

## FEASIBILITY OF INVESTMENTS FOR PLANTING AND MAINTENANCE OF APPLE ORCHARDS BY APPLYING VARIOUS TECHNOLOGIES

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### Abstract

*The main purpose of this paper is to determine correctly the investments required to establish apple orchards, as well as to point out the best option to ensure the quality, productivity and competitiveness of the relevant products. The feasibility of investments for planting apple orchards is considered according to the following method: preparation of investment budgets for planting and maintenance of apple orchards before fructification for three technologies of fruit cultivation (traditional, intensive and super-intensive), the budget for the apple orchard during the fructification period, and the comparison of the obtained results of calculation. The traditional orchard technology is more extensive, easier to implement, needs least investments per hectare and has lower economic effects, the intensive technology needs large investments per hectare and, therefore, allows obtaining more advantageous economic results, while the super-intensive technology is the most expensive, implies the greatest investments per hectare, and allows obtaining the best economic results. Given the above-listed findings, it may be concluded that intensive orchards allow obtaining apples of homogenous calibre and quality, have a high productivity per hectare, at lower costs, and benefit from state subsidies.*

**Key words:** *apple cultivation technologie, consumption, cost, feasibility, investments, price, profitability*

### 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.

Under market economy conditions, agricultural entrepreneurs should analyze in detail the start-up of a business to determine correctly the implementation of business and the investment amount. The investment budget during planting and maintenance of the apple orchard before fructification should be analyzed from the following points of view:

❖ The most important aspect is whether the selected technology allows ensuring **quality, productivity and competitive price** during fruit production. Only the high quality and productivity of apples will make our business competitive and will facilitate access of our products to strategic fruit markets.

❖ An important aspect is the optimal use of production factors in the agricultural enterprise.

❖ The amount of necessary investments and return on investment in the shortest time. These are the most important aspects which should be taken into consideration when planting apple orchards and, to ensure correct decision making, the farmer should avail of technological and economic information.

### MATERIALS AND METHODS

As materials for analysis and research we considered the Statistical Yearbooks of the Republic of Moldova, the data offered by the

Ministry of Agriculture and Food Industry regarding the developments in the agricultural sector and, particularly, high value agriculture, the data collected from agricultural enterprises dealing in apple production by applying various cultivation technologies. To analyze and substantiate the feasibility of investments for planting apple orchards, these materials were considered according to the following method: preparation of investment budgets for planting and maintenance of apple orchards before fructification for three technologies of fruit cultivation (traditional, intensive and super-intensive), the budget for the apple orchard during the fructification period, comparison of the obtained results of calculation, and formulation of final conclusions on the analyzed issue – feasibility of investments. On

the basis of calculations, it was established that the intensive technology of apple cultivation was the best one for agricultural entrepreneurs, as it offered real opportunities to compete with fruits produced on regional markets in terms of price and quality.

## RESULTS AND DISCUSSIONS

Below you will find an analysis of the economic information on investments for planting one hectare of apple orchard by applying the three technologies: traditional, intensive and super-intensive.

The table below shows a comparative analysis of apple cultivation technologies, which should be known by entrepreneurs in order to select the best and most efficient one to start their own business.

Table 1. Analysis of technical indicators for apple plantations cultivated through various technologies

Specification	UM	Apple cultivation technologies		
		Traditional technology	Intensive technology	Super-intensive technology
Planting scheme	m	4 X 2.5	3.5 X 1.2	3.5 X 0.75
Number of trees per hectare	trees	1,000	2,400	3,810
Average harvest that may be obtained	t/ha	25	40	60
Time for return on investment (per harvest)	year per harvest	3.49	4.72	3.95
Time for return on investment since plantation	years	8.49	8.72	6.95
Number of years upon fructification	years	5	4	3
Period of use	years	25-30	18-20	12-15

Source: Calculations made by authors

The investment budget for planting of apple orchards is a financial tool to project expenses and required financial resources for a certain period of time.

These calculations will serve as a basis for economic substantiation upon the selection of the best option of orchard plantation for entrepreneurs.



Photo 1. Traditional orchard



Photo 2. Intensive orchard



Photo 3. Super-intensive orchard

The table below shows the summarised information from the investment budgets for the establishment and maintenance of apple orchards before fructification, by applying

three types of fruit production technologies: traditional, intensive and super-intensive. To plant a hectare of traditional orchard, the farmer needs approx. MDL 111.2 thousand.

To create one hectare of intensive orchard, the investments will be 2.73 times higher (investments are provided for espaliers and drip irrigation system) in comparison with the

traditional orchard, while for one hectare of super-intensive orchard, investments will be 4.17 times higher (investments for hail protection nets are not taken into consideration).

Table 2: Total investments for planting and maintenance of apple plantations before fructification

Specification	Apple cultivation technologies					
	Traditional technology		Intensive technology		Super-intensive technology	
	MDL	%	MDL	%	MDL	%
I. Cost of production means	44,805	40.3%	175,436	57.9%	330,728	71.3%
II. Mechanized services	32,750	29.4%	54,000	17.8%	47,422	10.2%
III. Manual operations	23,550	21.2%	46,150	15.2%	43,450	9.4%
IV. Contingencies (10%)	10,111	9.1%	27,559	9.1%	42,160	9.1%
<b>TOTAL</b>	<b>111,216</b>	<b>100.0%</b>	<b>303,145</b>	<b>100.0%</b>	<b>463,760</b>	<b>100.0%</b>

Source: Calculations made by authors

If we compare the data in the table, we may conclude the following:

- ✚ The traditional technology is the less intensive (and more extensive), it is easier to implement by entrepreneurs, needs less investments per hectare and yields the lowest economic results from operational activity;
- ✚ The intensive technology may be implemented by farmers, but it needs large investments per hectare, and, as a result, allows obtaining more advantageous economic results from operational activity;

✚ The super-intensive technology is the most expensive for entrepreneurs, it requires the largest investments per hectare and, therefore, it allows obtaining the best economic results.

The table below shows the summarised information from budgets for the maintenance of apple orchards during fructification, by applying three types of fruit production technologies: traditional, intensive and super-intensive. [3, pag. 156-164]

Table 3: Budgets for the maintenance of apple plantations during fructification

Specifications	Apple cultivation technologies					
	Traditional technology		Intensive technology		Super-intensive technology	
	MDL	%	MDL	%	MDL	%
I. Net sales	75,000	X	120,000	X	180,000	X
II. Cost of production means	13,732	33.6%	14,760	27.3%	14,940	24.7%
III. Mechanized services	5,450	13.3%	11,850	21.9%	13,950	23.1%
IV. Manual operations	17,950	43.9%	22,600	41.8%	26,050	43.1%
V. Contingencies (10%)	3,713	9.1%	4,921	9.1%	5,494	9.1%
VI. Variable consumption - total	40,845	100.0%	54,130	100.0%	60,433	100.0%
<b>VII. Gross profit - total</b>	<b>34,155</b>	<b>X</b>	<b>65,870</b>	<b>X</b>	<b>119,567</b>	<b>X</b>

Source: Calculations made by authors

If we compare the data in the table, we may conclude the following: the selling price of apples is the same for all technologies, and amounts, on average, to MDL 3/kg of apples):

- ✚ The traditional technology allows obtaining a gross profit of MDL 34.155/ha, which is rather low for the application of high value agriculture;
- ✚ The intensive technology allows obtaining a gross profit of MDL 65.870/ha, which is advantageous for the application of high value agriculture;

✚ The super-intensive technology allows obtaining a gross profit of MDL 119.567/ha, which is the most advantageous result for the application of high value and sustainable agriculture.

The table below shows the economic indicators for the cultivation of apple orchards by applying the three types of fruit production technologies: traditional, intensive and super-intensive.

On the basis of economic calculations for planting an apple orchard, the specialists recommend the entrepreneurs to apply the intensive apple cultivation technology, as they allow obtaining best results with fewer risks.

Table 4: Analysis of economic indicators for the cultivation of apple orchards through various technologies

Specification	UM	Apple cultivation technologies		
		Traditional technology	Intensive technology	Super-intensive technology
Total investment amount	MDL	119,216	311,145	471,760
Income from sales that may be obtained	MDL	75,000	120,000	180,000
Direct consumption	MDL	40,845	54,130	60,433
Gross profit	MDL	<b>34,155</b>	<b>65,870</b>	<b>119,567</b>
Unit cost of production	MDL/kg	<b>1.634</b>	<b>1.353</b>	<b>1.007</b>
Average selling price	MDL/kg	3.000	3.000	3.000
<b>Direct consumption per MDL 1 of income from sales</b>	<b>MDL</b>	<b>0.545</b>	<b>0.451</b>	<b>0.336</b>
<b>Profitability</b>	<b>%</b>	<b>83.6</b>	<b>121.7</b>	<b>197.8</b>

Source: Calculations made by authors

**Note:** The intensive technology implies the installation of espaliers and drip irrigation system. In the Republic of Moldova, farmers cultivate apples by applying intensive technology and achieve high performance without installing espaliers and drip irrigation.

## CONCLUSIONS

Why the intensive apple cultivation technology? Answers to this question are shown in the following arguments:

- ✓ Intensive and super-intensive orchards allow obtaining high quality apples (homogenous by calibre and quality);
- ✓ The intensive technology is less expensive in comparison with the super-intensive technology and is the midpoint (average) option in apple production;
- ✓ The management of intensive orchards is more efficient through the middle form of tree crowns (easier dry pruning, tree spraying, apple harvesting, etc.);
- ✓ The high productivity of apples in the intensive orchards allows having competitive unit prices for products, which is extremely important in the competition on regional markets;
- ✓ Production factors in intensive orchards are used at a high level;

- ✓ Orchards planted using the intensive method benefit from substantial subsidies;
- ✓ Purchase prices for apples from the field will be further slightly adjusted (decrease), and intensive orchards allow for higher profitability under such conditions.

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