

EVOLUȚIA DINAMICII SECTORULUI DE FRUCTE DIN ROMÂNIA, ÎN PERIOADA 2013-2022

THE EVOLUTION OF THE DYNAMICS OF THE FRUIT SECTOR IN ROMANIA, IN THE PERIOD 2013-2022

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Abstract

The study focuses on analyzing and presenting the evolution of the pomological sector in Romania, both at the national and regional levels, between 2013 and 2022. The data used for this study were collected from various sources, including national statistics, publications, and specialized literature, and were subjected to qualitative research methods for analysis and interpretation. Relevant indicators for the agricultural sector, such as the number of cultivated trees, fruit production, and yield, were included in the study, and their minimum, maximum, and average values for the reference period were calculated and analyzed. Additionally, these indicators were studied at the level of the most important fruit species: apples, pears, plums, cherries, and sour cherries. The analysis of statistical data highlights significant variations in terms of the number of fruit trees and their productions in various development regions of Romania, thus providing insight into the evolution of the sector and guiding potential policies in the field.

Cuvinte cheie: plantație, producție de fructe, indicatori.

Key words: orchard, fruit production, indicators.

1. Introduction

The fruit sector is an essential pillar of Romania's agriculture and economy, having a significant contribution to the total value of agricultural production, and this gives it a strategic importance both for the European agricultural sector and for the approximately 1,000,000 farms specialized in horticulture from the EU. Fruit and citrus production contributes to the preservation of the environment, but also to the stimulation of economic growth, generating many direct and indirect jobs (Leonte et al., 2020).

The competitiveness of the products of the fruit and vegetable sector must be associated with the sustainability of their production. Food safety and security depend to a large extent on the fruit and vegetable sector, even if the eating habits of the Romanian population are not focused on their consumption, but on the consumption of animal products. That is why there is a need for a consolidated system that works regardless of the fluctuations of the various factors that influence it at a given time.

In the last three decades, the fruit-growing sector has registered a steady decline, with a negative impact on rural areas in traditional fruit-growing regions. Agricultural equipment and machinery in fruit farms are old and worn, affecting their productivity and competitiveness. Romania received financial funds from the EU for investments in the fruit-growing sector, including for reconversion and modernization (Chereji et al., 2022). Fruit growers have at their disposal a series of non-refundable funds for the reconversion and establishment of new plantations as well as for the modernization of holdings (Dana et al., 2021; Ciobanu, 2021; Chereji et al., 2022)

Although Romania has favorable pedoclimatic conditions for the production of vegetables and fruits, the agricultural sector is dominated by small and unorganized farms, which sell their products directly at the farm gate. To increase the competitiveness and efficiency of this sector, diversification of the cultivation system and varieties, as well as additional investments, are needed.

Horticulture is an intensive agricultural sector. In order to increase this sector, it is considered necessary to diversify the cultivation system, species and varieties, and additional investments in this field. Intensification of horticultural production focuses on the adoption of more productive and higher quality varieties, as well as strict adherence to agro-technical rules to maximize yield and quality (Turek and Badan, 2017; Badan et al., 2020).

Horticultural researchers, focusing on fruit growing, have looked in depth at aspects related to fruit production and consumer behavior. Analytical methods, including principal component analysis, have been used to better understand fruit production and consumption, contributing to the development of more efficient agricultural practices and consumer-oriented marketing strategies (Goryńska-Goldmann et al., 2023).

2. Material and methods

The study focused on the analysis and presentation of the evolution of the fruit growing sector in Romania in the period 2013-2022. The main aim was to provide a comprehensive perspective on this sector at national and regional level, as well as to make forecasts for future fruit production. To achieve this objective, several research methods were used.

The first method used was "bibliographic analysis", which involved the extraction of official data from the researched field, accessing the database of the National Institute of Statistics. The evolution of the main indicators of the fruit-growing sector, such as the number of fruit trees, fruit production and their yield, was analyzed, with an emphasis on relevant fruit species such as apples, pears, plums, cherries and sour cherries. To highlight the variations recorded during the studied period, variables such as minimum, maximum and average were calculated and analyzed for each tree species. The results of this analysis were presented in tables and graphs.

To make forecasts regarding fruit production, the "forecast" function was used, which allowed the estimation of future levels of production based on historical data and trends observed in the evolution of production. This method provided a systematic and rigorous way to predict the evolution of fruit production, providing essential information for horticultural decisions.

3. Results and discussions

3.1. Analysis of the dynamics of the number of fruit trees in Romania, in the period 2013-2022

At country level, the total average number of fruit trees varied between 73.58 million (in 2020) and 103.61 million (in 2014), the calculated average being 78.96 million trees. The trend is downward during 2014-2020, followed by a slight recovery in 2021-2022. The number of trees increased in 2021-2022 by 1.80%, respectively 3.66% compared to the minimum interval, reached in 2020 (Fig. 1).

We sorted the information according to the average by region and obtained a ranking, in which the South-Muntenia Region is in first place, where the calculated multi-year average varied between 12.9 and 38.2 million trees, followed by the North-West Region where the calculated multiannual average varied between 14.4 and 15.9 million and the Southwest Oltenia Region where the calculated multiannual average varied between 13.2 and 14.5 million trees. Obviously in last place is the Bucharest-Ilfov Region, where the multiannual average varied between 300 - 350 thousand fruit trees (Fig. 2).

Among the eight most important tree species, the paper analyzed only the first ranked ones, in terms of number of trees, productions and yields, namely: plums, apples, pears and cherries. At country level, the number of plums varied between 34.2 million (in 2017) and 60.25 million (in 2014), with a calculated average of 37.4 million plums.

In first place is the South-Muntenia Region, where the number of plums varied between 6.93 - 31.8 million, the calculated multiannual average being 9.8 million plums. In second place is the South-West Oltenia Region with a calculated average of 8.86 million plum trees, their number varying in the studied range between 8.5 - 9.5 million trees. The county with the highest average in terms of the number of plums is Argeş (5,915 thousand trees), followed by Vâlcea with an average of 4,081 thousand plums and Caraş-Severin 2,351 thousand trees (Fig. 3).

At country level, the number of apple trees varied between 23.65 million (in 2019) and 23.62 million (in 2018), with a calculated average of 25.5 million apple trees. In first place is the North-West Region, where the number of apple trees varied between 6.6 - 7.5 million, the calculated multiannual average being 7,048,362 apple trees. In second place is the North-East Region with a calculated average of 4,835,309 apple trees, their number varying in the range studied between 3.9 and 8.7 million trees. In third place is the Center Region with a calculated average of 3,915,541 apple trees, their number varying in the studied interval between 3.5 - 4.8 million trees. The county with the highest average number of apple trees is Maramureş (2,819 thousand trees), followed by Suceava with an average of 1,635 thousand apple trees and Bistriţa-Năsăud 1,548 thousand trees (Fig. 4).

At country level, the number of pears varied between 3.1 million (in 2019) and 3.5 million (in 2013), with a calculated average of 3.3 million pears. The trend is downward during 2013-2019, followed by a slight recovery in 2020-2022. The number of trees increased in 2020-2022 with percentages that varied between 3.18% and 5.86% compared to the minimum interval, reached in 2019. The Sud-Muntenia Region is in first place, where the number of pears varied between 700 thousand - 766 thousand, the calculated multiannual average being 715 thousand. In second place is the North-West Region with a calculated average of 609 thousand pear trees, their number varying, in the studied interval, between 581 - 780 thousand trees. In third place is the North-East Region with a calculated average of 580 thousand pear trees, their number varying in the studied interval between 530 - 662 thousand trees. The county with the highest average number of pear trees is Argeş (275,000 trees), followed by Suceava with an average of 180 thousand pear trees and Prahova 177,000 trees (Fig. 5).

At the country level, the number of cherries varied between 5.32 million (in 2018) and 5.64 million (in 2013), with a calculated average of 5.44 million cherries. The trend is sinuous throughout the analyzed period. In first place is the North-East Region, where the number of cherry and cherry trees varied between 1.40 -1.57 million, the calculated multiannual average being 1.5 million cherry trees. In second place is the North-West Region with a calculated average of 796,255 cherry trees, their number varying, in the studied interval, between 756 thousand - 841 thousand trees. In third place is the South-West Oltenia Region with a calculated average of 791,628 cherry trees, their number varying in the studied interval between 776 thousand and 810 thousand trees. The county with the highest average number of cherries and sour cherries is Iasi (624 thousand trees), followed by Prahova with an average of 263 thousand nectarines and Timiș with 246 thousand trees (Fig. 6).

3.2. Analysis of the dynamics of fruit production in Romania, in the period 2013-2022

The value of fruit production, in 2022, at the European level was 26,059.68 million euros, while in Romania it was 1,079.50 million euros and represented 4.14% of that of the EU-27. With this level of the value of fruit production, Romania ranked 7th in the EU-27. In Europe, the highest values of fruit production were achieved in Spain (7,915.85 million euros), Italy (4,412.22 million euros), Greece (2,814.27 million euros), France (2,494.68 million of euros), Portugal (1,767.45 million euros) and Poland (1,566.42 million euros). The dynamics of the value of fruit production, in 2023 compared to 2022, was negative both at the European level, where a decrease of 5.28% was recorded, and at the level of Romania, where a decrease of 11.39% was recorded.

To analyze fruit production in Romania, during the study period 2013-2022, we accessed the data available in the databases of the National Institute of Statistics. We calculated the minimum, maximum and averages for the whole country and for each variety of fruit. Thus, at country level, the average fruit production varied between 1.06 million tons (in 2017) and 1.8 million tons (in 2018), the calculated average being 1.4 million tons.

The trend of fruit production was winding during the analyzed period. In first place, in terms of fruit production, is the South-Muntenia Region, varying between 213.2 - 441 thousand tons, the calculated multiannual average being 320 thousand tons. In second place is the North-West Region with a multiannual average of 290 thousand tons, and in third place is the South-West Oltenia Region with a calculated multiannual average of 251 thousand tons. At the county level, Argeșul had the highest multiannual average of 117.50 thousand tons, followed by Dâmbovița with 112.60 thousand tons and Vâlcea with 93.8 thousand tons. The fourth place - Prahova - remains far behind with only 63.84 thousand tons (Table 1).

From the analysis of the statistical data available in the database of the National Institute of Statistics, it emerged that the fruits with the highest production in Romania are plums, with a weight of 45.85% of the total multi-annual average quantity per country. In first place, in terms of plum production, is the South-West Oltenia Region, varying between 118 thousand tons and 205 thousand tons, the calculated multiannual average being 153 thousand tons. In second place is the South-Muntenia Region with a multiannual average of 150 thousand tons, and in third place is the North-West Region with a calculated multiannual average of 107 thousand tons. At the county level, Argeșul had the highest multiannual average of 63.98 thousand tons, followed by Vâlcea with 58.97 thousand tons and Dâmbovița with 40.27 thousand tons. In fourth place is Prahova County with only 38.10 thousand tons (Table 2).

The next ranked in importance is apple production, which holds 37.74% of the total average fruit production, at the country level. In first place, in terms of apple production, is the Northwest Region, varying between 86 thousand tons - 151 thousand tons, the calculated multiannual average being 129.6 thousand tons. In second place is the South-Muntenia Region with a multiannual average of 118,856 tons, and in third place is the North-East Region with a calculated multiannual average of 87,832 tons. At county level, Dâmbovița County had the highest multiannual average of 58.97 thousand tons, followed by Maramureș with 40.36 thousand tons and Argeș with 39.18 thousand tons. In fourth place is Suceava County with only 35.99 thousand tons (Table 3).

In third place in terms of importance is pear production with a calculated weight of 3.89% of the total multi-year average total production. In terms of pear production, the South-Muntenia Region is in first place, varying between 11 thousand -19 thousand tons, the calculated multiannual average being 14.7 thousand tons. In second place is the Northeast Region with a multiannual average of 9,313 tons, followed by the Northwest Region with a calculated multiannual average of 8.5 thousand tons. At county level, Argeș County had the highest multi-annual pear average of 5.84 thousand tons, followed by Dâmbovița with 4.45 thousand tons and Suceava with 3.18 thousand tons. In fourth place is Prahova County with only 2.61 thousand tons (Table 4.).

Fifth in the top of fruit productions is the production of cherries and sour cherries, with a share of 2.30% of the total multi-year average total production. Thus, the North-East Region is in first place, varying between 17 thousand tons and 27 thousand tons, the calculated multiannual average being 21.9 thousand tons. In second place is the South-East with a calculated multiannual average of 10.9 thousand tons. At county level, Iași County had the highest multiannual average of 9.07 thousand tons, followed by

Botoșani with 3.47 thousand tons and Mehedinți with 3.32 thousand tons. In fourth place is Vaslui County with only 3.03 thousand tons (Table 5).

3.3. Analysis of the dynamics of fruit production yields in Romania, in the period 2013-2022

Starting from the calculated minimum, maximum and average productions, as well as from the minimum, maximum and average number of trees per development region and county, we calculated the yields for each analyzed tree species.

For plums, the best yield is in the North-West Region with a calculated average of 19.68 kg/tree, followed by the South-East Region with an average calculated yield of 18.72 kg/tree and the South-West Oltenia Region with 17.87 kg/tree. However, the county with the highest calculated average yield for plums is Dâmbovița with 24.75 kg/tree, from the South-Muntenia Region, followed by Timiș with 22.68 kg/tree and Cluj 21.47 kg/tree.

In the case of apples, the highest calculated average yield is found in the South-Muntenia Region (32.71 kg apples/tree). In second place, at a great distance, we find the South-West Region of Oltenia with 23.64 kg of apples/tree and the North-West Region with 18.39 kg of apples/tree. The counties with the best apple yields are Suceava (86.84 kg apples/tree), Mureș (57.63 kg apples/tree), Maramureș (56.89 kg apples/tree) and Bistrița-Năsăud (56.18 kg apples/tree).

For pears, the average yields were calculated, so that the South-Muntenia Region is in first place with 20.62 kg pears/tree, the South-West Oltenia Region is second (16.76 kg pears/tree) and the Region third Southeast (16.73 kg pears/tree). By county, the best pear yield is found in Bistrița-Năsăud County with 19.75 kg pears/tree, followed by Cluj (18.71 kg pears/tree), Bihor (14.68 kg pears/tree) and Sălaj (14.66 kg pears/tree).

Cherry and sour cherry are a bit demanding, therefore the calculated yields are approximately equal in 4 of the 8 development regions of the country, respectively the South-West Oltenia Region (14.77 kg of cherries/cherries per tree), the South-Muntenia Region (14.75 kg of cherries per tree), the North-East Region (14.55 kg of cherries per tree) and the South-East Region (14.07 kg of cherries per tree).

The first two ranked counties have close calculated yields, respectively Argeș with 18.99 kg of cherries per tree and Botoșani with 18.74 kg of cherries per tree. The next ranked, with a difference of about 1.5 kg, is Vrancea with 17.58 kg of cherries per tree.

3.4. Fruit production forecasts.

According to forecasts, the total fruit production is expected to reach 2.25 tons by the year 2035. This is a significant increase, considering the previous trends and technological and agricultural developments that can contribute to this growth (Fig. 7).

Plum production is expected to increase substantially between 2023 and 2035, reaching 1.27 million tons (Fig. 8). This growth, double compared to the year 2022, can be attributed to a series of factors such as the improvement of agricultural technologies, financial and political support, market demands.

Apple production is expected to reach 1.27 million tons by 2035. This increase can be the result of: adaptation to climate change, expansion of cultivated areas, improvement of agricultural practices.

Regarding pear production, forecasts suggest that it will remain stable at approximately 48.16 thousand tons until 2035.

Forecasts indicate a downward trend for the production of cherries, a phenomenon also observed in the growth rate from 2013-2022.

In order to maximize the growth potential of fruit production until 2035, a series of interventions are considered necessary such as: the promotion and financing of modern agricultural technologies, favorable policies, the creation and implementation of government policies to support the agricultural sector, research and development, education agricultural, adaptation to climate change.

4. Conclusions

In Romania, the restructuring of the fruit production system is a priority objective of the strategy of the fruit sector in order to improve the use of resources. Although the current yields are modest, there is considerable potential that can support economic growth and efficient management of resources. In order to achieve this objective, it is necessary to develop specific strategies for each culture, taking into account the evolution of the market, the demand of the population and the purchasing power, in the context of the development of the national economy.

The detailed analysis of the production of fruit trees in Romania reveals significant variations in terms of the total number of trees and their distribution by region and species. Although there has been a slight increase in recent years, some regions stand out for the large number of trees, such as Sud-Muntenia, while others, such as Bucharest-Ilfov, record lower numbers. The analysis of tree species shows different developments, with some being stable or increasing, while others have had significant fluctuations.

In the period 2013-2022, fruit production in Romania contributed significantly to the economy, although its value remains modest compared to other European countries. However, there is potential for improvement and growth in this area. The performance of the sector varies by region and county, with certain areas standing out for outstanding production of plums, apples, pears, cherries and sour cherries. Forecasts indicate a significant increase in production until 2035, with a focus on plums and apples, due to technological advances and political support.

The fruit sector in Romania represents an essential pillar of national agriculture, with great potential for growth and development. Appropriate investment and supportive policies can make a significant contribution to the national economy and the well-being of rural communities.

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References

1. Bădan D.N., Ilie D.M. & Marin A., 2020. Analysis of Romania Fruit And Vegetable Sector Compared With Other Eu Countries During The Period 2007-2018, Published in Scientific Papers. Series "Management, Economic Engineering in Agriculture and rural development", Vol. 20.
2. Chereji A.I., Maerescu C.M., Lazăr A.N., Mintaş O.S., Gîtea E.A., 2022. The evolution of the tree fruit sector in the context of national rural development programme 2014-2020 support at the level of the north west region, *Annals of the University of Oradea, Fascicle: Ecotoxicology, Animal Science and Food Science and Technology* 2022.
3. Ciobanu Banța A., 2021. National rural development programmes during the transition period. Financing the fruit-growing sector (2021-2022). *JOURNAL of Horticulture, Forestry and Biotechnology*, 25(3): 26-30.
4. Dana D., Chiurciu I.A., Firatoiu A.R., Chereji A.I., 2021. Applying the expert system-crom for the management of peach tree lands and orchards peach. *Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development* 21(1): 155-161.
5. Leonte E., Chiran A., Ungureanu G., Robu M., Fronea A.M., 2020. The Main Technical-Economic Aspects of the Fruit Market at Research and Development Station for Fruit Growing Iași, *BulletinUASVM Horticulture* 77(1).
6. Turek-Rahoveanu P.A., Bădan D.N., 2017. The evolution of the fruit sector in Romania between 2010-2016, In: *Agrarian Economy and Rural Development - Realities and Perspectives for Romania*. 8th Edition of the International Symposium, November 2017, Bucharest, The Research Institute for Agricultural Economy and Rural Development (ICEADR), Bucharest, pp. 124-129.
7. European Commission, National strategy for operational programs in the fruit and vegetable sector, https://ec.europa.eu/info/sites/info/files/food-farmingfisheries/plants_and_plant_products/documents/fruitveg-national-framework-romania_ro.pdf, 2020.
8. Goryńska-Goldmann E., Murawska A., Balcerowska-Czerniak G., 2023. Consumer Profiles of Sustainable Fruit and Vegetable Consumption in the European Union. *Sustainability* 15, 15512. <https://doi.org/10.3390/su152115512>.
9. INSSE, <http://statistici.insse.ro:8077/tempo-online/>

Tables and figures

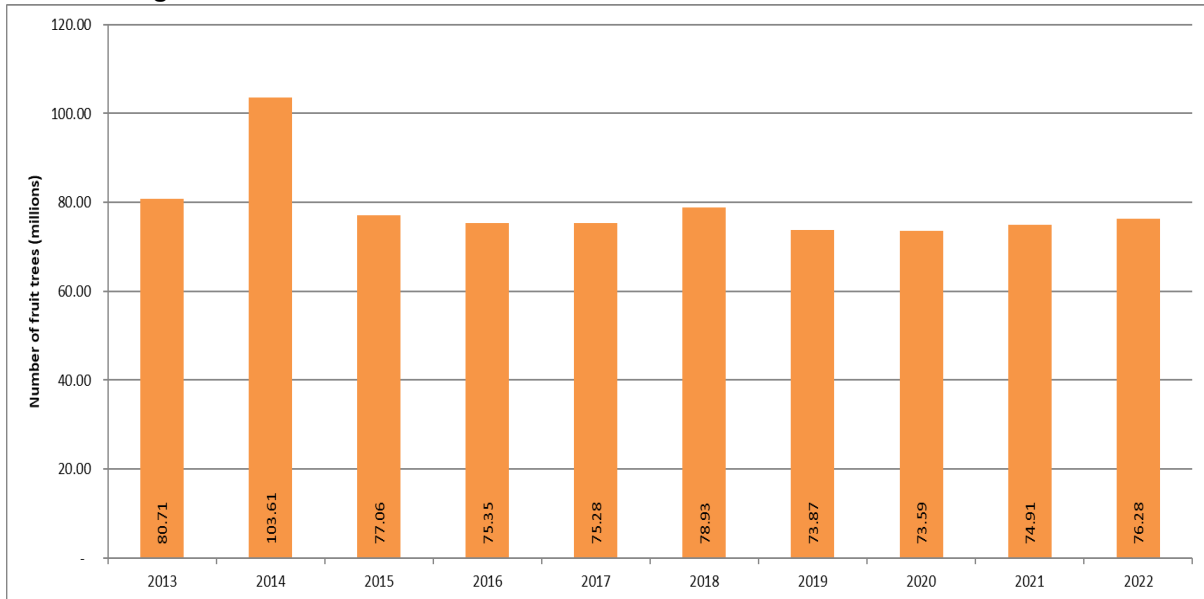


Fig. 1. Average number of fruit trees at country level, calculated for 2013-2022 (INSSE, accessed 19.01.2024)

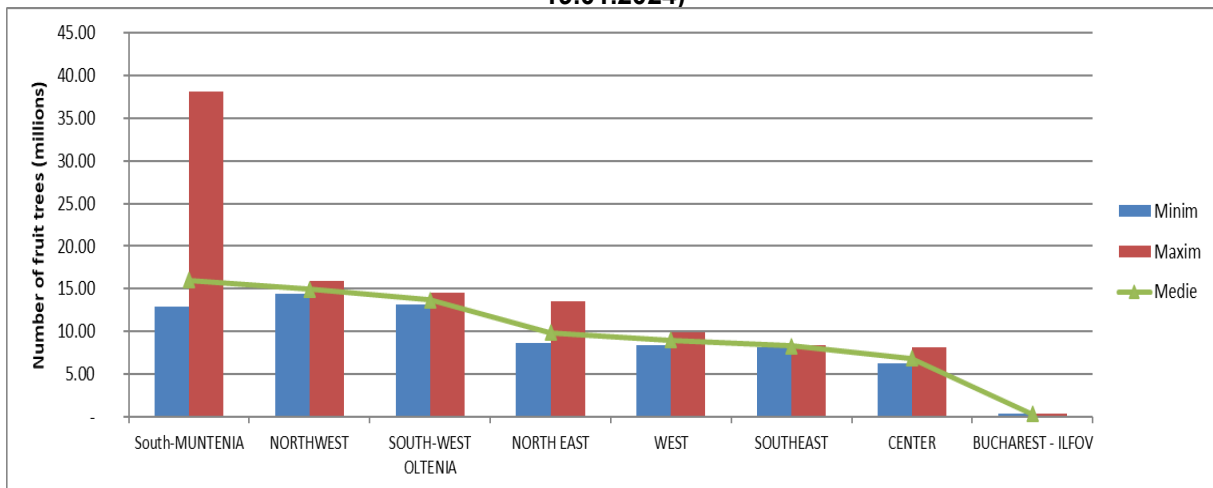


Fig. 2. Average number of fruit trees at the level of development regions, calculated for 2013-2022 (INSSE, accessed 19.01.2024)

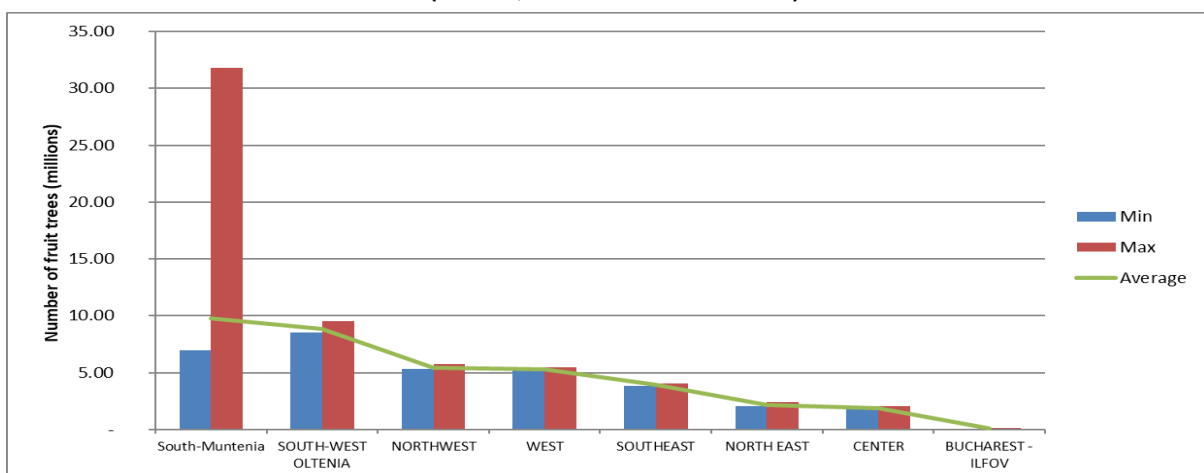


Fig. 3. Average number of plums at the level of development regions, calculated for 2013-2022, (INSSE, accessed 19.01.2024)

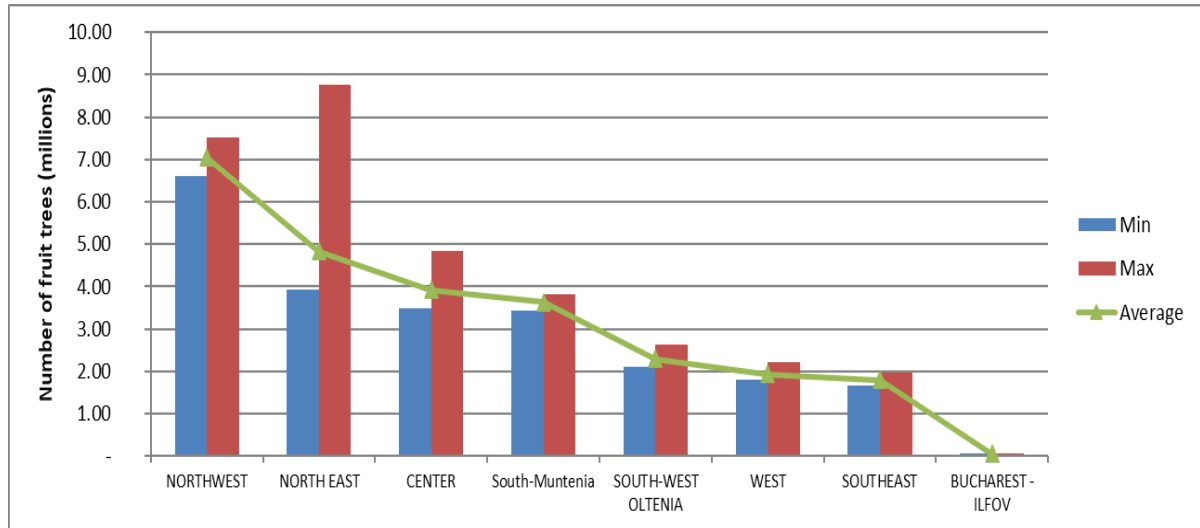


Fig. 4. Average number of apple trees at the level of development regions, calculated for 2013-2022 (INSSE, accessed 19.01.2024)

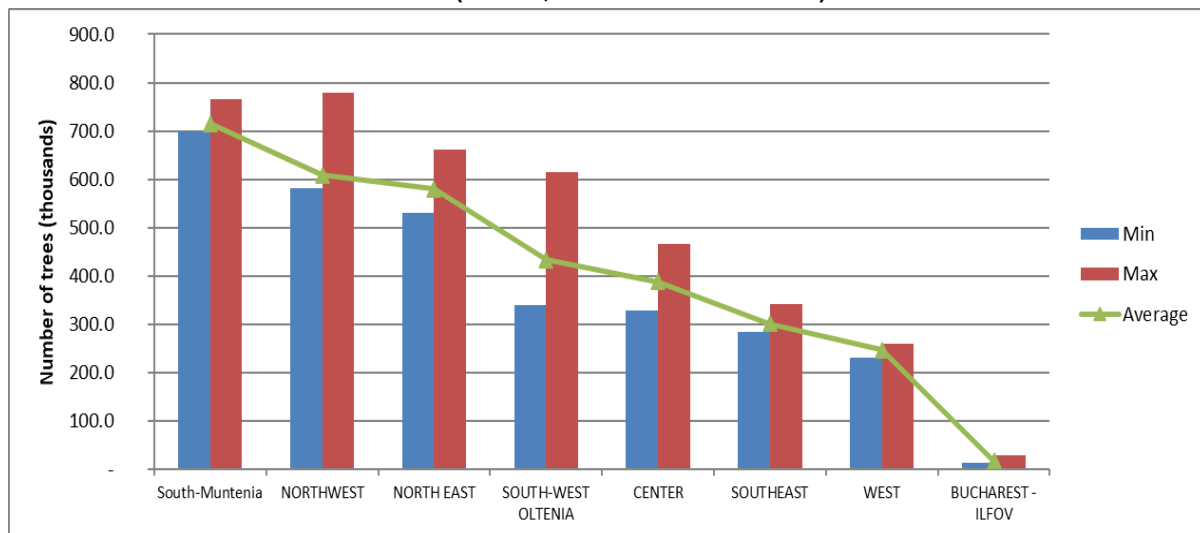


Fig. 5. Average number of pear trees at the level of development regions, calculated for 2013-2022, (INSSE, accessed 19.01.2024)



Fig. 6. Average number of cherry trees at the level of development regions, calculated for 2013-2022 (INSSE, accessed 19.01.2024)

Table 1. Fruit production indicators at the level of development regions (tons)

Region	Min	Max	Average
SOUTH-MUNTENIA region	213,173	440,965	319,995
NORTH-WEST region	210,877	344,835	289,936
SOUTH-WEST OLTENIA region	193,694	329,624	251,164
NORTH-EAST region	147,555	213,795	177,818
SOUTH-EAST region	110,378	182,802	144,917
WEST region	93,581	180,009	125,666
CENTER region	77,392	137,223	107,153
BUCHAREST - ILFOV region	3,111	5,052	4,000
TOTAL	1,058,494	1,813,420	1,420,649

Source: INSSE database, accessed 19.01.2024

Table 2. Plum production indicators at the level of development regions (tons)

Region	Min	Max	Average
SOUTH-WEST OLTENIA region	117,991	205,343	152,770
SOUTH-MUNTENIA region	96,192	196,882	149,483
NORTH-WEST region	72,144	145,457	106,868
SOUTH-EAST region	48,612	98,582	73,227
WEST region	51,633	111,141	73,025
NORTH-EAST region	29,063	59,201	41,722
CENTER region	20,373	44,914	29,825
BUCHAREST - ILFOV region	410	850	612
TOTAL	444,922	842,132	627,531

Source: INSSE database, accessed 19.01.2024

Table 3. Indicators on apple production at the level of development regions (tons)

Region	Min	Max	Average
NORTH-WEST region	86,465	150,705	129,607
SOUTH-MUNTENIA region	67,600	182,390	118,856
NORTH-EAST region	71,545	107,993	87,832
CENTER region	40,013	73,314	61,347
SOUTH-WEST OLTENIA region	37,620	76,112	54,314
SOUTH-EAST region	22,982	37,449	32,843
WEST region	21,217	44,346	31,207
BUCHAREST - ILFOV region	349	607	473
TOTAL	348,656	643,856	516,479

Source: INSSE database, accessed 19.01.2024

Table 4. Indicators on pear production at the level of development regions (tons)

Region	Min	Max	Average
NORTH-WEST region	6,832	10,011	8,508
CENTER region	3,735	5,703	4,648
NORTH-EAST region	7,684	12,740	9,313
SOUTH-EAST region	3,689	6,804	5,041
SOUTH-MUNTENIA region	10,984	19,150	14,745
BUCHAREST - ILFOV region	164	367	254
SOUTH-WEST OLTENIA region	5,067	8,371	7,262
WEST region	2,821	4,651	3,487
TOTAL	45,230	66,849	53,255

Source: INSSE database, accessed 19.01.2024

Table 5. Cherry and sour cherry production indicators at the level of development regions (tons)

Region	Min	Max	Average
NORTH-WEST region	7,716	11,731	10,302
CENTER region	3,093	6,013	4,534
NORTH-EAST region	16,799	27,001	21,873
SOUTH-EAST region	8,836	12,732	10,809
SOUTH-MUNTENIA region	8,359	13,189	10,818
BUCHAREST - ILFOV region	629	1,234	851
SOUTH-WEST OLTENIA region	8,622	14,401	11,695
WEST region	3,815	5,673	5,018
TOTAL	58,474	90,837	75,901

Source: INSSE database, accessed 19.01.2024

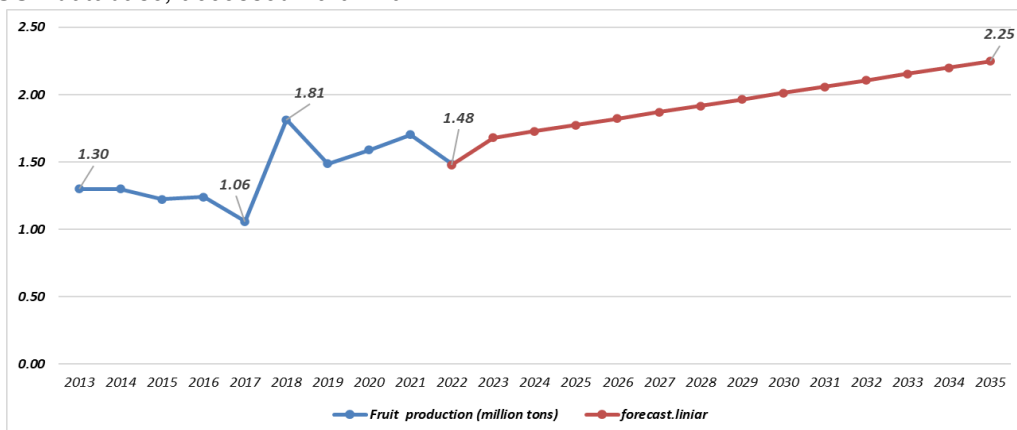


Fig. 7. Forecast of fruit production at the national level, (INSSE processed data)

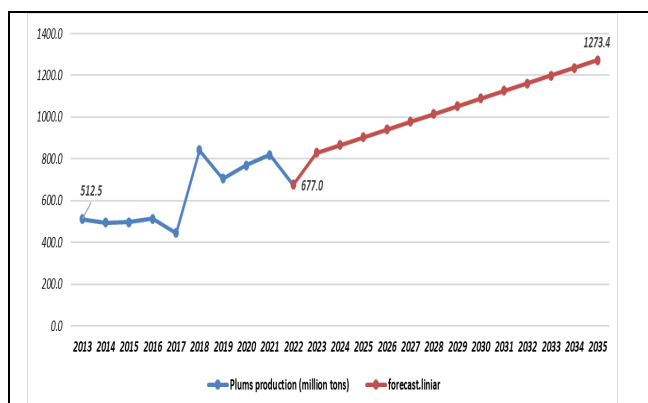


Fig. 8. Plum production forecast at the national level, (INSSE processed data)

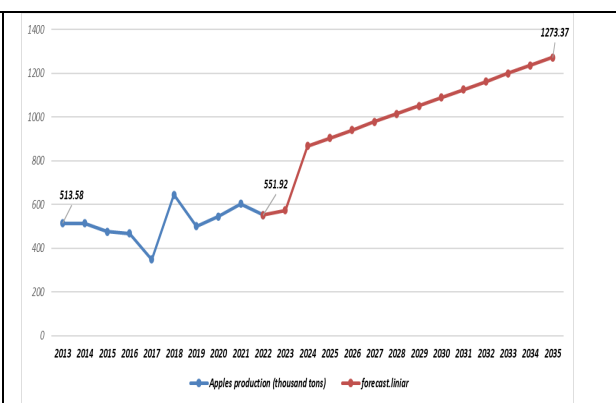


Fig. 9. Forecast of apple production at national level, (INSSE processed data)

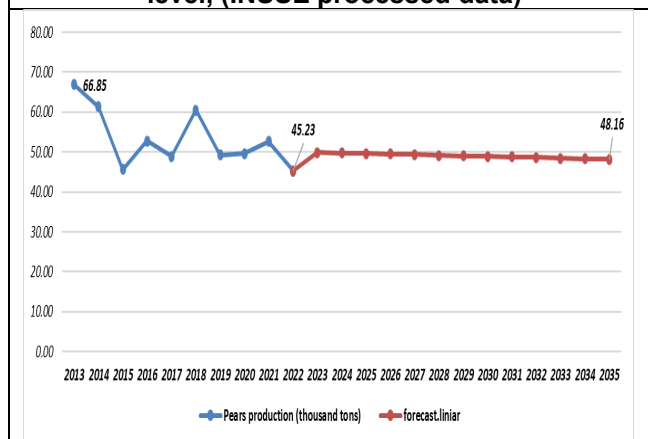


Fig. 10. Pear production forecast at the national level, (INSSE processed data)

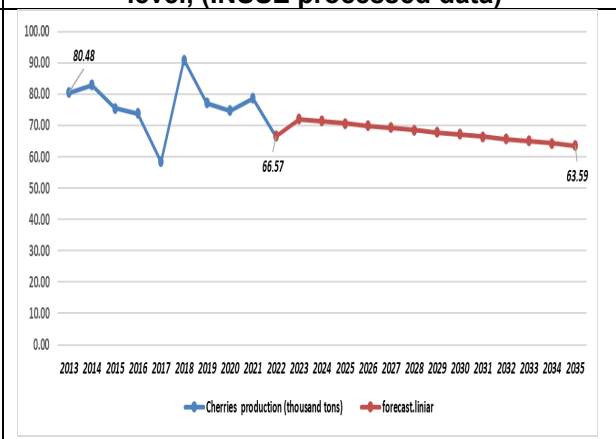


Fig. 11. Cherry production forecast at national level, (INSSE processed data)