

BENCHMARKING OF INVESTMENT AND THEIR RECOVERABILITY IN THE BERRIES SECTOR

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Abstract

Small agricultural producers of the Republic of Moldova focus on developing berries sector, which provides the greatest profits and, due to this fact, could become an important source of increasing income in the rural sector. The paper presents the results of economic calculations (performed by the authors) related to the amount of investments and terms of investment recovery (calculated per 1 hectare) for 15 berries crops, as well as to the economic results of the operational activity of growing these crops (sales incomes, sale costs, gross profit, economic profitability). The authors developed cost budgets and their components for each berries. The presented calculation data will enable farmers to select the correct berries based on the economic indicators and to deliberately invest the financial resources.

Key words: berries, high value crops, economic results, cost of sales, gross profit, profitability, sales income

INTRODUCTION

The development of the horticultural sector in the Republic of Moldova is a practical way of modernizing and diversifying agriculture and, at the same time, a source of income in rural areas. Domestic farmers do not have access to economic information (analyses, relevant marketing studies) on the high value agricultural sector and face problems in properly selecting crops for cultivation on their land holdings. The purpose of the study is to develop budgets and comparative economic analyses of cultivation of berries. The output of the study is the establishment of an economic information support system on the major bacciferous crops, which would allow small farmers to adequately select crops based on economic indicators and to invest funds based on evidence.

Currently, agricultural entrepreneurs aim at developing high value agriculture (HVA), while small and young entrepreneurs show a high interest in the production of berries, as this allows to obtain a high profit on small

areas while ensuring an efficient business management. The results of the study are important to all stakeholders in the bacciferous crop cultivation sector, who are interested in its development, including entrepreneurs and external donors (funding agencies).

MATERIALS AND METHODS

Statistical annual reports of the Republic of Moldova, the data of the Ministry of Agriculture and Food Industry regarding the development of the agricultural sector and especially of the high value agriculture as well as the relevant literature were used as sources of statistical data for the study. The comparative advantages of bacciferous crop cultivation were analysed by economic analysis of income and costs for 15 berry crops.

The research was carried out as part of the Project "Improving Productivity and Market Access for Berry Producers" (AMIB), implemented by the Business Advisory Center

NGO and funded by HEKS Moldova. For each multi-annual plantation, annual financial models including investment budgets (vegetation period) were developed. The comparative analysis of obtained data served as a basis for identifying comparative advantages of bacciferous crops cultivation and for developing recommendations for agricultural producers.

RESULTS AND DISCUSSIONS

Global trends in the development of the bacciferous crops sector are positive, and there is a steady growth trend: (a) international trade in soft berry fruit has an annual growth of 15-20%, while the annual growth for hard berries is 7-10%; (b) the demand for fresh berries is growing three times faster than for frozen ones; (c) the most commonly sold soft berry fruits are strawberries, raspberries, blueberries; (d) the most attractive niche berries are blackberries, redcurrants, gooseberries, caprifoliaceae; (e) the largest consumer in the berry market is Europe (Germany, France, UK), while the highest growth in consumption is found in the Asian markets.

Agriculture remains the main sector of the national economy in the Republic of

Moldova, as it has a share of 11.7% in the GDP and 50% in the volume of exports, while employing about 30% of the country's active population.

The bacciferous crop sector has good prospects for the future in the Republic of Moldova. The farmers who intend to develop a business focused on production of berries need to consider the following major issues:
 -whether the selected fruit(s) and technology allow ensuring quality, productivity and ultimately competitiveness.

-production of competitive berries is a key element for marketing on regional markets (where the end consumer should be identified immediately and the technology needs to be adjusted to meet the customer's needs in the product).

-only the quality/competitiveness will allow to compete and sell such products on the strategic berry sales markets.

Further, the authors analyse the development of the bacciferous crops sector in the Republic of Moldova, where a rapidly growing trend was noted over the last years. This sector has a high potential for development, which should be followed by the development of value chains for berries (Fig.1. and 2).

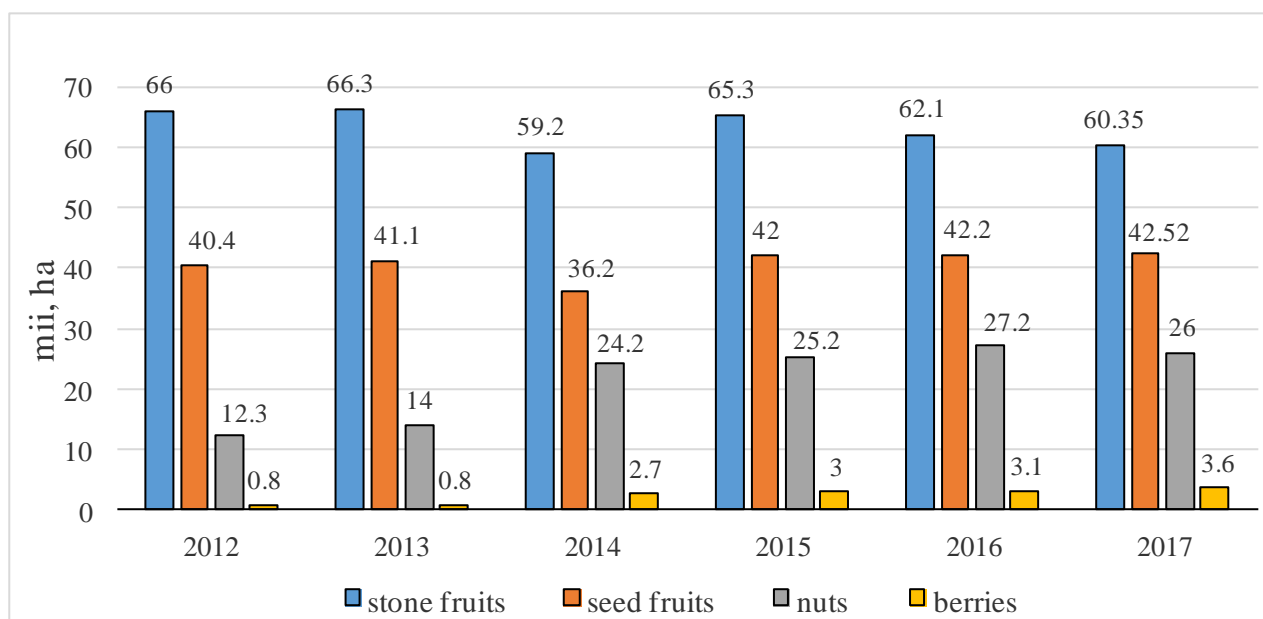


Fig. 1. Dynamics of areas of fruit plantations in Moldova.
 Source: Developed by authors based on NBS data [1].

The areas cultivated with bacciferous crops in Moldova were 4.5 times higher in 2017 as compared to 2012, which is an additional

evidence of the high interest of small farmers in practicing such business due to its profitability.

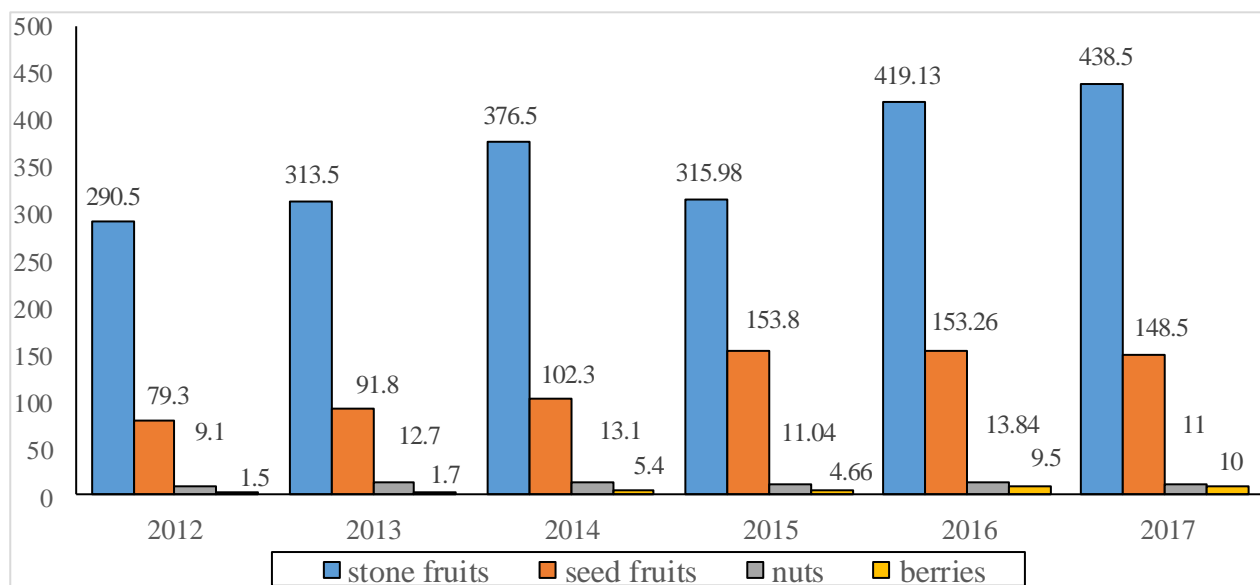


Fig. 2. Dynamics of fruit and berry production, tons.
 Source: Developed by authors based on NBS data [1]

In case of berry production, in the Republic of Moldova, the growth is even faster, showing a 6.67 times higher growth in 2017 as compared to 2012. In the bacciferous crop sector, domestic producers face the biggest challenge – the need to increase the competitiveness, which primarily requires upgraded technologies (the yield per hectare is low) and higher economic efficiency.

Berry producers need to identify the most relevant and optimal answers to the questions below in order to manage their business in an efficient and sustainable way:

- (i) Do they have all the production factors required for berry cultivation (irrigation, adequate land, labour force, knowledge)?
- (ii) Which is the end consumer and segment in the sales market (processing, sales in a market or supermarket)?
- (iii) Analysis of supply and demand of berries on a monthly basis for finding own niche;
- (iv) Distance from the sales market and selection of the bacciferous crops (degree of perishability, ripening time, etc.);
- (v) Ensuring the harvesting and sales conveyor, which allows for more efficient management of the business;
- (vi) Selection of the crop(s) (type and range of

varieties is very important) and selection of cultivation technology (which provides comparative advantages in respect to competitors and the competitiveness of products);

(vii) Proper information on berry crop cultivation, access to a flow of specialized information and technology transfer in the sector;

(viii) Feasibility study and business plan for bacciferous crop business and accumulation of economic data and analyses for correct and efficient decision-making;

(ix) Optimal harvesting time, correct harvesting methods, produce conditioning, adequate packaging;

(x) The need and willingness to invest in cultivation of bacciferous crops and to develop the value chain for berries in order to minimize risks and create added value in price;

(xi) Producer's willingness to associate and cooperate – these two prerequisites provide real possibilities for practicing a sustainable berry business.

High value production is a way to obtain a higher profit. The bacciferous sector consists of two subsectors: the fresh and processed

berry subsectors. The processed berry sector also includes four major groups of products: preserved, dried, frozen berries and juices. The production of fresh berries for the market provides the highest value for farmers, making it the most profitable, if the high quality of the product is ensured throughout the entire value chain and if the deliveries are ensured for a longer period. The production of

berries for the processing industry offers lower incomes to farmers. However, the requirements for fruit quality are also lower, and thus lower production costs are incurred. The table below shows the results of economic calculations regarding the amount of investments, the subsidies that can be obtained and investment recovery terms for the cultivation of berries (Table 1).

Table 1. Estimation of the required investments and of the recovery term for the cultivation of bacciferous crops in the Republic of Moldova (calculated per 1 hectare)

No	Crop specification	Operating period, years			Investment recovery term from planting, years	Yield per hectare, t / ha	Number of plants per hectare, plants	Required investment, Eur / ha	Possible subsidies to be obtained, Eur / ha
		Total, years	including						
			Vegetation period	Period of fructification					
1	Annual strawberry	1		1	0.95	29.59	51,020	11,243.3	3,106.8
2	Multi-annual strawberry	3	1	2	2.92	22.96	51,020	14,273.5	3,106.8
3	Strawberry - green house	3	1	2	3.95	29.44	55,556	106,219.5	36,998.4
4	Raspberry - seasonal	9	2	7	2.46	12.00	10,000	6,128.9	3,495.1
5	Raspberry Removable	9	2	7	2.35	14.00	10,000	6,510.1	3,495.1
6	Blackberry	14	2	12	2.89	13.33	2,667	10,698.5	3,430.4
7	Black currant	15	2	13	3.03	10.00	5,000	7,638.3	1,974.1
8	Red currant	20	2	18	3.01	12.80	4,000	6,701.1	1,974.1
9	Gooseberry	18	3	15	3.97	12.80	4,000	8,670.7	1,974.1
10	Black Scorpion (Chokeberries)	25	5	20	3.70	14.44	2,222	7,471.9	1,909.4
11	White seabuckthorn	26	3	23	3.93	11.43	2,286	7,826.2	1,423.9
12	Bilberry	25	5	20	7.37	6.00	2,222	41,564.1	2,912.6
13	Goji	10	2	8	3.28	8.33	3,333	28,140.3	582.5
14	Dogwood	25	3	22	4.02	15.56	2,222	7,184.9	453.1
15	Dogrose	25	3	22	4.60	5.80	2,222	5,252.3	453.1

Source: Authors' calculations based on investment budgets [2, 3, 4, 5, 6].

Based on the information shown in the table above, entrepreneurs/farmers can make quality decisions on what bacciferous crops to produce. At the same time, the owner should analyse the dynamics of the end consumer's demand, and namely whether it will increase, remain unchanged or decrease. Only after such complex analyses, the decision on implementation should be made regarding the production sectors that offer fewer risks and have a number of comparative advantages in respect to other agricultural activities.

The chart below shows the analysis of the amount of investment required to grow berries on a unit of area (Fig. 3). While analysing the investment budget, we can see that the production of strawberries in protected areas

requires the largest investment, followed by the cultivation of blueberries and Goji.

Based on the study of income and costs for 15 bacciferous crops, the authors managed to systematize data and perform a complex data analysis (Table 2).

The bacciferous crop sector is favourable for small farmers, because all berry crops allow for income generation and are highly profitable, provided that the organization and management of the business are efficient. Application of intensive technologies in bacciferous crop plantations ensures the best economic results.

Further, we analyse the gross profits obtained from cultivation of berries (Fig. 4).

The analysis of income and costs for

bacciferous crops allowed for the systematization of data on cumulative economic indicators that can be obtained for

the optimal period of operation of bacciferous crop plantations (Table 3).

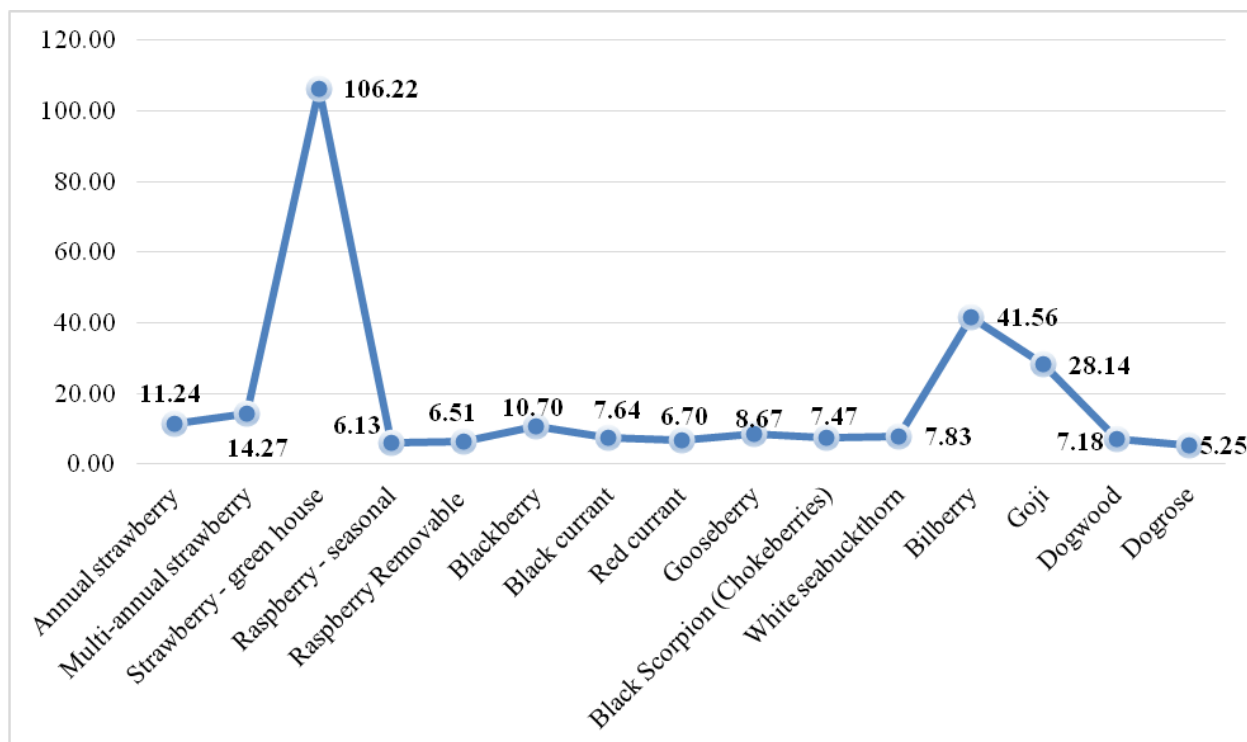


Fig. 3. Analysis of investments needed to cultivate bacciferous crops (area = 1 ha), thou. Eur
 Source: Developed by the authors based on investment budgets [2, 3, 4, 5, 6].

Table 2. Estimation of economic results for the cultivation of berries in the Republic of Moldova (per 1 hectare)

	Crop specification	Income from annual sales, Eur / ha	Cost of annual sales, Eur / ha	Annual profit, Eur / ha	Annual rentability, %	Analyse the economic effects for a production unit, Eur / kg		
						Average selling price	Unit cost	Gross margin
1	Annual strawberry	32,752.1	18,304.5	14,448	78.9%	1.11	0.62	0.49
2	Multi-annual strawberry	25,745.5	11,942.8	13,803	115.6%	1.12	0.52	0.60
3	Strawberry - green house	54,315.0	18,810.8	35,504	188.7%	1.84	0.64	1.21
4	Raspberry – seasonal	13,281.6	4,373.0	8,909	203.7%	1.11	0.36	0.74
5	Raspberry Removable	18,213.6	5,146.5	13,067	253.9%	1.30	0.37	0.93
6	Blackberry	14,886.7	5,010.7	9,876	197.1%	1.12	0.38	0.74
7	Black currant	11,165.0	4,228.3	6,937	164.1%	1.12	0.42	0.69
8	Red currant	10,563.1	4,375.1	6,188	141.4%	0.83	0.34	0.48
9	Gooseberry	13,669.9	5,238.1	8,432	161.0%	1.07	0.41	0.66
10	Black Scorpion (Chokeberries)	14,724.9	4,579.3	10,146	221.6%	1.02	0.32	0.70
11	White seabuckthorn	15,534.0	6,989.8	8,544	122.2%	1.36	0.61	0.75
12	Bilberry	22,281.6	5,963.3	16,318	273.6%	3.71	0.99	2.72
13	Goji	30,946.6	9,347.9	21,599	231.1%	3.71	1.12	2.59
14	Dogwood	11,175.8	4,590.1	6,586	143.5%	0.72	0.30	0.42
15	Dogrose	7,038.8	3,106.3	3,932	126.6%	1.21	0.54	0.68

Source: Authors' calculations based on budgets for cultivation for the fructification period [2, 3, 4, 5, 6].

The analysis of the cumulative economic data that can be obtained for the optimal period of operation of bacciferous crop plantations shows very good results of the analysed sector

and proves that these crops provide over 100% profitability for most berries, which is favourable and highly interesting for small farmers.

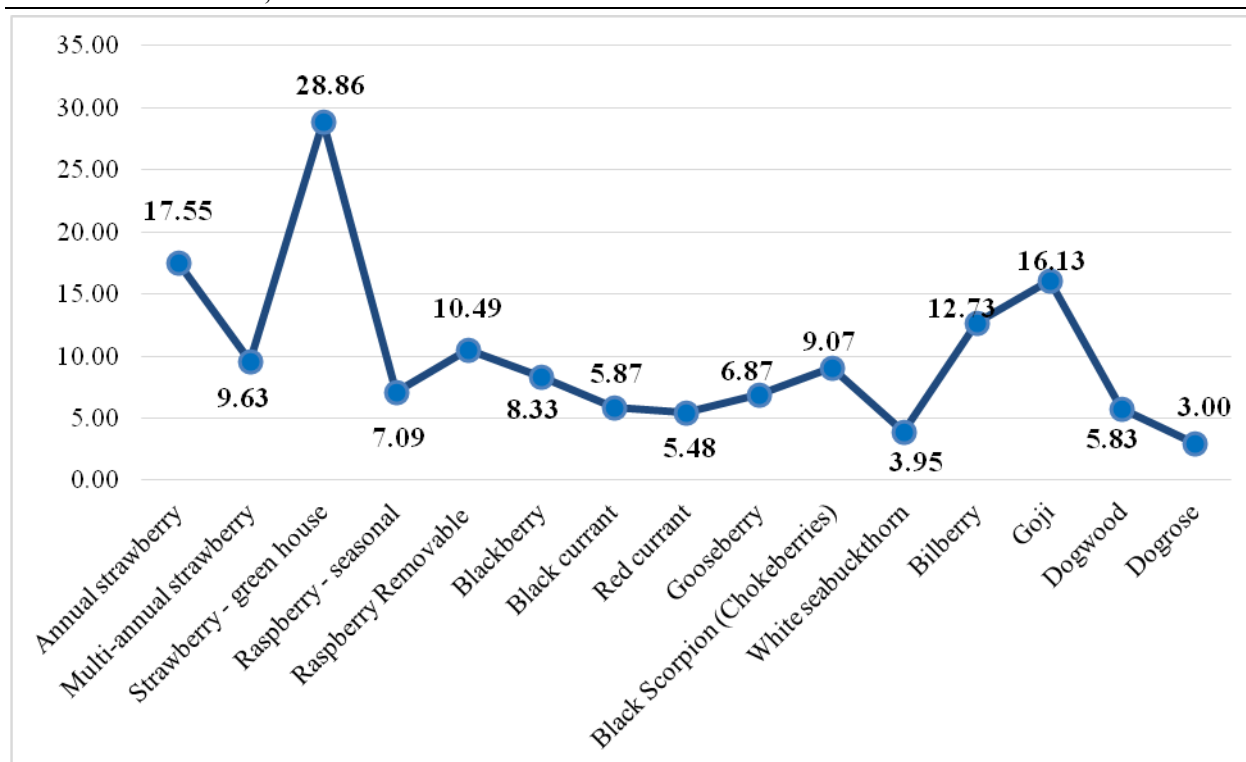


Fig. 4. Analysis of the gross profit obtained from the cultivation of berries, thou. EUR

Source: Developed by the authors based on budgets for cultivation for the fructification period [2, 3, 4, 5, 6]

Table 3. Cumulative analysis of the economic results that can be obtained for the optimal period of operation of bacciferous crop plantations (calculated per 1 hectare)

	Crop specification	Basic indices for the fruiting period of the plantation, Eur				Cumulative economic profitability, %
		Costs of cumulative sales	Income from cumulative sales	Gross profit (gross margin) cumulative	Gross profit (gross margin) cumulative in the average per year of exploitation	
1	Annual strawberry	18,304.5	32,752.1	17,554.4	17,554.4	95.9%
2	Multi-annual strawberry	40,778.3	69,668.9	28,890.7	9,630.2	70.8%
3	Strawberry - green house	54,356.6	140,950.2	86,593.7	28,864.6	159.3%
4	Raspberry - seasonal	38,869.6	102,711.1	63,841.5	7,093.5	164.2%
5	Raspberry Removable	44,866.3	139,256.4	94,390.2	10,487.8	210.4%
6	Blackberry	73,038.6	189,660.6	116,622.1	8,330.1	159.7%
7	Black currant	64,710.8	152,761.9	88,051.1	5,870.1	136.1%
8	Red currant	87,725.4	197,369.8	109,644.4	5,482.2	125.0%
9	Gooseberry	90,159.9	213,857.6	123,697.7	6,872.1	137.2%
10	Black Scorpion (Chokeberries)	102,976.7	338,059.4	226,667.1	9,066.7	220.1%
11	White seabuckthorn	92,418.3	195,246.8	102,828.5	3,954.9	111.3%
12	Bilberry	163,608.0	481,768.8	318,160.8	12,726.4	194.5%
13	Goji	103,606.7	264,900.6	161,293.9	16,129.4	155.7%
14	Dogwood	103,309.8	255,562.8	145,664.1	5,826.6	141.0%
15	Dogrose	73,344.8	146,248.8	74,911.4	2,996.5	102.1%

Source: Authors' calculations based on budgets for cultivation for the fructification period [2, 3, 4, 5, 6].

The chart below shows the analysis of the cumulative economic results obtained during

the cultivation of berries for the optimal period of operation of plantations (Fig. 5).

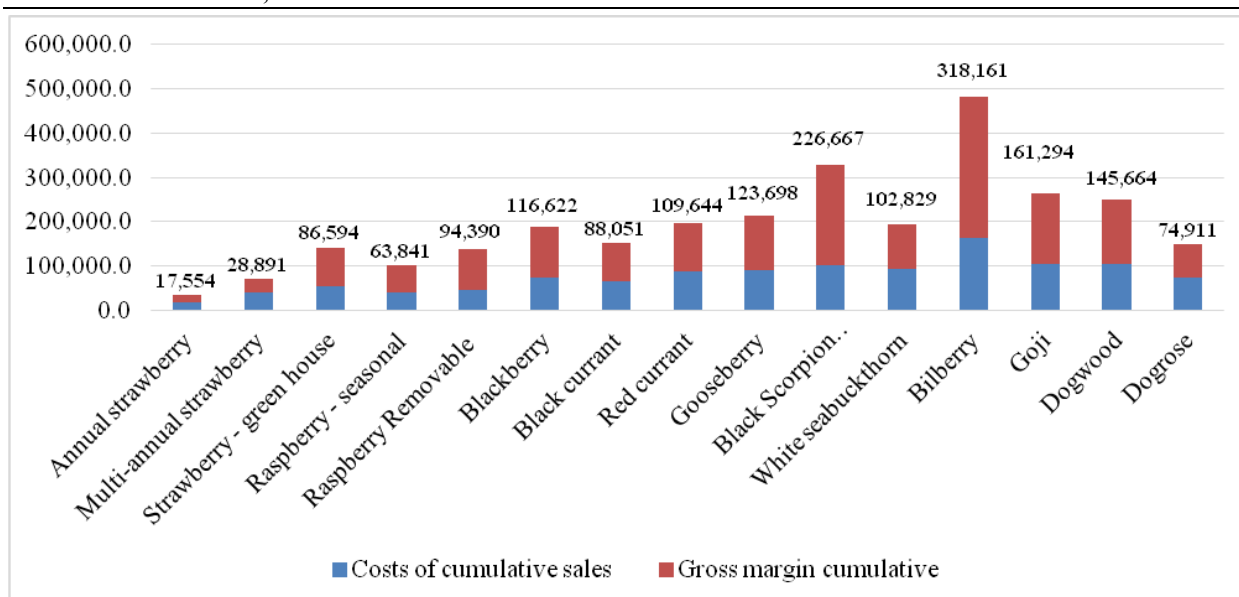


Fig. 5. Analysis of the cumulative economic results obtained during the cultivation of berries for the optimal period of operation of plantations, Eur.

Source: Developed by the authors based on budgets for cultivation for the fructification period [2, 3, 4, 5, 6].

While analysing the data in the Chart, we concluded that production of berries is profitable, as the farmer can obtain high profits as compared to production costs. The main conclusion based on the results and comparative economic analyses is that in the context of market economy, small agricultural holdings (with an area of 1 to 10 hectares) should focus on implementation of intensive agriculture based on advanced technologies of

bacciferous crops cultivation.

The economic analysis shows positive results for bacciferous crops. The comparative analysis of data shows a specific dependency: the economic efficiency and the results from the operational activity increase when the intensiveness increases.

The chart below shows the analysis of the recovery investment term for the cultivation of berries (Fig. 6).

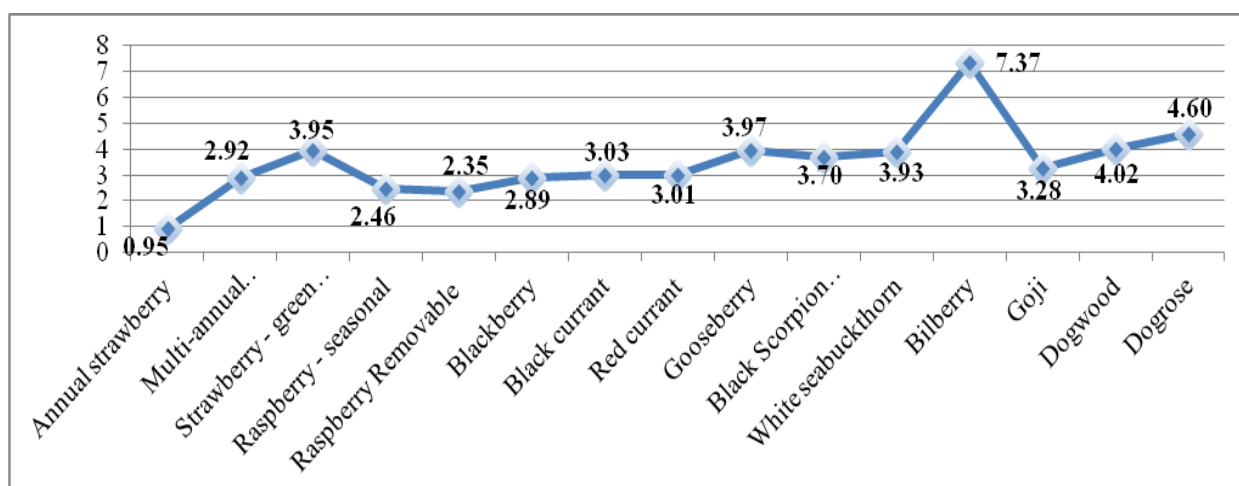


Fig. 6. Analysis of the recovery investment term for the cultivation of bacciferous crops, years

Source: Developed by the authors based on budgets for cultivation for the fructification period [2, 3, 4, 5, 6]

The bacciferous crop sector is a sector that requires considerable investment. However, the period of investment recovery is relatively short and it is often influenced by the period from planting to fructification (which is

relatively short except for blueberries). Based on this aspect, as well as the fact that production of berries will continue to be in higher demand among end consumers, it may be concluded that it is profitable for farmers.

The development of agricultural businesses should be based on competitiveness of products, assurance of quality and compliance with marketing requirements according to the demands of the end consumer. The market economy requires that agricultural producers guide their business by maintaining a business, which meets and observes the following important issues: implementation of modern and intensive technologies, development of product value chain, practice of commercial agriculture, development of marketing infrastructure, association in professional organizations based on common interest and homogeneous products, cooperation to promote and penetrate new favourable markets, etc.

The Moldovan agriculture should develop by practicing a sustainable and environmentally friendly agriculture.

CONCLUSIONS

Research and study of the berry sector allowed us to draw the following conclusions:

- Berries are fruits that are in high demand, easily perishable, have difficult distribution logistics and a complicated value chain that can only be implemented through joint efforts of all stakeholders, especially producers.
- A practical and applicable recommendation for small and medium-sized agricultural holdings is to practice commercial agriculture because it is the only effective and sustainable development solution in the market economy.
- Farmers should implement modern technologies and practice intensive cultivation of berries – a priority in ensuring competitiveness in regional and export markets.
- Production of berries allows for highest profits and presents a major potential for increasing the income of small farmers and diversifying the sources of income in rural areas.
- An important issue for small producers - it is absolutely necessary to identify and promote methods of association of agricultural producers for irrigation of bacciferous crops, supply with means of production and joint provision and use of agricultural services

(including development of value chains).

- Cooperation of producers is required to ensure the uniformity of technologies and quality of berries, creating industrial quantity batches and selling them at favourable prices both in local and export markets.

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