this kind.

3. To encourage farmers from the mountain area to grow beef cows, for their better accommodation to the environment and better yields comparing with dairy cows.

4. The control of the commitments to be done over a higher sample, eventually it could be even permanent. Also it would be more productive that state institutions cooperate more closely.

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SOIL EROSION BY WATER IN OLT COUNTY IN THE CONTEXT OF GLOBAL CLIMATE CHANGE

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Abstract

This paper presents some problems related to soil erosion, which are today among the most discussed topics in the circles of specialists worldwide. Soil erosion is one of the most negative phenomena, whatever it comes from the wind (wind erosion) or from water (hydric erosion)Water erosion is a complex phenomenon of degradation which affects the productivity of agricultural land and involving participation of several processes that change discrete or violent the physiognomy landscape. In the last period of history, the natural conditions that favor the emergence of such a process or added the massive deforestation were carried out at present. Only 26,7% of Romanian's surface is covered by forest and about 43% (6,4 million hectares) of total agricultural land is subject to soil erosion and associated processes, and as the amount of sediment that is eroded on the surface of agricultural land amounts to 106,6 million tons per year.

Keywords: *hydric erosion, soil, fertility, degradation*

INTRODUCTION

The purpose of this paper is to analyze the process of erosion by water and measures to be taken for control and combat this phenomena erosion, which develops on agricultural territory in Olt County, regarding the following issues:
- deepening the knowledge related to the natural conditions in which occurs land degradation with water erosion and landslides
- establishing the criteria for mapping the areas degraded by erosion and landslides in order to subordinate all ensemble cause - effect and concept of ecological rehabilitation
- increasing performance of the rehabilitation of degraded land and differentiation of technical solutions based on classes favorability morphologic

MATERIAL AND METHODS

In a broad sense by soil erosion is understood all processes by which water or wind causes partial or total destruction layer of soil and transports the place is where formed, often, with significant parts of the deeper layers, for to him lodges in downstream.
Resistance to erosion, soil is very different according to physical features and stability of rock from which is formed. Related to this , and knowing that the horizon A gives the highest
resistance to erosion must is keep the upper soil horizon by in a agriculture irrational that can him destroy it. Soil erosion was caused by a number of social, economic and natural factors:
- irrational deforestation of forests on slopes,
- grubbing natural grasslands on the slopes without precautions against erosion,
- grazing of the hill in the valley
- cultivation land on the direction from hill in the valley
- using the roads from the hill in the valley
- lack of fertilizers in general and particularly the organics fertilizers
- lack of protective crop rotations.
Natural factors that have contributed to the birth and formation of the erosion are: climate, relief, and vegetation. To estimate the average annual erosion, erosion so-called

universal formula (adapted by Moțoc M. after H. Wischmeier 1960).

A= R*K*L*S*C*P[2]

where: A - is the computed soil loss, R-is the rainfall-runoff erosion factor, K-is the soil erosion factor, L- is the slope length factor, S-is the slope steepness factor, C- is the cover management factor, P-is the supporting practices factor. ABAG equation was transferred in Europe after USLE equation (Universal Soil Loss Equation) and was known as RUSLE (Revised USLE) by Schwertmann, Vogel şi Karnz in 1990. For each factor, this corresponds to a Layer. It is multiplied in GIS. It is obtained a map of the danger of erosion in this way. Maps about the risks of development of erosion phenomena in their many forms (water, wind, landslides and anthropogenic challenges) are needed to develop soil conservation measures, measures that are part of the great projects for zonal, regional and global greening activities. [1]

RESULTS AND DISCUSSIONS

The shaping of the present territory of the Olt County is determined primarily by the intense activity of water from the rain, especially torrential rain that it drains from the slopes rapidly. It decreases in intensity and in affected areas, with the passage of the piedmont plateau in N the piedmont plains and terraces of S, in report to with decreasing relief energy, extended, fields interfluvial detrimental to the slopes and gradually decrease rainfall. The geomorphological processes that accentuate modeling activity reaching land degradation and surfaces devoid of vegetation. The land affected by surface erosion occupies almost 29,064 hectares, and that affected by deep erosion occupies an area of 1060 ha (Table 1). These lands are located in the mobile sand Ianca, Potelu, Stefan cel Mare. Land affected by erosion caused by water are widespread in Northern of Olt County, especially on valleys of the main watercourses. Areas affected by excess moisture are scattered sporadically approximately across the County totaling about 39580 ha.

Table 1 . Land affected by erosion, in the olt county

Restric□ion	Affected area	Weak	Moderate	Strong	Very strong	Excessive
Groundwater excess moisture	39580	15520	13188	5310	5239	323
Excess moisture stalled	63946	42782	18267	2655	229	13
Surface erosion	29064	12937	7179	3483	5307	158

Combating the excess of stagnant moisture can be achieved by: arrangement of ditches and culverts to drain excess water, drainage mole, modeling the land in strips with ridges, deep loosening. At this stage can say that soil pollution includes not only all the phenomena and processes caused by the intrusion of outside of substances or harmful elements, but and all disorders what occur in balance complex, of physical nature, chemical and biological, made and reached a certain degree in a period long time.

CONCLUSIONS

As a conclusion, Olt County is characterized by the symmetry of relief to Riverbed Olt and the simplicity of geological soil structures. In the specific conditions of Olt County (climate, rocks, relief, vegetation, etc.) quite different soils formed as genesis, and as the geographical distribution there is observed a great diversity of them, be distinguished with however, two large strips: one linked to Getic Piedmont, and other linked to Romanian Plain and separated by a strip of the middle with transitional character. The measures on farming soils have the following general objectives contained in National Action Plan for Environmental Protection and Strategy in field for Olt County: **1.**Refurbishment facilities of land reclamation, aiming at restoration and modernization of irrigation works in areas with stringent requirements, the erosion facilities on 39475 ha and extending them; **2.**The restoration of soil physical by the deep loosening on 137,245 ha and combating crust on 47 326 ha; **3.** Correcting soil reaction on about 37,458 ha, recovery of the stock of organic matter of minimum of 56 913 ha and the nutrients (especially phosphorus and micronutrients). And implementation other agro-technical measures of combating soil erosion, such as

agro-technical anti-erosion works relating to: Structure of Crop; Module Location crop on slopes and of execution the works; Using of works agrotehnic special; (agro) Rational use of fertilizers.

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THE DIMINUTION OF THE AGRICULTURE VULNERABILITY AT THE RISK FACTORS AND THE ENVIRONMENT PROTECTION IN REPUBLIC OF MOLDOVA

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Abstract

In the elaboration of agricultural politics directed to the agricultural harmonization with the environment protection it is indispensable to take into account of some essential elements dependent one of the others: the necessity to increase the positive contribution of the agriculture with reference to the environment; the maximum reduction of the pollution challenged to the environment by the agriculture; the agricultural politics must take into account of the environment. The agricultural practices that do not take into account of the possible negative effects on the soil, environment and biodiversity represent a peril for a durable development of the agriculture. The diminution of the agriculture vulnerability to the risk factors and the risk control may be promoted by means of different mechanisms and politics such as: measures with managerial character, special measures in order to fight the soil erosion and drought, the devastating meteorological phenomena risks, the transfer of the risks.

Keywords: *agriculture, vulnerability, risk, environment protection*

INTRODUCTION

The agricultural production sector of the Moldova Republic is vulnerable to a series of risks and tendencies with a natural and anthropogenic character with a strong, negative impact on the agriculture. The food self – sufficiency of our country is one of the constitutive priorities of the Durable Development Strategy of Agro industrial Complex in the period of 2008-2015 years. The general objective of the strategy consists of a durable increase assurance of the agricultural and industrial sector as well as a consequent improvement of the life quality in the rural environment by increasing competitively and productivity of this sector.

MATERIAL AND METHODS

For pointing out of the problem it was utilized the speciality literature as well as the obtained data after effectuated researches by the author as well as the data of the "Durable Development Strategy of the Agricultural and Industrial Complex during 2008-2015 years".
As research methods they were utilized the analysis SWOT by determining strong, weak points, opportunities and perils, synthesis, induction, deduction.

RESULTS AND DISCUSSIONS

Effectuating SWOT analysis of the agricultural sector of Moldova Republic it is distinguished the following:

Strenght points:

- The agriculture is an essential sector with a major weight in the Moldova economy: 15 percent in PIB and 40 percent in manpower;
- The agricultural lots make up 75 percent of the country total lots;
- Over 75 percent of agricultural lots are in private property (as a result of the land reform that had been finished in 2000);
- The risk soils, the relative favorable climate as well as the relative cheap manpower (for a moment) represent important competitive advantages of this sector;
- The production of high value crops especially of the fruits and vegetable offers the highest profits and so it presents an important potential for increasing farmers revenues;
- The labour productivity in the agriculture increased lattest years thanks to the belying of

the agriculture manpower in other sectors of the national economy, as well as out of our country;
- The connected markets to the agricultural sector – the land market, production means market, agricultural products market, financial market – are being functioned and are in a continuous development process.
- The institutional development of the associative sector, training and extension services in the domain of agricultural business represents important factors sustaining the development of the agricultural sector.

Weak points:

- The agriculture records an in steady and slow increase the latest years;
- The productivity at the sector is low in comparison with region countries and varies strongly from year to year that certifies the absence of the mechanism of risks attenuation in agriculture.
- Our country is vulnerable to a series of risks with negative impact on the rural incomes including erosions, lot slides, droughts, pouring rains, hail, frosts, floods and earthquakes;
- The current production structure reflects the character of subsistence of the Moldova agriculture.
- The insufficient promotion of ecological products that represents products of highs value with great dimand on the external markets especially the high developed ones;
- The actual low efficiency of the agriculture derives from a poor relation with the markets and the low competitively level of agricultural products;
- The financing, including the payment of the labour in the scientific institutions from the sector is insufficient, but the experimental material and technical basis is surpassed;
- The modern market substructure is sub developed in Moldova. It exists an acute of increased capacities of storing, gathering points, equipments for cooling in the field, packing houses.

Opportunities:

- Definite efforts in order to increase the competitively of Moldovan agricultural products will lead to transforming the agricultural of Moldova in a profitable and high productive business;
- The proximity of high developed countries and the direct neighborhood with UE allow a rapid relative transfer of advanced technologies that increase the sector productivity;
- The concentration of the land resources in the financial administration of the most efficient utilizes will create new opportunities in the agricultural sector.
- The modernization of the autochthonal system of quality management is absolutely necessary for keeping access on the new market especially on EU markets;
- The improvement of investment and business climate would permit the increase of the investments in the sector both local and especially foreign ones, that would increase the competitively and innovation;
- The increase of the attractively of the rural zones by developing the roads substructure and social one will impel the migration of the business in the rural space and respectively, the creation of labour places out of agricultural sector.

Perils:

- The improvement of the productivity in the agriculture is contributed by the over full filament of two major compulsions: the aged vineyards and orchards and used and old irrigation substructure.
- The failure of the primary agriculture to reach the coordination on vertical establishing strong connections with the other links of the valuable chain – retails, processers, exporters other interlopers – will interfere with the sector development;
- The slow progress of transition from the standard system based on GOST to the one based on the international standards tergiversates the penetration of the Moldovan products on the markets with high value.
- The agriculture will remain consequently avoided by the foreign investors if it does not occur improvements of the business and investment climate including the revision of the restriction concerning to the holding in property of the agricultural lots by the companies with foreign capital;

- Possible natural disasters like drought, floods, hail, etc.
- The absence of a intersectorial, national strategy of preparation for risks production and reduction of the impact of these ones;
- It is possible a total disappearance of certain autochthonal scientific schools in the domain of selection and improvement of agricultural crops;
- The agricultural practices that do not take into account the possible negative effects on the soil, environment and bio – diversity represent a peril for a durable development of the agriculture.

CONCLUSIONS

The diminution of the agriculture vulnerability at the risk factors and the risk control may be promoted by means of the following mechanisms and politics:

1.Measures with general character (organizing):

- the monitoring of the lots utilization according with the notion "the ecological limit of the territory", that characterizes the minimum potential of the renovation of the natural resources and it is realized by norms and standards adopted by law, the elaboration and adoption of the ecological norms and standards of a durable agricultural exploitation of the lots as part of the existent landscape;
- the creation of a stable and complex agricultural system as art of each agropedoclimatic zone by integrating of the vegetable production sector with the zoo technical sector;
- the promotion of the application of organic manures from the all possible sources and chemical fertilizers in moderated quantities ;
- the introduction of the integrated management of plants protection;
- the re – establishment of the physical quality state of the soils and the implementation of a minimum system of soil working;
- the support in the creation of production units and processing of ecological agro alimentary products in accordance with the ecological agriculture regulations;
- the creation of the necessary substructure for the technical and material assurance of the system of durable agriculture (machines, seeds, fertilizers, fuel, pesticides);
- activities of training education, extension and propaganda in the branch of a durable agriculture;
- the identification, implementation and pursuit of preventing measures and fighting of different forms of soils degradation with foresight of the financial and technological responsibilities;

2.Special measures in order to fight the erosion:

- the antierosional and hydrologic arrangement and organization of the lots by more rational and profitable ordering of the way of lots utilization;
- the establishing of the number of the working plots of land and soles, of the form and size of these ones on each versant apart, in conformity with the inclination, form and sizes of the versant;
- the establishing of an optimal net of technological roads, their sizing and placing on the slopes;
- the effectuation of the works for the extinction of pouring formations and erosion fighting in depth: leveling – modeling, level channel, falls and steps, thresholds, dams, consolidations, etc.;
- the creation of the foresty zones of protection of aquatic sources;
- the transformation from arable in surfaces covered with foresty vegetation, hay fields and pastures of the strong, very strong and excessive eroded lots;
- the realization of the agro technical measures for soil protection – antierosional crop rotation, antierosional agrotechnics, the crops cultivation in alternative strips and ungrassed bands;

3.Special measures for drought fighting. The drought risk may be mitigated by utilizing in each agropedoclimatic zone of sorts of adequate crops and zonal systems of working and fertilization of the foils which allow the most rational utilization of the soil moisture

by improving the metrological forecast as well as by irrigation of certain surfaces.

The real possibilities for the profitable extension of the irrigation the next 10years in order to mitigate the drought risks are limited to a surface of 100000 – 150000 ha that includes meadows, partly the meadows of the internal rivers, the high terraces of these rivers with usual black soils. The re – establishment of the irrigation in the meadows of the Nistru and Prut rivers will be effectuated simultaneously with the re – establishment of the drenage systems of the lots.

4.The diminution of the flood risks. The reduction of the flood risks on the small rivers may be reached by zoning of the inundable surfaces with the dissemination of warning about the floods in order to undertake of measurement on a short term concerning the diminution of this risk. The forecasting of the floods is less problematic in the cases of the Tran frontal rivers like Prut and Nistru rivers, as the inundations caused by these ones are conditioned by abundant pouring rains or by the snow melting in the upper waters zones.

The functioning in an urgency regime of the accumulating lakes of Costesti – Stinca and Dubasari will ensure the extinction of the flood waves formed in upper waters on these rivers and will increase the efficiency of flighting the inundation impact.

A particular role in the risk reduction and diminution of the flooding consequences is incumbent on maintaining in a sufficient technical state of the protection dykes against the flooding, to the pumping stations of the drainage systems, of the evacuation channels, of the regularization constructions, of the observance of the technical norms of exploitation of the hydro technical constructions and the creation of the intangible material reserves at the dams in conformity with the exploitation norms.

5. The transfer option of the risks. In order to mitigate the peril of climatic alterations on the food sufficiency and revenues of the agricultural manufactures it is necessary to elaborate and improve the assuration schemes in the agro alimentary sector that will reduce from associated risks with the unfavorable climatic conditions such as: hail, droughts and big frosts.

The strengthen of the institutional measurements in order to reduce the disaster foresees the development of a system of national alarm and of a reduction strategy of the risks, an improvement of the degree preparation for exceptional situations and of a system rapid prevention and communication, the improvement of the land planning and for avoiding the soil degradation and the afforesting of the lots submitted to the erosion. A modality of cost – efficiency of the risks distribution on a long length of time and for a considerable number of persons may be considered the assurances that would be able to approach some of the risks associated with extreme meteorological phenomena, so how would be for example the hail frosts or considerable droughts. At the same time thanks to unsuccessful juncture, the assurances could become a real solution only on the middle or long horizon.

Supplementary for the assuration of a better financial administration of the risks they were foreseen the following measures:

- Will be considered the option of elaboration and implementation of a preparation national strategy for risks reduction that would also foresee the assurance of the coordination of the monitoring measures public or extension realization and public measures like the civilian protection. Will be developed the cartography and capacity for cartographing of the risks and vulnerability including the types of soils predisposed to the erosions and slides of lots and the ground utilization, the hydrology and inundations the microclimates affected by the frosts and the seismic risk as well as the relations between the perils (for example, the inundations, earthquakes and erosions increase the risks of lot slides);

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EFFICIENT INFORMATION PROCESSING IN THE CONTROLLING PROCESSES FOR IRRIGATION SYSTEMS

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Abstract

In this paper, a design of the methods for efficient information processing in the controlling processes for irrigation system is proposed. Expected trends in the near future is a decided turn in the irrigation processes as a one of possibilities for solving actual problems how to achieve a sufficiently yield per hectare in the agriculture production. The size and stability of yield per hectare of agricultural crops are greatly affected by climatic conditions, temperature, solar radiation, but especially the quantity and quality of rainfall, which for most agricultural crops is insufficient. Building large-scale irrigation systems is difficult in terms of investment, as well as operating costs. Claimed agricultural yields often do not emanate from a set of certain claims for each of the crops, but are only an estimate based upon empirical experience. Precise determination of these data is very difficult and without the use of exact mathematical methods and information technology would be virtually impossible. Main emphasis is on the decision-making optimalisation in the irrigation process, where principles of heuristics data analysis are defined. Stochastic nature of water availability and irrigation requirements has been taken into account as well.

Keywords **:** *irrigation system, queuing theory, analytical model, process optimization*

INTRODUCTION

A simulation models work with stochastic variables. These processes cannot be described with mathematical models, because they are not exact and are based on ideal conditions, which we cannot achieve in real conditions.
Simulation models based on queuing theory irrigation systems are designed to solve real requirements generated in the system [2]. The basic scheme of queuing system is shown in Fig. 1.

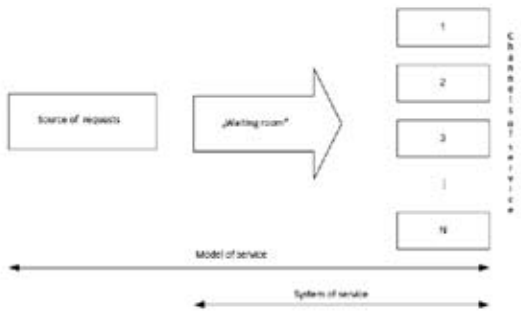

Fig.1: Scheme of queuing system

Customers (source of request) come into system from the source system. QT operating system consists of „waiting room“, where there may be a queue of requirements and channels of service. If channel is free, the request can be served, otherwise is still in queue [3].
Source may contain an infinite number of units - an open system, or final number of units (units return to the source again after operation) – a closed system.
The units input from source to a system in fixed or random point of time. The process is called the stream of requirements. If the points of time are fixed and deterministic, the stream of requirements is regular. Concerning the random input, we call the stream of requirements according the type of distribution of the process probability, which is determined by the sequence of random intervals between two next inputs of requirements. In practice, there are input streams of requirements - Poisson (exponential), normal, etc.

Upon entering the operating system the unit is served immediately, if one of the channels of service is free. Otherwise, the requirement is placed in a queue and waits. In some cases, it may leave the queue due to its impatience (e.g. a plant cannot wait for a long time for an operation in the form of irrigation). Mechanism of service is the way how the requirements are collected from lines (fronts) to the channel of operation. We describe two basic types of operation:

a) **Service without priorities** - the requirements are being selected according the order of arrival into the system, according to the rules:
   - "First in - first out"
   - "Last in – first out"
b) **Service with a priority** - the requirements enter in the system of operation under other rules (e.g. in irrigation management, a priority is assigned to individual crops in rotation according to the amount of looses in the early failure of delivering the irrigation in the irrigation management).

The reported algorithm does not include already generated facts and historical data, also not based on the extended amount of input data. These facts lead to a more accurate output of the algorithm and make better use of irrigation systems.

The basic obstacle to implement heuristic analysis and data mining in the process of effective management of irrigation have been the insufficiently operating computing and database systems able to process these data efficiently. Currently, we already have processed object database engines are high-operating server systems enabling processing of stochastic simulations. Using these instruments in methodology we can apply the methods of heuristic data analysis to real simulation models of irrigation systems and their procedural algorithm. Through benefits of the application of effective data processing by heuristic methods and datamining, we can create a simulation model, which evaluation routines and algorithms provide accurate and comprehensive output.

Advantages of database management systems in process of control precision irrigation:

- use statistical methods of evaluation,
- use of data mining and data warehouses
- faster and more efficient handling of individual cases,
- the possibility of using heuristics in evaluating
- archive data and the operations performed,
- use methods of object modeling reality,
- the possibility of short simulations.

MATERIAL AND METHODS

In agricultural practice we often encountered with various combinations of queuing systems depending on the solution process. QT standard process in irrigation systems is defined as **N-channel system, limited resource of requirements and the system with a priority in operation**. The number of channels in the system is defined as the available pool of technical devices of irrigation, the source of requirements as precisely determined number of units in the areas of agricultural products and priorities as current requirements of the individual segments and types of crops to keep the moisture in the soil. It makes no sense to ignore of priorities, because in real conditions are not usual to irrigate only one same type of agricultural crops in same conditions. In this case we do not have to consider a simulation model QT.

There are several options for simplifying calculated object [1]:

- Use only one single channel of service - in this case we simplify the process of operation and algorithms of selection the channel of service are eliminated. It is used for debugging efficiency of algorithms for determining priority of requirements in the waiting room.
- Absences of priorities – algorithms determining the order in the waiting room are eliminated. In the waiting room, the solution is limited to operation of a random current of requirements by a finite number of heterogeneous irrigation schemes.

- Determinization of requirements for heterogeneous service channels - used to monitor and review the effectiveness of choosing the correct channel of service.

In dealing with the efficiency of data processing we have set out a number of issues we will deal with.

Questions of allocating a certain amount of moisture to a certain point in the certain order is being solved by the G/D/1 simplified model where we consider a random stream of entering requirements served by exactly defined channels of service. In this simplified model, we can monitor the impact of the established methods of heuristics on the order of requests in the waiting room. Consequently, we can compare it with conventional simulation model of irrigation service. Deterministic servicing channel has well defined length of service of individual requirements, which are served continuously, resulting in diminishing number of requirements "in the waiting room". We solve a question of the use of service channels to service the arise requirements by simplified model of D / G / n. In this case we consider an exact defined source of requirements with identified priorities and we solve the algorithm of the efficiency of use of service channels. Approaches of efficient data processing used to address this part of the simulation model are analogous to solving the first two questions.

Precise irrigation management require use of service priorities. The basic idea of effective management is the determination of the waiting queue of plant requirements in order to achieve the most efficient possible use of irrigation techniques with a view to achieving productivity. To determine the order of the waiting queue it is necessary to include a number of factors entering:

- factors of crops requirements
  - physiology of crops and their humidity requirements,
  - the reaction and response of crops to soil moisture and its lack,
  - the life cycle of crops,
  - the allocation of crops on individual fields,
- operating factors,
  - the number of possible channels of operation
  - the types and kinds of irrigation systems, their technical condition etc.,
  - reaction ability of channel of operation
- environmental factors
  - stochastic phenomena (sudden and non-periodic changes in the external environment),
  - deterministic phenomena (periodic change)
  - mixed phenomena (continuously changing stochastic phenomena),
- factors of control members,
  - the choice of key algorithms,
  - the manual input into the management process,
  - the accuracy of input data,
  - the evaluation of the ability of the management system.

RESULTS AND DISCUSSIONS

The basic idea of modelling real process, which includes irrigation, is possible in the simulation of real processes. Using modern CASE tools we can design a database model that corresponds to each element of the process operations of irrigation. The elements of the model between create relational links according to the reporting process steps. Particularity of this model is the use of hierarchical links between records, and implementing the potential of object databases. Then we can effectively manage data real-time, we can react quickly and data would be efficiently processed.

Input data stream represents data entering into the system from outside environment. That are inputs from measurements of soil moisture, temperature, plant life cycle, period and manual input about service device operators and others factors. The database of input objects, which consists of object-hierarchical database of product plants, database moisture requirements of plants and priorities of the rules table, creating input to decision-making algorithm for assigning priorities of requests and its enlistment in the waiting room. Database of servicing objects includes object-hierarchical database of

service channels, their properties and methods from which we can determine the deployment of various devices to specific requirements.

Data sources

Set of input parameters is wide. Every parameter would be monitored in time and time intervals too. These data should be stored in data warehouses. Data sources for needed data in simulation model
of precision irrigation are divided into:

- input data stream,
- database of entry objects,
- database of application data,
- database of queue of requirements,
- database of objects of service channels.

We choose the model with one channel of service with priority of requirements, where the requirements do not leave the waiting room in the time interval. This process model considers an isolated instance; the weight of decision-making is based on a single algorithm that determines the priority of requests entering the system. By isolation of algorithms in the right combinations can objectively evaluate the effectiveness of algorithms. Evaluation of the results in this case is judged on the basis of the total time needed for the quantity served exactly the requirements of channel operation (in this case, the technical equipment of mobile irrigation system). Requirements entering the system are Poisson stream.

The probability of k number of requirements to time interval t is then determined by:

$$P_k(t) = \frac{(\lambda \cdot t)^k}{k!} \cdot e^{-\lambda \cdot t}$$

where λ is the parameter of arrival of requirements.

Requirements are random generated for the simulation. Real requirements entering in the system based on achievement of critical levels of soil moisture measured by soil sensors. Any requirement in the stream carries the basic information that is stored (Input data stream buffer):

- Location of measured sector requirement by the sector ID
- Requirement time of creation.
- Unique identification of plants according to the code of plant input DB.
- Current value of sensor measurement.
  - Current humidity.
  - Current temperature.

In this case, data from the sensor data stream pass through filter, which decides whether it is a legitimate request. The filter has several factors:

- Current soil moisture.
- The time interval from the last irrigation time.
- Coefficient of decline of soil moisture.

Coefficient of moisture loss in the soil determines the relative value of measurement for adding to list of requirements:

$$R_{koef.} = \frac{\Delta t_{\text{int}}}{L}$$

where Δt_{int} is the time interval since the last irrigation in hours, L is the ratio of intensity of crop moisture.

Each sensor records are stored in a database for need of algorithm analysis, especially for comparing current values with historical measurements.

Optimization algorithm for priority requirements determination compares the current entry requirements and information. Then the algorithm enters into a database application data, where information on measurements taken from sector and there are the values of other environmental variables.

Each incoming request gets to waiting room as the output value of the priority algorithm in the range of 1-100 points, which is the sum of the individual factors assessed. The value of 100 means the highest priority. The request in waiting room is placed in order according to its priority. In the waiting room is scheduled control mechanism that controls the duration requirement in a waiting room and this time changing the current priority of requirements depending on the complexity, the importance of technical crops, etc.

Analysis of the priority of each requirement monitors and compares the following parameters:

- The time interval from the last irrigation.
- The ratio of crop water demand balance in sector and current moisture.

- Compare the current value of moisture to the process of water balance during the crop vegetative life.
- The economic importance of crop.
- Progress of current environmental temperature vs. history with regard to the temperature requirements of plants.
- Inclusion of global climate variables: The probability of precipitation in the hours, service coefficient (you can manually adjust the priority according to the contingencies) and others.

The evaluation algorithm of requirements

The actual evaluation of established requirements in the system passes through several steps.

The first step is the defined instance requirements and its associated properties. Consequently, the requirement is passing the various ways, which meet the values of individual properties. Values were determined implicitly in the range from 1 to 100. After completion of all tests, the whole object of the requirements is checked and sent to arranging into the fronts, where according to priority, the object is sent to the front and the method of the actualization of output file. The examples of the evaluation test are to determine the urgency of the irrigation of given requirement. Date Time of requirement generation is tested toward the time and date of the last requirement of the instance of a given section included in the queue.

$$H_{12} = \frac{\Delta T_Q}{T_D} \cdot R$$

where:

H_{12} is the coefficient of priority (Table 1)

ΔT_Q is the interval between current and time of requirement,

T_D optimal time interval established as the average of the last 24 to timing differences,

R – the coefficient of the humidity resistance.

Table 1: calculation of H_{12} coefficient

H_{12}	Test result
< 0,7	0
0,7 – 0,9	Cumulative 1-20 step by 0,01
0,9 - 1	Cumulative 20-40 step by 0,005
1-1,1	Cumulative 40-60 step by 0,005
1,1 – 1,2	Cumulative 60-70 step by 0,01
1,2 – 1,3	Cumulative 70-80 step by 0,01
1,3 – 1,5	Cumulative 80-99 step by 0,01
> 1,5	100

Assigning the service channel to active requirement

The report about technical means implementing service of incurred requirements is isolated subsystem of the simulation model of irrigation management. Since we analyze in this thesis the efficient data processing by heuristics and by data mining and creating the optimization routines, the aim is not to include also the issue of channel management service. Channels have their own system of definitions, tables respecting the individual machines, their interoperability and service of machines. The proposed simulation model with the relevant algorithms can be applied to this section.

CONCLUSIONS

Optimization of data processing by method of heuristics and data mining shows us new ways in the management of agricultural processes.

Analysis of input filtering algorithm has pointed the benefits of input data into the whole system, where the filter algorithm was able to define precise and clear input requirements.

These data provide us with relevant requested basis for a major evaluation algorithm.

The expected trend in the near future is significant turnover in terms of irrigation, as one of the options for solving current problems in achieving adequate yields per hectare in agricultural production. Precision irrigation is intensifying factor, which gradually gaining importance as they are gradually exhausting the productivity of other intensifying tools. It is therefore necessary to

pay attention to this area and look for ways to fully exploit the future potential of intelligent irrigation. Object-relational data model to support efficient data processing is one option, which is efficient processing of data in the process of moving irrigation.

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ENHANCING THE ATTRACTIVENESS OF RENEWABLE ENERGY TRAINING IN THE GREEN SECTOR

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Abstract

One of the most important conclusions of the Lisbon Conference in 2000 was the declaration concerning the transition to a knowledge economy. This aim is linked with a constant upgrading and improvement of vocational training and education as a response to rapid changes in economies and societies so as to facilitate the employability and quality of knowledge acquired during the VET process and improving access to lifelong learning for all, including disadvantaged people.The aim of these recommendations has been oriented to the creation of affordable and accessible vocational and lifelong learning systems by the Member States so as to respond to the changing needs of the knowledge economy and society. This paper deals with the projects in the frame of Leonardo da Vinci – Transfer of Innovation – RESNET and ECEVE with the main objectives to improve the quality of education and international cooperation in the field of renewable energy resources and energy efficiency. These projects are linked to the principles of the European Qualification Framework, which combines the national qualification systems of various countries and places to better understand and compare qualifications levels of different countries and different education and training systems and its main aim is to establish new conditions for vocational training.

Keywords**:** *VET, lifelong learning, e-Learning, ICT, Renewable energy resources, European Qualification Framework*

INTRODUCTION

The European Union, en bloc, is more than 50% dependent on imports of the primary energy sources, often from politically or economically not very stable regions.
Commitments made in the field of climate protection have influenced the EU's energy strategy as well. Therefore, the EU strategy on energy is primary focused on energy efficiency and renewable energy sources (RES), the potential of which in particular member countries are not negligible. From this point of view it is very important to focus education and training on the acquisition of expertise and knowledge of RES and technologies that relate to this area.
Support for using RES to produce electricity, heat and hot water, as well as support for the use of biomass energy, energy-efficient buildings (in the form of thermal insulation of residential buildings, construction of energy efficient buildings, etc.) brings in addition the development of innovative technologies, the transfer to an energy saving economy and considerable growth in jobs possibilities.
These new economic needs imply changes in the content of educational systems.
The most frequently defined steps to provide such quality education include:

- the update or enlargement of study programs in accordance with the requirements of the labour market on all levels and forms of learning;
- the use of modern ICT devices to make the education process more attractive – especially for young people;
- the provision of quality teaching in foreign languages at the level of expertise.

According to the State Educational Program ISCED 3A education of the pupils has to be oriented to obtain:

- competences in communication skills and the use of ICT,

- competences in the field of living sciences and technologies,
- competences in identifying and analyzing problems and proposing solutions,
- competencies in developing manual skills, creative and artistic psychomotor skills,
- actual knowledge and work in areas related to continual education and the labour market.

The projects will allow the training of participants to obtain new knowledge, competencies and skills in the area of renewable energy resources and their effective uses by new young people in a very attractive, way - using ICT and multimedia.

Project RESNET - On-Line Learning Modules For Renewable Energy Resources For Landscape Development

This project was conducted from October 2008 until September 2010 and its proposal had been developed on the basis of the need for lifelong learning in the agro-sector, especially in the area of its economical and ecological development. The priority was to gain knowledge in the area of renewable energy sources and their possibilities for landscape development.

The project is based on the study program of the Slovak University of Agriculture in Nitra "Techniques for renewable energy sources". Six project partners had different roles in the project depending on their experiences. The partners concentrated on:

- agricultural and renewable energy resources (The Slovak University of Agriculture in Nitra, Slovakia and MultiMedia SunShine Ltd., United Kingdom);
- E-learning and webhosting (Infoart, Bulgaria);
- technical sciences (FH Johanneum – The University of Applied Science, Austria);
- telematics, multimedia and E-learning (The Swedish Telepedagogic Knowledge Centre, Sweden);
- the development of lifelong learning strategies and concepts in the agro-food sector (Agroinstitut Nitra, Slovakia).

The successful implementation of the project depended on the mutual connection of long-time participants, their experiences in the area of RES, lifelong learning, design and realisation of virtual study space and multimedia study materials. From this point of view the aims of project were defined as follows:

- to create the Institute of Lifelong Learning for agro-sector employees;
- to implement actual knowledge in the area of RES in the sector of agricultural firms and their employees;
- to use attractive and, from the point of a view a lifelong learner, an acceptable form of RES in the area of the agro-sector;
- to prepare an online course in LMS Moodle created by online modules with individual subjects of Solar, Wind, Water and Geothermal energy and energy of Biomass;
- to prepare study materials on CD-ROM in the area of RES using interactive tools and multimedia;
- to prepare a manual of the online courses in LMS Moodle and organisation of the learning process for tutors and a study guide for students and other participants of lifelong learning;
- to realise the pilot course.

The target group was defined as:

- agro-sector employees;
- unemployed personnel and anyone interested in gaining further qualifications;
- students of VET.

Results of the RESNET project:

The Institute of Lifelong Learning (www.resnet-project.org/ill):

- was created on January 1, 2009;
- advisory services in the agriculture sector including RES applications;
- optimization of the possibilities to bring the education into the area of the agro-sector;
- a "service centre" for lifelong learning for the farmers and employees in the green sector.

On-line modules (www.resnet-project.org/e-edu):

- 6 modules using e-learning methods (General, Biomass, Geothermal, Solar, Water, Wind);
- based on the principles of RES and possibilities for their use in the area of the agro-sector with the main emphasis on landscape development .

Multimedia study book (www.resnet-project.org/ebook):

- offline form as CD-ROM and SD cards and online form;
- six modules – solar, biomass, wind, water, geothermal, general;
- multimedia and ICT devices are used for the creation of multimedia contents - videos, animation, text, graphics, stereo sound and computer software.

Education Guide for Tutors (http://www.resnet-project.org/guides):

- courses in LMS Moodle (Creating a new course, Modifying the course, How to view the course, How to login into the course);
- course Homepage (Homepage and Navigation);
- creating the content of the course (Study materials in Moodle, Activities in Moodle, Quizzes and Assignment).

Education Guide for Students (http://www.resnet-project.org/guides):

- the principles of distance and programming learning – schemes and forms of these specific learning methods;
- how to access the course;
- course Homepage (homepage and navigation);
- definition of activities (Chat, Forum, Test, Assignment, Lesson) and how to use them.

Impact on the specific target groups:

- the creation of the virtual learning platform for agricultural employees;
- increasing the qualifications of the target groups in the area of RES with the main emphasis on ecological and economical landscape development;
- the transfer of the new knowledge to the farmers from the universities and experts;
- the improvement of existing professional knowledge in the participating countries;
- the implementation of the new learning methods within the learning groups;
- the development of the virtual study space within the consortium for the universities, lifelong learning centres and vocational institutions.

Project ECEVE - Implementation of E-learning Content for Energy Saving Farm into Vocational Education

The aims of the ECEVE project are linked to the European policies in the field of education and training defined in "Council Conclusions on a strategic framework for European cooperation in education and training – ET 2020" in Brussels and the Lisbon Strategy. In both of these documents, vocational education and training have a crucial role in the areas of socio-economy, environment and technology. It was stated that European education and training systems should become world reference by 2010 and that cooperation should be promoted in the area of Vocational Education and Training (VET). From this aspect, the ECEVE project is an investment in vocational education through the implementation of the latest knowledge into educational content and innovative learning. Improving VET in the fields of RES, energy efficiency and climate changes and their application in the agriculture sector will enhance the human potential of the target group in the agri-food sector.

The ECEVE project started in October 2010 and the consortium consists of partners which have very good experience and competences in the areas of interest. The Slovak University of Agriculture, MultiMedia SunShine Ltd., the Czech Technical University and the Université de Corse have long-time experiences with learning in the area of RES, energy audit, energy efficiency, the practical applications of RES and the implementation of methods of Blended Learning and e-learning into educational processes. The Agroinstitut, as part of Ministry of Agriculture of the Slovak Republic and methodical advisor for agricultural VET schools, is a counselling, vocational and lifelong learning educational centre in the agrosector with a wide range of experiences.

Info-Art from Bulgaria is expert in the development and implementation in the field of ICT into all forms of educational process, digital libraries, e-learning systems or e-training. The Kahramanmaraş Technical and Vocational High School is one of the most experienced schools in Turkey. It follows world-developing technologies closely and educates many successful personnel.

The project will prepare a study program for VET schools with the main emphasis in the areas of renewable energy resources, basic procedures for reducing energy intensive farms and the theory of climate change as a result of greenhouse gas emissions. Educational methods to be used include blended learning supported by WEB 2.0 technologies as blogs, wikis and forums. The main attention will be focused on improving language skills - with the participation of foreign lectures in the educational process. The European Credit System for VET (ECVET) will be also considered.

Secondly, the project will prepare teachers – experts for the newly-formed study program. The project gives opportunities for VET teachers to become familiar with knowledge from the areas of energy efficient farms, climatic changes and the effective use of RES. Distance learning methods will be used for improving their skills.

The creation of a new educational program, using the newest knowledge from the area of RES and energy efficiency, modern educational methods and ICT technologies will attract the interests of young people in vocational education and will increase their competencies in the field of using RES and energy audit for economical and ecological rural development and so will increase their chances in the labour market. Training through ICT equipment will improve the participants' competencies in working with ICT. Cooperation between VET schools across the whole of Europe will assist in implementing ECVET into practice and raising the mobility of VET students and teachers. These facts, together with study materials in the English language will also improve their language skills. The study materials available in online form consisting of the latest knowledge of actual problematic can be used not only for partners of the ECEVE project but in other European countries.

Cooperation with institutions providing lifelong learning inside the consortium and using the online version of the study materials using principles of blended learning will allow wide transfer of knowledge into the lifelong learning area.

CONCLUSIONS

This article deals with projects in the frame of Leonardo da Vinci - Transfer of Innovation initiative. The emphases of the projects RESNET and ECEVE are upon improving the quality of education and human resources in the European Union through international cooperation, using modern educational methods and ICT devices. The major constituents of the consortiums are formed by universities, but the projects also comprise the entire path of international cooperation in the education process from school to vocational training and university education up to and including adult education in the areas of renewable energy resources, energy efficiency, climate changes and agriculture.

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POPULATION AGEING PHENOMENON IN THE REPUBLIC OF MOLDOVAN, ITS DETERMINANTS AND CONSEQUENCES

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Abstract

The purpose of this investigation is to elucidate the evolutionary aspects of the population ageing phenomenon in the Republic of Moldova, its basic determinants and consequences. In order to achieve the intended purpose, there have been examined statistical data which reveal population structure by average and age, population's natural movement rates in the Republic of Moldova in the period of 1980-2009, and the evolution of population migration in the Republic of Moldova in the period of 2002-2009. The study results highlighted the evolutionary trends of population ageing phenomenon, emphasized the main determinants, and exposed the consequences of this phenomenon. By examining the correlative data which prove population ageing, evolution of migration and population's natural movement, it has been argued the impact of migration and reduction of natural increase on the population ageing phenomenon.The main conclusion of our research consists in the need for more effective state action aimed at remedying the problem of population migration in the Republic of Moldova, creating a suitable environment for working and living in their home country, thus ensuring the necessary conditions to solve our demographic problems and, implicitly, the economic and social problems.

Keywords: *population ageing, migration, natural increase, social insurance.*

INTRODUCTION

One of the main problems of human resource management in the Republic of Moldova is generally the population ageing and rural population ageing in particular. This conclusion is argued by the data published by the National Bureau of Statistics of the Republic of Moldova [1], confirmed by thorough studies of this problem, among which we can mention those accomplished by the National Commission for Population [2], and those of the Ministry of Labour, Social and Family Protection [3]. But population ageing phenomenon cannot be examined as an isolated phenomenon, but in close correlation with the factors that determine it. At the same time, the fact of highlighting the consequences of this phenomenon allows to understand better the significance and importance of the measures to solve this problem.

MATERIAL AND METHODS

In order to achieve the intended purpose of our research there have been used: various statistical data which emphasize the share of different age groups in the total population of the Republic of Moldova and allow to specify the average dynamics rate of birth, mortality and natural growth; research materials provided by the National Commission for Population; certain interpretations stated by Minister of Labour, Social and Family Protection in a recent publication; all these addressing issues regarding population ageing and its consequences. The synthesis of investigated data made it possible to identify the tendencies of the analyzed phenomenon, to underline the dependencies between this phenomenon and factors that generate it, and to describe its consequences.

RESULTS AND DISCUSSIONS

In the last twenty years, there is an increase of the population ageing rate in the Republic of Moldova by 3.3 percentage points. Thus, for comparison: in 1980, out of each 100 inhabitants there were 10.7 people aged 60

and over, but at the beginning of 2010 the number of older persons to every 100 inhabitants exceeded 14 persons [1].

The rural population is exposed to a greater extent to this phenomenon. According to the National Bureau of Statistics of the Republic of Moldova, on the 1st of January 2010, out of 3,563,700 inhabitants of the country, older people (men over 62 years old and women over 57 years old) constituted 15.25% (Table 1).

Table 1. Population structure in the Republic of Moldova by average rates and age groups on 1.01.2010 [1]

Specification	Total	including:	
		in urban area	in rural area
A	1	2	3
Total population, thousand persons	3563,7	1476,7	2087,0
Including:			
Men and women aged up to 15 years old	649,1	227,4	421,7
Men aged between 16-61 years old and women aged between 16-56 years old	2371,2	1042,8	1328,4
Men aged 62 years old and over and women aged 57 years old and over	543,4	206,5	336,9

But if we examine the ratio of older people by average rates, we find that it constitutes about 13.9% of the total urban population and 16.4% in rural areas. Therefore, the ratio of older people in rural areas exceeds the one in urban areas by 2.5 percentage points. Recent number of older people from rural areas exceeds the one of urban people by 63%.

Among the main factors that generate the respective demographic tendency we can mention:

1.The reduction of young population number and share as a result of birth decrease;

1. Quantitative and structural aspects of migration that is taking shape in the last years.

In order to elucidate the situation regarding natural evolution of population we present data revealing the number of births, deaths and natural increase of population in the period 1980-2009 (table 2).

According to data shown in Table 2, in 1980 the natural increase of population in Moldova was 9.7 persons per 1000 inhabitants and at the end of 2009 it was (-0.4), emphasizing the prevalence of the number of deaths over the number of births with about 4%. Simultaneously we observed that the natural growth of urban population was 1.1 persons for every 1,000 inhabitants and in the rural areas in 2009 it was (-1.4) people. Therefore, every newborn corresponded to 1.1 deceased.

The negative tendencies in the natural increase of population can be more easily seen in the graphics (Figure 1).

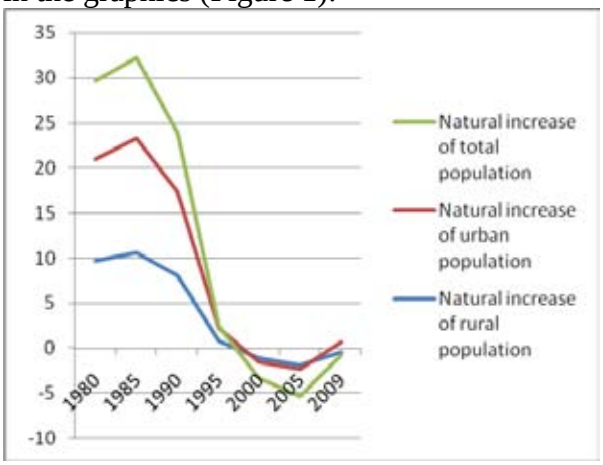

Fig.1. Natural increase of Moldova's population in the period 1980-2009

Table 2. Rates of natural movement of Moldova's population in the period 1980-2009

	For 1000 inhabitants								
	Births	Deaths	Natural increase	Including					
				Urban area			Rural area		
				Births	Deaths	Natural increase	Births	Deaths	Natural increase
A	1	2	3	4	5	6	7	8	9
1980	19,8	10,1	9,7	19,4	8,1	11,3	20,1	11,5	8,6
1985	21,5	10,9	10,6	20,7	8,0	12,7	22,1	13,2	8,9
1990	17,7	9,7	8,0	16,7	7,4	9,3	18,5	11,9	6,6
1995	13,0	12,2	0,8	10,8	9,3	1,5	14,9	14,7	0,2
2000	10,2	11,3	-1,1	8,4	8,8	-0,4	11,4	13,2	-1,8
2001	10,0	11,0	-1,0	8,4	8,6	-0,2	11,2	12,8	-1,6
2002	9,9	11,6	-1,7	8,5	8,8	-0,3	10,8	13,5	-2,7
2003	10,1	11,9	-1,8	8,6	9,1	-0,5	11,2	13,9	-2,7
2004	10,6	11,6	-1,0	9,4	8,9	0,5	11,5	13,4	-1,9
2005	10,5	12,4	-1,9	9,1	9,5	-0,4	11,5	14,5	-3,0
2006	10,5	12,0	-1,5	9,2	9,3	-0,1	11,4	14,0	-2,6
2007	10,6	12,0	-1,4	9,3	9,4	-0,1	11,6	13,9	-2,3
2008	10,9	11,8	-0,9	9,7	9,1	0,6	11,8	13,6	-1,8

As we have mentioned above, another factor affecting the demographic problem is population migration. Statistical data generally show an increase in the number of people who migrate (when we compare the situation in 2009 with the one in 2002) and a substantial difference between the number of emigrants and immigrants (table 3).

Table 3. Evolution of the population migration in the Republic of Moldova in the period 2002-2009

Specification	2002	2003	2004	2005	2006	2007	2008	2009
A	1	2	3	4	5	6	7	8
Number of emigrants, pers.	6592	7376	7166	6827	6685	7172	6988	6633
Number of immigrants, pers.	1297	1620	1706	2056	1968	2070	2749	2010
Ratio between the number of emigrants and immigrants	5,08	4,55	4,2	3,3	3,22	3,46	2,54	3,3

The data shown in Table 3 attest a fluctuating trend in the number of emigrants and immigrants. The same unstable trends are also noted in the evolution of the coefficient which appoints the ratio between the number of emigrants and immigrants. It is still, however, undeniable that, on the one hand the number of emigrants is very high, and on the other, it exceeds three times the number of immigrants. By the way, we should mention than the official data on population migration, especially those that reveal emigration, have a wide margin of error, since a large number of people leave the country illegally and their record is difficult. In reality, the number of emigrants is much higher.

The negative consequences of mass emigration of Moldova's population is not summarized to only population ageing. We can point out a number of negative effects of this phenomenon, the most significant being the following:

- Loss of economically active population and thus decrease of country's economic potential;
- Loss of highly qualified population;
- Brain drain (migrating population is characterized by a high level of intelligence). In this way there occur losses of intellectual and scientific value, and there is a decrease of entrepreneurial initiative.

Besides other negative effects of the population ageing phenomenon, we can also underline the direct impact on the public system of social insurance. Among the major risks for the social insurance system we can enumerate the following:

• increase of the number of pensioners in the next years due to the generations born in the period 1948-1952, which are 2-3 times more numerous than the previous ones;
• offer decrease of the young labour force, because a considerable share of young people don't enter the labour market;
• workforce ageing, fact which reduces labour productivity.

According to the situation on the 1st of January, 2010, the total number of pensioners was 624600 people, surpassing the 2008 level by over 2000 people. Even if in the last five years (2004-2009), the number of pensioners decreased by 0.48%, the reduction of active and employed population number was much higher, constituting 13.2% and 11.1% respectively. In these circumstances, there is an obvious need for state actions aimed at increasing the number of taxpayers to the social insurance system. For comparison: in 2002 the ratio between the number of pensioners and employed persons was 1/2,4 but at the beginning of 2009, it was 1/2. The redress of pension insurance situation is possible when the ratio between the number of pensioners and the number of employed persons is about 1/4 -1/5 [3].

CONCLUSIONS

Population ageing phenomenon in the Republic of Moldova is a complex one and it is caused by several factors. Among these, population migration plays a very important role, and it is characterized by an increased prevalence of emigration. The influence of the mentioned factor on the analyzed phenomenon is characterized by a reduction of population of reproductive age. Simultaneously, we also note other negative consequences of population migration, such as: reduction of the economically active population, exodus of the highly qualified and intelligent population.

Along with the mentioned problems, we should also call attention to the negative impact of the population ageing tendency on the public system of social insurance. In this vein, there is an obvious need for major state actions, aimed at remedying the problem of population migration in the Republic of Moldova, and creating a suitable environment for working and living in the home country, thus ensuring the necessary conditions to solve the existing demographic and, implicitly, social-economic problems.

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METHODS AND ASSESSEMENTS UPON THE HOLDINGS' SIZE AND DELIMITATION OF THE SEMISUBSISTENCE AGRICULTURE

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Abstract

Semisubsistence agriculture is difficult to identify statistically while no clear definition exists to delimitate it. As CAP is based on methods used for evaluation of the economic size that creates a disparity in dimensioning the individual farms, the paper investigates methodological tools, currently used in EU and Romania, related to the identification and assessment of the agricultural holding. This study will address the analysis side of the distribution of farms by physical and economical size class, in order to identify differentiation basis for evaluation the Romanian semisubsistence holdings. The scientific endeavour underlines the necessity of providing sound basis of analysis at the semisubsistence level and adjustment the policies to the Romania's agricultural structures features, in order to provide larger perspectives for the holding of family type, economically viable, as a potential segment of the rural economy. In this view, contextually connected to the sustainable development objectives, it is expected that reshaping the compatibility of the EU model to be expressed by political measures addressed to the semisubsistence agriculture and its integration in the market.

Keywords **:** *semisubsistence holdings, size classes, sustainable rural economy*

INTRODUCTION

Semisubsistence agriculture is difficult to be defined and identified statistically, fact that requires conceptual and method clarifications. Field researches at the microeconomic level use indicators on the basis of surveys on samples of farms, but without being able to get accurate results, but only estimates of yields and the consumptions implied by the agricultural activities. At the level of the European Commission, in defining certain variables used in the studies concerning the capitalization of farms, factors productivity and implications on agricultural revenue, a major significance has the quantification of the costs resulted from the farm activities related to the production . Due to the fact that the subsistence farms do not hold, in general, accounting records and their revenues do not place them within the classes corresponding to commercial agriculture, they are excluded from the potential beneficiaries of the support provided through the CAP policies. Considering that the methodology used for assessing the economic size of farms creates a disparity in dimensioning the individual farms, this study will address the analysis side of the distribution of farms by physical and economical size class, in order to identify differentiation basis for evaluation the Romanian semisubsistence holdings.

MATERIAL AND METHODS

The paper review methodological tools used by the European Commission for obtaining information at the microeconomic level, necessary for the development and evaluation of agricultural policies and examine the corresponding relevance to the official information available on the agricultural holdings in Romania. The approach aims at contributing to identify a real base of analysis at the level of semisubsistence agriculture, useful for the support policies and the integration of this segment in the rural economy. The data have been provided both by EUROSTAT and the Romanian National Institute of Statistics - Statistical Yearbook of Romania, the most recent available statistics

from the Structural Surveys in Agriculture, and the General Agricultural Census.

RESULTS AND DISCUSSIONS

Although there is not a clear definition to delimitate the semisubsistence agriculture, in the documents and specialized studies of the domain are used different criteria for the identification and assessment. However, the information is incomplete for an analysis on actual basis, given that official sources are missing certain relevant data for this segment of the rural economy. From this perspective, in the paper are presented aspects related to the fact that existing methods requires reassessment for the expansion of coverage, uniformity and comparability of the information and highlight the necessity of completing the assessments in the field.

According to the methodology of the European Commission to create a database of agricultural holdings, the national networks of accounting data at farm level (FADN) recorded annual data obtained through surveys on a sample of agricultural holdings (80,000 in EU-25), representing the single source of harmonised information at the microeconomic level, the principles that accounts' evidences are based on being the same in all Member States. FADN is the tool through which the European Commission and publish comparable information regarding the assessment of incomes of agricultural holdings in the EU countries. The data describe in detail the economic situation of farms by standard groups of farms existing in the EU [1], on the basis of various economic and financial indicators, for the previous year and evolving. The Commission has defined each variable in the standard results, in order to ensure a close correlation between the variables and those of other organizations that provide agricultural statistics. It has also been defined a method for determining the main variables, representing the average values for the revenue and capital [2]. Annual sectoral analyses are carried out (e.g. cereals, dairy products, pork, beef) for the study of the margins per unit of product and income earned on the farm. Also are published regularly and reports on trends in income distribution, direct payments and less-favoured areas, and other special analyses for directions to the Commission and other EU institutions responsible for the management of agricultural markets, rural development and evaluation of the measures of the CAP and designing policies in these areas. Yet, data requested from the national reports are used to establish agricultural policies and assess the impact of proposed political measures designed for structure of EU existing before the last two enlargements, disregarding the multiple socio-economic implications for rural sustainability of the large semisubsistence sector existing in new member states. As well, the sample of evidence shares only a percent in the total EU farms. Under these circumstances, it cannot be said that there is a sound assessment of the situation of agricultural holdings in the EU.

The investigations concerning the delimitation of agricultural holdings reveal different aspects related to the methods of physical or economical size-evaluation and possibilities of identification the subsistence agriculture.

In the field of agrarian economy are usually adopted thresholds of up to 10% of the marketed production to delimit subsistence farms and of 10-90% for the semisubsistence farms, while commercial are considered to be those that sell over 90% of production [3]. There are also alternative approaches, which policy decisions are generally based on, related to the utilised agricultural area (UAA), which is relatively easier to appraise. But the limits differ, being as well determined by the local natural, social and economic specificities of each country.

Another possibility of identification may be given by the analysis of the level of input use, because the commercial farms are those that use off farm input and the other two categories usually use family labour, the input produced on the farm and fewer technical means.

The contributions of the non-farm sources to total revenues of the farms have not been revealed up to now. As well, the geographic location of the farms and mixed production

profile can induce various reactions of farms facing the same political measures.

Definition of semisubsistence farms, laid down in Commission Regulation CR/1698/2005, Art. 34/1, designates those holdings producing mainly for own consumption, but also commercialize a proportion of the products. However, the thresholds on the share of sales of agricultural production, which can differentiate the categories of farms, are not established.

Table 1. Number and average size of agricultural holdings, by the UAA, in 2007 compared to 2002

	2002	2007	2002	2007	2002	2007	2002	2007	2002	2007
	<1ha		1-5 ha		5-100 ha		>100 ha		Total	
No. of holdings, thou.	2169	1686	1850	1766	270	391	10	10	4299	3852
Share in total, %	50.5	43.8	43	45.8	6.3	10.2	0.24	0.25	100	100
UAA, thou. ha	759	649	4180	4179	2451	3756	6540	5167	13930	13753
Share in total, %	5.4	4.7	30	30.4	17.6	27.3	46.9	37.6	100	100
Aerage size, ha	0.3	0.4	2.3	2.4	9.1	9.6	641	537	3.2	3.6
Average no. of plots	2	2	4	4	8	8	19	19	6	6
Average size of plot, ha	0.2	0.2	0.6	0.6	1.1	1.2	33.7	28.3	8.9	7.6

Source: own processing [4]; Average no. of plots evidenced in Romanian - German - French Twinning Project RO2007/IB/AG0, assumed constant.

Assuming that the holdings less than one hectare can be treated as being of subsistence, it appears that most of those semisubsistence will find in the category of natural size 1-5 ha.

As shown in Table 1, this category comprised 1.7 million farms in Romania, in 2007, rising towards the year 2002. It is observed a decreasing trend of the number of farms of less than 1 ha, higher than those of up to 5ha and over 100 ha, but also a growing of farms between 5 and 100 ha.

The figures do not indicate, however, a clear delimitation of the semisubsistence farms, for which is needed information on the dependence of the consumption of own production, to identify the category to which they belong, being also difficult to obtain homogeneity within the semisubsistence or subsistence categories.

In the analysis of the distribution by size classes of holdings, compared to the Romanian methodology, FADN methodology of calculation of the economic size of farms disadvantages the evaluation of the individual farms. Theoretically, while the qualitative side is reflected by the extent of the process of production concentration, the quantitative side is mirrored by the evaluated size, between the two concepts interposes the concept of intensive production, which shows the degree of revaluation of the basic resources through successive capital investment [5]. The size of agricultural holdings shall be expressed, primarily by the land area (territorial size) or through the herd of animals. Other indicators, as are labour or endowment indicators, e.g. the volume of operational capital, number of tractors and agricultural machinery, etc., can indirectly characterize the size of the agricultural holdings.

In EU, the farms size is featured by 2 indicators: the physical size, expressed by the number of hectares of UAA and the economic size. In the Community typology (Reg. 85/377/EEC), farm size corresponds to the European standard economic unit (ESU), currently of 1200 Euro, established in relation to the total standard gross margin (SGM), annually calculated per hectare or livestock. Depending on the number of ESU they meet, the agricultural holdings are classified in 6 economic size classes: Very small < 4 ESU; Small 4- < 8 ESU; Average low level 8 - < 16 ESU; Average high level 16 - < 40 ESU; Large 40- < 100 ESU; Very large >= 100 ESU [1] .

Only the holdings that exceed certain thresholds of economic size, distinct in each Member State, reflecting the great diversity of existing agricultural structures, are considered professional holdings and enter the field of observation of the FADN. According to EUROSTAT statistics, the threshold of economic size varies greatly between 1UDE (Cyprus) and 16 ESU (Belgium, Netherlands and United Kingdom) [6]. FADN Surveys performed annually in EU Member States demonstrates that agricultural holdings which fall in the higher classes of economic size, with more than 40 ESU are more effective. Having regard to the amount of MBS's unit established by the investigation completed so far, considering that very few farms with 0-5

ha exceed a minimum threshold of 8 EDU established for the economic size of medium-sized holdings. The increase the physical size of agricultural holdings is accompanied by faster growth in the economic dimension, which means that more important than increasing the surface area is the intensification of production per unit area.

According to the National Program for Rural Development for the period 2007-2013, approved by the Commission in 2008, the semisubsistence farms in Romania, defined in accordance with the mentioned regulation, fall in the economic size of 2-8 ESU [7]. Official statistics indicate 3.9 million of functional farms, in 2007. Of these, the 3 million (over 70%) have less than 1 ESU, are named subsistence farms. The 1-2 ESU class includes 629 thousand farms (16%) and 212 thousand farms (5.4%) have between 2 and 8 ESU. Over 8 ESU obtained yearly correspond to a number of farms 23500 (0.6%), which are considered to produce mainly for the market.

Table 2. Agricultural holdings by size classes, in Romania compared to the EU-27

	Size class	UAA		No. holdings		Average size
		Thou. ha	% in total	Thou.	% in total	ha/ holding
Romania	Total	13 753	100	3 931.4	100	3.5
	0-5	4 829	36.7	3 530.7	89.8	1.4
	5-10	2 018	13.9	300	7.6	6.7
	10-20	924	6.1	70.1	1.8	13.2
	20-50	481	3.4	16.1	0.4	29.9
	>50	5 501	40	14.4	0.4	382
EU-27	Total	172 485	100	13 700.4	100	12.6
	0-5	14 407	8.4	9 644.8	70.4	1.5
	5-10	10 907	6.3	1 560.5	11.4	7.0
	10-20	13 887	8.1	992.6	7.2	14
	20-50	25 386	14.7	804.3	5.9	31.6
	>50	107 898	62.6	698.1	5.1	154.6

Source: processing of EUROSTAT statistical database for agriculture.

The average size of agricultural holdings in Romania was 4 times less than the average European Union in 2007. With 3.9 million holdings and over 14 million of assessed plots within the project English – German - French Twinning Project RO2007/IB/AG03, representing 30% of the total number of holdings in the EU-27, invoking undue application of measures of agricultural policy of granting subsidies and production quota management. But the same problem arises and other States, having regard to the structure of holdings by size classes of UAA. In Table 3 it can be seen, by the average sizes of holdings, in Romania a relatively similar structure to the EU regarding the classes of up to 50 ha, for which the weights of the number of holdings in those classes are comparable very large, of 99.6% in Romania and of 94.9% in the EU.

Table 3. Agricultural holdings in Romania, by the legal status of holding

	No. holdings (thou.)	% in total holdings	UAA, (thou. ha)	% in total UAA	Average size (ha/ holding)
Individual holdings	3915	99.6	9582	69.7	2.4
Legal holdings	16.2	0.4	4171	30.3	257

Source: own processing [4].

According to the General Agricultural Census, in Romanian agriculture 2 types of agricultural holdings coexist: individual holdings, mostly peasant farms and units with legal personality, e.g. agricultural societies/associations, companies, cooperative societies. However, on the basis of the legal framework for the setting up, i.e. Law 36/1991, holdings with legal personality established as agricultural societies or associations have by status as the object activity the utilization of land, agricultural machinery, animal husbandry and agricultural investments, but without having a commercial character. Consequently, as indicates the currently existing official data, shown in Table 3, these holdings using 69,7% of the UAA and having an average size of 2.4 ha, produce for own consumption and low sales on the local peasant markets, while only 0.4% of total, using 30% of agricultural land, produce to the market [8].

CONCLUSIONS

The results presented stress the necessity of reviewing the statistical and analytical methods for substantiation the analysis in this area with detailed, specialized information and extended research upon criteria of farms' delimitation.

Integrating statistical records of semisubsistence agriculture is a fundamental endeavour in designing on sound basis the policies to support this segment. Thus, the concentration of agricultural production should be focused in particular on increasing the economic size of holdings, involving the intensification of production, within the ecological limits, and productivity.

Political thought should reflect the integration of the economic, social and ecological criteria and the private economic interest in the national economic interest, while respecting the traditions. This approach will avoid measures of enhancement the physical size of farms which lead to the disappearance of a large number of peasant households, small and very small, with multiple social implications.

Under the CAP, the support measures should provide farmers with opportunities to adapt to the market, without imposing boundary requests linked to certain size thresholds of holdings only for increasing the areas.

The coexistence of the three types of farms, small - subsistence oriented, medium and large – market oriented, shapes the Romanian agrarian model, and crystallizes the rural economic geo-socio-cultural structures. This situation indicate the necessity of adjustment the policies to the internal structural features in order to provide larger perspectives for the holding of family type, economically viable, as a potential segment of the rural economy.

Reshaping the compatibility of the EU model in the context of the sustainable development objectives it is expected to be expressed by political measures addressed to the semisubsistence agricultural holdings and their integration in the market.

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PAKISTAN's POPULATION GROWTH AND ITS EXPECTED BURDEN ON ENVIRONMENTAL RESOURCES.

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Abstract

Population explosion is a big problem in most of developing countries like Pakistan. Pakistan is undergoing rapid industrialization with insufficient natural resources (explored) and low literacy rate causing a serious threat to the targets of achieving sustainability for the country. Recent studies were designed to determine the correlation between population increase and condition of natural resources of Pakistan. Ecological Foot Print was chosen as an indicator of condition of natural resources. It was concluded that Ecological Foot Print has increased a little representing a poor quality of such a huge population according to international standards. On the other hand, in spite of low ecological foot print, country is running at an ecological deficit of -0.3 g ha / person, representing an alarming situation. Continuously deteriorating natural resource will definitely put a limit on economic development which will ultimately lead to social deterioration. Pakistan needs immediate efforts in the form of environmental management and mass awareness in this regard to follow a sustainable path of development.

Keywords : *Ecological Foot Print, Population Growth, Environmental Sustainability*

INTRODUCTION

World's population is projected to continue increasing well into the next century. Much of this increase was accounted for by developing countries like Pakistan. Pakistan: a developing country located in South Asia possesses the world's oldest civilizations. Pakistan is experiencing an average growth rate of 1.6. Major source of earning livelihood is agriculture which is directly related to the natural resources. 24% of its population is living below poverty line. (CIA Fact Sheet., 2011). Population growth is considered as carcinogenic i-e "cancer like" by many scientists, destroying or engulfing both biotic (living resources of biosphere e.g all living organisms and their decayed products including biofules) and abiotic resources (non-living resources including land, water, air and ores such as gold, iron, copper, silver etc.). (Zhao *et.al.*, 2005). All these natural resources are either important for our survival or provide raw materials for economic growth. An unchecked increase in population growth puts a serious burden on natural resources of locale/region or country. And more importantly the pattern of using these resources plays the key role in depleting these resources. All these natural resources have upper threshold limit or act in a source and sink manner that has specified capacities. If utilized up to or above that limit, they are no longer available for human use (White., 2007). By understanding the relationship between natural resources and their exhaustible limit, the term "Sustainability" was introduced in the book "The World's Conservation Strategy". Later on, in 1992, concept of sustainability was adopted in "The Earth Summit' that resulted in "Agenda 21"(Cochrane., 2006). Sustainability has been defined as the level of human consumption and activity which can continue into foreseeable future so that the system which provides services and goods to humans, persists indefinitely (Mayer., 2008). To measure these consumption patterns, large number of sustainability indicators have been put forward so far. Some most important sustainability indicators addressing

environmental issues are: Living Planet Index (LPI), Ecological Footprint (EF), Environmental Sustainability Index (ESI), Environmental Vulnerability Index (EVI), Environmental Adjusted Domestic Product (EDP) (Bohringer and Jochem., 2007). Main motive of this paper is to find out the exact situation of the natural resources of Pakistan as mentioned by the international environmental sustainability indices. Pattern of consumption of these resources and most important of all how they are affected by the population growth.

2. Research Methodology

Three indicators namely; Environmental Sustainability Index(ESI), Environmental Performance Index and Ecological Foot Print provide the reliable data for the environmental condition of Pakistan as mentioned in the index reports of these indices. Data for population growth and size was taken from census report of Pakistan.

Data for analysis of Ecological Footprint and Human Development Index was used in 2007 by Saeed R, and it is dependent partially on the data from foot print network organization and living planet reports. Data for population and poverty was collected from census report of Pakistan.

Statistical Analysis

Correlation studies were performed using SPSS software package among Ecological Foot Print, Ecological Deficit/Reserve, Biocapacity and total population/population growth.

Pakistan's Environmental Conditions According to Different Sustainability Indices.

Table 1.Ecological Footprint 2005 (global hectares per person)

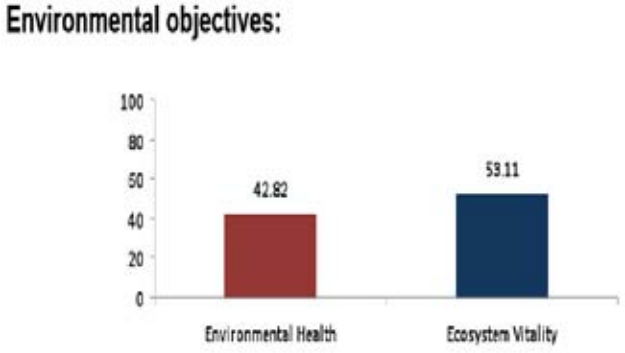
Population (Millions)	157.9
Total Ecological Foot Print	0.8
Carbon Foot Print	0.3
Crop Land Foot Print	0.39
Grazing Land Foot Print	0.01
Forest Foot Print	0.07
Fishing Ground Foot Print	0.02
Build up land Foot Print	0.05
Total Foot Print m3/person/yr	1,218
External Foot Print m3/person/yr	1,000

(Source: LP Report, 2005)

Table 2.Environmental Performance Index (2010)

Rank	125
Score	48.0
Income Group Average	48.7
Geographic Group Average	58.0
GDP/capita 2007 est. (PPP)	$2,357
Income Docile	8 (1=high, 10=low

Source: (Environmental Performance Index Report, 2010)



(Source: EPI Report,2010)

Table 3.Environmental Sustainability Index (2005)
2005 ESI Ranking and Optimal Rank for Pakistan

2005 ESI Ranking	Best Ranking
131	110

According to the cluster analysis, Pakistan falls in group 7 with low system score, moderate stresses, vulnerability, capacity and stewardship.

Table 4.ESI Ranking of Pakistan

No of group	7
Average ESI Score	46.2
Environmental Systems	37.4
Reducing Env. Stresses	50.9
Reducing Human Vulnerability	49.4
Social and Institutional Capacity	44.4
Global Stewardship	52.2
GDP/ Capita	$1,730
Population (millions)	149
Area (thousand square kilometers)	1010
Population density (per square kilometer)	147
Environmental Governance Indicator (z-score)	-0.2

(Source: ESI Report., 2005)

RESULTS AND DISCUSSIONS

Comparison of Trends in Ecological Foot Print (EF), Biocapacity (BC) and Ecological Deficit (ED) of Pakistan:

The ecological foot print is a measure of how much biologically productive land and water area an individual, a city, a country, a region or humanity uses to produce the resources it consumes and to absorb the waste it generates, using prevailing technology and resource management (Wilson *et al*., 2007). It is calculated by the Foot Print Organization for all the countries in United Nations statistical data that have population greater than one million people. It employs the unit of global hectares. And biocapacity (or biological capacity) is the capacity of ecosystem to produce useful biological materials generated by the humans using current management scheme and extraction technologies. While an ecological deficit/ reserve represents the amount by which the ecological foot print of a population exceeds the available biocapacity of that population/ territory in a given year.

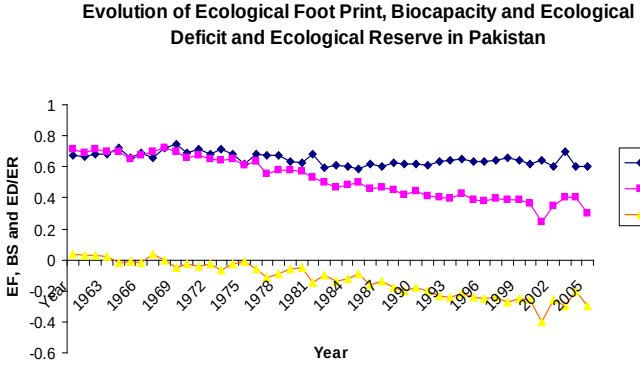


Fig.1.Evolution of Ecological Foot Print, Biocapacity and Ecologic Deficit and Ecological Reserve in Pakistan

EF of Pakistan followed a varying trend between the years 1961-2005. It was maximum in 1970 i-e 0.75 g ha/ person and minimum in 1986 i-e 0.59 g ha/ person. But the difference is not notable and overall EF makes Pakistan fall in a category of very low consumption pressure depicting poor standard of living of population of Pakistan.

The BC of Pakistan declined significantly from 0.712 g ha/ person (1961) to 0.3 g ha/ person (2005). And it is further expected to decrease if same trend is followed. Pakistan was enjoying an ecological reserve of 0.039 g ha/person in 1960 but due to steady decrease in BC and minor increase is EF, country has to face an ecological deficit of -0.3 g ha/ person during current years.

Trends in Population of Pakistan

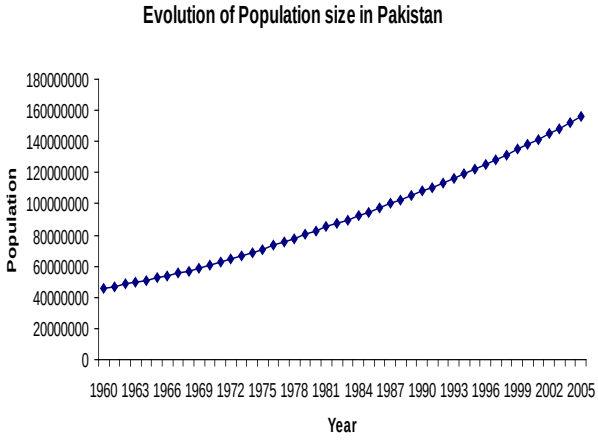


Fig.2.Evolution of Population Size in Pakistan

Population of Pakistan has increased from 39,448,232 in 1950 to 174,579,000 in 2009, with an average growth rate of 1.60 (Census of Pakistan).

Correlating EF, BC, ER/ED and Population Size

Population size was correlated to EF, BC and ER/ED. Using SPSS software package vicariate analysis was performed to determine Pearson's correlation. Total number of observations was 47 for each of variables. When EF, BC and ER/ED were correlated to population size, Pearson's correlation values found were 0.181,-0.431, and -0.755, respectively. For all the correlations significant two tailed alpha value was 0.01.

CONCLUSIONS

According to the foot print network organization's data, the current Biocapacity and ecological foot print of Pakistan are 0.3 and 0.6, respectively. So Pakistan is facing an ecological deficit of -0.3. Ecological foot print

is not a threat if seen in global perspective, but as compared with the national biocapacity, it presents a disappointing picture being almost double of it. If the ecological foot print is above 1.8 g ha/ person, which is a value up to which a country or nation is not harming the earth by over consumption or mismanagement of resources. But above this value, a person or a nation is considered to be consuming resources voraciously and above defined rights to consume. Impact of population on natural resources is viewed by few authors like Moles et. al., (2008) and Eris (2010). Due to under developing economy, limited natural resources and rapid population growth major point of concern of all the policies is to provide food, stuff and shelter to the masses. Environmental sustainability issues are ignored altogether. More over rapid industrialization is putting serious threats to the environment. Unchecked population growth means we need more and more raw material to meet the needs of population whereas our biocapacity is depicting an alarming situation, as it is already not sufficient to fulfill the requirement. And the situation may become worse as it is following a declining trend. As far as correlation studies are involved, with an increase in population, ecological foot print should also increase. But a non-significant correlation was observed between EF and population depicting a low consumption pressure and low living standard of people of Pakistan. Pakistan is facing a severe deterioration of natural resources like water, land, forests and biodiversity. So an increase in population logically results in decrease in biocapacity. While a decrease in BC should result in ultimate increase of ED. Rapid industrialization and unchecked industrial emissions into air, water and soil have played key role in depleting the natural resources.

To ensure the environmental sustainability, there is a need to put a check on rapidly growing population of Pakistan. More importantly, there is a need to manage it properly. As Pakistan is an agricultural country in which most of the poor folk is living in villages. They are earning their livelihood directly from environment and deteriorating it due to their ignorance. To conserve our natural resources and for their sustainable use, attention should be paid towards awareness of poor folk. Education is the most important factor in creating awareness among masses. Use of all kind of media is necessary to raise awareness among population. Environmental education or environment based education is the most important element that should be kept in mind. There is need to incorporate environmental issues in syllabi at all levels of education. We should put a check on rapid population growth as well as we must train people in other technical fields so that burden on environment may be reduced.

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ENVIRONMENTAL IMPACT ASSESSMENT (EIA): AN EYE WASH OR AN EFFECTIVE ENVIRONMENTAL MANAGEMENT TOOL IN PAKISTAN.

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Abstract

EIA is a policy tool used for evaluating a project proposal from physical and socioeconomic environmental perspectives. Its aim is to reduce the impact of development on environment, hence, ensuring environmental sustainability. It is mandatory to submit an Environmental Impact Statement (EIS) before starting a mega project as required by Environmental Protection Act of 1997 and Environmental Policy of Pakistan. Public consultation plays a key role in an EIA system, identifying the likely aspects and impacts of a development activity. This aspect has been ignored in effective enactment of environmental legislations in Pakistan. Sufficient legislative instruments are there to support EIA system in the country but the agencies responsible for the enforcement of environmental regulations have failed to do so. Most of the environmental issues arising during construction phases of development projects are addressed by the Supreme Court of Pakistan; although the honourable court is not the most appropriate agency meant for this purpose. This paper gives an insight into the actual status of EIA system in Pakistan along with the feedback of EIA specialists and University teachers of the concerned departments. The data collected was interpreted in the form of an index in the order to exhibit the over all system in Pakistan.

Keywords**:** *EIA, Sustainability, Economic Development, Pakistan*

INTRODUCTION

EIA is a systematic process to identify, predict and evaluate the environmental effects of the actions and proposed projects. This process is applied at planning stage of the project prior to major decisions and commitments being made (Fitzpatrick and Sinclaie, 2009, 2005; Sinclair et al., 2008; Petts, 1999; Wood, 1995). A broad definition of the environment is adopted, whenever appropriate social, cultural and health effects are considered as an integral part of EIA practice, for preventing, mitigating and offsetting the adverse effects of the proposed undertaking. Reducing the burden of environmental impacts is necessary if development has to be sustainable. As a result, EIA has become of ever increasing importance as a tool for development decision-making. (UNU EIA Module, 2006). This role is formally organized in the Principle 17 of the Rio Declaration on environment and development. Environmental Impact Assessment, as a national instrument, shall be undertaken for proposed activities that are likely to have a significant adverse impact on environment and are subject to a decision of a competent national authority (Rio Declaration). Pakistan is experiencing a rapidly growing economy as well as high population and urbanization growth. Ineffective natural resource management over many years and a long history of unplanned development not only has had negative impacts on Pakistan's socioeconomic fabric but also on its environment, particularly in urban areas (Nadeem and Hameed, 2008). In Pakistan, like in many jurisdictions around the globe, not all development activities need to undergo EIA but those likely to have adverse environmental and social impacts. But it does not appear as an effective tool to safeguard the environment and socio-economic fabric of the communities in Pakistan (Aslam, 2006; Saeed, 2004). Islamabad, the federal capital of

Pakistan has two main highways: Islamabad highway and Kashmir highway, these two roads have to bear most of the traffic burden of the city. At the intersection of the two roads occurs the zero point: central point of Islamabad; has to face severe traffic jam problems. To overcome this problem Capital Developmental Authority (CDA) started construction of an interchange worth 2.33 billion ignoring the submission of an EI statement of the project to PAK-EPA and having an environmental permission. The project was stopped by the PAK-EPA after complaint from the people of the native area facing severe environmental problems and CDA was directed to submit an EI statement of the project. A draft report of the EI statement of the Zero Point Project is submitted by NESPAK (Pvt) Ltd (a consultancy firm hired by CDA).

MATERIAL AND METHODS

Environment Assessment tools vary to a great extent. A variety of tools exist (Haapio and Viitaniemi, 2008). Analysis of an EIA report consists of evaluation of legislative provisions, guidelines, institutional setup, screening, scoping, public participation, mitigation of impacts and monitoring (Ahmad and Wood, 2002; Wood, 2003; Fuller 1999; Nadeem & Hameed, 2008). As Environmental Impact Assessment for Zero point Interchange has recently been a burning issue in the media with a common view from different authors that the project has been among top priorities of the government and will go to completion irrespective of its environmental or social costs. The authors were extremely curious to go through an EIA report for this project and wanted to know about the degree of concerns on behalf of EIA experts and environmentalists engaged in other sectors. For this purpose, the authors collected the viewpoints of environmental experts and faculty members of concerned environment departments of the leading universities of Pakistan about the validity of the draft report. Major queries made were about the potential environmental and socio-economic impacts of the whole project cycle. It was inquired that; (i) Whether EIA report is just a formality or effective mitigation measures to the anticipated impacts were recognized in the report; (ii) Whether the proper participation of all the stakeholders (public, Govt. agencies, NGOS, UN agencies etc) was ensured; (iii) Whether environmental cost of project is comparable to the economical benefits; and (iv) Does the report cover all the significant impacts and aspects, etc. This big controversy on zero point interchange project reveals that there was no use of power on behalf of PAK-EPA. Overall response was disappointing, as most of respondents have not gone through the EIA report for the project; even some of them were totally unaware of the project and its impacts. Hence, major output in this paper comes from the authors after detailed review of the report under consideration. To evaluate the EIA system, a number of models are available in literature (Riffat and Khan, 2006). In addition to questionnaire survey, in order to analyze the EIA system of Pakistan, a model proposed by the Lue etal., (1996) was used. This model consists of 7 key pillars.

RESULTS AND DISCUSSIONS

Environmental Policies, Regulations and Guidelines. The Constitution of Pakistan contains provisions for environmental protection and resource conservation. The Constitution mentions ―Environmental Pollution and Ecology as a subject in the Concurrent Legislative List, meaning that both the federal and provincial governments may initiate and make legislation for the purpose. However the basic ingredients for an EIA system were present in the Pakistan Environmental Ordinance (1983). But unfortunately, it could not draw the attention of the people unless 1st July, 1994, when it became a pre-requisite for the mega projects (Nadeem and Hameed, 2006). National Conservation Strategy (1992) was another important milestone to high lighten the important and need of the EIA process. Later, the Government passed and promulgated the Pakistan Environmental Protection Act 1997. The Act is fairly comprehensive. The law provides for an Environmental Impact

Assessment (EIA) of various projects being launched in the country including the construction of roads, buildings, factories or other installations, or any alteration, expansion or repair of the same, or mineral prospecting or mining or quarrying, etc. The law states that no project may be launched without an EIA being carried out and safeguards provided to the effect that the proposed project will not pollute the environment. EIA had been introduced in Pakistan Environmental Protection Ordinance (PEPO) of 1983 (GoP, 1983), later on, it was replaced by the Pakistan Environmental Act of 1997, which contains a detailed package of guidelines comprising preparation and review of environmental reports and public consultation (GOP,1997a; GoP, 1997b). The Pakistan Environmental Protection Act 1997 has been duly operationalised. The requisite rules and regulations have been enacted including Pakistan Environmental Protection Agency (Review of Capital IEE/EIA) Regulations 2000. National Environmental Policy (2005) provides that ―Environmental Impact Assessment related provisions of the Pakistan Environmental Protection Act, 1997, shall be diligently enforced for all development projects. Nevertheless Capital Development Authority (CDA) started construction of the interchange (Zero Point) without submitting an EIA report to Pakistan Environmental Protection Agency (Pak-EPA) and without obtaining a no objection certificate.

Environmental Administrative Framework

The Ministry of Environment, Local Government and Rural Development is responsible

for all the environmental issues. A Federal Minister heads the Ministry while the Secretary holds the administrative charge. Additional Secretary is responsible for different sections dealing with environment, forestry, local government and urban affairs. The Pakistan Environmental Protection Council (PEPC) was first constituted in 1984 under section 3 of the Pakistan Environmental Protection Ordinance, 1983 with President of Pakistan as its Chairman. In 1994, an amendment was made in the Ordinance to provide for the Prime Minister or his nominee to be the head of the Council. The Council was reconstituted after enactment of the new law i.e. Pakistan Environmental Protection Act 1997. Pakistan Environmental Protection Council is an apex statutory body. The Chief Executive is the Chairperson of the Council and the Federal Minister for Environment, Local Government and Rural Development as its Vice Chairperson and Governors of all the provinces are its members besides others. The Council is represented by trade and industry, leading NGOs, educational intuitions, experts, journalists and concerned ministries. Pakistan Environmental Protection Agency was created with thin staff and meager resources under the 1983 Ordinance. In the beginning, agency was responsible for pollution control, however after enactment of 1997 Act, the functions and responsibilities of the agency were enhanced and this department was strengthened technically and logistically to meet the environmental challenges. Pak-EPA also provides technical support to the Ministry of Environment. Federal EPA is responsible for all the projects in federal territory while provincial EPA's takes care of provincial projects under the direct authority of EPA. While other related departments are:

- Environmental Tribunals (in Punjab and NWFP)
- Pakistan Forest Institute
- National Council for Conservation of Wildlife
- Zoological Survey Department
- National Center for Rural Development and Municipal Administration
- Planning and Development Departments (P&D)

The superior judiciary and in particular, the Supreme Court of Pakistan, has played a positive and constructive role in preventing the degradation of the environment and preserving a sustainable ecological balance of nature. The Supreme Court of Pakistan also resorted to the exercise of extraordinary jurisdiction under Article 184(3) of the Constitution by entertaining petitions pertaining to maintaining clean environment,

this being an issue of great public importance. Zero Point interchange project in Islamabad is an example of extreme negligence of the whole environmental administrative framework. As the project had been started in federal territory with out notifying the concerned authorities and no notice was taken by the concerned executing agency (CDA) unless the environmental Ministry received public complaints about the pollution as a result of project.

EIA Procedure. Pak-EPA has introduced an EIA-Package in collaboration with key stakeholders. This EIA-Package provides a comprehensive guideline about the EIA procedure in Pakistan. Important EIA steps mentioned in EIA-Package is as follows.

Description of Project and related Environment. A comprehensive description of the plan should include type and category, objectives, alternative considerations, need for the project, detailed location descriptions size and magnitude of the project as well as government approvals. Also, a clear and brief picture of the environment of the area including physical resources, ecological resources and human resources, economic development and quality of life values, should be depicted. As far as EI statement of zero point project is concerned, more emphasis has been laid on the proponent's introduction and consultant's preface instead of paying maximum attention to the important issues. Technical aspects of the project were poorly addressed in the report rather it was masked with unnecessary material to give an impression of a comprehensive one

3.3.2 Screening: Screening is the 1st key decision of the EIA process. It involves making a preliminary determination of the expected impacts of a proposal on the environment and its relative significance. Developmental projects have been divided into schedules under section 12 of the Pakistan Environmental Protection Act (1997). IEE or EIA requirement of the project is decided by its cost and capacity. Broader categories like agriculture, livestock and fisheries, energy, manufacturing and processing, transport, water management, water supply treatment are included in schedule-I that requires initial environmental examination (IEE)(project of total cost less than 50 million), while schedule-II includes the project in the environmentally sensitive sectors like agriculture livestock and fisheries, of worth more than 50 millions rupees. There was no screening stage as EI statement was prepared after the project had been launched and practical work had been started.

Scoping. Scoping is a critical, early step in the preparation of an EIA. The scoping process identifies the issues that are likely to be of most important during the EIA and eliminated those that are of little concern. Scoping refers to the early, open and interactive process of determining the major issues and impacts that will be important in decision-making on the proposal, and need to be addressed in an EIA. Scoping is completed when the detailed studies required in the EIA have been specified often this involves preparing Term of Reference (ToR) or an equivalent document. The sectoral guidelines are available for projects belonging to various development sectors. The guidelines for preparation of environmental reports also suggests for complete and comprehensive formulation of the EIA report, however, in EI statement of zero point interchange project, possible or likely impacts during pre-construction, construction and operational phases are not properly assessed. Design phase has not been considered by the consultants in formulating the EIA report in the project impact matrix as evident from the Table 2 of the draft report. Consequently, impacts have not been discussed in a logical manner as they ought to be placed in the following order:

- Pre-construction Impacts
- Construction Impacts, and
- Operational Impacts

Physical Environment; Impacts on ambient air quality, Impact on ambient noise, Impacts on surface water and ground water quality, Impacts on land use, Impacts on soil fertility Biological Environment; Impact on trees/vegetation, Impacts on fauna, Socio-Economic Environment; Impacts on other infrastructure, Impacts on employment, Impacts on public health and safety, Impacts

on cultural resources, Impacts on aesthetics. The consultant has carried out various tests for ambient air quality, air pollution etc but the standards against which these values had been calculated have not been mentioned. As stated by the consultant, the number of automobiles increased on roads in previous years and this trend will increase in future, but the consultant did not count the number of vehicles/ traffic load on already existing and interlinked roads of proposed project, which is a common approach used to justify the project need and a strong argument for the approval of the project. It would also give a dynamic approach to the consultant for the study of unambiguous and acceptable alternatives. Zero point is situated in the center of Islamabad; its exact position should be specified using advanced global navigation system, but it was not done by the consultant. The proposed project alternatives are ambiguous in the sense that there is no practical alternative given in the report.

EIA Report Preparation. A number of different names are used for the report that is prepared on the finding of the EIA process. The purpose of EIA report is to provide a coherent statement of the potential impacts of a proposal and the measures that can be taken. An EIA report must be actionable, decision-relevant and user friendly. EIA-Package of the PAK-EPA provides comprehensive information about the ingredients of the EIA report. The main theme of the report is supposed to give a justification for the need of proposed project in a dynamic way, but the report only discusses the number of vehicles on the road. There is no interlink given in the report between the project and the environment, economy, development and basic infrastructure built in the country and particularly in Islamabad.

Public Consultation. Nearly all EIA systems make provisions for some type of public involvement. This term includes public consultation (or dialogue) and public participation, which is more interactive and intensive process of stakeholder engagement. The main purpose of the public involvement is to: inform the stakeholder about the proposal and its likely effects; canvass their input, views and concerns; and take account of the information and views of the public in the EIA and decision making. It is mentioned in the EIA guidelines that all the stakeholders should be consulted during this process. For most of the time, stake holder's involvement is most neglected element of the EIA procedure, practiced in Pakistan. And if such activity is there, it is managed in such a way as to indulge minimum participation from public, like venue of the public hearing is decided such that it is often inaccessible by the directly affected people of the project. In Pakistan, public participation or consultation in the form of public hearing is mandatory during the scoping phase as in well developed EIA systems of Netherlands and Western. Australia (Wood, 2003;Nadeem and hameed,2008) The public consultation section is very poor. The consultant team might not exactly identify the stakeholder categories. Their methodology and approach about public consultancy is not professional. They have just taken general views of people about the proposed project; even no technical sentence was seen in this section. No stakeholder from International organizations like IUCN, UNDP, WWF etc. and institutional stakeholders like Environmental Directorate, Ministry of Forestry, Ministry of Environment, etc. were invited honestly and sufficiently for raising the environmental issues regarding proposed project. Guidelines for the preparation of the environmental reports suggest thorough discussions with key stakeholders, assembling available information from concerned departments and agencies, consulting with possible affectees, considering alternatives and identifying information gaps (GoP, 1997c).

EIA Review and Decision Making. The purpose of review is to assure the completeness and quality of information gathered in an EIA. When undertaken as formal step, it acts as a final check of the quality of the EIA report submitted to obtain a project authorization. Inevitably there will be several decisions-makers involved in the complex depending upon the legislative and institutional framework. In Pakistani, involvement of the 3rd party is an important

feature of the EIA system; however, no independent review commission exits. Also number of anomalies arises in decision making process due to lack of technical capacity and political pressure. Decision about the construction of the zero point interchange project had already been taken, in fact construction had been started. So reviewing the EI statement was just taken as formality.

Role of Actors Involved in EIA Procedure. The role of actors involved depends upon the type, magnitude and funding body involved. For most of the time, major actors involved are federal and provincial EPAs, planning and development departments, consultants, NGOs, international cooperating bodies and super ordinated and judiciary. In this case all the key actors involved had shown sheer negligence. Capital development authority started the construction of the interchange without obtaining no objection certificate and by ignoring the legislative provisions of the country. Key stakeholders are neither identified nor given the exact importance.

EIA Compliance Monitoring and Enforcement. Key objectives of the EIA monitoring and enforcement are to: confirm that the conditions of the project approval are implemented satisfactorily; verify that impacts are within predicted pr permitted limits; take actions to manage unanticipated impacts or other unforeseen changes; ensure that environmental benefits are maximized through good practice; and learn from experience in order to improve EIA process and practice. International donor agencies providing the funding for the project and the penalty section are major contributor of this section. The responsible authorities at their direction setup an environmental monitoring committee for an approved project to assist and guide the proponent in the management of monitoring program. In case of zero point interchange project the consultancy firm provides a Monitoring Plan for the proposed project, but the Monitoring Plan has not mentioned the basic parameters against which the monitoring will be carried out and basic enforcement criteria. In spite of sufficient legislative support, role of judiciary is totally missing.

EIA Implementation in Practice. The key objectives and tools of EIA implementation and follow up include: Surveillance and supervision of key EIA terms; monitoring of environmental parameters, auditing to describe a systematic process of examining documentation and verifying the EIA procedures and outcomes; ex-post evaluation of including policy-oriented review of EIA process. The consultancy firm has failed to provide any section for Post Operational Stage Auditing/Environmental Auditing, which is a big deficiency in the report. The report has a table, which shows the responsibility of each person related to proposed project; it is a good effort in Pakistan keeping in view the International standards. International experiences indicate that political cultural and economic conditions in general influence the EIA practices (Thomas, 2001). Decision for the construction of the zero point project had been taken in 1971. Justification for such a long delay should have been given in the report.

Resource Availability for EIA Implementation. As an emerging tool in policy and implementation, EIA process have special concerns about resources both human resources and physical resources. Also international factors including financial & technical assistance and bilateral regional cooperation are of important consideration. Being a party to the many multilateral environmental agreements, it has to fulfil its obligations, but as evident from the above example Pakistan is seriously lacking the financial and technical assistance to carry out the EIA process in its true sense.

CONCLUSIONS

The basic approach of Environmental Impact Assessment (EIA) is a detailed and multi dimensional study of the proposed project with alternative analysis, base line status of project area on multi pillars i.e. environment, economic and socio-cultural issues, a large scale public consultation and stakeholder concerns, identification and further detailed

assessment of all possible or likely impacts and environmental management plan on technical basis, applicable mitigation measures, monitoring and evaluation of the recommended measures and environmental audit. On the basis of all these and above described points, the quality of draft report is average. But the report tries to discuss all the relevant issues except the ones indicated above. The major issues are availability of non-technical persons, lack of interest or we can say that another factor was the short period of time for consultant to adopt the best methodology and approach for conducting EIA for proposed project. The other shortcoming in report is the discussion on irrelevant issues like migratory birds; another deficiency is poor public consultation, which is the poorest section of this report. The report is lacking a Native Plantation Plan for proposed project. The report has not included waste disposal plan for construction phase. The mitigation for Residual Impacts has not been discussed in mitigation section. Environmental Management Plan (EMP) section as required for such type of projects in the world is missing. The division of labor and responsibility identification as well as the environmental cost section for the proposed project is appreciable.

5. Recommendations:

EIA system of Pakistan is provided with enough legislative support but there is need to implement it properly with an effective check and balance system. Inter-departmental coordination is imperatively required. Agencies responsible for environmental protection in Pakistan are just silent lookers of violations of existing environmental rules and regulations. These organizations are playing their role as sleeping partner as they are not significantly contributing towards effective enactment of EIA rules in the country. Rather, it is the public, print media and somewhat NGO's who take lead in pointing out the environmental issues, after they arise during construction phase of a development project. The Supreme Court of Pakistan addresses most of the environmental violations; although the honorable court is not the only agency meant for redressal of hue and cry of people affected adversely by a development project. At present it is the need of hour that for all development projects like zero point Interchange project, all stakeholders, in particular, the project affectees, must be identified and consulted at the design and planning stage of the project and EIA system be implemented in true spirit for achieving the national goal of sustainable environmental management in Pakistan.

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CORRELATIVE ASPECTS OF THE ECOLOGICAL SITUATION AND OF THE SUSTAINABLE DEVELOPMENT IN THE REPUBLIC OF MOLDOVA

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Abstract

Environmental issues by their nature, character and implications prove to be a global problem. The environment and its protection increasingly require more coherent, flexible and competent management, a wide variety of intervention tools, and continuous communication with socio-economic actors in order to decrease to the minimum pollution phenomena and to use rationally planetary resources. Sustainable development reveals to us an economic and social development, which provides vital needs of the society by exploiting natural resources and human values and simultaneously preserving to the maximum the potential of the nation's natural heritage. At present Moldova has the opportunity to rectify the poor ecological situation by taking measures to promote environmental training and education of the population, to implement effectively environmental management achievements, and finally, to reach the path of sustainable development within European space.

Keywords: *environmental factor, sustainable development, ecological status, environmental management, investment.*

INTRODUCTION

Nowadays the ecological factor is associated with the negative processes that take place in the nature under the influence of human activities. The environment and its protection require a coherent, flexible and competent management, a wide variety of intervention tools, as well as a continuous communication with socio-economic actors in order to reduce to the minimum pollution phenomena and to exploit rationally planetary resources. Under the conditions of market economy the main means to assure ecological durability is the use of economic tools and of normative regulations. In order to correlate and promote the policy of sustainable development as well as to correlate ecological and social expenses, it is necessary to extend the use of economic tools, taxes, duties. Ecological management tends to assume the fundamental role in overcoming environmental crises. Rational resources management, environmental damages and costs, economic tools of environmental policy, micro and macroeconomic consequences of environmental protection means etc are some of the main principles of this science. The promotion of a coherent policy in environmental protection of the Republic of Moldova is a modern requirement. This policy assumes the consolidation of the course of our country on its way to sustainable development, its integration in European structures and the intensification of international cooperation processes in this field as our only chance to relieve social poverty, to solve our multiple environmental problems.

MATERIAL AND METHODS

During the research there were used traditional research methods, methods of quantitative and qualitative analysis, methods of compared and logical analysis, as well as modern methods of study. The official data of the National Agency of Statistics of the Republic of Moldova formed the databases

RESULTS AND DISCUSSIONS

The objectives of sustainable development and their achievement at a large scale mean

that the economic policies should be planned according to environmental considerations and to economic functions of natural resources. The standard economic indicators, that mainly describe financial flows, deliver incomplete information about the influence of economic activities on the environment.

The investments in fixed capital are granted to all the branches of the national economy being a technical and material source that is necessary for production activities. During the last decades, when the alarm of ecological danger became inevitable, these investments in fixed capital have increased in the field of the environmental protection and rational exploitation of natural resources. Further, in table 1, we are going to analyze the investments in fixed capital for environmental protection.

Table 1. The investments in fixed capital for the environmental protection and rational exploitation of natural resources, thousand leis

	2004	2005	2006	2007	2008
The total of the investments in fixed capital for the environmental protection and rational exploitation of natural resources	27398,9	43938,7	51593,2	69201,1	87885,2
inclusive for:					
- the protection and rational exploitation of water resources	11395,9	23061,8	17879,2	7210,0	4269,6
- the protection and rational exploitation of soil	16003,0	20876,9	33711,5	57700,8	80781,9
- air protection	-	-	2,5	4291,0	2833,7

The source: calculated according to the databases of the National Agency of Statistics

Analyzing the data from table 1 we can notice that the investments in fixed capital for the environmental protection and rational exploitation of natural resources have been increasing annually. Thus, if their value constituted about 27398.9 thousand leis in 2004, this value increases more than 3 times to 87885.2 thousand leis in absolute terms in 2008. They are divided in several sectors: the sector of the rational protection and exploitation of water resources, the sector of the rational protection and exploitation of the soil and the sector of air protection.

The biggest share comes to the investments in fixed capital for the protection and rational exploitation of soil that constitute 58.4 % and 47.5 % in 2004-2005 in relative terms of the total investments made. In 2006 65.34 % of the investments in fixed capital are directed to the protection and rational exploitation of soil and 34.65 % to the protection and rational exploitation of water resources. In the same 2006 a small share of the total of these investments goes to the protection of the air that constitutes about 2.5 thousand leis or 0.01 %.

In 2007 financial resources were invested in fixed capital in the absolute term of 69201.1 thousand leis, of which a share of 83.38 % goes to the protection and rational exploitation of soil and accordingly 10.4 % go to the protection and rational exploitation of water resources. At the same time, during the analyzed period the investment for air protection has considerably increased to 4291 thousand leis.

In 2008 the investments for the protection and rational exploitation of soil are maintained at an increased level that constitute 91.92 % of the total of the investments in fixed capital for the environmental protection and rational exploitation of natural resources. Thus, the share of the investments for the protection and rational exploitation of water resources and for air protection has reduced to 4.86 % and 3.22 % respectively.

The fixed means of production, used in the environment, are of different efficiency. They require certain financial means, that's why we are going to analyze the value of the fixed means of production for environmental protection in table 2.

Analyzing the data from table 2 we may come to the conclusion that the value of the fixed means for environmental protection in 2004 constituted 1009.8 million leis, which means that they haven't significantly changed. The value of the fixed means of production for the protection and rational exploitation of water resources have had the leading share during the years 2004-2008 that is over 90 % of the total of the value of the fixed means for environmental protection.

Table 2. The value of the fixed means of production for environmental protection, %

	2004	2005	2006	2007	2008
Total	100	100	100	100	100
inclusive for:					
-the protection and rational exploitation of water resources	89,68	90,91	91,71	92,23	91,32
- air protection	6,82	6,79	6,52	6,12	6,67
-other fixed means for environmental protection	3,5	2,3	1,77	1,65	2,01

The source: calculated according to the databases of the National Agency of Statistics

On the other hand the value of the fixed means for air protection reduced in 2004 from 35.3 million leis to 22.4 million leis in 2008. Other fixed means in the domain of the environment have small shares to 2 % in comparison with the means for water and air protection.

Every year the State has to grant financial means for environmental protection that could have been used for other purposes, if the natural factors had been used rationally by all the economic agents.

The analysis of budget expenses for environmental protection can be made on the basis of the analytical table below (Table 3).

Table 3. State budget expenses for the environmental protection in the Republic of Moldova

Indicators	Years				
	2005	2006	2007	2008	2009
Expenses, total mil. leis	7724,2	10024,8	12161,4	16466	17199,4
Expenses for environmental protection and hydrometeorology, mil. leis	509,777	684,035	1219,434	1121	1669
The share of the expenses for environmental protection and hydrometeorology from the total state budget expenses	0,66	0,68	1	0,68	0,97

The source: calculated according to the databases of the National Agency of Statistics

The State budget grants certain means to environmental protection simultaneously with the various activities of economic agents and of the whole society. The share increase of these expenses is reflected annually, thus, if in 2005 these expenses constituted 0.66 % in relative terms, in 2006 they constituted 0.68 %, and in 2007 we obtain 1.00 %. This fact proves that the State has to improve the situation created in the environment and caused by the unwise attitude of the population. In 2008 the expenses for environmental protection reduced by 0.32 percentage points in relative terms in comparison with the previous year and in absolute terms they increased by 9843.4 thousand leis. In 2009 there is an increase of state budget expenses for environmental protection by 54800 thousand leis.

CONCLUSIONS

In order to safeguard a prosperous future for the Republic of Moldova we need to think about a balanced treatment of the environmental protection and of the sustainable development. The economy and social life should be adjusted to the requirements of the conceptions of the ecological socio-economic sustainable development. For that we must carry on a number of reorganizations in this field under the conditions of market economy. On the basis of the undertaken research we have come to the following conclusions:

a) Natural factors serve the basis for the continuous existence of the humankind. The rational exploitation of natural resources assures standard welfare and healthy environment to the future generation.

b) Integrated estimate and maintenance of 4 types of capital define sustainable development: it may be weak, sensible or strong. The man and the nature constitute a whole that cannot be destroyed, that's why environmental degradation will strongly influence the humans.

c) In order to maintain normal functioning of natural systems the spheres of environmental policy are being established by means of legal and economic tools and certain indirect and general economic measures.

d) Economic estimate of environmental goods and services allows us to set prices for physical environmental changes, as well as the financial value of the restoration of these effects.

e) The analysis of environmental and sustainable indicators explains the interdependence of the relation "economy-environment" revealing the connection between resources delivery and their absorption at macro and microeconomic level. It shows pollution indicators, resources exhaust, the risks of the ecosystem, as well as the influence of the environment on human welfare.

f) The present ecological situation in the Republic of Moldova is characterized by a quantitative aggravation of air, water and soil pollution, forests destruction, garbage accumulation that result from household activities and the activities of industrial sector: extraction, mining, construction, food and drinks industry, metallurgy, as well as "green revolution" in agriculture.

g) The investments in fixed capital for the environmental protection and rational exploitation of natural resources increase their value from 27398.9 thousand leis in 2004 to 87885.2 thousand leis in 2008 in relative terms. The investments in fixed capital for protection and rational exploitation of the soil and water resources have the biggest share.

h) The share of state budget expenses for environmental protection increases every year from 0.66 % in 2005 to 0.74 % in 2008 in relative terms that shows the necessary situation of environmental improvement from state budget income.

As to the recovery of the situation we suggest the following:

1.Saving, preserving, regenerating of natural resources, recycling of production and household wastes in order to assure healthy economical-ecological environment.

2.Change of economic and social behavior, creation of a new culture of natural resources utilization, consumption and life model. The promotion of another way of thinking and behavior by means of all the possible information channels.

3.The State should promote environmental management standards in order to elaborate evaluation techniques in financial terms of the phenomena linked to the environment evolution, the State should implement and maintain environmental policies, as well as a change from the stable model to sustainable development.

4.The State should work out and assure the application of the national strategies of sustainable development in all the strategic directions of the national economy.

5.The establishment of the mechanism of accumulation and granting of the incomes for prevention and control of the negative effects caused by environmental pollution.

6.The assurance of the sustainable natural resources exploitation that makes possible sustainable socio-economic development.

7.The implementation of an accounting program that would impose another level of recording and management of natural resources including ecological resources.

8.The assurance of socio-economic reforms implementation compatible with the environment that would allow the integration of the Republic of Moldova in the European Union space.

At present stage the Republic of Moldova has possibilities to change its uncertain ecological situation, it can promote educational ecological campaign among its population, implement efficiently the achievements of environmental management in order to come to sustainable development within European space.

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ECONOMIC SITUATION ANALISYS AND IRRIGATION USE POSSIBILITIES IN THE REPUBLIC OF SERBIA

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Abstract

Today world is characterized by growing food demand, which requires constant improvement of applied agro-technical practices in order to increase yields per unit of used arable land. Irrigation is one of the major melioration and hydro-technical measures in agricultural production. According to statistics, in 2009 in Serbia only 30,000 to 40,000 ha out of 4.7 million ha of arable land was irrigated, which seems rather low in comparison to the existing potentials and needs. Based on the last five-year period statistics, the paper analyses the current state and tendencies of irrigated areas, as well as potential of application of certain methods of irrigation. With the aim of Serbia's agricultural production improvement, during the analysis all important issues were taken into consideration and certain suggestions were also given for more intensive application of mentioned agro-technical measures.

Keywords: *arable land, irrigation, problems, opportunities, Republic of Serbia.*

INTRODUCTION

Serbia has favourable agro-ecological conditions for crop farming and vegetable production, therefore it is necessary to determine measures which would stimulate production development based on highly-efficient basis. However, due to changes in global climate, favourable agro-ecological conditions are not sufficient to reach production characterized by stability, sufficient quantities of products, continuity in delivery. As a partial solution to this problem, increase of areas under irrigation systems imposes, what will significantly affect predictability of crop farming and vegetable production results on territory of Serbia.

Lack of available funds for investment and unfavourable agriculture position in Serbia, obstructed the development of hydro melioration as well, which cannot be observed apart from the whole agriculture development. Economic conditions in agriculture and issues of prices, margins, loans, etc. respectively, significantly influence the possibility and efficiency of hydro melioration measures implementation. Measures and decisions established for agriculture development, influence the issues in hydro melioration as well, since hydro melioration development is closely related to the results of use of existing irrigation and drainage systems.

Number of data indicates that from ancient times land was irrigated by the use of water from wells, reservoirs, canals or river. In that time irrigation contributed to higher and more stable production of plant food, but as land drainage was disregarded, creation of swamps and soil salinization occurred which decreased the positive effects of irrigation. Development of irrigation in Serbia, presented in time units and size of irrigated areas, was quite uneven. Although used, irrigation did not have expected results, since adequate agro-technical measures were not applied. The land was irrigated incompetently, without rational use of water that often resulted in to land productivity. Therefore, the aim of the paper is analysis of irrigation during the past five year period, as well as possibility of greater use of this hydro melioration measures, which is important for agriculture and overall economic development of Serbia.

MATERIAL AND METHODS

Research was based on the official data of the Statistical Office of the Republic of Serbia for the observed five-year period (2005-2009). Total irrigated area, used irrigation methods, capacities of

used facilities and equipment, as well as the use of different sources of water for irrigation were taken into consideration. For the data analysis and results presentation economic-statistical indicators were used and all results are presented graphically. Research is based on available data, and method applied was "desktop study". Period in focus is 2005-2009.

RESULTS AND DISCUSSION

Autonomous Province of Vojvodina and Central Serbia are in climates characterized by variable, unstable and unpredictable weather conditions in longer time period. This is primarily related to the amount and distribution of rainfalls, which significantly varies from year to year. Presence of drought is usual during the summer period, hence the need for steadier approach in solving of this issue by process of irrigation.

Established and installed irrigation systems cover roughly around 190,000 ha, but according to the official statistics, in Serbia only about 40,000 ha of the total arable land (4.7 million hectares) is irrigated, with AP Vojvodina containing about 87%, and Central Serbia only 13% of these areas. This ranks Serbia to the bottom of the table in Europe. In EU irrigation systems cover in average about 30% of total surfaces under arable land. Surrounding countries are in much better situation by observed parameter, so in Romania about 2.3 million ha is irrigated, in Bulgaria 1.2 million ha, in Greece around 1 million ha, in Hungary 260,000 ha and in Albania around 390,000 ha.

Number of irrigation facilities and equipment, as well as length of channels and pipelines, has changed significantly during the previous five year period (Figure 1). Total length of all channels on the Republic territory, within the analyzed period, was on its lowest level during the 2007, when in Central Serbia and AP Vojvodina was in use around 460 km of channel network. Channel network was the longest in 2009, with 2,297 km, with 2,065 km of canals functioning in AP Vojvodina, while in Central Serbia their effectiveness was achieved on only 232 km. Most of the pipeline network is installed on the territory of AP Vojvodina, where about 1,075 km during 2009 was in use, while in Central Serbia around 665 km of pipelines functioned.

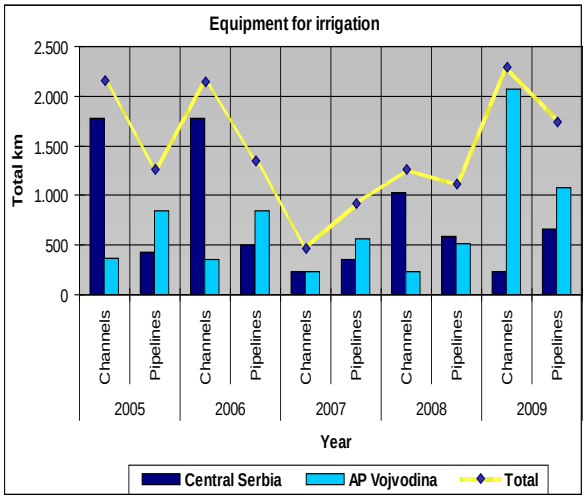

Fig.1. Use of equipment for irrigation during the period 2005-2009
Source: *Statistical yearbook of Serbia*, 2006-2010, Statistical Office of the Republic of Serbia.

The most common irrigation method used in Serbia is irrigation by artificial rain (Figure 2), used on around 93%, while the surface water irrigation and drip irrigation system are used on only 7% of total irrigated areas.

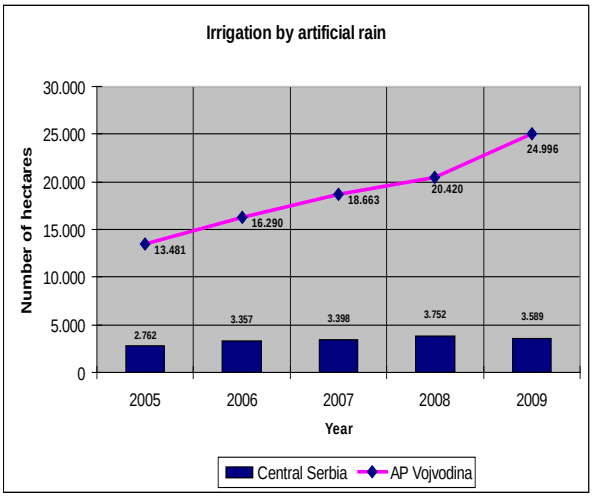

Fig.2. Irrigation by artificial rain during the period 2005-2009
Source: *Statistical yearbook of Serbia*, 2006-2010, Statistical Office of the Republic of Serbia.

During the 2009 watercourses were the biggest water resources in irrigation, with a total share of 89%, followed by water from water reservoirs and lakes 8%, while groundwater take only 3% in the structure of used water for irrigation.

Irrigation from the water reservoirs and lakes has been present in 2007 on the territory of AP Vojvodina (Figure 3), with 4.593 million m^3 of water used, while in 2009 the volume of water used for irrigation from these sources decrease to mere

1.495 million m^3. Opposite situation was in Central Serbia, where the volume of used water was very low level during the observed period, below 500,000 m^3, having in mind that in 2009 irrigation from these sources rapidly increased to a level of 2.1 million m^3 of used water.

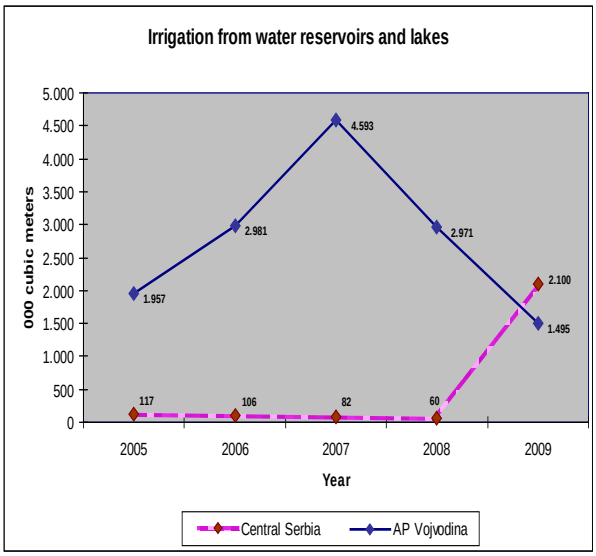

Fig.3. Irrigation from water reservoirs and lakes during the period 2005-2009
Source: *Statistical yearbook of Serbia*, 2006-2010, Statistical Office of the Republic of Serbia.

Use of water for irrigation from watercourses is important for Central Serbia (Figure 4), so during 2006 and 2007 it was more than 70,000 m^3. Unfortunately, this trend was discontinued, so in last observed year only about 9,000 m^3 of water was used. Reverse situation is on the territory of AP Vojvodina, where the trend of irrigation with the water from watercourses is constantly increasing, from 10,000m^3 in 2005 to almost 30,000m^3 in 2009.

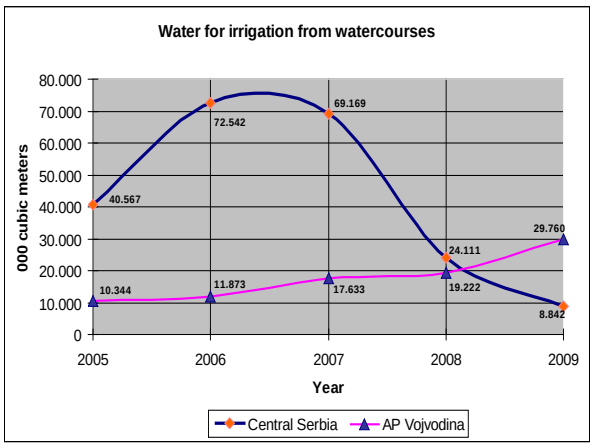

Fig.4. Use of water for irrigation from watercourses during the period 2005-2009
Source: *Statistical yearbook of Serbia*, 2006-2010, Statistical Office of the Republic of Serbia.

From the economic aspect, achieved results evidently confirm the low rate of utilization of hydro melioration systems in Serbia. This is usually due to following factors:

- inadequate technical solutions in general, or on specified facilities;
- inadequate and insufficient equipment for artificial rain and drip irrigation;
- lack of experience in the intensive agricultural crops farming under system of irrigation;
- incompatibility of crops according to the irrigation time and required amount of water (e.g. cereals and vegetables);
- parcels atomization in private sector;
- lack of qualified labour, especially specialized in irrigation systems and production under irrigation;
- inadequately organized, or not organized at all, crop-purchase system;
- lack of accompanying facilities and processing capacities;
- uncertain realization of agricultural products;
- insufficient and inadequate cooperation between entities - water suppliers and water users;
- inadequate implementation of the Law on water and use of hydro melioration systems;
- insufficient engagement of scientific-research institutions from the field of land reclamation;
- under-built pricing system for irrigation water, etc.

Solving many problems in utilization of hydro melioration systems, requires greater engagement of experts and interested business entities, so irrigation can reach its real use-value function, or in other words to reach better financial effects in agriculture.

CONCLUSIONS

According to available arable land and other natural resources within agriculture, as well as the need for agricultural production intensification, presence of irrigation is on relatively low level in Republic of Serbia. Despite satisfactory water potentials for irrigation process, a small number of investments are directed to facilities building, and purchasing of equipment and machines for irrigation. Unfortunately, up to now established systems were irrationally used and in quite a bad condition. Greater investments into the establishment and reconstruction of irrigation systems would create a

strong base for continuous and intensive use of land and water in plant production. On the other hand, intensification of fodder production would create an excellent base for the development of livestock fund in certain regions of Serbia. Mentioned would lead to the improvement of agriculture, sector of economy that has the development priority status and significant share within the total foreign trade balance of the country.

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THE ROLE OF THE STATE IN PROMOTING THE INNOVATIONS IN AGRICULTURAL SECTOR IN REPUBLIC OF MOLDOVA

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Abstract

Currently, the state's role in facilitating of innovation investment in agriculture is crucial, because it confirms the possibility of participation in the innovation process so for the domestic investors as for foreign investors. State policy in the science and innovation needs to be orientated towards stimulating innovation and creating a favorable climate to innovative processes, as a system of measures taken by state power to realize, an effective bridge from technical activities - academic scientific to the own sphere of production. In this context, the creation of favorable conditions for innovation investigations will realize new preconditions for implementation of innovation at all levels of the national economy, and this will create a continued economical growth.

Keywords: *innovation, innovative process, agricultural sector, investment, economical growth*

INTRODUCTION

An essential role in generating and promoting the innovations in the agricultural sector is constituted by the investments, that are contributing directly to the promovation of the innovative processes. In this way, the investments represents the source of the innovations and these constituent the way to attract investments.
The development of the agricultural sector in Republic of Moldova requires investments as well an active involvement of the central and local public administration, private sector, for maintaining the business environment favorable for foreign and local capital investments destinated to the durable country's development. In this way the state has an important role through its policies in creating economical, organizational and juridical conditions necessary to assure the carryon of the scientific and innovatory activities, to stimulate the innovatory processes and to contribute to the efficient use of its results in fulfilling with the social economic development objectives.

MATERIAL AND METHODS

During the study process the specific investigation methods used were: the observation, the reasoning, the comparison, the analysis and synthesis as well as other methods of economical statements. As a methodological and theoretical support has served the following savants' works as Bargan P., Bunu M., Hrişcev E., Law of State Budget for 2010 year, Report of the CSSDT's activity and the principal scientific results obtained in the science and innovatory environment in the period of 2006-2010 years. The study subject was the Research Institute of the Academy of Science of Moldova.

RESULTS AND DISCUSSIONS

The main traditional occupation in Republic of Moldova it was and is the agriculture, being practicated since very long time. At the present time the agriculture is exposed to a lot of risks with negative impact as: erosions, earth flows and natural calamities that is contributing to the strong variation of the harvest on hectare, being lowest in comparison with the neighbour countries; small production with low outturn and low

technical supply. Another difficulty is the commercialization of the ingathering production caused by the reduces acquisition volumes and vegetables processing by the canneries, as well the weak development of the gathering services, storage, transporation of the agricultural products for the alimentary industry and its commercialization on the market. All these aspects is not a stimulation or insurance for a durable development of this sector on the contrary increase the farmer's risk [7].

In spite of all these the agriculture of Republic of Moldova has the development potential and we can contribute to its return to the lost positions in the last decades through coherent modern policies, well calculated measures and common efforts of the authorities, producers and exporters, by protecting them of import invasions and high prices stabilized by the monopolists, seeds and productive technologies that can protect the harvest and the sown fields during the non favorable climacteric conditions; ideas and innovations, etc.

According to the international definitions, the innovation represents those scientific, organizational, financial and commercial steps that lead the implementation and improvement of the new products and processes. Innovation is based on the results of new technological developments, on the new combinations between the existing technology or other knowledge acquired by a particular organization; or new products and processes and some not necessarily bring something new but are necessary for the implementation.

Implementation of innovations in agricultural activities contributes to increased economic efficiency of the agricultural sector. Low population living standard is the result of a very low productivity of products per capita. But the productivity can be enhanced through the implementation of scientific and technical progress in agriculture – a necessity of prime importance in providing for the population a decent living standard [2].

The innovative activity in agriculture has its merits as: efficiency of implementing the high dependence of scientific research results in the climatic conditions; differentiation of the climatic zones where are significant conditions for production's innovation and efficiency; multitude of verities cultivated in the country, each of them having specific features and requirements to technologies, seasonality, the need to implement it in a short period of time, related to certain phenophase; the long duration of implementation to achieve the production, especially in multi-yearly plantations; the risk of natural disasters; the excessive land parceling; and dependence of the innovation efficiency limiting factor.

The innovative activity in Moldova is poorly developed for the following reasons: the lack of the economic mechanism in financing innovative activities, including the allocation of budgetary and extra budgetary funds, attracted and borrowed funds; low economic and innovative potential; low receptivity from the entrepreneurial sector for new innovations; lack of qualified personal; lack of own financial resources; high value and return of investment's recuperation; high economic risk; imperfect legislative base, particularly normative- legal acts regulating the whole innovation cycle; absence of capacity for innovation on the national market.

A key role in promoting the innovation in agriculture is the investment necessary for innovation, and vice versa, because only the innovation can achieve high efficiency of investment. Investments serve as the material support that is contributing directly to the promotion and innovation in innovative processes. These arguments make a close correlation with innovations and investment activity. In this way the investments are the source of innovation and the innovations means attracting investments [3].

Development investments needs of the agricultural sector of the Republic of Moldova require an active involvement of central and local administration, the private sector in maintaining a favorable business environment for domestic and foreign capital investments fated to the modernization and sustainable development of the country.

In this regards the state has a direct and active role, which through its policies to create

conditions for promoting economic, organizational and legal work necessary to ensure the deployment of the science and innovation, to stimulate innovative processes to increase the public funding of scientific research and the efforts for attracting investments and facilitating the expense of the economic foreign investors and other sources to contribute to the efficient use of scientific and technical results and other objectives of social and economic development.

Republic of Moldova needs to establish a conducive business environment to a clear and realistic innovation in the field. It requires a systemic approach to innovation in the context of the interest's and relations' of all the participants in this process: universities, research institutions, donors, and the state. This task can be solved only through innovative state policy by which the state will control and adjust all the processes to the technology market, beginning with the demand for some research and ending with realization of their domestic markets and some foreign markets.

Given the importance of research and innovation area's development in ensuring the sustainable growth and competitiveness of national economy, have been adopted a series of legislative strategic documents aimed to improving the created situation: The Code of Science and Innovation of the Republic of Moldova [4]; Law approving the National Development Plan 2008 -2011[5], The Action Plan for the Implementation of National Strategy [1] etc.

In the same order of ideas were established the main objectives of the state policy in research and innovation areas which are: increasing the research and development, efficient use of the scientific – technological activity's result in the economy; development of innovation's area based on research and development and its results; recovery and continued development of intellectual potential in these fields.

According to the Law of State Budget from 2010 year, nr. 133 – XVIII of December 23rd, 2009, for the finance expenditures in science and innovation for the Academy of Science of Moldova were allocated 358,3 mil lei, which represents 0, 48 percents of gross domestic product (GDP) planned for this year [8]. The dynamics of science and innovation funding amount (executed) during 2006-2010 year is presented in the Table 1 [6].

Table 1. The dynamics of science and innovation funding amount during 2006-2010 year, in mil. lei

Indicator's name	Executed				
	2006	2007	2008	2009	2010
Science and Innovation, total	**198,2**	**304,0**	**388,2**	**351,3**	**350,8**
inclusively:					
Main constitution	176,3	279,7	359,4	316,6	311,8
Special funds	0,3	0,3	0,6	0,8	-
Special resources	21,6	24,0	28,2	33,9	38,9
Weight in % besides the GDP	0,46	0,58	0,7	0,59	0,50

Although science's and innovation's funding in 2006-2008 years were in ascendant way, this volume does not fully allow scientists to stop the savants exodus from science, the technical renovation and restoration of the prestige of the material science and innovative activity. Since 2009, there is low trend in science funding, which led to the suspension of research projects and programs within the state.

Table 2. Dynamic execution costs based on priority areas, mil. lei

Type of research	Executed				
	2006	2007	2008	2009	2010
Fundamental research	43,950	67,561	86,582	86,100	81,570
Applicative research	86,698	138,05	168,486	158,014	163,242
Scientific personnel preparation	11,281	11,667	14,190	14,844	13,497
Institutions and activities for science and innovation unassigned to other groups	14,907	15,136	28,930	21,460	19,558
Administrative bodies	6,797	9,141	8,361	5,941	5,970
Total outlay	**163,632**	**241,553**	**306,550**	**286,360**	**283,837**
Capital investments	12,625	38,147	52,843	30,326	27,979
Total science and innovation	**176,257**	**279,70**	**359,392**	**316,686**	**311,815**

The distribution of the budget allocations and funding of the science and innovation from the state budget is made on a competitive basis to programs and research projects in line with the strategic directions of science and innovation activities for 2006-2010, approved

by the Parliament's Decision nr. 160-XVI of July 21st 2005.

The projects are submitted by organizations from science and innovation area, with any type of property and legal form of organization certified. [6]

Public financial funds for science and innovation have been used for both, maintenance and development of the scientific organizations in the health, agriculture, education and culture areas, as well for the programs' state realization, teacher's preparation, etc [6].

From the amount of 1443, 9 mil. lei, allocated from the state budget for science and innovation during the period of 2006 -2010, 10803 billion lei were allocated for scientific research, which constitutes 74,8% of the total funding, which were aimed for the institutional projects, projects under state programs, projects for young researchers, projects for equipment procurement, for international projects from strategic directions of science and innovation activity.

Of the total funding volume allocated for basic research has been allocated 365,8 million lei or 33,9 % of the total funding for scientific research and applied research – 714,5 mil. lei or 66,1 %.

Follow – up is presented the dynamic volume of financing (plan performed) during the 2006-2010 years applied in the agricultural sector by the research institutes from Science Academy of Moldova, and institutions of high education profile from the total volume of the total science and innovation funding [6].

Table 3. The dynamics of funding volumes in the agricultural sector during 2006-2010 years, mil. lei

	2006	2007	2008	2009	2010
Budgetary allocations, total	*15950,1*	*29446,4*	*39630,9*	*44308,2*	*46943,5*
Fundamental scientific researches	1966,1	3471,2	3795,6	3054,0	3091,7
Scientific applicative researches	12512,5	22163,5	33967,7	39400,1	40245,1
Innovation projects and technologic transfer	1471,5	3811,7	1867,6	1854,1	3606,7
Special resources (extra budgetary)	*17568,7*	*27654,8*	*29539,2*	*27948,7*	*32908,8*
Nationals	10577,1	11081,4	18769,1	22332,4	26808,5
Internationals	6991,6	16573,4	10770,1	5616,3	6100,3
TOTAL	**33518,8**	**57101,2**	**69170,1**	**72256,9**	**79852,3**

According to the above mentioned data that volume of budgetary allocations approved for the science and innovation was increased in 2010 compared with 2008 and 2009, with 7312,6 and respectively 2,64 mil. lei, which is assessed positively.

The analysis of budgetary allocation's distributions under the State Budget Law for 2010 represents the highest allocations of – 40,25 mil. lei (85,73%) allocated to the scientific research applications, and only 3,09 mil lei (6,59%) for the basic scientific researches.

However the Moldovan agriculture has the potential, natural, human and less the economic development, there are big gaps in the technical endowment, labor productivity, fertilizers use, field innovation, however through the consistent modernization policies, well calculated measures and joint efforts of the authorities, manufacturers and exporters we can contribute to the agricultural rehabilitation and development.

CONCLUSIONS

Thus, for the development of the economy it is necessary to put as a priority task the establishment of the mechanism for the administration of the national innovation system that can provide the: creation of the institutional and legal functionality of this system; creation of an innovative integral structure; creation of an innovation market in the country; elaboration of the funding system for innovations and sciento – intensive products.

The mentioned goals will be achieved if the country's Government, scientific community and the society provides the achievement of the projects and innovative programs as a priority; the development of the innovation system in the complex of all the basic process of innovation; scientific and technical elaborations, creation and processing of a new experimental models of technology for the production of sciento – intensive products in series, the respect for the principle of ecology, environmental protection and new technologies' development; uniform country's

development on the bases of the new technologies' expansion.

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POSSIBILITIES OF NAVIGATION OF MOBILE AGRICULTURAL ROBOTS ON THE PRINCIPLE OF THE GEOMETRICAL OBJETS DETECTIONS

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Abstract

Nowadays, there is a great emphasize laid on the effectivity of production. We can achieve it by optimalizing the production time and labor. For the reason that agricultural production is a seasonal labor we can accomplish great profit by implementing mobile robotics elements into the production. Mainly, autonomous mobile robots are required because of their self working abilities. However, it brings new problem that has to be solved. The mobile robot should be able to localize itself with the biggest punctuation in whatever setting. We have to find a solution for navigating mobile robots into specific positions and so we have to search the most proper method for this navigation. Although at our modern age there are various methods of navigation, none of them is really applicable in real agricultural conditions if we want to get accurate data. For autonomic navigation we can take into consideration systems based on inertional navigation, odometry or visual navigation with the detection of geometrical objects. In this article we introduce possibilities of the last mentioned navigation. Because we should find an autonomic mobile robotic system, our goal was to create navigation without the support of GPS.

Keywords**:** *mobile robot, agricultural robot, autonomic mobile robot, navigation, localization.*

INTRODUCTION

Navigation is based on the detection of a particular object from the image we have made by camera. One way is to search and direct detection of a geometric object, we are looking up the object directly using an appropriate image transformation e.g. Hough transformation. The advantage of this transformation is that it is not limited only to find straight lines but through it we can look for any object in the image which we can parameterize [1][3]. The second option is to find the color that is representative of a geometric object [2]. Color must be unique and in an environment there cannot be selected similar hue. This condition is not completely attainable, but we can be closer to her by choosing a color that is in a minimal representation in the operating environment of mobile robot. In our work we have chosen the color red for internal and external navigation.

MATERIAL AND METHODS

For the reason that in the internal production halls are mostly white walls, red on white background is well resolved. In external conditions, given the scope of the mobile robot on the fields, red is also in a minimal representation. The sources of red colour are red fruits and vegetables, such as strawberries, tomatoes, peppers and apples, etc. In these cases, the geometric object must be several times bigger, e.g. from 5 to 8 times to avoid the situation when the fruit is exchanged for the navigation object. Worse situation occurs in cases where source of the similar light shade is not the many times smaller fruit, but a result of human activity, like roofs, parked red cars next to the field, etc.. These may be much larger than the navigation object. With increasing distance decreases the intensity of these colours and they can be filtered out. In some cases, it is enough to choose another shade of red and set the specific colour detection. Theoretically, we could choose navigation object of any shape and size. Ideal object is a ball, because each side of the image retains the same diameter. The diameter of the object is also well distinguishable on the cylinder. Here, however, we must take into consideration the

need for correction of the main axis of cylinder by rotating the camera to one side, e.g. by the passing of obstacles. The main axis of the cylinder is tilted out of the rectangular system that is bordered by the photo. Triangle seems like an interesting object. Different angles of the shot will change the length of the sides. With appropriate detection could be backwardly set the position of the observer with his parameters:

• The distance of the observer, which will be evident from the size of the triangle.
• The angle of the observer, determined from lateral displacements.

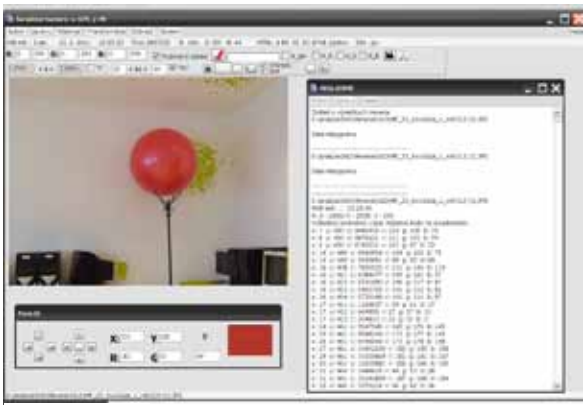

Fig. 1 The example of navigation object´s interior location during software evaluation

There are two options we can considerate. First of them is based on the idea, that geometric object will be placed on the autonomous mobile equipment and at least on two positions will be placed cameras that will seek mobile robot and evaluate its distance. The second option is the location of at least two navigation objects of known geometric position and placing the camera system directly on the mobile robot. In both cases, from the resulting triangle subject - camera - subject, we can specify the position of an autonomous mobile robot by triangulation or trilateration. The second option is closer to the characteristics of autonomous mobile devices, because there is no need for additional communication with the standpoint of the cameras.

For our work we have chosen the search of appropriate colors, which is a representative of a geometric object. As a geometric object we selected a ball because of the above described advantages.

RESULTS AND DISCUSSIONS

The first action is the calibration of the whole system. Calibration must be carried out separately for each navigation object. The following picture shows the curve, which is the result of calibration.

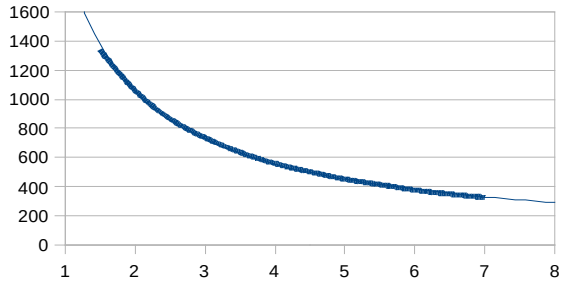

Fig. 2 Dependence of the of the navigator object´s diameter size from a distance

On the x-axis are shown the distances in (m). Y-axis is the number of pixels that are found on navigator object´s diameter. Subsequently, we obtained the regression equation, describing the curve with R^2 reliability equation.

$$f_{(x)} = 2011{,}03.x^{-0.93} \quad (1)$$

$$R^2 = 1 \quad (2)$$

To increase accuracy of reading we set the correction curve which eliminates deviations from the main course. In our case we present the correction curve for both scroll balls:

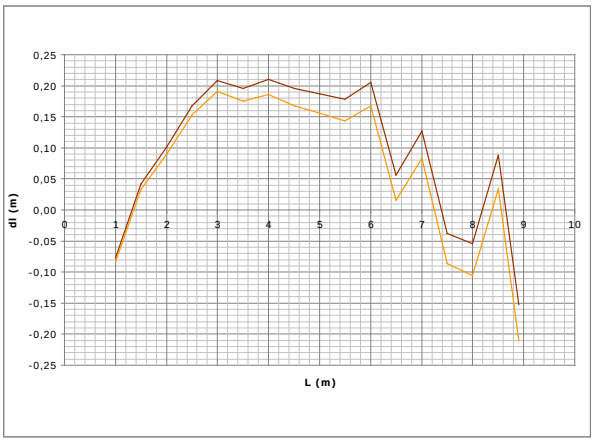

Fig. 3 The process of the calibration curves

On the x-axis is distance, y-axis contains deviation in (m). To determine the actual deviations from the actual positions we have established a number of points in space. The actual deviations from the distance are described in (m) on the following picture.

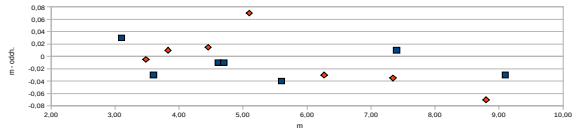

Fig. 4 Actual navigation deviations described on individual points

Figure 1 shows that it is a power curve, where with increasing distance the process decreases, but at larger distances it is stabilizing. This phenomenon is not desirable, because a large change in distance, the diameter of the navigation ball varies only slightly. Ideal part of the curve is that, where there a large change in the number of pixels occurs at the appropriate distance. This shortcoming can be eliminated by using the zoom. The following figure shows the process´s changes according to the size of the optical zoom.

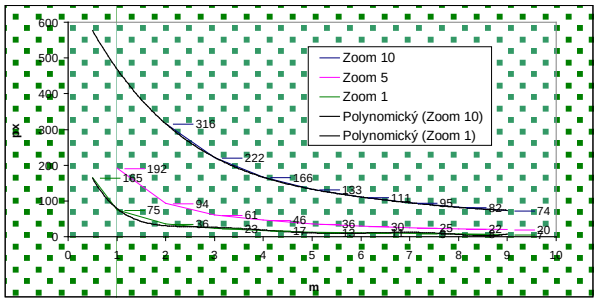

Fig. 5 The change of processes according to the change in optical zoom

Here are the following relations for the processes from zoom1 to zoom10 also with the likelihood value R^2.

$$y = 0{,}0344x^6 - 1{,}0802x^5 + 13{,}417x^4 - 83{,}725x^3 + 275{,}57x^2 - 458{,}8x + 333{,}59 \quad (3)$$

$$R^2 = 0{,}9965 \quad (4)$$

$$y = -0{,}0035x^5 + 0{,}2778x^4 - 6{,}0782x^3 + 59{,}556x^2 - 293{,}67x + 709{,}42 \quad (5)$$

$$R^2 = 1 \quad (6)$$

It appears ideally to use zoom 10 anyplace, but it is not possible for the covering the entire operational area. Zoom10 cannot be used for close distances and vice versa zoom1 for distant subjects. Because this method of navigation is dependent on the sheer size of the navigator object, the size of the optical zoom can reach up to several times larger navigation.

The whole analysis was performed using own software that is developed for this purpose at the Department of Electrical Engineering, Automation and Informatics.

CONCLUSIONS

In conclusion, we observed that with application of this method we are able to navigate mobile robots in indoor and outdoor circumstances. The navigator object has a diameter of 0.7 meters without the use of zoom within a distance of about 20-30 m. Navigation accuracy in each axis does not exceed 0.1 m. For longer distances we use a series of navigation items.

Fig. 6 The model of mobile robot navigation with geometric object

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RELATIONAL GROUP COUNSELLING

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Abstract

The goal of the paper is to test the relational method devised by the author in improving organizational relations. The methods used are the Relational group questionnaire and relational matrix of the organization. The relational method can be used in groups, particularly in organizations, classrooms and families to change crossed relations and thus increase performance and satisfaction.The results obtained involved identifying conflict generating crossed relationships, and changing them, followed by reassessment. The main conclusion of the paper is that the relational method can be safely and fruitfully used in organizational settings, actually improving work relations.

Keywords **:** *relational, organization, group counselling, crossed relations, relational matrix, qualitative method*

INTRODUCTION

The relational method can be used in groups, particularly in organizations, classrooms and families to change crossed relations and thus increase performance and satisfaction [1], [2], [3], [4].

The steps to be followed are:

- Initial individual assessment (through the group relational questionnaire and interviews) and drawing the relational matrix of the group;
- Individual and triadic intervention by the relational counselor, aimed to change crossed relations; the counselor works with each group member involved in a crossed relation, and with both members of that relation, as she tries to help them change their crossed interaction patterns.
- Final individual assessment and relational matrix.

MATERIAL AND METHOD

Group relational questionnaire

Instructions to the tested subject:

For each person in your group, except you, if you remember that something mentioned here happened to you recently in relation with that person, check in the cell corresponding to the phrase and the person.

1. When she did something for me, I felt that she liked me.

[act-feel crossed interpersonal relation]

2. When she did something that hurt me in some way, I felt she didn't like me.

[act-feel crossed interpersonal relation]

3. I thought of what her body language might have meant.

[express-think crossed interpersonal relation]

4. I tried to help her, in order to make her understand that I liked her.

[feel-act crossed intrapersonal relation]

5. I tried to sabotage her, in order to make her understand that I didn't like her.

[feel-act crossed intrapersonal relation]

6. I tried to make her understand through my body llanguage what I thought about her.

[think-express crossed intrapersonal relation]

The method has been applied to a team in an organization, comprising a boss and four employees.

RESULTS AND DISCUSSIONS

Here is the relational matrix of the team.
J.D. interprets P.B.'s body language "signs" as conveying meaning
J.D. avoids P.B., as a reaction to perceiving a negative assessment of his work, made by P.B.
J.D. feels that M.K.'s behavior expresses that she has come to have feelings for him, and tells her that
To the avoidant behavior of J.D., P.B. reacts rationally, by thinking that Jim holds a negative attitude towards him
Through his body language, P.B. is trying to make J.D. aware that he thinks Jim is not doing his job well enough
P.B. thinks that O.D. Is arrogant, because he seems rude and indifferent to the presence of others, and, being his boss, considers sanctioning him
M.K. wants to learn more from J.D., and she tries to make him understand that through her behavior (she tries to keep him after work, she often asks for help)
M.K. thinks that O.D. Is arrogant, because he seems rude and indifferent to the presence of others

The relational matrix of the same team, after relational intervention:

J.D. interprets P.B.'s body language "signs" as conveying meaning
J.D. learned to act according to body language signs he received from his boss, and adjust his actions so as to not receive any more negative signals, as well as ask him for verbal clarifications when he received such signals.
J.D. is now willing to help M.K. develop professionally, and spends more time tutoring her
P.B. did not manage to be more outspoken, and spontaneously and plainly communicate through verbal language his cognitive assessments of J.D.'s work
P.B. no more thinks that O.D. is arrogant, and thus no more considers sanctioning him
O.D. is very preoccupied with his new business ideas, and expresses this verbally to J.D.

CONCLUSIONS

The results obtained involved the following:
1. Initial individual assessment (through the group relational questionnaire and
interviews) and drawing the relational matrix of a group comprising a boss and four employees;
2. Individual and triadic intervention by the relational counselor, aimed to change crossed relations; the counselor worked with each group member involved in a crossed relation, and with both members of that relation, as he tried to help them change their crossed interaction patterns.
3. Final individual assessment and relational matrix provided a detailed portrayal of organizational relations and change.
The main conclusion of the paper is that the relational method can be safely and fruitfully used in organizational settings, actually improving work relationships.

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PROSPECTS FOR AGRICULTURE IN THE GROWTH OF FOOD NEEDS OF POPULATION

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Abstract

Agriculture is one of the backbone industries of any country. Regardless of soil and climatic conditions even the most advanced industrial countries are investing heavily in the development of domestic agriculture. The crisis in agriculture and the decline of its production directly inflicts a heavy blow to the economy because it leads to loss of huge amount of free natural resources, and these losses have to pay for food imports. Based on the value of agricultural production as the main source of food, should assess the prospects of this sector in the current economic conditions and determine trends in the use of agricultural resources, primarily for food purposes. forecasts of production of main agricultural products suggest that if transfer of agricultural innovation, resource development trajectory for the foreseeable period can significantly reduce the threat of a protracted global food crisis.

Keywords: *agricultural production, economic resources, scientific and technical progress, food crisis.*

INTRODUCTION

Agriculture is one of the key sectors of the economy and the main employer in developing countries. Over the past 30 years, however, many of these countries were forced to limit food exports. This was partly due to the rapid growth of their population that requires more and more products. Other factors that adversely affect agricultural production, are political instability, civil wars and natural disasters such as droughts and floods. [1]
Agricultural development has always been closely linked with the growth of world population. Progress in farming - for example, the invention of irrigation - will inevitably lead to an increase in food production. As a result of growing population and the agricultural sector is forced to seek ever more efficient production methods. [1]

MATERIAL AND METHODS

The studies were conducted mainly on the materials Food and Agriculture Organization - FAO, and used the official data of the Ministry of Agriculture of the Republic of Moldova. The problems of production and consumption, and exports and imports of basic foodstuffs in the developed and developing countries in the long term. The object of analysis has the structure of production and distribution of wheat as the main crops, meat and meat products.
We used the following methods of economic research: a comparative and economic - statistical methods, the method of logical conclusions, analysis.

RESULTS AND DISCUSSIONS

Calculations of long-term projections, developed jointly by specialists from the Organization of Economic Cooperation and Development and FAO, give an estimate of the major markets for agricultural products for 10 years [4]. If we take as a hypothesis that in the longer term will remain the same trends and the influence of various factors on each other, then we can construct a scenario of the

situation in world agriculture, based on current forecasts. As a prerequisite for the scenario put forward four hypotheses:

First. Area under major crops (wheat, maize, rice) will not decline and will even increase. This is one of the main lessons that all the countries must learn from the food crisis in 2007-2009. Otherwise, many of the countries and mankind in general doom themselves to the constant repetition of such crises.

Second. In all countries, more resources will be spent to the introduction of scientific and technological progress in agriculture, which will increase the efficient use of resources, primarily resources of land and water.

Third. Developing countries from many regions will increase the intake of protein from meat and dairy products. It means that more and more of grown plant resources will be used for feed.

Fourth. In most countries, will remain the trend of use of agricultural resources, primarily for food purposes.

As an example we present the results of predictive calculations of wheat production [5].

Table 1. Forecast of world production and consumption of wheat

	2008	2010	2020	2030	2050
Developed countries					
Harvested area, thous. of ha	125350	121371	121722	122029	122584
Production, thous. of ton	388540	355459	395469	435187	514901
Import, thous. of ton	23396	23416	24831	26173	28849
Consumption, in all, thous. of ton	277660	277686	300516	324963	373925
§ food	140677	141744	146877	152437	163592
§ feed	104804	102312	107303	114482	129148
§ for other purposes	28579	27849	30013	32280	36810
Export, thous. of ton	106431	100006	117577	133165	165388
The share of imports in consumption	0,08	0,08	0,08	0,08	0,08
Developing countries					
Harvested area, thous. of ha	100648	101625	103591	105661	109207
Production, thous. of ton	291593	307573	339226	370889	432709
Import, thous. of ton	95553	93669	113726	132405	170538
Consumption, in all, thous. of ton	371729	384917	430745	477227	569805
§ food	319258	330155	370641	411492	493086
§ feed	21199	22627	25285	28197	33869
§ for other purposes	31272	32134	34819	37537	42845
Export, thous. of ton	12924	17079	20980	25413	33999
The share of imports in consumption	0,25	0,24	0,26	0,28	0,30

Source: The Food and Agriculture Organization of the United Nations

Leading exporters of agricultural products are the U.S., EU, Australia and Canada. Main place of world trade took cereals. Although rice is the second most important cereal crop in the world market falls relatively small amount, due to its consumption by producing countries - China and India. As a result, the wheat is grown in both developed and developing countries is a major agricultural commodities in world trade.

Wheat production is forecasted by 2020 to have amount of 806 million tons (an increase of 18% by 2008), and in 2050 - 950 million tons (an increase of 40% compared to 2008) over the same period, according to forecasts of UN population will grow approximate by 30-35%. Consequently, the average per person availability of grain in the wheat segment may be slightly increased.

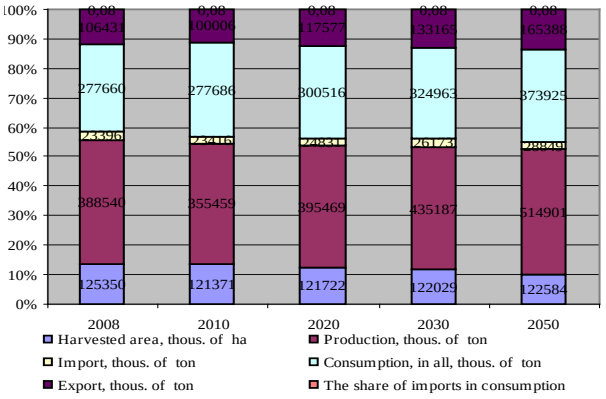

Fig.1. Histogram of forecast of world production and consumption of wheat (Developed countries)

In developing countries can be expected increasing of imports part in total consumption of wheat from 24-26% to 30% - because of the increasing use of wheat for animal breeding. Only in this case they will be able to reduce dependence on imports from 60% to 50%.

However, this level cannot be considered normal. Specific actions have to be made by the developed countries, which could contribute to an increase in wheat production exactly in this group of states. [2]

Now we will present some results of forecasting the development of dairy and meat industries. According to our estimates, the production of milk in the world will increase faster than population. By 2050, world milk production can reach 1222 million tons, almost 80% higher than that in 2008. The largest contribution to this increase should

make developing countries, where production increased by almost 2.25 times. However, even in the distant future will remain a significant gap in the productivity of dairy cattle between developed and developing civilizations. Currently in developing countries this index is 7 times lower than in developed countries (690 kg and 4900 kg).

The most vexed and complex problem of food ensuring of mankind in the future is the production of meat, which is a major factor in improving the nutrition of the population of the planet. Table 2 shows the forecasted levels of production of the three main types of meat: beef, pork, poultry meat in the whole world.

Table 2. Forecast of world production and consumption of basic kinds of meat (thous. of ton)

	2005	2008	2010	2015	2020	2030	2050
Developed countries							
Beef							
Production	29038	30354	30222	30485	31391	33102	36600
Import	4600	4006	4152	4535	4960	5908	7705
Consumption	30049	29967	29957	30514	31588	33690	37956
Export	3616	4394	4409	4492	4772	5341	6468
Pork							
Production	38380	40947	41452	43296	45298	49892	59117
Import	3662	3683	3297	3378	3328	3354	3376
Consumption	37668	38763	39901	41530	43253	47377	55637
Export	4162	5648	4616	4933	5171	5648	6608
Bird meat							
Production	36840	39315	39891	43258	46161	52326	64664
Import	3528	3800	3518	3608	3733	4007	4432
Consumption	36471	38390	39269	42439	45261	51349	63369
Export	3817	4607	4147	4425	4626	4970	5694
Developing countries							
Beef							
Production	33792	35332	36651	40712	44831	52846	69020
Import	3271	4051	4565	5495	6251	7917	11209
Consumption	32132	35253	36356	40121	44097	51731	67157
Export	4939	4136	4887	6204	7198	9428	13841
Pork							
Production	60065	60516	64977	71268	78259	92351	120520
Import	1788	2800	2450	3018	3678	4890	7333
Consumption	60367	62153	66149	72676	79955	94487	123604
Export	1428	1191	1285	1611	1980	2743	4228
Bird meat							
Production	47713	54417	60273	70143	79718	98912	137187
Import	4512	6401	6667	7610	8970	11432	16322
Consumption	47573	54939	60832	70890	80541	99804	138379
Export	4737	5889	6148	6966	8317	10842	15698

Sourse: The Food and Agriculture Organization of the United Nations

At current trends, this gap will only slightly reduce. Developed countries should make some efforts to accelerate the introduction of technological change in dairy farming of developing countries. In developing countries, we can expect some reduction in the number of cows because of a significant increase in their productivity.

This would solve two problems: will increase the production of plant food resources available for the public, and increase the proportion of milk protein in the food intake of the poor people.

Projections indicate that production and consumption of beef can increase by 2050, more than by 60%, pork - by 77%, poultry - by 2,15 times.

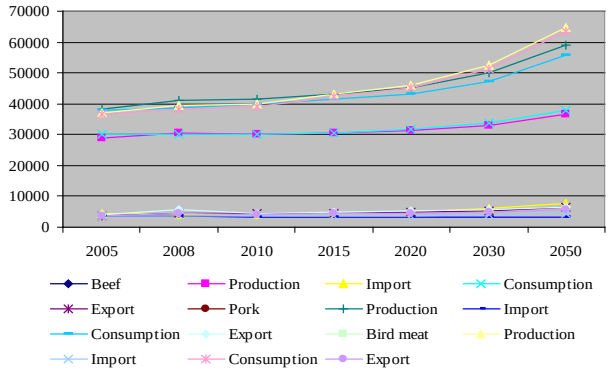

Fig. 1. Forecast of world production and consumption of basic kinds of meat (thous. of ton) (Developed countries)

This schedule reflects the primacy of poultry meat production in developed countries compared with beef and pork, as in 2005, and the forecast for 2050. If in 2005 the difference between these figures were 21.2%, while in 2015 the production of poultry meat exceeds the production of beef by 32%.

Pork production more than in beef and poultry meat in 2005 by 24% and 4% respectively. But by 2050, this trend will change in favor of poultry meat production and consumption which exceeds the level of beef and pork at 76.7% and 9.4% respectively.

Growth rate of meat production may exceed the rate of population growth. Is revealed the possibility of the growth of the meat industry in developing countries that will be able to satisfy their inner demand through domestic production.

Many experts believe that great prospects and opportunities open for the agriculture of Moldova, given the projected world food shortages and price risings for it. However, this is a big risk for the economy, which should be ready to jumps of the prices within the country.

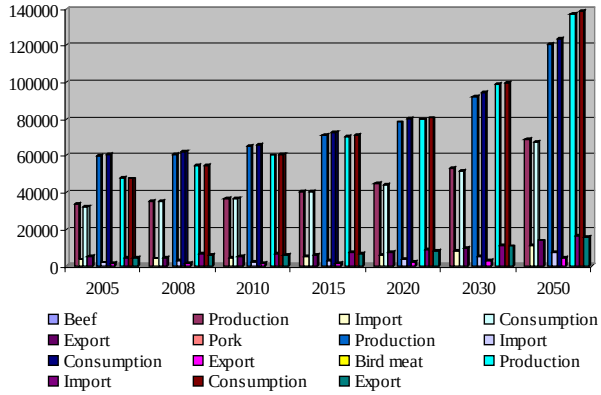

Fig. 2. Forecast of world production and consumption of basic kinds of meat (thous. of ton) (Developing countries)

This graph shows that in developing countries, production of meat and meat products will increase by 2050 more than 2-fold, compared with 2005.

In recent years the Republic of Moldova increased volume of production of potatoes, vegetables, grapes (except drought of 2007 year). However, the production of meat, milk has steadily decreased due to a decrease of number of livestock. Until 1991, for example, Moldova produces 12 times more pork than in 2009, although today the needs have grown considerably. [4]. As result increased prices for animal products. In this regard, with indicative planning in the country should be given particular attention to enhancing the volume of livestock products.

Due to the growth of the Moldavian economy, its GDP by 2014 should increase in nominal prices to 109.9 billion lei. For comparison: in 2010 the GDP amounted 71.8 billion lei. In addition, the Ministry of Economy believes that by the end of 2011 GDP would increase to 82.1 billion lei.[4]

But this economic growth looks quite realistic, provided that the GDP will grow within 4,5-5,0% for a year. By 2014 it is projected that the part of agricultural production in GDP will be decreased to 10%, while industrial production growth in this period will be at 7% per year. It means that the forecast of the Ministry provides a substantial increase in industrial production. Already by 2012 its volumes have to be 31,7 billion lei (compared with 27.1 billion lei in 2010). And in 2014 - 44,7 billion lei. It should be noted that this is more than twice the rate of industrial production in the crisis year of 2009. [3]

Various versions of forecasting of food consumption in the world suggest an increase in its level of per capita income. However, the pace of this growth will slow down. Projections for 2001 - 2030 years suggest that consumption will increase up to 2,950 kcal, but the increment in 30 years will amount to only 9% or 0.28% per year on average.[4] Currently, only a half of the population has an opportunity to feed fully. Let's note that 30 years ago only 4% of the population were included in this category. By mid-century, about 90% of the world's population will be able to consume food at more than 2,700 kcal per day per capita.

CONCLUSIONS

World economy's globalization with all its contradictions and distortions has the potential to develop ecologically pure and cost-effective agriculture. It is able to alleviate the global food crisis and to prevent its most terrible form - massive starvation with the multimillion human victims. Long-term forecasts of food supply the world's population and development programs for agribusiness and food markets across countries and regions are required to do this. Particular importance in these programs should belong to the exploration and development of resource-saving technologies in all areas related to food supply for the population.

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STUDY ON RURAL DEVELOPMENT STRATEGY IN "BREBENI" OLT COUNTY

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Abstract

This paper present some objective data of local strategy, sustainable development analysis of the current situation of Brebeni, local plan of action for sustainable development The efficiency of this action enforced by the "Strategy of Local development is tied by the accessibility of potential beneficiaries to the information and opportunities offered by this operational program. The Local Council will take care to provide technical assistance for putting in practice the necessary, improving relations with participants of the territory (specifically the social and economic, Local authorities and other relevant organizations interested.) and to inform the public opinion about the results obtained from the interventions provided by "Rural Development Strategy" 2008-2013 of Brebeni.

Keywords: *investment, facilities, infrastructure and agriculture.*

INTRODUCTION

Current status planning related by the unpredictability and complexity of dynamics what govern economic and administrative process, make to become urgent the design of organisms that can guarantee a ratio of increasingly tight between assessment and plan process.

Indications on local facilities, coming from technical guidelines and directives or development financing system is linked to European funds- become more sensitive to the theme of the plan and draw up a development strategy.

The Development strategy of Brebeni must have an own coherence, not only founded on respect for its own historical emergencies, infrastructure and environment, and especially coordination with the general direction of development of the district and the region. Regional Development Strategy is linked to policies and regulations, as well as national development strategies.

MATERIAL AND METHODS

Location: Brebeni village is situated in the central part of Olt district , south of Slatina, a distance of 12 km. The territhory consists of the villages Brebeni as a residence and that Teius.

Relief: The relief of Bebeni village is low altitude , village lying in the centre of the district were we fiind a hilly terrain.

Flora and Fauna: Flora and fauna are characterized by a variety of species. In the village there are the following wildlife species: rabbi, fox, badger, marter tree, ferred, polecat, weasel.Species as hunting interes are: pheasants, partridgers, guails, geese, etc.

Resoursces: Agricultural Land Fund is the main natural source and the commune social and economic profile of the dominant function is to develop agriculture with the two main branches: the culture of plant anf animal breeding.

Analysis of current situation will meke joint Brebeni 6 priority areas wich are included in the operational priorities of the National Development Plan 2007-2013

Tabel 1.Operational Priorities of National Development Plan

AREAS	CATEGORIES
1.Agricultures, forestry and rural development	Agriculture
	Plant production
	Fruit growing, viticulture, vegetable growing
	Livestock
2.Infrastructure and Environmend	Transport infrastructure
	Utility infrastructure
	Health
	Environment
3.Economy	Economy
	Business Environment
4.Tourism	Tourism
5.Education and culture	Education
	Culture
6.Human Resources	Population
	Labour market

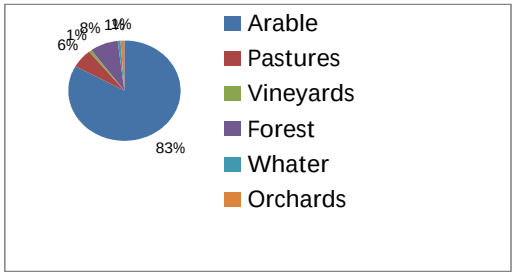

Fig. 1 Description of surfaces by use

Geographic and climatic conditions particularly favorable to the inhabitants of the area led to a series of practical activities predominantly agriculture such as farming and animal husbandry.

In common Brebeni farmland is suitable for growing wheat and maize, sunflower and vegetables.

The economic potential of Brebeni, consist in local enteprenurs in the commune who carries out various activities.

SWOT Analisys:

Any community needs to assimilate and promote a strategic vision regarding its future development.

SWOT analysis is a methodology of a project, the name is descriptive:

Strengths ,Weaknesses, Opportunities,Threats

Strengths and weaknesses are related to its policy and strategies, and how it compares with the competition. Opportunity to abort and threats coming from the direction of the market environment and competition, are usually the factors on which generally has no control. SWOT analysis enables the key areas to focus on development of assumptions on which areas are less detailed knowledge. Some "opportunities" and "threats" will appear in the "strengths" and "weaknesses" of the village.

Following the SWOT analysis there are identified three priority principles that should underpin the development strategy for sustainable development, namely:

1.Economic Brebeni village, and developed must be revived in all its areas: agriculture, animal husbandry, industry, trade and forestry. The local council will have to invest to revitalize the economic life of the village, should be priority number one, because it produces the greatest benefits.

2.Requires continuous infrastructure improvements, therefore investments must be made according to certain criteria in order to produce economic benefits:

- safety and security of the inhabitants against disasters,
- report the amount of investment / economic effects of financial products;
-report the investment value / number of beneficiaries.

3.Connection, another important economic factor for the attractiveness of the village are the cultural and leisure facilities on offer, or that could provide common Brebeni so that people's social comfort to be improved.

Complementing this will increase tourist attractiveness of the village.

Agriculture,forestry and rural development strengths, weaknesses, opportunities,threats:

Strengths:

- adimistrativ-territorial area of the village is 9600 ha.,
- That the conditions for business development and tradition common husbandry, animal breeding households;
-existence mainly wheat and maize crop and forage plants,
- reduced use of pesticides and fertilizers;

Weaknesses :

-in the sectors of agriculture is poor technical equipment

-system for collecting, processing and recovery of specific products is higher in small quantities;
-irrigation system is lacking in the area,
- insufficient financial funds for upgrading infrastructure and livestock pollution;
-consulting services face low number of specialists;
-owners with small plots of land, several hectares, are in great numbers;
-artificial insemination centers,are nonexistent
Opportunities
- existence of the National Strategic Plan for Rural Development;
-approval of the National Framework Programme for Restructuring and Modernisation of units specialized in livestock and food industry;
-support from the County Office of Olt County Agricultural Consultancy on European funds
- existence of the legislative framework for the foundation and development of agricultural holdings
Accessing the European Agricultural Fund for Rural Development and European Fisheries Fund, for investment projects completed after January 1, 2007, to finance agriculture and rural development.
Threats
-increasing the number of the Competition for food products on the EU market
-absence of a legal framework to protect domestic agricultural production,
-unstable legal framework,
-poor farmers with information on the European norms;
-reduced financial resources for funding by co financing of projects financed by the Structural Funds, Cohesion Fund, EAFRD and EFF.;
-cursory knowledge about the development and implementation of projects financed by the Structural Funds,
- Cohesion Fund, EAFRD and EFF.

RESULTS AND DISCUSSIONS

To achieve a European standard of development in the village want to set up complex Brebeni agricultural buildings, points of collection and processing of animal products. Composition of associative forms, associations, farmers, agricultural associations in order to obtain EU funds and attracting investors. Companies operating in the cereals, livestock production companies, creating a chain of stores. Because resources, tax incentives and specific municipality may invest in agriculture, tourism and even livestock.
With regard to the common Brebeni my vision is:
Brebeni can reach in six years a European community, developed in terms of economic and social rehabilitation of infrastructure and attracting investors who will create a healthy business environment through better use of local resources.
It is essential for the future of the village to the amount of potential, developing self awareness, to make known the objectives and development plans. A special problem is the formulation of projects and preparing documentation for funding requests to the European funds co.

CONCLUSIONS

In conclusion, setting the vision and long-term development objectives at the commune level, the widest possible participation, including public consultations and all relevant actors in rural development stages of local development strategies; will follow the strategy of priority projects which the community will be able to employ their own resources for implementation of programs and attracted European funding.

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