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FEASIBILITY OF INVESTMENTS IN CULTIVATION OF TOMATOES IN PROTECTED AREAS

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Abstract

The main purpose of this paper is to identify the amount of investments required for the establishment of greenhouses, which would ensure quality, productivity and competitiveness of the products concerned. The feasibility of investments for the establishment of permanent greenhouses is based on the following method: development of a budget for investments for the establishment of permanent greenhouses and a budget for cultivation of tomatoes with analysis of the economic performance. Based on the above mentioned, it can be stated that permanent greenhouses are fit for growing a wide range of vegetables in one or two cycles, for obtaining homogeneous crops by size and quality with high productivity per hectare, which contributes to higher cost efficiency and state subsidies for entrepreneurs.

Key words: *consumption, cost, feasibility, investments, price, profit*

INTRODUCTION

The integration objective of the Republic of Moldova in the international economic system as a competitive partner imposes a qualitative change of the actual situation within the agro-food sector. The globalization of the world economy and the technical – scientific progress provides new possibilities for increasing the efficiency of more levels of the agriculture. For Moldova, the achievement of this task can be reached through prior orientation towards the production and export of high value agro-food products, for which there are profitable and modern markets.

In a market economy, agricultural entrepreneurs should closely consider initiating and launching a business to have a proper understanding of the business implementation and amount of investments. The budget for investments for the establishment of greenhouses and cultivation of vegetables should be analyzed from the following viewpoints:

-The most important issue is whether selected technology allows to ensure **quality, productivity and competitive price** in vegetable production. Only high quality and productivity of vegetables will allow us to compete and penetrate strategic markets of vegetables.

-An important issue is the optimal use of production factors at the agricultural holding.

-The value of required investments and their payback in the shortest possible period.

These are the most important aspects to be taken into account when establishing a greenhouse and, in order to take a correct decision, the farmer should avail of technological and economic information.

MATERIALS AND METHODS

Materials used for analyzes and research were the Statistical Yearbooks of the Republic of Moldova, the data provided by the Ministry of Agriculture and Food Industry on the development of the agricultural sector, in particular the high value agriculture, data collected from agricultural enterprises producing tomatoes in protected areas. To analyse the feasibility of investments for the establishment of greenhouses, the proposed material is based on the following method: development of a

budget for investments for the establishment of greenhouses, for cultivation of tomatoes in one cycle, a budget for a greenhouse, analysis of results and drafting final conclusions on the analysed issue – feasibility of investments. The calculations showed that the cultivation of tomatoes in permanent greenhouses is the best option for agricultural entrepreneurs, which offers real opportunities to compete in terms of price and quality with vegetables produced both on the domestic and the regional market.

RESULTS AND DISCUSSIONS

Tomatoes are grown for their fruit used as fresh, cooked, dried, canned food and juices. Tomatoes play an important role in food industry. Cultivation of tomatoes in protected areas is a perspective branch of vegetable production. Currently, there is a positive trend in the development of vegetable production in protected areas through a constant increase in greenhouse areas, farmers' high interest in conducting such a business, a short payback period and government support through subsidies to compensate a part of investments for initiation or development of vegetable cultivation in greenhouses.

Photo 1. Protected Areas

Cultivation of tomatoes (especially in protected areas) plays an important role in the economy and food industry. Production of tomatoes has the following advantages:

- ✓ tomatoes are used extensively in human nutrition and in the processing industry;
- ✓ tomatoes are rich in nutrients;
- ✓ tomato is a crop that ensures high profits and efficient use of production factors;
- ✓ tomatoes can grow from seeds and seedlings both in greenhouses and in the open field;
- ✓ they are in high demand on the domestic and foreign tomato markets, especially as fresh products all the year round.

Investments in establishing permanent greenhouses. For a successful production of tomatoes in protected areas, the producer should have arable land, capacity for irrigation, access to electricity, adjacent buildings. Cultivation of tomatoes in greenhouses requires considerable investment in fixed assets.

This business of cultivation of tomatoes in greenhouses entails the implementation of an investment pattern through construction of permanent greenhouses that are relatively expensive. Permanent buildings have a high production potential, which allows for a number of production cycles, a better modelling of production factors.

Photo 2. Protected Areas

Cultivation of tomatoes in permanent greenhouses allows farmers to sell tomatoes on agricultural markets out of the season (at reasonable prices), obtain a good quality and a high yield potential compared to other types of greenhouses (solariums, tunnels) and, certainly, cultivation of tomatoes in the open field.

The investment pattern entails the estimates of investments for the construction of two greenhouse modules (size: 9X60 m or 540 sq. m) with a total area of 1080 sq. m, available on the domestic market and ensuring a considerable sustainability for the farmer and efficient business practice.

Table 1: Budget for investments for establishing permanent greenhouses, area of 1080 sq. m

Specification	UM	Quantity	Unit price, MDL	Total investments, MDL
2 greenhouse modules (greenhouse area, S=540 sq. m)	sq. m	1,080	250	270,000
200 micron film	sq. m	2,700	25	67,500
Water tank - 10 m3	m3	10	750	7,500
Drip irrigation system	ha	0.1	15,000	1,500
Water pump	unit	1	2,500	2,500
Direct combustion generators	unit	2	7,500	15,000
Plastic crates for harvesting tomatoes	unit	100	12	1,200
Greenhouse inventory	X	X	5,000	5,000
Contingencies (5% of total)	X	X	X	18,510
Total investments	X	X	X	388,710

Source: Calculations made by authors

Investments for permanent greenhouses of 10 acres were estimated at **388,710 MDL**.

Photo 3. Tomatoes

For the cultivation of tomatoes, both in the protected area and in the open field, the farmer should provide circulating means of optimal quality and quantity for the technologic process. In Moldova, tomatoes can be grown by sowing seeds or by planting seedlings.

Tomato seedlings can be produced in home conditions (greenhouses) or can be purchased from companies specialized in producing seedlings.

The table below shows an economic model of cultivation of tomatoes in protected areas (area of 1080 square meters), with estimates of the economic performance and clear arguments for conducting such a business, aimed at the development of high value agriculture. For the proposed option for cultivation of tomatoes, the potential average yield was estimated at **26 t/1080 m^2**.

Photo 5. Tomatoes

Based on calculations shown in the table above for a permanent greenhouse with an area of 10 acres, the amount of income from sale of tomatoes is 174,960 MDL and the cost of sales is 91,745.2 MDL. Given this, the annual profit that may be obtained amounts to 83,214.8 MDL from 10 acres of permanent greenhouses for tomatoes with indeterminate growth.

Table 2: Budget for cultivation of tomatoes in greenhouses (greenhouse area = 10 acres)

Specification	UM	Unit price, MDL	Intensive technology - 1080 sq. m		
			Quantity	Amount, MDL	Consumption structure, %
I. Income from sales	**MDL**	**X**	**25,920**	**174,960**	**X**
Tomatoes sold – cold season (50%)	kg	9.0	12,960	116,640	X
Tomatoes sold - mass harvesting season (50%)	kg	4.5	12,960	58,320	X
II. Cost of production means	**MDL**	**X**	**X**	**23,860.7**	**26.01%**
Seed material (seedlings)	MDL/unit	2.50	3,240	8,100.0	8.83%
Mineral fertilizers:	MDL	X	X	535.4	0.58%
- Nitrogen (*Ammonia soda*)	kg	4.50	20	90.0	0.10%
- Phosphate (*Superphosphate*)	kg	7.00	40	280.0	0.31%
- Macro and micronutrients (*Cristalon*)	kg	27.70	2	55.4	0.06%
- Macro and micronutrients (*Terraflex T*)	kg	22.00	5	110.0	0.12%
Chemicals:	MDL	X	X	375.3	0.41%
- Herbicide (*Triflurex 480 EC*)	l	109.20	0.25	27.3	0.03%
- Herbicide (*Agil 100 EC*)	l	374.40	0.13	46.8	0.05%
- Insecticide (*Actara 25 WG*)	kg	1,659.84	0.01	16.6	0.02%
- Fungicide (*Cuproxat SC*)	kg	77.38	0.50	38.7	0.04%
- Insecticide (*Confidor 200 SL*)	kg	673.92	0.05	33.7	0.04%
- Fungicide (*Tatoo 55 SC*)	l	157.25	0.30	47.2	0.05%
- Fungicide (*Ridomil Gold 68 WG*)	kg	197.18	0.25	49.3	0.05%
- Fungicide (*Kocide 2000*)	kg	148.51	0.30	44.6	0.05%
- Fungicide (*Acrobat 79 WP*)	l	188.50	0.20	37.7	0.04%
- Insecticide (*Calypso 480 SC*)	l	1,340.35	0.03	33.5	0.04%
Expenses for electricity	MDL/month	350.00	10.00	3,500.0	3.81%
Greenhouse heating	MDL/l	7.00	1,500	10,500.0	11.44%
Water (irrigation)	m^3	8.50	100	850.0	0.93%
III. Cost of machinery services	**MDL**	**X**	**X**	**1,944.0**	**2.12%**
Transportation of sold crops (L=15 km)	t/km	5.00	389	1,944.0	2.12%
IV. Manual operations	**MDL**	**X**	**X**	**24,000.0**	**26.16%**
2 permanent workers (working 8 months)	om/luna	1,500.00	16	24,000.0	26.16%
V. Expenses - wear of production means	**MDL**	**X**	**X**	**33,600.0**	**36.62%**
VI. Contingencies (10%) (II+III+IV+V)*0.1	**MDL**	**X**	**X**	**8,340.5**	**9.09%**
VII. Consumption - total (II+III+IV+V+VI)	**MDL**	**X**	**X**	**91,745.2**	**100.00%**
VIII. Profit (I-VII)	**MDL**	**X**	**X**	**83,214.8**	**X**

Source: Calculations made by authors

Table 3: Payback period

Indicators	UM	Amount
Total investments	MDL	388,710.0
Net profit	MDL	83,214.8
Payback period	years	4.67

Source: Calculations made by authors

Based on the total amount of investments in building a permanent greenhouse with an area of 10 acres and the planned annual profit, their payback period will be 4.67 years for the entrepreneur, which generates a practical interest in rural areas to diversify activities and income.

CONCLUSIONS

Why namely the technology of cultivation of tomatoes in greenhouses? The answer to this question can be found in the following:

-Greenhouses allow to obtain qualitative tomatoes (homogeneous by size and quality) all the year round;
-High yield of tomatoes in greenhouses allows to establish unit costs for competitive products, which is extremely important in a severe competition on regional markets;
-Production factors available in greenhouses are used extensively;
-Establishment of greenhouses is supported by substantial subsidies;
-Purchase prices for tomatoes grown in greenhouses will remain competitive, and greenhouses ensure a high profitability under these circumstances;
-The influence of natural factors that may affect the crops and their harvesting is excluded.

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