

The Economic Efficiency of Tomato Cultivation and the Impact of the “De Minimis” Scheme on the Profitability and Competitiveness of Romanian Farmers

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Abstract: *Tomato cultivation in protected areas plays an essential role in Romanian agriculture, due to the high demand for fresh, quality products throughout the year. However, the technological complexity and high costs associated with this crop can become a barrier for small producers. In this context, the Romanian state has implemented the “De minimis Aid for the Application of the Tomato Production Support Program” scheme, a financial support designed to support farmers, reduce their financial burden and improve their competitiveness on the market. This paper analyzes the economic efficiency of tomato cultivation in protected areas, using the technical-economic method to evaluate relevant indicators such as profit, rates of return and the break-even point in two variants: with and without the application of the financial support offered through this program. The results of the study show that financial support supports farmers' expenses, facilitating their access to the necessary resources, increasing profitability from 9% to 75% for an area of 1000 sq m. The support program contributes to the economic stability of producers, facilitating market access for high-quality local products, improving their competitiveness. The support measures represent a fundamental pillar for the consolidation of the Romanian agricultural sector, stimulating economic sustainability and promoting local products.*

Keywords: economic efficiency, break-even point, support program, tomato production, protected areas.

Introduction

Tomatoes are among the most widely grown and consumed vegetables worldwide (Roshan et al. 2021) due to their nutritional value and culinary versatility. They are the main source of lycopene, a powerful antioxidant that plays an important role in health, helping to reduce the risks of cancer, heart disease and other conditions. In addition, tomatoes contain nutrients such as: vitamin C, vitamin K, potassium, folic acid, saturated fat and sodium (Shankara et al. 2006; Onyeneke et al. 2023).

Given the constant consumer demand and the economic role of tomato cultivation, the European Union, through its policies, aims to extend the marketing period of fresh tomatoes. Tomato cultivation represents a significant source of income for small producers, and from a socio-economic point of view, a significant part of tomato production comes from family farmers, providing them with jobs and income (Vladu C. & Vladu M., 2018). Also, growing tomatoes in

protected spaces (greenhouses and solariums) has become an essential practice for obtaining large and constant productions even in difficult climatic conditions.

In the context of supporting Romanian agriculture, in 2017, the "Government Program for Supporting Tomato Production in Protected Areas" was initiated, regulated by GD 39/2017. The main objective of the program was to support agricultural producers in the vegetable sector, reduce dependence on imports, increase local production and generate jobs in rural areas. The program provided financial support through a "de minimis" aid scheme.

For 2018, the "De minimis aid for the implementation of the tomato product support program in protected areas" scheme was approved by GD 943/2017, and continued in 2019 by GD 107/2019. In the first three years of implementation (2017-2019), financial support granted was 3,000 euros/beneficiary for a minimum area of 1000 sq m and a capitalized production of at least 2,000 kg of tomatoes during the period January - May inclusive, and/or November - December 20 inclusive. In 2019, the deadline was extended until June 15.

The program to support tomato production in protected areas has generated significant interest since its launch. In 2017, the program registered 4,397 beneficiaries who completed cycle I with a paid amount of 58,277,715.80 lei and for cycle II, 3,619 beneficiaries received the amount of 48,789,147 lei by December 18.

In 2019, by April 18,500 farmers were already registered, with 15,337 applications for the first cycle, far exceeding the number of beneficiaries in 2017 and even 2018, when 15,712 farmers participated in both production cycles. By August 2019, 14,398 producers had benefited from financial support, most of them from Olt (5,250), Galați (4,100), Giurgiu (1,951), Dolj (1,780) counties.

Annually, checks carried out by the National Phytosanitary Authority confirmed compliance with recommendations on the use of plant protection products, thus guaranteeing that tomatoes under the program are safe for consumption (MADR, 2019).

In 2020, the program was approved by Government Decision no. 248/2020, and presents some adjustments compared to previous years, in order to better respond to market requirements and to encourage higher production. The main change consisted in increasing the minimum production capitalized to 3,000kg/1,000 sq m, reflecting the need to improve productivity and efficiency in the tomato sector. Subsequently, through the additions made by Decision 463/2020, the capitalization period is extended until July 1 inclusive, thus contributing to ensuring a constant supply of tomatoes on the market throughout the year. This year, according to MADR press releases, the largest number of eligible beneficiaries was recorded since the beginning of the program. Compared to 2019, the number of beneficiaries in the first cycle increased by approx. 21%, from 14,405 to 17,386 (MADR, 2020).

Tomato cultivation continued to be supported in 2021, through the "Programme to support vegetable production in protected areas" approved by Government Decision no. 651/2021. This was included in a broader framework for supporting vegetable cultivation, also targeting other crops (eggplants, peppers and cucumbers), reflecting a more comprehensive approach to the sector. The value of the support granted was 2,000 euros/1,000 sq m, for a minimum production of 8,500kg/1,000 sq m for tomatoes grown in greenhouses or 3,200kg/1,000 sq m for those grown in solariums, capitalized on between November 2 and December 2.

For 2022, the Program for Supporting Vegetable Production in Protected Areas, approved by Decision 148/2022, included support for tomato crops in the I and II production cycles, as well as funds for the II production cycle for other vegetables in short supply on the market, such as: peppers, cucumbers, beans, lettuce, spinach, green onions, to facilitate access to these products.

The value of the support was 4,000 euros/beneficiary for tomato production of at least 3,000 kg/1,000 sq m sold during the period: March 1 - June 10 (3,000 euros/1,000 sq m for cycle I) and October 15 - December 9 (1,000 euros/1,000 sq m for cycle II).

For 2023, Decision 1569/2022 approves the "Support Program for Tomato Production in Protected Areas" for 2023, which maintains the support of 3,000 euros/1,000 sq m for the first production cycle, provided that a minimum of 3,000 kg is exploited on the planned area, between July 1 and 15, 2023.

The support for cycle II was approved by Government Decision no. 846/2023, with beneficiaries receiving 1,000 euros/1,000 sq m for cultivating one of the eligible crops. For tomatoes, the minimum production that had to be capitalized was also 3,000kg/1,000 sq m, between October 20, 2023 and January 31, 2024 inclusive.

In 2024, the "Tomato" program continues, with payments being made in two tranches: 1,500 for establishing the crop and the difference upon the capitalization of at least 3,000kg/1,000 sq m. According to sources, 24,472 beneficiaries benefited from the first tranche, most of them from OLT county (7,923 growers), followed by Galați (6,651 producers) and Dolj with 2,071 producers.

For the II production cycle, Decision no. 1342/2024 approved the scheme "De minimis aid for the application of the Program to support the production of vegetables grown in protected areas", for the period 2024-2025. The support is 1,000 euros/1,000 sq m cultivated exclusively with one of the crops: peppers, cucumbers, beans, lettuce, spinach, green onions and tomatoes. The minimum production that must be capitalized is 3,000 kg/1,000 sq m, until January 31, 2025 inclusive.

The paper aims to analyze the economic efficiency of tomato cultivation in protected areas in the two variants taken into account, namely: with and without the application of the financial support offered through the "Program to support tomato production in protected areas". The objectives of the paper are: evaluating the production costs for tomato cultivation in protected areas and analyzing the impact of the "de minimis" support scheme on the economic profitability of the crop.

Literature review

Growing plants in protected spaces, which involves the use of various technologies, from simple greenhouses to advanced indoor farms, is recognized as an important strategy for improving global food security. According to studies by Chavan et al. (2022), although technology and automation have great potential for optimizing land use, the large-scale adoption of agriculture in protected spaces has not yet reached the level of expectations. However, these technologies are seen as sustainable solutions for increasing agri-food production. According to research, in 2019 the total area dedicated to protected crops globally was estimated at 5,630,000 hectares. Of these, almost 500,000 hectares were intended for growing vegetables and herbs in spaces, 10% of these crops being grown in greenhouses, and 90% of them in solariums.

Protected cultivation is recognized as a modernized agricultural technique, having a significant impact on agricultural yield and the economic sustainability of farmers, especially in regions with pronounced climatic variability. According to Pandey (2019), this method facilitates the extension of production cycles and the diversification of seasonal agriculture. For example, farmers in Uttarakhand benefit from the possibility of cultivating tomatoes both in the off-season (March-April and October-November) and during the summer rainy conditions in Nainital district. Furthermore, the author emphasizes that the use of protected spaces for tomato cultivation can

generate significant profits even for small producers, offering them more stable and sustainable economic opportunities.

On the other hand, Shukla et al. (2024), detail the benefits of controlled microclimate in agriculture, highlighting that temperature, humidity and light are factors that can be adjusted to optimize the growth of cultivated plants. The types of structures used - greenhouses, solariums and low tunnels allow for seasonal and off-season agricultural production. Thus, the cultivation of vegetables, including tomatoes, becomes more efficient and predictable, contributing to reducing the risks associated with variable climatic conditions.

More specific research, such as that carried out by Dobrescu et al. (2016), investigated the physiological processes of tomatoes grown in protected spaces, such as photosynthesis, respiration and transpiration. The study showed that the dynamics of these processes vary depending on the type of hybrid and the phenophase of development (vegetative growth, flowering or fruiting) highlighting the complexity of plant adaptation to controlled conditions. In addition, Moreira et al. (2022), underlines the importance of advanced technologies in protected horticulture, with particular emphasis on the detection and classification of tomatoes in greenhouses. According to the authors, the tomato harvesting process represents a crucial stage in the modernization of agricultural processes, having a significant role in increasing the efficiency and sustainability of tomato production.

To optimize production, Charlo et al. (2007) showed that, in the case of the cherry tomato variety “Sindy” grown in protected areas, the optimal distance between plants is 0.5 m, and the use of two stems per plant maximizes yield. In turn, Lucio et al. (2016) evaluated the optimal plot size for cherry tomatoes grown in protected environments. Their results recommend the use of seven-plant plots for evaluating yield characteristics, regardless of crop rows, thus contributing to a more efficient planning of the agricultural sector.

In Romania, tomatoes are an essential component of vegetable production in protected areas. The results of local studies highlight the need to develop indigenous varieties adapted to specific cultivation conditions in order to increase market competitiveness (Sora et al. 2016). The support program for tomato cultivation in protected areas, implemented in Dolj County, demonstrated that accessing European funds led to a significant increase in cultivated areas and productivity, even in localities without tradition in this type of agriculture (Vladu & Vladu, 2018).

Although there is a considerable amount of research analyzing the conditions and impact of protected cultivation technologies on vegetable production, fewer studies focus on the relationship between financial support provided through the “de minimis” schemes and the economic efficiency of these crops. In the context of the existing literature, this paper contributes to filling a significant gap regarding the impact of the “de minimis” schemes on tomato cultivation, a topic that requires a more detailed analysis, especially in the context of advanced technology usage in the horticultural sector, with the aim of reducing vulnerability and ensuring the continuity of activities within horticultural farms.

Methodology

The research method used in this paper is the technical-economic analysis, which allows for a detailed assessment of the costs and revenues associated with an agricultural crop, in this case, tomato cultivation in protected areas. This approach integrates both technical aspects of the production process (such as the work required within the cultivation technology) and economic dimensions, which include the determination of expenses, income and profitability. By applying this method, the main components of the income and expense budget were identified and

calculated, including production capitalization, production costs, subsidies and net income. The technical-economic analysis also allowed for the calculation of the break-even point, an essential indicator for establishing the point at which tomato cultivation becomes profitable. This method provides a clear and substantiated picture of the economic viability of agricultural activity, in the context of the economic conditions forecast for 2025.

In this regard, the technical-economic analysis included a series of essential indicators for assessing the economic performance of tomato cultivation in protected areas. These include the value of production, determined based on the average production per hectare and the estimated price on the domestic market, as well as the subsidies granted by the Romanian state to support tomato production in protected areas. Intermediate consumption was also taken into account, which reflects the expenses for the inputs necessary for production, as well as taxable income and net income, calculated by deducting a percentage of taxable income. Another important indicator was the rate of return, which measures the economic efficiency of the crop, and the break-even point provided information on the moment when tomato cultivation becomes profitable, depending on production costs and sales prices. All these indicators contribute to a complete assessment of the economic viability of tomato production in protected areas, estimated for the year 2025.

Results and discussions

According to FAO (Food and Agriculture Organization of the United Nations) data, in 2022 global vegetable production was 71% higher than in 2000, reaching 1.17 billion tons, and tomatoes were the most produced vegetable, with 186 million tons (FAO, 2023).

In 2023, approximately 5.4 million hectares of tomatoes were cultivated globally, with an average yield of 35.5 thousand kg/hectare. World production reached 192 million tons, marking a 3% increase compared to 2022. The highest productions were recorded in India (20.4 million tons), Turkey (13.3 million tons) and the United States of America (12.3 million tons).

In the European Union, total tomato production amounted to approximately 16 million tons. Italy ranked first with a production of 6 million tons, followed by Spain with 3.9 million and Portugal with 1.8 million tons. Romania ranks ninth among EU member states producing tomatoes, with a production of 271.5 thousand tons (FAOSTAT, 2023; Vladu C&Vladu M, 2018).

According to Eurostat, in 2023, Spain had the largest area cultivated with tomatoes in protected areas, totaling 16.8 thousand hectares. This represents a decrease of 7.79% compared to 2010 (18.22 thousand hectares), but an increase of 4.74% compared to 2022 (16.08 thousand hectares). Romania ranked sixth in the EU, with an area of 2.04 thousand hectares, registering an increase of 72.88% compared to 2010 (1.18 thousand hectares) and an advance of 7.37% compared to the previous year (Figure 1).

The increase in tomato cultivated areas in protected areas in Romania can be attributed to the implementation of national support policies for the agricultural sector, including subsidy programs for farmers in the vegetable sector.

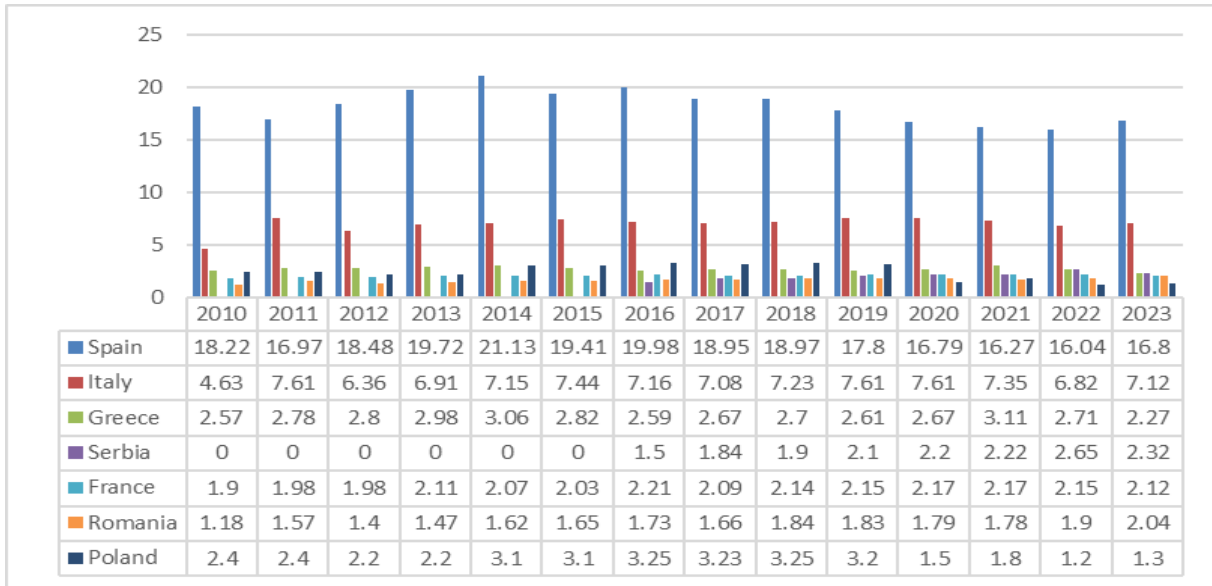


Figure 1. Evolution of tomato cultivated areas in protected areas at European level during the period 2010-2023 (1,000 ha)

Source: Eurostat database, accessed January 2025.

Analyzing the top 10 EU member countries in terms of tomato production in protected areas, Spain maintained its first place position in 2023, with a total of 1,442.86 thousand tons. This registered a slight decrease of 0.52% compared to the previous year, but a sharp reduction of 13.93% compared to 2010. In second place is the Netherlands, with a production of 726 thousand tons, followed by Poland, which recorded a production of 646.9 thousand tons, marking an increase of 5.07% compared to 2020 and a considerable advance of 51.18% compared to 2010. Compared to 2022, Italy, with a production of 521.37 thousand tons, recorded an increase of 7.30% and France, with 442.02 thousand tons, recorded a decrease of 12.34%.

Romania ranks 9th among EU member states in terms of tomato producers in protected areas, with a production of 78.45 thousand tons in 2023. This represents an increase of 10.71% compared to 2022 and a remarkable advance of 57.12% compared to 2010. The annual growth rate of tomato production in Romania, of 3.3% between 2010 and 2023, is one of the highest in the European Union member states, underlining the positive impact of support policies for farmers, as well as their adaptation to market requirements for quality tomatoes grown in protected areas (Table 1).

Table no. 1. Top 10 countries in the European Union in tomato production in protected areas in the period 2010-2023 (1,000 t)

	Spain	Netherlands	Poland	Italy	France	Belgium	Greece	Germany	Romania	Austria
2010	1,676.46	-	427.9	396.21	554.1	-	288.19	73.29	49.93	44.08
2011	1,694.57	-	-	517.31	582.59	-	293.16	76.72	69.62	50.18
2012	1,873.08	809	-	460.33	534.31	-	325.76	61.19	49.57	51.61
2013	1,930.96	855	-	432.47	567.01	249.8	365.08	69.26	60.23	53.09
2014	2,112.02	900	538.7	498.61	580.1	249.25	384.19	84.5	75.93	56.97
2015	1,835.31	890	553.2	516.29	589.32	253.05	340.77	80.92	79.41	55.38
2016	2,027.86	890	606.59	447.05	625.18	259.54	321.72	85.29	98.52	54.75
2017	1,827.11	910	643.46	442.56	560.36	255.96	309.66	96.56	76.55	53.90
2018	1,836.19	910	675.84	465.94	522.86	258.68	328.38	103.27	87.14	57.80
2019	1,623.43	910	677.3	524.93	524.27	270.14	293.28	106.69	76.33	57.99
2020	1,553.19	910	571.3	513.66	486.59	311.5	344.62	102.12	68.79	58.24
2021	1,475.06	880	654.4	536.5	521.17	282.67	397.89	101.77	67.56	59.34
2022	1,450.44	770	615.7	485.92	504.25	298.80	337.03	102.18	71.21	56.46
2023	1,442.86	726	646.9	521.37	442.02	289.70	260.22	101.06	78.45	56.40
2023/2010 (%)	-13.93	-	51.18	31.59	-20.23	-	-9.71	37.89	57.12	-
2023/2022 (%)	-0.52	-5.71	5.07	7.30	-12.34	-3.05	-22.79	-1.10	10.17	-15.10
Ritm annual (%)	-1.1	-	3.0	2.0	-1.6	-	-0.7	2.3	3.3	-

Source: Eurostat.eu database, accessed February 2025.

Although Romania has registered a steady increase in the domestic production of tomatoes grown in protected areas, with an average annual rate of 3.3% between 2010 and 2023), this progress has not been sufficient to reduce the trade deficit in this segment. The volume of imports continues to be much higher than that of exports, reflecting an insufficiently developed domestic market to support exports on a competitive scale. Thus, the volume of imports increased from 59,399 tons in 2010 to 89,243 tons in 2023, and their value increased significantly, from 42,922 thousand euros in 2010 to 150,090 thousand euros in 2023. At the same time, Romania's tomato exports remain at a low level, which indicates challenges in terms of international competitiveness of local production. In this context, the deficit recorded in 2023, both in volume and value, underlines the need to continue support programs in the vegetable sector (Figure 2).

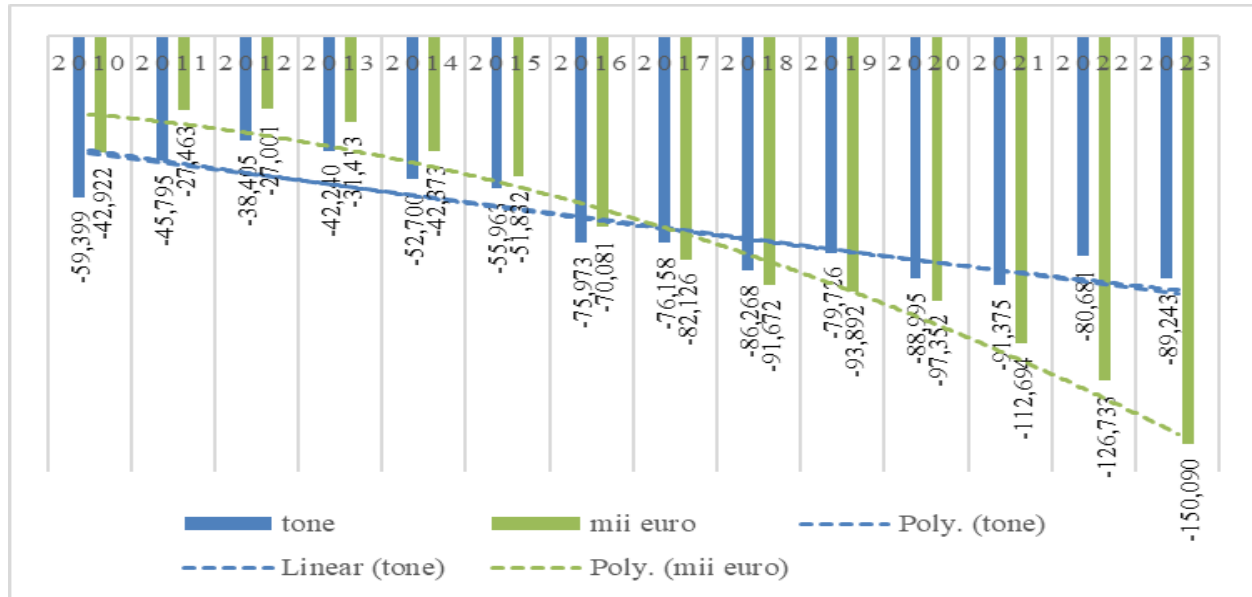


Figure 2. Evolution of tomato import and export in Romania during 2010-2023 (thousands of euros)

Source: TradeMapp database, accessed January 2025, product code 07020.

1. Structure and analysis of production costs included in the production framework technology for tomato cultivation in protected areas, estimates for 2025

In order to assess the economic efficiency of tomato cultivation in protected areas, a minimum level of valorized production of 3,000 kg/1,000 sq m was established, in accordance with the provisions of GD. no. 1342/2024. This regulation is part of the "De minimis aid for the application of the Program to support the production of vegetables grown in protected areas" scheme for the period 2024-2025, a government program aimed at financially supporting vegetable producers in protected areas, in order to stimulate domestic production and support farmers in the face of economic challenges. Thus, this minimum threshold of 3,000 kg/1,000 sq m becomes an essential condition to benefit from the financial aid offered through this program.

Table no. 2. Structure of production costs for tomato cultivation in protected areas – estimates for the production year 2025

Expenses for main production		Value
Total agrotechnical expenses, of which:	Lei/1,000 mp	22,026
	Euro*/1000 mp	4,451
	%	100
Mechanized work	Lei/1,000 mp	1,253
	Euro*/1000 mp	253
	%	5.69
Manual work	Lei/1,000 mp	7,693
	Euro*/1000 mp	1,554
	%	34.93
Raw materials and supplies	Lei/1,000 mp	13,080
	Euro*/1,000 mp	2,644
	%	59.38

*Euro exchange rate = 4,949 lei

Source: own calculations.

From the analysis of the expenses for tomato cultivation in protected areas, for an area of 1000 sq m, agrotechnical expenses totaling 22,026 lei (the equivalent of 4,451 euros) are required. Among these, it can be noted:

- Expenditures allocated to mechanized work, which total 1,253 lei (253 euros), represent only 5.69% of total costs, highlighting a modest contribution of mechanization in the production process.
- Expenses related to manual work amount to 7,693 lei (1,554 euros), representing 34.93% of the total costs. This percentage highlights the significant involvement of the workforce, which is characteristic of crops in protected areas.
- Expenses for raw materials and supplies, which amount to 13,800 lei (2,644 euros), represent 59.38% of total costs. This share reflects the high dependence on inputs such as seedlings, fertilizers, phytosanitary products to combat diseases and pests, irrigation costs, etc.

II. Analysis of the budget of income and expenses for tomato cultivation in protected areas, with and without the application of the program to support tomato production in protected areas

The analysis of the data presented in the revenue and expenditure budget (Table 3) highlights the following aspects:

- At a minimum level of production value of 3,000 kg/1,000 sq m, the financial analysis highlights two distinct variants, depending on the application of the tomato production support program in protected areas. In Variant 1, without subsidies, the total value of production is 24,000 lei (4,849 euros), and the total costs for production are 22,026 lei (4,451 euros). In contrast, in Variant 2, by applying the subsidy in the amount of 14,847 lei (3,000 euros), total revenues increase significantly, reaching 38,847 lei (7,849 euros).

Table no. 3. Income and expenditure budget for tomato cultivation in protected areas – calculations for 1,000 sq m -estimates for the production year 2025 (production 3,000 kg/1,000 sq m)

Nr. Crt.	Indicators	UM	Variant 1*		Variant 2**	
			Lei	Euro	Lei	Euro
1	Production value	lei/euro	24,000	4,849	24,000	4,849
2	Subsidies	lei/euro	0	0	14,847	3,000
3	Gross product	lei/euro	24,000	4,849	38,847	7,849
4	Total expenses	lei/euro	22,026	4,451	22,026	4,451
5	Variable expenses	lei/euro	14,333	2,896	14,333	2,896
6	Fixed expenses	lei/euro	7,693	1,554	7,693	1,554
7	Taxable income	lei/euro	1,974	399	1,974	399
8	Net income + subsidies	lei/euro	1,777	359	16,624	3,359
9	Taxable income rate	%	9	9	9	9
10	Net income rate + subsidies	%	8	8	75	75
11	Breakeven point in value units	lei/euro	19,098	3,859	19,098	3,859
12	Breakeven point in value units	to	2.4	2.4	2.4	2.4
13	Cost of production	lei/euro / t	734	148	734	148
14	Foreseeable price on the domestic market	lei /euro/t	800	162	800	162

*Variant 1 = without applying the tomato production support program in protected areas

**Variant 2 = with applying the tomato production support program in protected areas (3,000 euros/1,000 sq m)

Source: own calculations.

The total costs for both options amount to 22,026 lei (4,451 euros), which represents the estimated cost for obtaining a production of 3,000 kg/1,000 sq m. Of these, variable costs amount to 14,333 lei (2,896 euros), which constitutes 65.1% of the total costs. This highlights the fact that a large part of the production costs are influenced by factors that vary depending on the level of production, such as the purchase of raw materials, irrigation, phytosanitary products, etc. Fixed costs amount to 7,693 lei (1,554 euros), representing 34.9% of the total costs.

- In Variant 1, given that no subsidy is applied, its share in relation to total expenditures is 0%. In contrast, in Variant 2, the planned subsidy covers approximately 67.4% of the total expenditures.
- In both variants, by deducting the total expenses from the production value, a taxable income of 1,974 lei/1,000 sq m (399 euros/1,000 sq m) is obtained. The rate of return is 9%, which suggests a modest profitability of tomato production, even in the variant in which subsidies are applied.
- By deducting the tax, in the case of Variant 1, the net income, including subsidies, reaches 1,777 lei/1,000 sq m (359 euros/1,000 sq m), and the net income rate represents 8% of the total expenses. In the case of Variant 2, by adding the subsidy, the total net income is 16,624 lei/1,000 sq m (3,359 euros/1,000 sq m), and the net income rate increases significantly, reaching 75%. This difference underlines the major impact of subsidies on the profitability of tomato production in protected areas.
- Tomato cultivation in protected areas becomes profitable starting with an estimated average production of 2,400 kg/1,000 sq m, which corresponds to a production value of 19,098 lei/1,000 sq m. This suggests that, even without including subsidies, the crop has positive economic potential.

Conclusion

The analysis of the profitability of tomato cultivation in protected areas provides an essential perspective on the economic sustainability of this agricultural activity, highlighting the role of financial support within the government program to support tomato production in protected areas.

The results of the study show that the financial support granted through the "de minimis" scheme contributes to the increase in farmers' incomes, reaching from an income of 1,777 lei/1,000 sq m (without subsidies) to 16,624 lei/1,000 sq m, which underlines the positive impact of this aid on the profitability of farms and the capacity to develop sustainable production in the long term. Thus, this support becomes an essential resource for Romanian farmers, covering approximately 67.4% of total production costs. In this context, it not only helps to maintain profitability, but also stimulates modern investments and improves production quality, having a positive impact on the entire vegetable sector. The success of this program has led to the extension of support to other crops, contributing to the consolidation of the entire agricultural sector. However, despite the significant increase in tomato production in protected areas in Romania, imports remain quite high, which highlights the need to continue these support programs for Romanian farmers, to ensure a strong and sustainable vegetable sector, capable of facing the challenges of the international market and ensuring long-term food security.

Potential limitations of this study are related to market price fluctuations, climate uncertainties and the long-term sustainability of subsidies. Fluctuations in tomato market prices, driven by seasonal factors and competition from other key products, can affect farmers' financial stability and undermine the effectiveness of subsidies, limiting their ability to invest in modern technologies and maintain consistent production. Additionally, unpredictable climate change may

negatively impact crop yields and quality. Regarding subsidies, instability or reduction of long-term funding sources could lead to economic difficulties for farmers. Therefore, identifying alternative support solutions is crucial for the long-term viability of tomato cultivation in protected areas.

Financial support for vegetables in protected areas is essential for sustaining farmers. Consequently, it is necessary to adjust subsidy policies to better meet their needs, considering market fluctuations and production costs. To this end, ensuring a sustainable long-term funding mechanism by diversifying funding sources is recommended to protect farmers from potential financial instability. Furthermore, alternative support measures should be explored for farmers who do not qualify for subsidies, such as tax incentives, access to favorable loans, or other forms of economic assistance, enabling them to remain competitive and sustainable amidst market challenges.

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