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HIGH VALUE AGRICULTURE IN THE REPUBLIC OF MOLDOVA, COMPARATIVE ANALYSIS AND FEASIBILITY OF INVESTMENTS

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Abstract

The objective of Moldova's integration into the international economic system requires a qualitative change of the current situation in the food sector. The globalization of the world economy and the technical – scientific progress provides new opportunities for increasing efficiency and upgrading production technologies for agricultural production. In Moldova this task can be achieved by targeting entrepreneurs towards crop diversification and export of agricultural products with high added value, for which there are profitable and modern markets. Currently, entrepreneurs focus on development of high-value agricultural sector, which provides the greatest profits and, due to this fact, could become an important source of increasing income in the rural sector. The aim of the research is a comparative analysis of cultivation of high value crops, and the result is to create an informational support that enables local entrepreneurs to select the correct crops based on the economic indicators and financial resources to invest argued. Information and research results were made under the Agricultural Competitiveness and Enterprise Development Project (ACED). The authors have developed annual financial models for each crop and perennial plantations were developed additional investment budgets. High value production (particularly fruit and vegetables) offers the highest profits and it has great to increase farmers' incomes. For small and medium farms practicing commercial agriculture (HVA) is the solution for developing efficient and sustainable business in market economy.

Key words**:** *agribusiness, production costs, profitability, sales income, budget*

INTRODUCTION

Transformation of Moldovan food sector in a modern, efficient and competitive one requires important investments and appropriate support of authorities especially through agrarian policies. The development of local horticultural sector is a practical way of modernization and diversification of agriculture and at the same time a potential source of incomes in rural areas. Local farmers have no access to complex information (economy, technology, and marketing) of high value agrarian sector and meet problems while selecting correctly crops for cultivation.

The aim of the research is to develop budgets and comparative economic analysis that includes the most important high value agrarian crops allowing local and international entrepreneurs to select correctly the crops based on economic indicators and to invest reasonably financial resources.

Currently the agrarian entrepreneurs are oriented to develop high value agriculture (HVA) that is locally represented by the horticultural products (fruits, vegetables, grapes, essential oil crops and products derived therefrom).

The outcomes of research are actual for all stakeholders that are covering the high value agrarian sector where currently a great interest is observed for its development from the side of entrepreneurs and external donors (sponsors).

MATERIALS AND METHODS

As sources for research were used data of agrarian sector especially of high value agriculture as well as specialized literature. Other sources are field surveys and information from agricultural producers. The comparative advantages of growing of high value crops was analysed through economic argumentation of incomes and costs for 45 crops.

Information and research results were

conducted within the Project Agricultural Competitiveness and Enterprise Development (ACED). The author developed annual financial model for each crop (technological sheet) and for the perennial plantings investment budgets were developed (the period from planting to fructification). The results of these tests served as a basis for the comparative analysis of advantages of growing high value crops and for making recommendations for farmers.

RESULTS AND DISCUSSIONS

Agriculture of the Republic of Moldova stays the main sector of national economy with a share of 11.7% in GDP structure, 50% of volume of exports and employees around 30% of the working population of the country.

Table 1. Estimation of necessary investments and term of recovery for growing high value crops in the Republic of Moldova (calculated per 1 ha)

No	Specification	Term of recovery for investments, years	Average yield per hectare, t/ha	Necessary investment, Euro/ha	Available subsidies, Euro/ha
1	Apples - MM 106	10.6	25.0	6,128	465
2	Apples - M 26	7.7	41.2	8,274	698
3	Apples - M 9	7.3	60.3	19,999	4,498
4	Plums	11.0	20.0	5,411	349
5	Peaches	9.0	20.0	5,014	349
6	Nectarines	8.0	15.0	5,148	349
7	Pears	9.5	21.4	6,208	465
8	Pears Abbé Fétel	9.7	53.3	30,276	4,493
9	Apricots	8.1	14.6	5,745	349
10	Cherries Mahaleb	7.1	8.0	4,296	349
11	Cherries Maxima 14	6.0	12.0	5,746	660
12	Cherries Gisela 6	6.7	16.3	14,542	4,279
13	Cherries	6.9	12.0	4,734	349
14	Nut	11.1	2.2	7,281	465
15	Almond	7.9	1.6	6,849	465
16	Currant trellis	2.5	6.0	5,627	3,102
17	Currant bush	2.2	5.2	4,013	3,102
18	Raspberry	3.4	7.0	7,057	3,163
19	Blackberries	2.4	16.7	7,181	3,163
20	Strawberry	4.0	17.8	14,521	3,163
21	Remontant strawberry	3.1	23.7	14,521	3,163
22	Wine grapes	29.1	12.9	9,365	930
23	Table grapes	10.8	14.4	10,144	1,163
24	Greenhouse cucumbers	4.8	104.6	156,837	62,326
25	Greenhouse tomatoes	4.2	153.8	156.837	62,326
26	Greenhouse peppers	4.1	76.9	156,837	62,326
27	Outdoor tomatoes, seedling	0.1	70.0	1,116	372
28	Outdoor tomatoes seeds	0.2	60.0	1,116	372
29	Outdoor cucumbers	0.1	40.0	930	312
30	Outdoor peppers	0.1	45.0	1,116	372
31	Eggplant	0.1	60.0	1,116	372
32	Early potatoes	0.3	22.0	1,116	372
33	Late season potatoes	0.3	38.0	1,116	372
34	Onion	0.2	50.0	1,256	502
35	Garlic	0.1	12.0	1,256	502
36	Late season cabbage	0.3	80.0	1,116	372
37	Cauliflower	0.2	25.0	1,116	372
38	Broccoli	0.2	22.0	1,116	372
39	Carrot	0.1	45.0	1,256	502
40	Beet	0.3	50.0	1,116	372
41	Courgette	0.5	50.0	930	372
42	Watermelon	0.5	40.0	1,116	372
43	Melon	0.4	30.0	1,116	372
44	Salad	0.2	20.0	1,116	372
45	Celery	0.1	20.0	1,116	372

Source: Author's calculations based on investment budgets (period from planting to fructification) [1, 2].

Fruit and vegetables sector consists of two subsectors: fresh products and processed products. The sector of processed products includes four major product groups: canned, dried, frozen products and juices. Production of fresh fruits and vegetables for market provides the highest value to farmers, thus being the most profitable, where high quality of product is assured throughout the value chain. Production of fruits and vegetables for processing industry offers farmers lower incomes and requirements towards products' quality are lower thus requiring lower production costs.

Below are the results of economic calculations related to the amount of investments, subsidies and terms of recovery for high value agricultural plantations (Table 1).

Table 2. Estimation of economic results of the operational activity of growing high-value crops in the Republic of Moldova (calculated per 1 hectare)

No	Specification	Sales incomes, Euro/ha	Sales costs, Euro/ha	Gross profit, Euro/ha	Economic profitability, %	Economic calculations per 1 kg of production, Euro/kg		
						Average sales price	Unit cost	Gross profit (commercial excess)
1	2	3	4	5	6	7	8	9
1	Apples - MM 106	3,512	2, 287.3	1,224	53.5%	0.140	0.091	0.049
2	Apples - M 26	6,244	3,395.3	2,848	83.9%	0.152	0.082	0.069
3	Apples - M 9	10,408	5,674.2	4,734	83.4%	0.173	0.094	0.078
4	Plums	2,940	1,919.2	1,020	53.2%	0.147	0,096	0,051
5	Peaches	3,349	1,817.6	1,531	84.2%	0.167	0.091	0.077
6	Nectarines	4,256	1,811.6	2,444	134.9%	0.284	0,121	0,163
7	Pears	4,286	1,987.6	2,298	115.6%	0.200	0.093	0.107
8	Pears Abbé Fétel	10,933	5,471.6	5,461	99.8%	0.205	0.103	0.102
9	Apricots	4,612	1,987.1	2,625	132.1%	0.316	0.136	0.180
10	Cherries Mahaleb	5,507	1,960.1	3,547	181.0%	0.688	0.245	0.443
11	Cherries Maxima 14	7,926	2,913.8	5,012	172.0%	0.660	0.243	0.418
12	Cherries Gisela 6	10,733	4,570.9	6,162	134.8%	0.660	0.281	0.379
13	Cherries	6,718	1,932.6	4,786	247.6%	0.560	0.161	0.399
14	Nut	5,116	1,816.9	3,299	181.6%	2.326	0.454	1.871
15	Almond	5,233	1,827.6	3,405	186.3%	3.256	0.512	2.744
16	Currant trellis	8,037	3,020.4	5,017	166.1%	1.340	0.503	0.836
17	Currant bush	6,966	2,667.2	4,298	161.2%	1.340	0.513	0.827
18	Raspberry	6,837	4,029.1	2,808	69.7%	0.977	0.576	0.401
19	Blackberries	14,264	4,259.2	10,004	234.9%	0.856	0.256	0.600
20	Strawberries	12,403	6,606.6	5,797	87.7%	0.698	0.372	0.326
21	Remontant strawberries	18,522	7,830.6	10,691	136.5%	0.781	0.330	0.451
22	Wine grapes	2,230	1,880.7	349	18.6%	0.173	0.146	0.027
23	Table grapes	3,897	2,357.1	1,540	65.3%	0.270	0.163	0.107
24	Greenhouse cucumbers	46,469	26,902.8	19,566	72.7%	0.444	0.257	0.187
25	Greenhouse tomatoes	48,234	25,583.6	22,651	88.5%	0.314	0.166	0.147
26	Greenhous peppers	48,301	25,036.3	23,264	92.9%	0.628	0.325	0.302
27	Outdoor tomatoes, seedling	10,874	5,546.5	5,328	96.1%	0.155	0.079	0.076
28	Outdoor tomatoes seeds	6,460	3,042.7	3,417	112.3%	0.108	0.051	0.057
29	Outdoor cucumbers	9,581	3,265.3	6,316	193.4%	0.240	0.082	0.158
30	Outdoor peppers	11,143	5,217.9	5,925	113.6%	0.248	0.116	0.132
31	Eggplant	12,093	4,462.1	7,631	171.0%	0.202	0.074	0.127
32	Early potatoes	5,526	3,175.5	2,350	74.0%	0.251	0.144	0.107
33	Late season potatoes	6,221	3,801.1	2,420	63.7%	0.164	0.100	0.064
34	Onion	6,977	3,354.3	3,622	108.0%	0.140	0.067	0.072
35	Garlic	9,070	3,816.8	5,253	137.6%	0.756	0.318	0.438
36	Late season cabbage	5,767	3,489.5	2,278	65.3%	0.072	0.044	0.028
37	Cauliflower	7,151	3,928.0	3,223	82.1%	0.286	0.157	0.129
38	Broccoli	7,930	3,546.5	4,384	123,6%	0.360	0.161	0.199
39	Carrots	8,623	3,105.9	5,517	177.6%	0.192	0.069	0.123
40	Beet	5,442	2,864.1	2,578	90.0%	0.109	0.057	0.052
41	Courgette	3,140	1,922.9	1,217	63.3%	0.063	0.038	0.024
42	Watermelon	3,256	1,841.9	1,414	76.8%	0.081	0.046	0.035
43	Melon	4,070	2,018.5	2,051	101.6%	0.136	0.067	0.068
44	Salad	9,209	4,487.3	4,722	105.2%	0.460	0.224	0.236
45	Celery	10,698	4,887.2	5,810	118.9%	0.535	0.244	0.291

Source: Author's calculations based on cultivation budgets for the fructification period [1, 2].

Based on the presented information in the previous table entrepreneurs/farmers can take qualitative decisions regarding the sector which they want to invest. At the same time the owner need to analyse the dynamic evolution of the consumers and mainly: if it

would rise, stay at the same level or will decrease. Just after these complex analysis decisions on implementation for production sectors that offers fewer risks and have a range of advantages compared to other agricultural sectors need to be taken.

Based on researches conducted at budgeting incomes and costs for 45 high value agrarian costs, it was possible to systematize data and to provide their complex analysis (Table 2).

Table 3. Costs budgeting and its components at growing high-value crops in the Republic of Moldova (calculated per 1 hectare)

No.	Specification	Sales costs, Euro/ha					
		Total	Inlcuding				
			means for production	machinery services	manual operations	Other costs and fees (including amortization)	unexpected expenses
1	Apples - MM 106	2,287.3	783.1	229.9	687.6	378.7	207.9
2	Apples - M 26	3,395.3	858.4	303.8	1,036.9	887.6	308.7
3	Apples - M 9	5,674.2	942.2	367.7	1,635.0	2,213.6	515.8
4	Plums	1,919.2	523.7	167.7	692.1	361.3	174.5
5	Peaches	1,817.6	413.1	174.8	626.1	438.4	165.2
6	Nectarines	1,811.6	429.8	163.1	542.5	511.5	164.7
7	Pears	1,987.6	430.9	163.8	703.3	509.0	180.7
8	Pears Abbé Fétel	5,471.6	590.0	322.6	1,715.6	2,346.0	497.4
9	Apricots	1,987.1	259.0	126.0	687.6	733.8	180.6
10	Cherries Mahaleb	1,960.1	235.2	110.5	871.7	564.5	178.2
11	Cherries Maxima 14	2,913.8	310.5	170.0	1,196.9	971.5	264.9
12	Cherries Gisela 6	4,570.9	427.7	213.9	1,627.9	1,885.9	415.5
13	Cherries	1,932.6	208.4	119.9	1,196.9	231.7	175.7
14	Nut	1,816.9	313.8	108.3	689.7	540.0	165.2
15	Almond	1,827.6	313.8	107.3	649.3	591.1	166.1
16	Currant trellis	3,020.4	400.0	507.2	817.3	1,021.3	274.6
17	Currant bush	2,667.2	436.6	505.3	698.8	784.1	242.5
18	Raspberry	4,029.1	486.8	526.2	932.9	1,716.8	366.3
19	Blackberries	4,259.2	500.9	221.2	1,481.2	1,668.8	387.2
20	Strawberries	6,606.6	452.8	292.2	1,147.1	4,113.8	600.6
21	Remontant strawberries	7,830.6	614.9	318.9	1,649.4	4,535.6	711.9
22	Wine grapes	1,880.7	441.1	140.3	702.4	425.9	171.0
23	Table grapes	2,357.1	570.0	157.6	864.3	550.9	214.3
24	Greenhouse cucumbers	26,902.8	6,953.0	857.7	4,196.3	12,450.1	2,445.7
25	Greenhouse tomatoes	25,583.6	8,176.4	1,108.7	3,662.9	10,309.8	2,325.8
26	Greenhouse peppers	25,036.3	6,119.8	709.0	3,182.0	12,749.5	2,276.0
27	Outdoor tomatoes, seedlings	5,546.5	3,142.2	501.6	1,027.7	370.8	504.2
28	Outdoor tomatoes, seeds	3,042.7	1,363.0	396.3	834.2	172.6	276.6
29	Outdoor cucumbers	3,265.3	1,141.4	329.3	879.1	618.6	296.8
30	Outdoor peppers	5,217.9	3,148.4	423.3	999.3	172.6	474.4
31	Eggplant	4,462.1	2,417.3	429.7	1,036.8	172.6	405.6
32	Early potatoes	3,175.5	1,930.5	271.7	469.9	214.8	288.7
33	Late season potatoes	3,801.1	2,303.7	359.9	602.4	189.5	345.6
34	Onion	3,354.3	1,315.2	354.6	954.6	425.0	304.9
35	Garlic	3,816.8	1,926.3	252.8	795.5	495.2	347.0
36	Late season cabbage	3,489.5	1,801.4	465.1	683.7	222.0	317.2
37	Cauliflower	3,928.0	2,302.6	397.7	618.4	252.2	357.1
38	Broccoli	3,546.5	1,978.2	375.8	502.5	367.6	322.4
39	Carrots	3,105.9	956.3	326.0	929.6	611.5	282.4
40	Beet	2,864.1	1,054.7	343.0	863.3	342.7	260.4
41	Courgette	1,922.9	587.8	306.6	616.3	237.5	174.8
42	Watermelon	1,841.9	707.0	299.8	421.8	245.9	167.4
43	Melon	2,018.5	846.6	268.0	547.8	172.6	183.5
44	Salad	4,487.3	1,994.2	403.1	1,226.9	455.2	407.9
45	Celery	4,887.2	2,752.6	396.0	722.0	572.2	444.3

Source: Author's calculations based on cultivation budgets for the fructification period [1, 2].

Based on the achieved results and comparative economic analysis of practice of HVA we can conclude that in conditions of market economy small and medium farms (cultivated area within 1 ha to 50 ha) need to concentrate on implementation of intensive

agriculture applying advanced technologies mainly based on high-value agriculture and narrow specialization.

At the same time economic results of operational activities differ considerably for high-value crops through obtained value of sales revenues and gross profit depending on the intensity level. The comparative analysis of budget data economic argument of activities in vegetable sector demonstrates a true regularity: with justified increasing of the production costs (intensity level), economic efficiency and results of operational activity enhance.

As a result of calculations realized at budgeting incomes and costs for high-value crops, it was possible to systemize data regarding related costs and their components for crops (Table 3).

In Moldova the trade balance of fruits and vegetables in general has a positive balance. This is due to the fact that the country records positive results for fruits sale, but for vegetable sales our country has a significant negative balance for the whole period. The main reason is the fact that local farmers cannot ensure production and sale of fresh vegetables during the year and huge imports of these products are needed.

Dominance of agriculture in Moldova's economy is confirmed by the highest share of food exports. This high share is supported by the processing industry that makes the majority of food exports and contributes with 7-8% to the GDP and employees around 5% of labour force.

Processing industry of fruit and vegetables is a traditional industry in Moldova oriented mainly to export that at the moment has a total capacity of around 200 thousand tons and is focusing its efforts to diversification of markets and products.

Now the processing industry of fruits and vegetables includes 8 large enterprises that process 70-80% of the total volume of production and around 90 small and medium enterprises that contribute with 20-30%. Currently food industry uses its processing capacities just for around 45-50% from the total and it continuously decreases that proves inefficiency of this sector though: diversification of the range of products and markets, enhancing the quality and production conformity, price guarantees for the fruits and vegetables purchased in advance, slow modernization of technology and processing process, etc.

In the conditions of market economy Moldova has considerable reserves regarding the increasing production volumes of fruits and vegetables to ensure local needs and volume of export because there is a guaranteed demand and prerequisites for continuous growth for the local and international markets.

Conditions of market economy impose agricultural producers to orient their activity through businesses that fall and meet the following aspects: quality and productivity, implementation of modern and intensive technologies, development of product's value chain, combine high-value agriculture (commercial agriculture) with subsistence farming (extensive farming), develop marketing infrastructure, associating the interests of homogeneous production professional organizations and cooperation for promoting and access to new profitable markets, etc. Moldovan agriculture will revitalize and develop just in the case agricultural producers will comply and practice sustainable agriculture for all the sectors, including the horticultural sector.

CONCLUSIONS

Researches and investigations carried out in the sector of high-value agriculture allowed us to conclude the following:

-Production of high-value products (especially fruits and vegetables) offers the highest profits and thus represents an important potential for increasing farmers' incomes. For small and medium farms practicing commercial farming (of high-value) is the only solution for efficient and sustainable development in market conditions;

-It is necessary to implement advanced technologies and to enhance the intensity level for crops cultivation – main direction to ensure competitiveness of local fruits and vegetables on regional and strategic markets;

It is necessary to use intensive technologies

for production of berries and vegetables (outdoor and greenhouses) that will ensure diversification of high-value products and more efficient use of production factors during the year (especially of labour force);
-Is absolutely necessary to identify and promote methods of farmers' association for irrigation of crops, especially for fruits and vegetables;
-Cooperation of farmers for homogenisation of technologies and quality oriented to create industrial quantities and their sale at reasonable prices.

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