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THE STATISTICAL INDICATORS OF POTATO PRODUCED IN ROMANIA

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Abstract

In this study we have analyzed and interpreted the main statistical indicators of potato produced in Romania. First of all, we start by presenting some information about potatoes: origin and appearance, their importance and necessity in the life of people and animals. Then on the basis of the specific statistical indicators, it was interpreted the evolution of the cultivated area, the percentage of the main counties in the cultivated area with potatoes, the average yield per hectare, as well as the import and export of potatoes in a given period. Each indicator was analyzed and corresponding remarks and conclusions have been drawn.

Key words**:** *average yield, cultivated area, export, import, potato*

INTRODUCTION

The potato origin was in the South American continent. Various species of wild tuber-bearing Solanuns are found in Central America. The potatoes introduction to Europe happened at two independant instances: around 1570 in Spain, and around 1590 in England. However, the large-scale crop cultivation began only in the beginning of the 19th century.

The potatoes of today in Europe are largely the result of the intensive breeding programs of the 19th century, but have benefitted greatly from the improvements in breeding techniques of the 20th century to improve traits like disease resistance, tolerance to environmental factors, etc[6].

In Romanian agriculture, potato has a relatively long tradition, first references being made in Transilvania in the XVIII Century.

With the passing of time the crop importance increased and potato is now considered the "second bread" of Romania [5].

The most widespread species in culture and the only important for temperate zones is Solanum tuberosum, of the family Solanaceae [2].

The uses of species are varied: food, in feeding stuffs and in all types of industries. As a novel food is used in the form of various cooked dishes, making it a valuable, tasty and digestible food. In feeding stuffs, potato is used in particular for feeding to pigs and cattle, it replaced a part of cereal, also it is exploited and of other species [1].

Taking into account the importance of potato in Romania, recent studies analyzed the potato market and its economic efficiency [3,4].

In this context, ongoing the actual results, the present study regards the evolution of potato cultivated area, production and trade in order to identify the main trends based on the statistical data in the period 2005-2010.

MATERIALS AND METHODS

For the purposes of this analysis we have used following indicators: the moving average, the mean square deviation, standard deviation, the coefficient of variation, confidence limits for a given risk, the yearly average increase, and statistical significance of these indicators. The used data have source: statistical yearbook of Romania.

The used formulas:

For the moving average = $\overline{X} = \frac{\sum xi}{n}$, where:

X = the average; Xi = media production values in a number of years (i);

n = number of years

For standard deviation, $\partial = \sqrt{\frac{\Sigma (x-\bar{X})^2}{(n-1)}}$ where:

∂ = standard deviation; $\bar{X}$ = media production values in a number of years

n = number of years

For the mean square deviation

, $\partial x = \sqrt{\frac{\Sigma (x-\bar{X})^2}{n(n-1)}}$ where:

∂x = mean square deviation; confidence limits for certain levels of risk = $\bar{x} \pm \partial \bar{x} * tp$, where tp= tabular values depending on the probability and number of observations (in the this case is number of years.

For confidence limits for certain levels of risk: $\bar{X}$+/-ðx*tp, where:

$\bar{X}$= average; mean square deviation; tp= tabular value for the transgression probability (risk).

For coefficient of variation = $C = \frac{\delta}{\bar{X}} x100$, where: C – coefficient of variation (it is expressed as a percentage). Coefficient of variation can be: between 0-10 % - small variation; between 10-20% -middle variation; over 20% - large variation.

RESULTS AND DISCUSSIONS

The main counties with the largest area cultivated with potatoes are Suceava, Covasna, Brasov, Maramures, Harghita si Bihor. All these 6 counties districts occupy 36.64% of the cultivated area as presented in Table 1 and Fig.1.

Table 1. The cultivated area with potatoes in the main counties of the country

No.	Main counties	Cultivated area(ha)	%
1	Suceava	27,697	9.82
2	Covasna	19,988	7.09
3	Brasov	15,244	5.40
4	Maramures	14,968	5.31
5	Harghita	14,367	5.09
6	Bihor	11,066	3.92
7	Total top 6 counties	103,330	36.64
8	Total country	282,047	100

Source: Calculations according to the Romanian Statistical Yearbook, 2011

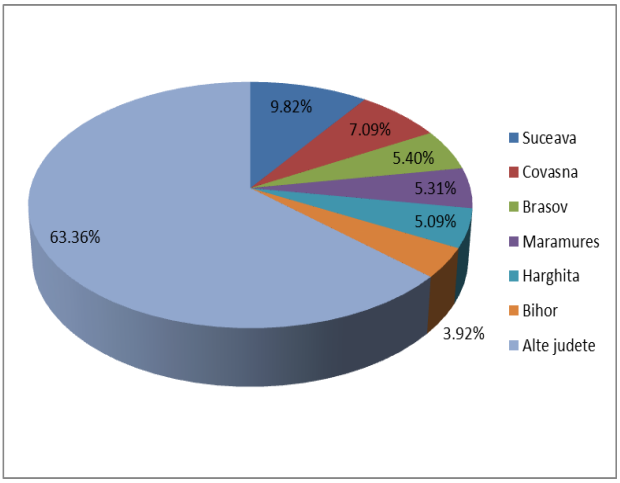

Fig. 1. Cultivated area with potatoes in the main counties of Romania

In the period 2005-2010, the cultivated area with potatoes registered a decreasing trend so that in in 2010 it was by 5.45% lower than 2005 (Tabel 2).

Table 2. Evolution of potato cultivated area in the period 2005-2010

No	Years	2005	2006	2007	2008	2009	2010
1	Cultivated area (thousands hectares)	284.9	278	268.1	255.3	255.2	241.3
2	Average rate %	-	97.58%	96.44 %	95.23 %	99.96%	94.55 %

Source: Calculations according to the Romanian Statistical Yearbook, time series[7][8]

Average yield per hectare obtained from potato cultivation had a positive evolution during the period 2005-2010. According to Table 3 it can be seen that average yield grew from a year to another, so that in 2011 it was by 24 % higher than in 2005.

Table 3. Average yield per hectare in 2005- 2010

	Years	**Average yield kg/ ha**	**Average rate 2005=100%**	**Annual rate %**
1	2005	13,078	100	-
2	2006	14,191	108.51	108.51
3	2007	13,663	104.47	96.28
4	2008	14,108	107.88	103.26
5	2009	15,498	118.50	109.85
6	2010	13,354	102.11	86.17
7	2011	16,554	126.58	123.96

Source: National Institute of Statistics[7][8]

Table 4. The calculation of indicators which characterize average production of potatoes for the period 2005-2011

No.	Average /year 2005-2011	Mean square deviation	Confidence limits p.90%, risk 10%		Standard Deviation of fouth	Coefficient of variation
			Lower limit	Upper limit		
1	14349.4	471.6	13433.1	15265.76	1247.8	8.70

Source: Own calculations[7][8]

As a result of calculating mean square deviation we will notice that in the confidence interval with a probability of 90% will be around yields average production which has values between 13,433.1 kg/ha and 15,265.76 kg/ha.

In accordance with coefficient of variation (8.7 %), it appears that yields per hectare in the period 2005-2011 did not show a high deviation from the average production, therefore the data were characterized by uniformity.

Romania's potato export during the period 2002-2011 has grown in average by 10.14 %, starting from Euro 1,037 in 2002 up to Euro 2,444 in the year 2011.

In the same period, 2002-2011, potato import has substantially increased from Euro thousand 2,700 in 2002, amounting to Euro thousand 23,670 in the year 2011, the rate of increase being 28.52 %.

Table 5. Analysis of potato export and import in the period 2002-2011

	2002	2006	2009	2010	2011	Average growth rate %
Export (Euro Thousands)	1,037	264	1,006	2,214	2,444	
%	-	2.64	1.84	2.2	1.1	10.14
Import (Euro Thousands)	2,700	16,240	9,763	11,944	23,670	-
%	-	1.77	0.73	1.31	1.84	28.52

Source: Own calculations[7][8]

The difference between the export and import is very high, reflecting that Romania is a net importing country of potatoes.

CONCLUSIONS

The area cultivated with potatoes decreased in Romania, but total production, average production, import and export increased. The increase of average production was possible due to the technological improvements in potato production.

The year 2010 was not a good year for potato because in this year cultivated area, average yield per hectare and potatoes export decreased and the potatoes import increased.

These was caused by the adverse climate conditions.

Taking into account the results obtained in production by the 6 counties, the main conclusion is that that in Romania, potato have a positive and increased economic efficiency in the hilly area.

In the period 2002-2011, potato exports increased but less than imports, which had a very high growth.

The import of potatoes increased due to annual consumption. Romanians consume annually, in average, 92,2 kg/inhabitant, ranking the 4th in the EU.

In this respect, Romania is overcome only by Portugal with 126,9 kg/inhabitant/year, Ireland with118,7 kg/inhabitant/year and United Kingdom with 112,4 kg/inhabitant/year [9].

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