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Conference Paper

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Provided in Cooperation with:

The Research Institute for Agriculture Economy and Rural Development (ICEADR), Bucharest

Suggested Citation: Sterie, Cristina Maria; Audrone, Ispiryman (2023) : Analysis of areas, production and export potential for soft fruit and raspberries in Romania and Lithuania, In: Rodino, Steliana Dragomir, Vili (Ed.): Agrarian Economy and Rural Development - Trends and Challenges. International Symposium. 14th Edition, The Research Institute for Agricultural Economy and Rural Development (ICEADR), Bucharest, pp. 186-194

This Version is available at:

<https://hdl.handle.net/10419/301780>

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ANALYSIS OF AREAS, PRODUCTION AND EXPORT POTENTIAL FOR SOFT FRUIT AND RASPBERRIES IN ROMANIA AND LITHUANIA

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Abstract: *This research paper analyses the evolution of cultivated areas, production and export potential of soft fruits in Romania and Lithuania compared to the European Union, using Eurostat and Intracen data. The comparative analysis method revealed a significant increase in Romania, with cultivated areas and production increasing by more than 250% and 800% respectively. In contrast, Lithuania showed smaller fluctuations, with a steady increase of more than 9% in cultivated areas and about 41% in production. In the case of raspberry cultivation, Romania has seen a significant increase, while Lithuania has had a larger but recently decreasing cultivated area. Romania and Lithuania export to Germany, France, Serbia and Poland, Germany, the Netherlands respectively, with Germany identified as the main market for these fruits.*

Keywords: raspberries, export, Romania, Lithuania, berries.

JEL classification: Q10, Q12, Q14, Q19.

INTRODUCTION

The cultivation of berries is a well-developed business in Europe, supplying significant quantities of the crop to European markets for direct consumption and for various products in the food industry. This sector is a key pillar of agriculture and an area with strong environmental potential. Although Poland, Russia, Ukraine and the UK are among the largest producers, each country has a distinct competitive advantage in berry cultivation (Multescu & Susman, 2022). The evolution of this industry is based on crucial aspects such as technological processes, the potential of organic farming, the creation of high value-added products, the orientation towards organic business and the promotion of sustainable agriculture (Asănică et al., 2016; Dumitru et al., 2021).

The main challenges faced by berry producers identified at EU level are price fluctuations, international regulations and standards, labour, climate change, but also global competition (Greblikaite et al., 2019).

In Romania, a variety of berries, such as blueberries, raspberries, strawberries, blackberries, are true jewels of nature, with a long history of human relationship with the environment (Leahu et al., 2020; Stavrescu-Bedivan et al., 2022). In addition to their unmistakable taste, berries contribute to a diverse ecosystem, which attracts the attention of researchers in terms of biodiversity, climate change, but also the food industry in order to achieve their maximum medical and economic potential (Micu et al., 2022). Bioactive phenolic compounds, such as phenolic acids and tannins, found in berries, have been recognized for their strong potential in protecting against a wide spectrum of diseases (Kačergius et al., 2004). These compounds, either individually or in synergistic combination, have demonstrated the ability to reduce the risk and impact of cardiovascular disease, cancer, inflammation, obesity, diabetes and other chronic diseases (Ložienė et al., 2016). Raspberries are an aromatic fruit that is known for its content of vitamins and substances that contribute to maintaining health and can help reduce the risk of various diseases (Stan et al., 2019).

In Lithuania, the berry industry is important regarding sustainable development, but also for the country's agri-food export. Thus, these fruits are of considerable importance for the Lithuanian economy and their potential should be exploited.

Various experiments and studies are carried out to help improve crop productivity, as recent studies show that on the global market raspberry growing is not sustainable (Ispiryan et al., 2023).

MATERIALS AND METHODS

The research is based on data provided by Eurostat on areas and production in Romania, Lithuania and the European Union, as well as data provided by Intracen to identify the export potential of berries to other EU countries. Comparative analysis was also used to identify differences in practices, production, export potential and to assess the factors influencing this potential between Romania and Lithuania.

RESULTS AND DISSCUSION

In 2014, Romania had an area of 470 hectares dedicated to berry cultivation, and by 2022, this area has increased to about 1.7 thousand hectares, showing an increase of more than 250%.

On the other hand, Lithuania, in 2014, was growing berries on an area of 7.69 thousand hectares, rising to 8.42 thousand hectares in 2022, an increase of more than 9%. There is a significant difference between the two countries' areas under berry cultivation in the period under review. In 2022, Lithuania cultivated 5 times more area than Romania.

Within the European Union, in 2016, the area devoted to berry cultivation was 140.83 thousand hectares, increasing by 2022 to 161.77 thousand hectares (Table 1).

Table 1. Determining the Economic Size of the Family Farm in 2022

Nr. crt.	Family members	Minimum/average economy wage	Average monthly expenditure on food and drink consumed	Months	Suggested profit achieved at farm level (lei) (1*(2+3)*4	Recommended profit in euro (rate 4.9204 euro) (col. 5 * exchange rate)	Production expenditure (euro) (according to Eurostat*)	SO VALUE (firm income) (euro)	Simulation - Physical size of the farm (wheat crop)
0	1	2	3	4	5	6	7	8	9
1	2	1,524	211	12	41,640	8,463	15,716	24,179	39
2	2	3,879	211	12	98,160	19,950	37,049	56,999	93
3	3	1,524	211	12	62,460	12,694	23,575	36,269	59
4	3	3,879	211	12	147,240	29,924	55,574	85,498	139
5	4	1,524	211	12	83,280	16,925	31,433	48,358	79
6	4	3,879	211	12	196,320	39,899	74,099	113,998	186
7	5	1,524	211	12	104,100	21,157	39,291	60,448	98
8	5	3,879	211	12	245,400	49,874	92,623	142,497	232
9	6	1,524	211	12	124,920	25,388	47,149	72,538	118
10	6	3,879	211	12	294,480	59,849	111,148	170,997	278
11	7	1,524	211	12	145,740	29,620	55,008	84,627	138
12	7	3,879	211	12	343,560	69,824	129,672	199,496	325
13	8	1,524	211	12	166,560	33,851	62,866	96,717	157
14	8	3,879	211	12	392,640	79,798	148,197	227,995	371
15	9	1,524	211	12	187,380	38,082	70,724	108,806	177
16	9	3,879	211	12	441,720	89,773	166,722	256,495	418
17	10	1,524	211	12	208,200	42,314	78,582	120,896	197
18	10	3,879	211	12	490,800	99,748	185,246	284,994	464

*based on the minimum/average wage in the economy, the lower and upper limits were determined according to family members, Source: own processing;

Due to the increase in the minimum/average income in the economy, as well as the increase in the exchange rate, the value of the S.O. has increased significantly, so that in the case of a family

farm, consisting of 2 persons, in the normal scenario, the economic size would be 24,179 S.O., In the "optimistic" scenario, the economic size of the same type of holding would be 56,999 S.O., compared to the previous year of analysis when it was 48,015 S.O. (equivalent to 93 hectares of wheat) (Table 2.).

Table 3. Scenario A1 (Objective function) - 2 members - 24,146 N/A

Subsistence and semi-subsistence farm	Cereal plants	Oil plants	Protein plants	Vegetable and flowering plants	Total
V1 Restrictions	0.25	0.25	0.25	0.25	1
Area (ha)	1.66	1.66	1.66	1.66	6.62
Estimated economic size (S.O.)	24,146				
V2 Restrictions	0.2	0.2	0.2	0.4	1
Area (ha)	0.88	0.88	0.88	1.75	4.39
Estimated economic size (S.O.)	24,162				
V3 Restrictions	0	0	0	1	1
Area (ha)	0.00	0.00	0.00	1.86	1.86
Estimated economic size (S.O.)	24,179				

Source: own processing;

In order to reach a minimum (normal) economic size of 24.146 S.O., the 2-person farm needs to cultivate 6.62 hectares taking into account the restrictions of option 1, 4.39 hectares taking into account the restrictions of option 2 and 1.86 hectares taking into account the restrictions of option 3 (where only vegetables and flowers are cultivated) (Table 3.).

Table 3. Scenario A2 (objective function) - 2 members - 56,999 N/A

Subsistence and semi-subsistence farm	Cereal plants	Oil plants	Protein plants	Vegetable and flowering plants	Total
V1 Restrictions	0.25	0.25	0.25	0.25	1
Area (ha)	3.90	3.90	3.90	3.90	15.61
Estimated economic size (S.O.)	56,845				
V2 Restrictions	0.2	0.2	0.2	0.4	1
Area (ha)	2.07	2.07	2.07	4.14	10.34
Estimated economic size (S.O.)	56,958				
V3 Restrictions	0	0	0	1	1
Area (ha)	0.00	0.00	0.00	4.40	4.40
Estimated economic size (S.O.)	56,999				

Source: own processing;

In order to reach an optimal economic size of 56,999 S.O., the 2-person farm needs to cultivate 15.61 hectares taking into account the restrictions of option 1, 10.34 hectares taking into account the restrictions of option 2 and 4.40 hectares taking into account the restrictions of option 3 (where only vegetables and flowers are cultivated) (Table 4.).

Table 4. Scenario B1 (Objective function) - 3 members - 36,269 N/A

Subsistence and semi-subsistence farm	Cereal plants	Oil plants	Protein plants	Vegetable and flowering plants	Total
V1 Restrictions	0.25	0.25	0.25	0.25	1
Area (ha)	2.48	2.48	2.48	2.48	9.94
Estimated economic size (S.O.)	36,243				
V2 Restrictions	0.2	0.2	0.2	0.4	1
Area (ha)	1.32	1.32	1.32	2.63	6.58
Estimated economic size (S.O.)	36,243				
V3 Restrictions	0	0	0	1	1
Area (ha)	0.00	0.00	0.00	2.80	2.80
Estimated economic size (S.O.)	36,269				

Source: own processing;

To reach a minimum (normal) economic size of 36,269 SO, the 3-person farm needs to cultivate 9.94 hectares taking into account the restrictions of variant 1, 6.58 hectares taking into account the restrictions of variant 2 and 2.80 hectares taking into account the restrictions of variant 3 (where only vegetables and flowers are cultivated) (Table 5).

Table 5. Scenario B2 (Objective function) - 3 members - 85,498 N/A

Subsistence and semi-subsistence farm	Cereal plants	Oil plants	Protein plants	Vegetable and flowering plants	Total
V1 Restrictions	0.25	0.25	0.25	0.25	1
Area (ha)	5.86	5.86	5.86	5.86	23.42
Estimated economic size (S.O.)	85,319				
V2 Restrictions	0.2	0.2	0.2	0.4	1
Area (ha)	3.10	3.10	3.10	6.20	15.51
Estimated economic size (S.O.)	85,435				
V3 Restrictions	0	0	0	1	1
Area (ha)	0.00	0.00	0.00	6.59	6.59
Estimated economic size (S.O.)	85,496				

Source: own processing;

To reach an optimal economic size of 85,498 SO, the 3-person farm needs to cultivate 23.42 hectares taking into account the restrictions of option 1, 15.51 hectares taking into account the restrictions of option 2 and 6.59 hectares taking into account the restrictions of option 3 (where only vegetables and flowers are cultivated) (Table 6.).

Table 6. Scenario C1 (objective function) - 4 members - 48,358 N/A

Subsistence and semi-subsistence farm	Cereal plants	Oil plants	Protein plants	Vegetable and flowering plants	Total
V1 Restrictions	0.25	0.25	0.25	0.25	1
Area (ha)	3.31	3.31	3.31	3.31	13.25
Estimated economic size (S.O.)	48,292				
V2 Restrictions	0.2	0.2	0.2	0.4	1
Area (ha)	1.75	1.75	1.75	3.51	8.77
Estimated economic size (S.O.)	36,243				
V3 Restrictions	0	0	0	1	1
Area (ha)	0.00	0.00	0.00	3.73	3.73
Estimated economic size (S.O.)	48,358				

Source: own processing;

In order to reach a minimum (normal) economic size of 48,358 S.O., the 4-person farm needs to cultivate 13.25 hectares under the restrictions of option 1, 8.77 hectares under the restrictions of option 2 and 3.73 hectares under the restrictions of option 3 (where only vegetables and flowers are cultivated) (Table 7.).

Table 7. Scenario C2 (Objective Function) - 4 members - 113,998 N/A

Subsistence and semi-subsistence farm	Cereal plants	Oil plants	Protein plants	Vegetable and flowering plants	Total
V1 Restrictions	0.25	0.25	0.25	0.25	1
Area (ha)	7.81	7.81	7.81	7.81	31.23
Estimated economic size (S.O.)	113,843				
V2 Restrictions	0.2	0.2	0.2	0.4	1
Area (ha)	4.14	4.14	4.14	8.27	20.68
Estimated economic size (S.O.)	113,916				
V3 Restrictions	0	0	0	1	1
Area (ha)	0.00	0.00	0.00	8.79	8.79
Estimated economic size (S.O.)	113,998				

Source: own processing;

In order to reach an optimal economic size of 113,998 S.O., the 4-person farm needs to cultivate 31.23 hectares taking into account the restrictions of option 1, 20.68 hectares taking into account the restrictions of option 2 and 8.79 hectares taking into account the restrictions of option 3 (where only vegetables and flowers are cultivated) (Table 8.).

Table 8. Scenario D1 (Objective function) - 5 members - 60,448 N/A

Subsistence and semi-subsistence farm	Cereal plants	Oil plants	Protein plants	Vegetable and flowering plants	Total
V1 Restrictions	0.25	0.25	0.25	0.25	1
Area (ha)	4.14	4.14	4.14	4.14	16.56
Estimated economic size (S.O.)	60,366				
V2 Restrictions	0.2	0.2	0.2	0.4	1
Area (ha)	2.19	2.19	2.19	4.39	10.96
Estimated economic size (S.O.)	60,405				
V3 Restrictions	0	0	0	1	1
Area (ha)	0.00	0.00	0.00	4.66	4.66
Estimated economic size (S.O.)	60,448				

Source: own processing;

To reach a minimum (normal) economic size of 60,488 SO, the 5-person farm needs to cultivate 16.56 hectares under the restrictions of option 1, 10.96 hectares under the restrictions of option 2 and 4.66 hectares under the restrictions of option 3 (where only vegetables and flowers are cultivated) (Table 9.).

Table 9. Scenario D2 (Objective function) - 5 members - 142,497 N/A

Subsistence and semi-subsistence farm	Cereal plants	Oil plants	Protein plants	Vegetable and flowering plants	Total
V1 Restrictions	0.25	0.25	0.25	0.25	1
Area (ha)	9.76	9.76	9.76	9.76	39.04
Estimated economic size (S.O.)	142,304				
V2 Restrictions	0.2	0.2	0.2	0.4	1
Area (ha)	5.17	5.17	5.17	10.34	25.84
Estimated economic size (S.O.)	142,395				
V3 Restrictions	0	0	0	1	1
Area (ha)	0.00	0.00	0.00	10.99	10.99
Estimated economic size (S.O.)	60,448				

Source: own processing;

In order to reach an optimal economic size of 142,497 S.O., the 5-person farm needs to cultivate 39.04 hectares taking into account the restrictions of option 1, 25.84 hectares taking into account the restrictions of option 2 and 10.99 hectares taking into account the restrictions of option 3 (where only vegetables and flowers are cultivated) (Table 10.).

Table 10. Scenario E1 (Objective function) - 6 members - 72,538 N/A

Subsistence and semi-subsistence farm	Cereal plants	Oil plants	Protein plants	Vegetable and flowering plants	Total
V1 Restrictions	0.25	0.25	0.25	0.25	1
Area (ha)	4.97	4.97	4.97	4.97	19.87
Estimated economic size (S.O.)	72,440				
V2 Restrictions	0.2	0.2	0.2	0.4	1
Area (ha)	2.63	2.63	2.63	5.26	13.16
Estimated economic size (S.O.)	72,486				
V3 Restrictions	0	0	0	1	1
Area (ha)	0.00	0.00	0.00	5.59	5.59
Estimated economic size (S.O.)	72,538				

Source: own processing;

In order to reach a minimum (normal) economic size of 72,538 S.O., the 6-person farm needs to cultivate 19.87 hectares taking into account the restrictions of variant 1, 13.16 hectares taking into account the restrictions of variant 2 and 5.59 hectares taking into account the restrictions of variant 3 (where only vegetables and flowers are cultivated) (Table 11.).

Table 11. Scenario E2 (Objective Function) - 6 members - 170,997 N/A

Subsistence and semi-subsistence farm	Cereal plants	Oil plants	Protein plants	Vegetable and flowering plants	Total
V1 Restrictions	0.25	0.25	0.25	0.25	1
Area (ha)	11.71	11.71	11.71	11.71	46.84
Estimated economic size (S.O.)	170,765				
V2 Restrictions	0.2	0.2	0.2	0.4	1
Area (ha)	6.20	6.20	6.20	12.41	31.01
Estimated economic size (S.O.)	170,874				
V3 Restrictions	0	0	0	1	1
Area (ha)	0.00	0.00	0.00	13.19	13.19
Estimated economic size (S.O.)	170,997				

Source: own processing;

In order to reach an optimal economic size of 170,997 S.O., the 6-person farm needs to cultivate 46.84 hectares taking into account the restrictions of option 1, 31.01 hectares taking into account the restrictions of option 2 and 13.19 hectares taking into account the restrictions of option 3 (where only vegetables and flowers are cultivated) (Table 12.).

Table 12. Scenario F1 (Objective function) - 7 members - 84,627 N/A

Subsistence and semi-subsistence farm	Cereal plants	Oil plants	Protein plants	Vegetable and flowering plants	Total
V1 Restrictions	0.25	0.25	0.25	0.25	1
Area (ha)	5.80	5.80	5.80	5.80	23.18
Estimated economic size (S.O.)	84,512				
V2 Restrictions	0.2	0.2	0.2	0.4	1
Area (ha)	3.07	3.07	3.07	6.14	15.35
Estimated economic size (S.O.)	84,566				
V3 Restrictions	0	0	0	1	1
Area (ha)	0.00	0.00	0.00	6.53	6.53
Estimated economic size (S.O.)	84,627				

Source: own processing;

To reach a minimum (normal) economic size of 84,627 SO, the 7-person farm needs to cultivate 23.18 hectares under the restrictions of option 1, 15.35 hectares under the restrictions of option 2 and 6.53 hectares under the restrictions of option 3 (where only vegetables and flowers are cultivated) (Table 13.).

Table 13. Scenario F2 (Objective function) - 7 members - 199,496 N/A

Subsistence and semi-subsistence farm	Cereal plants	Oil plants	Protein plants	Vegetable and flowering plants	Total
V1 Restrictions	0.25	0.25	0.25	0.25	1
Area (ha)	13.66	13.66	13.66	13.66	54.65
Estimated economic size (S.O.)	170,765				
V2 Restrictions	0.2	0.2	0.2	0.4	1
Area (ha)	7.24	7.24	7.24	14.47	36.18
Estimated economic size (S.O.)	170,874				
V3 Restrictions	0	0	0	1	1
Area (ha)	0.00	0.00	0.00	15.39	15.39
Estimated economic size (S.O.)	170,997				

Source: own processing;

In order to reach an optimal economic size of 199,496 S.O., the 7-person farm needs to cultivate 54.65 hectares taking into account the restrictions of option 1, 36.18 hectares taking into account the restrictions of option 2 and 15.39 hectares taking into account the restrictions of option 3 (where only vegetables and flowers are cultivated) (Table 14.).

Table 14. Scenario G1 (Objective function) - 8 members - 96,717 N/A

Subsistence and semi-subsistence farm	Cereal plants	Oil plants	Protein plants	Vegetable and flowering plants	Total
V1 Restrictions	0.25	0.25	0.25	0.25	1
Area (ha)	6.62	6.62	6.62	6.62	26.49
Estimated economic size (S.O.)	96,586				
V2 Restrictions	0.2	0.2	0.2	0.4	1
Area (ha)	3.51	3.51	3.51	7.02	17.54
Estimated economic size (S.O.)	96,647				
V3 Restrictions	0	0	0	1	1
Area (ha)	0.00	0.00	0.00	7.46	7.46
Estimated economic size (S.O.)	96,717				

Source: own processing;

To reach a minimum (normal) economic size of 96,717 SSO, the 8-person farm needs to cultivate 26.49 hectares taking into account the restrictions of variant 1, 17.54 hectares taking into account the restrictions of variant 2 and 7.46 hectares taking into account the restrictions of variant 3 (where only vegetables and flowers are grown) (Table 15.).

Table 15. Scenario G2 (Objective Function) - 8 members - 227,995 N/A

Subsistence and semi-subsistence farm	Cereal plants	Oil plants	Protein plants	Vegetable and flowering plants	Total
V1 Restrictions	0.25	0.25	0.25	0.25	1
Area (ha)	15.61	15.61	15.61	15.61	62.46
Estimated economic size (S.O.)	227,686				
V2 Restrictions	0.2	0.2	0.2	0.4	1
Area (ha)	8.27	8.27	8.27	16.54	41.35
Estimated economic size (S.O.)	227,831				
V3 Restrictions	0	0	0	1	1
Area (ha)	0.00	0.00	0.00	17.58	17.58
Estimated economic size (S.O.)	227,995				

Source: own processing;

In order to reach an optimal economic size of 227,995 S.O., the 8-person farm needs to cultivate 62.46 hectares under the restrictions of option 1, 41.35 hectares under the restrictions of option 2 and 17.58 hectares under the restrictions of option 3 (where only vegetables and flowers are cultivated) (Table 1.16.).

CONCLUSIONS

The high number of subsistence and semi-subsistence farms is due to their small economic size, mainly due to the low efficiency of the crops grown in relation to the small area they cultivate.

This is also the case for family farms whose agricultural area is small and should therefore be oriented toward crops with a higher economic value, such as the cultivation of vegetables or flowers.

It can be seen that, in all scenarios, the larger the area under vegetables or flowers, the faster the economic size is reached. In addition, the optimistic variant, which requires a larger economic

size in order to provide family members with an average standard of living, requires 2.3 times more land than the minimum variant, which is quite difficult for them to achieve.

However, growing vegetables and flowers can be a viable alternative for small-scale farmers (including family farmers) to provide a normal standard of living, but involves a somewhat higher initial labour and expenditure than other crops. The subsidies available to them can also help reduce production costs, thus increasing profitability at the farm level.

ACKNOWLEDGEMENT

The work was supported by the Internal Research Plan of the Research Institute for Agricultural Economics and Rural Development, project "RESEARCH ON METHODS OF ECONOMIC EFFICIENCY OF FARMS IN ROMANIA".

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