

ASSESSING THE APPLE SECTOR IN ROMANIA AND INSIGHTS ON THE CONSUMPTION

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Abstract

The present work proposes as an area of analysis the apple sector and the characteristics of apple consumption in Romania. For this, a theoretical and applied documentation of different approaches in specialized works was made. A series of themes and methods used were identified. In our article we addressed the descriptive analysis of the data procured from national and international databases. The results were presented in the form of tables, graphs and figures. Thus, we were able to note the fact that Romania is part of the top five European countries producing apples, owning areas and an important number of orchards. In order to complete the study and obtain some results on the consumption of apples in Romania, we applied a questionnaire, to which 663 valid answers were obtained, they showed us a complex profile of consumers of fresh apples in our country.

Key words: apple, Romania, survey, consumption

INTRODUCTION

It is known that in Romania there is a tradition in the cultivation of fruits. The share is 38.25% in the private system, and 30.06% is found in the individual family farm system, the farms with large areas being quite small, and many plantations are abandoned or aging. This led to a decrease in the production levels of domestic products, turning Romania from a predominantly exporting country into a fruit importing country. Although at the beginning of the 2000's there were legislative initiatives [11] regarding a national strategy aimed at increasing the competitiveness of Romanian products for export and thus, increasing the degree of employment in related fields. There was also a project on the strategy for the development of the agri-food sector in the medium and long term – on a period 2020-2030 [9]. In this sense, it is confirmed that there is a need for a reorganization of the system of production and utilization of fruits, considering the pedo-climatic conditions of our country. Although Romania's soil and climate offer favourable conditions for the

cultivation of trees up to altitudes of almost 800 m, the total area cultivated with fruit trees is reduced, in 2020 being approximately 138 thousand ha, representing only 1% of the country's agricultural area, the plantations of apple occupying an area of 57,100 ha, a large part of which is in decline. At the European level, in the top 5 countries with areas cultivated with apple crops (EU-25), Romania is also on the 4th place, with a percentage of 11.1%, after Turkey, Poland - the main producer of apples in the EU by volume, the ranking being completed by France.

In order to carry out the present work, a documentation of the existing literature was made, on the subject addressed. Thus, we will mention part of the research that focused on the production and consumption of apples.

The hypothesis that there is a decrease in the apple consumption, has been taken into consideration by several authors. Thus, researchers covered a higher range of approaches evaluating that “in high-income markets where more local food production and consumption is desired, where consumers are increasingly conscious about seasonality,

a large choice of products, and health issues, the traditional apple may not have a bright future. In fact, a rather low-income elasticity of apples reflects the fruit's low attractiveness to food consumers".

Moreover "strategies of the apple industry to win back lost buyers in such markets may include variety innovation in particular to improve on the fruit's health properties and smaller and softer fruits to cater for the needs of aging consumers" [6]. Another paper started from the idea that "per capita apple consumption is falling in many European countries while overall fruit intake is growing or is stable, and consumption of other fruits is increasing" and concluded that "for the European apple growing industry, the decline in local per capita apple consumption may not be an economic problem if the industry decides to focus on emerging markets in the future. However, innovating fruit quality and better satisfying apple consumer preferences in high-income markets may prove to be more challenging" [1].

There are also papers that studied in depth the disease recognition of apples and inspection of quality of fruits where different types of diseases exist in different fruits. This kind of research is focus on quality evaluation of apple fruit [13].

Approaching a nutritional side of the apples consumption it was observed "an increasing appreciation and understanding of the link between dietary fruit and vegetable intake and improved health in humans" [8].

A more general approach of a paper stated that the apples are widely produced in temperate regions, "the fruit color development in apple is a major focus for both breeders and researchers as consumers associate brightly colored red apples with ripeness and a good flavor" [2].

There was also another kind to approach different types of apples, analyzing the shape of leaves. "The geometry of the leaf was studied by fractal analysis in order to characterize the cultivars studied. Regression analysis revealed the relationship of interdependence between leaf area and fractal dimensions for each apple cultivar" [12]. One

paper focusing on the storage impact of apples, has shown that "correlating the results regarding storage losses, sensory properties and changes in major chemical components", and so, it can conclude that with a proper storage will lead to minimal losses in the quantity and quality fruits [3].

Another practical approach on the apples sector and the impact on the environment by using special measures stated that "Apple orchards and farmlands were graded with additional points starting from 36 to 100 by implementing the Expert System CROM and were classified into three classes: unrestricted, with some restrictions and unsuitable for apple cultivation" [4].

One paper that also used survey as tool for analyse the apple orchard found that "owners wanted to know both the consumers' perception of the apple juice they produce and market, as well as finding solutions to improve their marketing activity so that their products are as attractive as possible" [10].

A more complex method to take into consideration when approaching the apple orchard is the LCA (Life Cycle Assessment), which can conclude on a wide field of interest, including the impact on the environment. In this specific paper, the authors used the apple as a case study and "an LCA method was performed to obtain the impacts associated with young and old low productive trees, alongside those associated with trees in full production" [7].

This standardized method (LCA) focused on the environment impact has been covered in a wide range of fields and it is now used also in agriculture, horticulture etc. The paper mentioned below confirm once again that "Life Cycle Assessment is a valuable tool in identifying environmental hotspots, which can help inform targeted change to address sustainable concerns, where hard apple cider can be a component of sustainable agriculture as a means for low-impact, high-profit added value for an apple orchard" [14].

Sometimes, together with LCA method, there is a complementary method focused more on the monetary side of a field. This is the LCCA (Life Cycle Cost Analysis) method. There is a

paper aimed “to establish a framework based on the two mentioned methods in order to select the best parameters of apple technology by identifying the particularities of fruit production technologies and providing practical recommendations on how to approach the two methods” [15].

Covering a relatively small part of the literature, we can conclude that there is a clear need for more research and innovation in the field of apple orchards and further in the industry transformation for one simple reason - increase high quality consumption of these fruits and so, research papers and progress will certainly be requested.

MATERIALS AND METHODS

The present article considered information regarding the orchard sector, more precisely the existing apple orchards. These were obtained by querying national and international databases. Thus, descriptive analysis methods were used on the data processed from the National Institute of Statistics (NIS) and Eurostat. With the help of these data, the dynamics of surfaces, productions, the number of trees and consumption in Romania and in some European countries were presented. In this sense, the graphic and tabular presentation was part of the methodology used to create this article. Also, a questionnaire was created (Google form) regarding the consumption of apples among the population of our country, which was disseminated online. Thus, we received the answers from 663 people. For the analysis and interpretation of the results, we used as a method the analysis of the frequencies of certain answers. The processing and interpretation of the questionnaire results using the SPSS program. In this sense, we followed the structuring of the results by age, gender, area of residence, education, job, etc. Then, we drew the profile of the consumer by the number of apples consumed, the type of apples, the place of supply for them, the influence of advertising on the products, the reason why they consume

apples/fruits and the preference for domestic or imported fruits.

RESULTS AND DISCUSSIONS

Fruits are consumed as food or as vitamin supplements in the human diet, so the consumer is more oriented towards the quality and taste of the fruits, being generally willing to recognize these elements with a distinctive character, at a higher price.

Dynamics of surfaces and productions at European level

Although Romania ranks 4th in the area cultivated with apples, and the production is on an upward trend, we depend more and more on the import of apples.

Also, in the average annual consumption of apples/capita, an increase of 129.33% was observed, from 22.5 kg of apples/capita in 2010, to a consumption of 29.1 kg of apples/capita in 2020. According to Table 1 (Surface occupied by apple orchards), we can see that at the European level, in 2017, in the top 5 European countries, Romania is also included with a percentage of 11.1%, occupying the 4th place (out of the total the group of the first 5 large apple growers), after Turkey (34.95%), Poland with 32.46%, and Italy, which is very close to our country, with a percentage of 11.44%. France (10.05%) is the last of the top 5 countries with areas cultivated with apples, but very close to the percentages of the last 2 states.

In the period 2018 - 2020, the ranking of the surfaces is preserved, Romania oscillating insignificantly and thus occupying a percentage between 10.72% and 10.9%. In 2021, the situation changes, with Romania rising to 3rd place with a percentage of 15.38%, Germany reaching 2nd place, two new apple-growing states appearing, Spain and Hungary, with 12.36% and 11.35%, respectively, Turkey and France not being in the top 5 European countries with areas of apple orchards.

From the point of view of production, in the period 2017 - 2020, the EU-5 top of the 5 European apple-producing countries is correlated with the cultivated areas, Turkey

being the top producer with an average of 30.76% in this period of 4 years, followed by Poland, with an average of 27.37% (Table 2).

Table 1. Area (cultivation/harvested/production) (1,000 ha), fresh consumption

Country	2017	% from top EU-5	Country	2018	% from top EU-5	Country	2019	% from top EU-5	Country	2020	% from top EU-5	Country	2021*	% from top EU-5
Turkey	175.0	34.9%	Turkey	175.0	34.8%	Turkey	174.0	35.7%	Turkey	171.0	35.60%	Poland	175.0	50.6%
Poland	162.5	32.5%	Poland	166.2	33.0%	Poland	155.6	31.9%	Poland	152.00	31.6%	Italy	54.2	15.7%
Italy	57.3	11.4%	Italy	57.4	11.4%	Italy	55.0	11.3%	Italy	54.91	11.4%	Romania	53.2	15.4%
Romania	55.6	11.10%	Romania	53.9	10.7%	Romania	52.7	10.8%	Romania	52.34	10.9%	Germany	33.9	9.8%
France	50.3	10.1%	France	50.5	10.1%	France	50.4	10.3%	France	50.15	10.4%	Spain	29.5	8.5%
Total top EU-5	500.7	100%	Total top EU-5	503.1	100%	Total top EU-5	487.7	100%	Total top EU-5	480.40	100%	Total top EU-5	345.8	100%

Source: own processing, based on Eurostat database [5].
 *Apples for fresh consumption; no data for fruit processing.
 *Data for 2021 is to be confirmed. Not validated yet.

At the same time, Italy and France remain on the 3rd and 4th places, but Romania is no longer included in this classification, appearing as a top 5 European producer, only from 2021, with a percentage of 11.75%, occupying the 4th place, with a small difference from Hungary on the 5th place

(11.35%), now included in this ranking, of the 5 years studied in our article. In 2021, Spain also entered the market with apple production, occupying a percentage of 12.36%, on the 3rd place in the top EU - 5 productions at the European level.

Table 2. Harvested production in EU standard humidity (1,000 t), fresh consumption

Country	2017	% from top EU-5	Country	2018	% from top EU-5	Country	2019	% from top EU-5	Country	2020	% from top EU-5	Country	2021*	% from top EU-5
Turkey	3,032.0	31.24%	Poland	3,999.5	30.69%	Turkey	3,619.0	30.80%	Turkey	4,300.0	33.18%	Italy	2,149.1	44.33%
Poland	2,441.4	25.15%	Turkey	3,626.0	27.83%	Poland	3,080.6	26.22%	Poland	3,554.3	27.43%	Germany	979.4	20.20%
Italy	1,912.27	19.70%	Italy	2,466.9	18.93%	Italy	2,303.7	19.61%	Italy	2,462.4	19.00%	Spain	599.4	12.36%
France	1,723.1	17.75%	France	1,740.4	13.36%	France	1,753.5	14.93%	France	1,619.9	12.50%	Romania	569.8	11.75%
Germany	596.67	6.15%	Germany	1,198.5	9.20%	Germany	991.45	8.44%	Germany	1,023.3	7.90%	Hungary	550.5	11.35%
Total top EU-5	9,705.5	100.00%	Total top EU-5	13,031.4	100.00%	Total top EU-5	11,748.2	100.00%	Total top EU-5	12,959.9	100.00%	Total top EU-5	4,848.2	100.00%

Source: own processing, based on Eurostat database [5].
 *Apples for fresh consumption; no data for fruit processing.
 *Data for 2021 is to be confirmed. Not validated yet

In Table 3, it was summarized Romania's position in relation to the European average, regarding the area and production of fresh

apples intended for consumption in the period 2016-2020.

Table 3. Area and production of apples* in the EU-27** and shares for Romania

	2016	2017	2018	2019	2020
Apples Area (1000 ha) for fresh consumption, EU-27	506.48	505.55	507.24	491.08	484.01
Total Area, of which % Romania din UE 27	10.96%	11.00%	10.63%	10.74%	10.81%
Apples harvested production (1000 t) for fresh consumption, EU-27	12,112.22	9,594.86	13,333.43	11,585.41	11,832.51
Total production, of which % Romania din UE 27	3.77%	3.54%	4.76%	4.25%	4.54%

Source: own processing, based on Eurostat database [5].
 *Apples for fresh consumption; no data for fruit processing.
 **EU-27, from 2020

The area cultivated with apples for fresh consumption, at the EU-27 level, in the period 2016 - 2020, was on average 498.87 thousand ha, of which Romania, on average, owns 10.82% of this area. Analyzing the production of apples for fresh consumption, at the EU-27 level, in the period 2016-2020, an average of 11,693.68 thousand tons were recorded over the 5 years analyzed, with a peak in 2018, when - they produced 13,333.43 thousand

tons of apples. From the average production at the EU-27 level, Romania produced a relatively small amount, covering a percentage of only 4.17% of the production.

Dynamics of the apple sector in Romania

Below, in Figure 1, we have represented the share of the number of apple trees in the total number of fruit trees, by the development regions of Romania and by property type, in 2020.

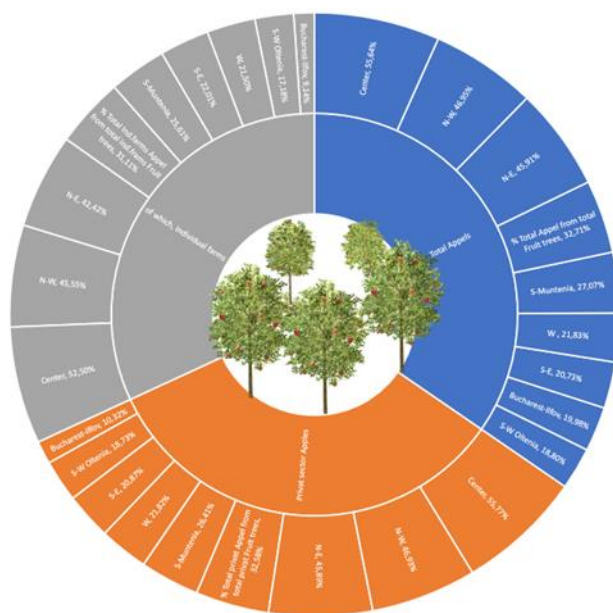


Fig.1. Shares of the Apple trees from Total number of Fruit trees, per Region, Romania (2020)
 Source: own elaboration based in tempo online dataset (NIS, accessed on February 2022) [16].

When we analyze the share of the number of apple trees in the total number of fruit trees, by property type, at the level of our country, we observe the following that apple orchards are grown in 2 ownership systems: the individual farm system, which occupies an average of 30.06 %, the largest percentage being occupied by the Center area with 52.5% from Total number of Fruit trees. The private sector has an average share of 38.25%, where the Center area covers the largest number of trees, with a percentage of 55.77% from Total number of Fruit trees.

At the zonal level, Shares of the Apple trees from Total number of Fruit trees, the Central area is in first place, with 55.64%, followed by the West area with 21.83%, then the South-East area with one percent of 20.73% from Total number of Fruit trees.

The private sector in the area of fruit tree orchards in Romania has always occupied a privileged place. The orchard areas were, even during the communist period, an area where private property kept a wider place. We present in the following graph (Fig. 2) the share of the number of apple trees in the private area, in relation to the total number of apple trees at the country level and in the development regions of our country, in the year 2020.

Regarding the total number of apple trees, grown in private system, it occupies an average percentage of 99.12% of the total of our country, and a percentage of over 99.39% is found in all the development regions of Romania, except making Bucharest which occupies a percentage of only 43.65% and which is justified by the fact that it is not an area where fruit growing is practiced.

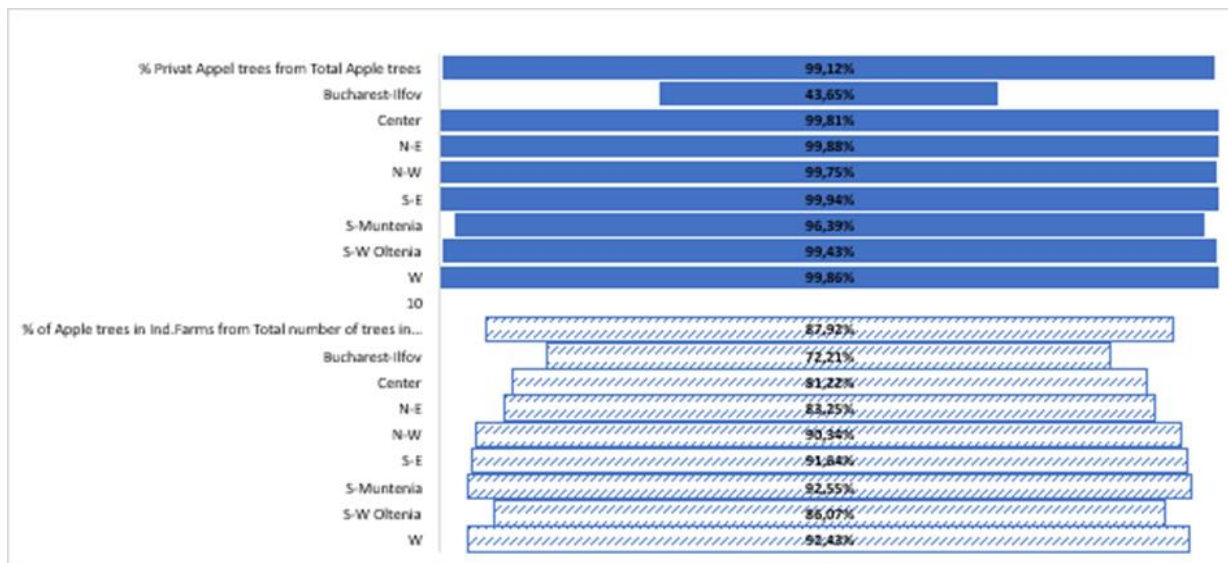


Fig. 2. Shares of the apple trees in Privat sector Apple, 2020
 Source: own elaboration based in tempo online dataset (NIS, accessed on February 2022) [16].

When we also refer to apple trees, from individual farms, they cover a total percentage of 87.92% of total private apple trees, and in the rest of the regions the percentages vary in

a small range of approximately 10 percent, from 81.22% and 92.55% from private farms, the exception is again Bucharest, which occupies a smaller percentage (72.21%).

Legal form	Region	2019	2020
Total	TOTAL	21	23
Total	South-Muntenia	28	31
	South-West Oltenia	28	28
	North-East	21	21
	West	20	19
	North-West	19	21
	South-East	19	18
	Center	17	19
	Bucharest-Ilfov	6	7
Privat Sector	TOTAL	21	23
Privat Sector	South-Muntenia	29	32
	South-West Oltenia	28	28
	North-East	21	21
	West	20	19
	North-West	19	21
	South-East	19	18
	Center	17	19
	Bucharest-Ilfov	13	11
out of which: Individual farms	TOTAL	23	24
out of which: Individual farms	South-Muntenia	30	34
	South-West Oltenia	29	32
	North-East	22	23
	Center	20	21
	South-East	20	19
	West	20	20
	North-West	19	21
	Bucharest-Ilfov	16	15

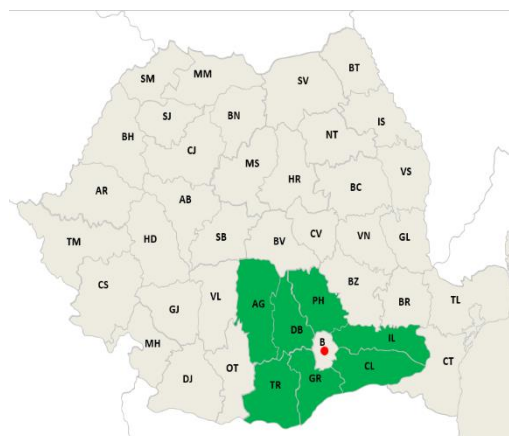


Fig. 3. Average apple production (kg/tree) by Legal forms and by region, Romania, 2019-2020
 Source: own elaboration based in tempo online dataset (NIS, accessed on February 2022) [16].

The total average production of apples (kg/tree/apple) in Romania, at the level of 2020, indicates that in the Southern Region-

Muntenia the trees give the best production, obtaining 31 kg/tree, followed by the Southern Region- West-Oltenia with 28

kg/tree, the other regions varying between 21-18 kg/tree, respectively the Bucharest-Ilfov Region with a rather small amount of 7 kg/tree, compared to the total average of Romania of 23 kg/tree (Fig. 3).

The differences are not very big, if we refer to the quantities obtained in the private sector as a whole and that from individual farms, this being only 1 kg/tree, which is obtained in

addition in the private sector, respectively 24 kg/tree. The average difference between the private and the individual sector, at the level of kg/tree, is 2 kg/tree, this being found in the individual sector, where more attention is paid to these crops. In Table 4, we presented the quarterly consumption of apples, by social category and by residence, respectively rural and urban.

Table 4. Quantity of average quarterly fresh fruit consumption per social category, per rural and urban areas, Romania, 2015-2021*

		Q1	Q2	Q3	Q4**	Average monthly quantity bought/person (2021)		Quarterly averages (2021)	Difference between urban and rural areas
Total	Urban (%)	119.48%	121.21%	129.99%	121.17%	Total	Urban (%)	122.96%	49,75%
Total	Rural (%)	77.38%	75.37%	64.78%	75.31%	Total	Rural (%)	73.21%	
Employed population	% from Total	108.15%	109.62%	111.16%	107.89%	Employed population	% from Total	109.21%	
Farmers		53.79%	48.98%	48.68%	53.60%	Retired population		105.73%	
Unemployed population		74.90%	72.25%	63.81%	61.72%	Unemployed population		68.17%	
Retired population		106.75%	104.98%	104.88%	106.30%	Farmers		51.26%	

Source: own elaboration based in tempo online dataset (NIS, accessed on February 2022) [16].

*For 2021 – provisory data,

**T4 was calculated without 2021

Regarding the total amount of apple consumption in rural and urban areas, in the 5 years analyzed and separately in 2021 (table on the right), we note that in the urban environment, on average, 49.75% is consumed (in 2021) more apples, respectively 122.96%, compared to the rural environment, where this consumption is 73.21% (in 2021). Also, on the left side of the table 5, we notice

that the biggest consumers of apples by social category are employees, consuming on average 109.62% (Q2), followed by a very small percentage difference by retirees with a percentage of 106.75 % (Q1), the unemployed and farmers being at the tail of consumers, the difference between them being 16.91%, from 48.68% (in Q3) to 74.9% (in Q1).

Table 5. Share from the Total 2020/2015 of the fruit quantity bought quarterly, per region, Romania

	Q1	Q2	Q3	Q4	2020 / 2015	Growth per total 2020/2015	
TOTAL	120.63%	127.76%	120.97%	130.48%	124.96%	TOTAL	24.96%
North-West	131.09%	122.09%	135.53%	140.26%	132.25%	S - E	36.49%
Center	125.11%	120.41%	121.65%	116.72%	120.97%	N-V	32.25%
North-East	111.82%	114.35%	91.61%	104.07%	105.46%	V	31.95%
South-East	121.58%	144.14%	155.90%	124.33%	136.49%	S - V Oltenia	31.52%
South-Muntenia	114.45%	131.17%	134.11%	136.35%	129.02%	S - Muntenia	29.02%
Bucharest-Ilfov	116.68%	120.97%	101.86%	149.74%	122.31%	Bucharest-Ilfov	22.31%
South-West Oltenia	119.11%	140.17%	128.65%	138.14%	131.52%	Center	20.97%
West	126.63%	140.89%	120.56%	139.73%	131.95%	N - E	5.46%



Source: own elaboration based in tempo online dataset (NIS, accessed on February 2022) [16].

On the right side of Table 5, the Southeast Development Region is presented, with its six component counties, a region where, according to the data in the adjacent table, the largest increases were recorded in terms of the average amount of fruit purchased quarterly per social categories, in total, in rural and

urban areas. It should also be mentioned that private apple orchards had the highest percentage in the country, as it was mentioned previously in this work, and the offer of these orchards came to support apple consumers. Consequently, reporting the average monthly amount of fruit bought by households, in the

period 2020 compared to 2015, it was 124.96% at the national level, the largest amount of apples bought was in the S-E Region of Romania, which was 136, 94% (2020/2015), followed by the N-W Region with 132.25%, the west and S-W Oltenia reached an average percentage of 131.73%, followed by the S-Muntenia Region with 129.02%, the last regions, but with insignificant differences being Bucharest Ilfov (122.31%) and the N-E Region (105.46%).

The increases in the quantities of apples bought between 2015 and 2020 were a total of 24.96%, the S-E region being at the top with

an increase of 36.49%, at the opposite pole being the N-E Region with an increase of only 5, 49%. And in the Bucharest-Ilfov area, the quantities of fruit bought increased by 22.31% in 2020 compared to 2015, which indicates a continuously growing consumer preference for these fruits.

Extending the analysis period for the consumption of fruit and fruit products and for apples, 2010-2020, Table 6, we note an increase of approximately 61% in 2020 compared to 2010 (Fruit&fruit products) and an increase of half (compared to the previous category), to apples (29%).

Table 6. Average consumption/capita, Fruit&fruit products and Apples, 2010-2020, Kg

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2020 / 2010
Fruit and fruit products	67.0	74.7	71.1	73.7	80.2	87.8	96.0	96.1	110.8	111.3	107.6	161%
Apples	22.5	26.2	24.3	23.5	25.2	25.9	28.4	26.3	31.7	34.5	29.1	129%

Source: own elaboration based in tempo online dataset (NIS, accessed on February 2022) [16].

Thus, it can be observed that the average annual consumption of fruit and fruit products per capita, registered an increase of 161% for the period 2010-2020, from 67 kg of fruit in 2010, to 107.6 kg of fruit in 2020. However, the highest value of this indicator was attributed to the year 2019, of 111.3 kg of fruit, the year in which the highest consumption of apples was also recorded, this being 34.5 kg. And the average annual consumption of apples, per capita, for the same period recorded an increase of 129%. If in 2010 an average of 22.5 kg of apples were consumed per inhabitant, in 2020 a consumption of 29.1 kg of apples was reached. Of the total fruits consumed on

average, in 2020, apples represented 27.04%, as opposed to 33.58% in 2010, so we can conclude that apples have decreased in the preferences of those who consume fruit. Based on these Romanians' preferences for fruits, which we identified as continuously increasing, we presented in the following table (Table 7) the daily average consumption expressed in calories and nutritional factors. The table indicates the average consumption per inhabitant of calories and the large groups of nutritional elements, in Romania, in the period 2010-2020 and the share of the intake that fruits and fruit products have in this consumption for calories, proteins, lipids and carbohydrates.

Table 7. Average daily food consumption, per inhabitant, expressed in calories (number) and nutritional factors (grams)

Product groups for consumption expressed in calories and nutritional factors	Specific measurement units	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Calories	number	3400	3390	3287	3302	3320	3464	3462	3500	3549	3548	3555
<i>Fruit and fruit products</i>	<i>number</i>	<i>3.7%</i>	<i>4.1%</i>	<i>4.0%</i>	<i>4.2%</i>	<i>4.5%</i>	<i>4.8%</i>	<i>5.2%</i>	<i>5.3%</i>	<i>6.1%</i>	<i>6.1%</i>	<i>6.0%</i>
Proteins	Grams	109.4	110	106.7	108.4	108.6	112.3	112.4	114.1	117.4	117.7	117.4
<i>Fruit and fruit products</i>	<i>Grams</i>	<i>1.6%</i>	<i>1.7%</i>	<i>1.7%</i>	<i>1.8%</i>	<i>1.8%</i>	<i>2.1%</i>	<i>2.2%</i>	<i>2.5%</i>	<i>2.7%</i>	<i>2.7%</i>	<i>2.6%</i>
Lipids	Grams	112.1	104.3	103.6	99.6	106.6	111.7	113.6	116.2	118.1	118.7	120.2
<i>Fruit and fruit products</i>	<i>Grams</i>	<i>2.9%</i>	<i>3.4%</i>	<i>3.1%</i>	<i>3.4%</i>	<i>3.3%</i>	<i>3.8%</i>	<i>4.0%</i>	<i>4.5%</i>	<i>5.2%</i>	<i>5.1%</i>	<i>5.1%</i>
Carbohydrates	Grams	466.4	481.4	460.8	471.8	460.4	479.9	475.5	477.2	481.6	479.8	478.3
<i>Fruit and fruit products</i>	<i>Grams</i>	<i>4.7%</i>	<i>5.1%</i>	<i>5.1%</i>	<i>5.1%</i>	<i>5.7%</i>	<i>5.9%</i>	<i>6.6%</i>	<i>6.5%</i>	<i>7.5%</i>	<i>7.6%</i>	<i>7.4%</i>

Source: own elaboration based in tempo online dataset (NIS, accessed on February 2022) [16].

It can be seen that the values of these indicators have increased for all categories, as follows (in descending order): in the category proteins from fruits and fruit products 172.22%, calories from fruits and fruit products 170%, lipids from fruits and fruit products 107.23 % and fruit carbohydrates

and fruit products 162.67 %. For 2020, the percentage of fruit and fruit products was as follows: calories 6%; proteins 2.6%; lipids 5.1% and carbohydrates 7.4%. As expected, fruits and fruit products contribute the most to the carbohydrate category and the least to the protein category.

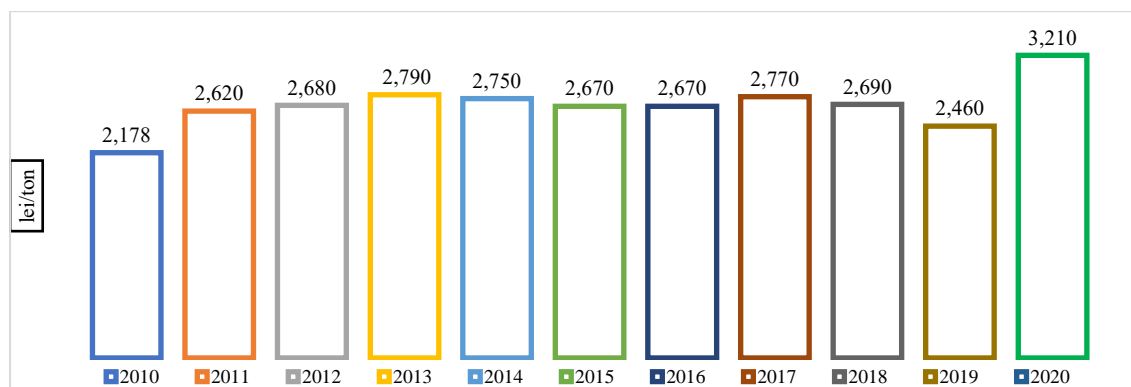


Fig. 4. Price dynamics of apples, Romania, 2010-2020, lei/tons
 Source: own elaboration based in tempo online dataset (NIS, accessed on February 2022) [16].

Analyzing the basic prices for apples, in the period 2010-2020, we note that they had a fluctuating dynamic, from 2,178 lei/ton in 2010, to 3,210 lei/ton in 2020, which means an increase of 147.38%. Apart from 2020, where the biggest price difference was recorded (compared to 2010), the best price in

the analyzed period was recorded in 2013 (2,790 lei/ton). Of course, price changes over the course of a year are variable. A representation of these quarterly differences between apple prices (lei/kg), in the period 2014-2020 can be seen in the figure below (Fig. 5).

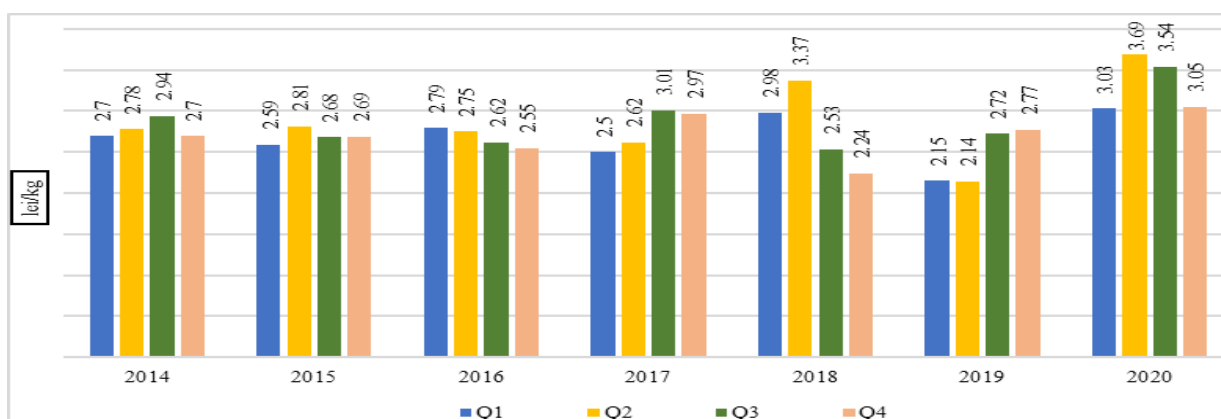


Fig. 5. Average prices of apples in Romania, per quarters
 Source: own elaboration based in tempo online dataset (NIS, accessed on February 2022) [16].

Thus, it can be observed that at the level of average prices for table apples, for the whole country, by years and semesters, for the period 2010-2020, the lowest value was recorded in Q2, 2019, of 2.14 lei/kg, and the highest value in 2020, Q2, namely 3.69 lei/kg. We note the similar evaluation of prices, in the sense that, in the first 2 quarters, price

increases are observed, and then they decrease. Exceptions were observed for the years 2015 and 2019, when slight increases in average price values were recorded. In line with average and core apple prices, producer prices also showed an upward trend. Thus, the increase in the analyzed period was 148.61%, and for 2019 a slight decrease was

noted, due to the fact that 2019 was not a good year for apples (NIS source).

Analysis of the results of the questionnaire

Following the application of the questionnaire regarding the preferences of apple consumers

in Romania, we received 663 responses, which we have structured in the following table (Table 8).

Table 8. Table frequencies on the survey' answers

Questions	Possible answers	Frequency	Percent	Key word on the Apple consumer's profile
AGE	under 19 years old	17	2.6%	YOUNG
	20 -29 years old	262	39.5%	
	30 -39 years old	163	24.6%	
	40 – 49 years old	141	21.3%	
	50 – 60 years old	65	9.8%	
	over 60 years old	15	2.3%	
GENDER	female	383	57.8%	FEMALE
	male	280	42.2%	
RESIDENCE	urban	434	65.5%	CITY
	rural	229	34.5%	
EMPLOYMENT	private sector	413	62.3%	PRIVATE CORPORATION
	state sector	250	37.7%	
STUDIES	college	301	45.4%	EDUCATED
	university	362	54.6%	
CONSUMPTION BENEFITS	Yes	597	90.0%	INFORMED
	No	66	10.0%	
CONSUMPTION	Yes	624	94.1%	YES
	No	39	5.9%	
HOW MANY APPLES/WEEK	1-3 apples	310	46.8%	1-3 APPLES
	4 - 6 apples	185	27.9%	
	7 - 9 apples	69	10.4%	
	over 10 apples	59	8.9%	
	none	40	6.0%	
OTHER FRUITS	yes	293	44.2%	MAINLY APPLES
	no	370	55.8%	
ADVERTISING	Not at all	279	42.1%	NO INFLUENCE FROM MASS-MEDIA/ADVERTASING
	less	289	43.6%	
	relatively high	60	9.0%	
	high	24	3.6%	
	Very high	11	1.7%	
STATUS RESPONDENT	employed	416	46.7%	EMPLOYED / STUDENT
	entrepreneur	56	6.3%	
	farmer	45	5.1%	
	student	357	40.1%	
	unemployed	2	0.2%	
	retired	13	1.5%	
	Home working	2	0.2%	
PLACE TO BUY	market	412	39.4%	BUY ON THE MARKET
	supermarket	335	32.0%	
	Self production	259	24.7%	
	other	41	3.9%	
VARIETY OF APPLES	Florina	210	22.2%	YELLOW AND RED
	Idared	136	14.4%	
	Golden_delicios	339	35.8%	
	Jonatan	237	25.0%	
	Voinești	2	0.2%	
	Granny_Smith	10	1.1%	
	Starkrimson	5	0.5%	
	others	8	0.8%	
TYPE OF CONSUMPTION	fresh	651	83.4%	FRESH APPLES
	transformed	130	16.6%	
REASON	dessert	383	47.2%	AFTER MEAL, AS A DESSERT
	diet	125	15.4%	
	meal	58	7.2%	
	others	245	30.2%	
PLACE OF PRODUCTION	Romania/local market	653	92.6%	FROM ROMANIA
	imported	52	7.4%	

Source: own representation on the questionnaire.

The analysis of the frequencies of the answers obtained showed us a certain profile of the apple consumer in Romania.

Thus, we were able to have the personal characteristics of age, gender, residence, job, professional training. Later, we noted the

characteristics of the consumption itself, namely the knowledge of the benefit brought by the consumption of fruit, the number of apples per day, the preference for other fruits, the influence of advertising on consumption behaviour, the professional status, the

provenance, the variety, the type, the reasons and the place of purchase of apples.

All these figures being based on descriptive analysis's results and the frequencies can be summarized in a short "story", such as the following.

Romanian apple/fruit consumer is a young (20-29 years old 39.5%), female 57.8% (male 42.2%), living in a city (65.5%) and working in a private corporation (62.3%). She is highly educated (54.6%) and informed on the benefits of fruit consumption (90%). She also

enjoys eating fruit - up to 3 apples/day (46.8%), mainly Golden delicious (35.8%), Jonathan (25.0%) and Florina (14.4%), without being influenced by the advertising (42.1%). She could be also a student (40.1%), buying fruit on the market 39,4% (and on the supermarket 32.0%), targeting the fresh (83.4%), yellow or red apples, as a dessert (47.2%) and buying these fruits widely from a local market (92.6%). The figure below (Fig. 6), resumes in a picture the apple consumer's profile, based on the survey.



Fig. 6. Apple consumer representation, based on the survey, Romania, 2022.
Source: own representation.

CONCLUSIONS

The results obtained following the analyses carried out in this paper showed a presence of Romania in the top European countries in terms of surface area and production, in the analyzed periods. At the national level, the dynamics of the number of fruit trees, the production, the quantities purchased and the consumption of fruit, and in particular that of apples, were analyzed. The results of the article were also based on the analysis of Romanians' consumption preferences, results that we obtained following the application of a questionnaire. Thus, we had 663 respondents who gave us answers that allowed us to create a profile of the apple consumer in Romania. We were able to identify a consumer characterized by young age (20-29 years; 39.5%), female gender (57.8%), with urban residence (65.5%), who

works in the private sector (62.3 %), with higher education (54.6%) and knowledgeable about the benefits of fruit consumption (90%). Regarding the actual consumption of apples, we could identify a preference for 1-3 apples/day – Golden delicious (35.8%), Jonathan (25.0%), Florina (14.4%), but also others fruits, bought from the market, originating from Romania, and this consumer is not influenced in the consumption process by advertising or mass media.

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