

**SECTION ECONOMICS, BUSINESS ADMINISTRATION, TOURISM
AND STATISTICS**

**THE IMPORTANCE OF PUMPKINS AND OIL GOURDS IN
ROMANIA**

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Abstract: In my article, I chose one group of cucurbits, the oil pumpkin. The pumpkin can be considered an old cultivated plant dating back hundreds of years, but the importance of the oil pumpkin can be traced back to the last 10 years. My goal in writing this article is to point out the importance of pumpkin seed oil and to highlight its beneficial effects in addition to emphasizing a healthy lifestyle. In Hungary, pumpkin seed oil is more important in the western part of the country's border (Vas and Zala counties), while in Romania it is in Cluj County and the surrounding areas, as well as the territorial units of Bucharest. In addition to its characteristic delicious taste, pumpkin seed oil is also considered healthy, as it is considered one of the best immune-boosting substances. Pumpkin seed oil is also beneficial for preserving masculinity, preventing prostate problems, and stomach and digestion problems. After presenting the cultivation conditions of pumpkin seed oil, I present the production possibilities of pumpkin seed oil and the market prospects of pumpkin seed oil from the perspective of Romania.

Keywords: *energy, pumpkin, consumption, production, pumpkin seed oil*

JEL classification: O13

Generally, Introduction or Background - The cultivation conditions of olive gourds

Based on the literature review, it can be seen that pumpkins originate from the American continent and that they were already cultivated in pre-Columbian times (Antal, 1992). Among the many types of pumpkins, in my article I deal with the oil pumpkin (*Cucurbita pepo convar. pepo var. styriaca*). Due to its beneficial effects, it is excellently suitable for families/persons following a healthy diet, since according to oral tradition, pumpkin seed oil has a healing effect (as a result of which its popularity is increasing). In both Romania and Hungary, its consumption is slowly spreading, as all products produced from oil gourd represent a high price category. This is also the reason why pumpkin seeds and pumpkin seed oil are mostly exported in both Romania and Hungary.

Romania's territorial characteristics are suitable for the cultivation of olive gourds, since olive gourds are heat- and light-demanding, moderate water-demanding and shade-tolerant plants (they are not demanding on the soil, they can be grown in all arable areas). It yields the largest amount on calcareous or neutral, quickly warming, humus sand (sandy loam) and on looser chernozems. A soil temperature of 12 °C is required for the germination of olive gourds, and the optimum for fruit formation is 25-28 °C. In the early stages of its development, it is very sensitive to frosts, but in autumn the ripe fruit is not damaged even at -3 and -4 °C. Since corn is also cultivated in many territorial units in Romania, this plant can be a complementary plant in crop rotation, as it can also be a companion plant to corn in intermediate cultivation. Its water requirement is greatest during flowering and fruit formation, and it appreciates watering when the flower is in bud, so water applied during drought (end of June and mid-July) can have a significant yield-increasing effect. Depending on the cultivated variety, the cultivation period is 130-150 days.

The gourd is a nutrient-demanding plant, as the need for P₂O₅ and K₂O is significant even during the seed production period. Nitrogen appreciates fertilizing, but an overdose can cause disease hypersensitivity and seed set problems. I have summarized the nutrient requirements of butternut squash in Table 1.

Table 1: Nutrient requirements of butternut squash at different nutrient supply levels

Cultivation site in arable land	Active ingredient (kg/t)	Nutrient supply of the soil				
		very weak	weak	medium	good	really good
I.	N	78	65	55	47	41
	P ₂ O ₅	40	38	35	32	30
	K ₂ O	125	105	90	85	80
IV.	N	84	73	65	57	52
	P ₂ O ₅	49	44	40	37	35
	K ₂ O	130	110	90	85	80

Source: My own editing based on the data of Antal (2000).

It is not demanding on the previous crop, but it is very sensitive to pesticide residues. Due to its wide space, it is considered a weed-growing culture, so attention must be paid to the weeding effect of the pre-crop. Its best pre-crops are: eared cereals (after pumpkins, any spring-sown plant can be grown successfully, except green vegetables). What is important to pay attention to is that it cannot be planted for 4-5 years after itself due to agrotechnical reasons (Dutka, 1998).

The most common weeds occurring in oil gourd culture are: libatop and pig's sedge, ragwort, cock's-foot grass, and various species of fly ash and bitter gourd (Ragasits, 1994). The most significant pests of pumpkins are: various soil-dwelling insects, nematodes, the common spider mite, the cucumber, black beet and green peach aphids (Vecseri – Horváth, 2001). In addition to viruses, the most common diseases in olive gourds are powdery mildew, downy mildew, fusarium wilt, colletotrichum and

cladosporium (Késmárki – Kuroli, 2002). Since oil gourd is resistant to fungal diseases, chemical protection is not recommended.

Harvesting pumpkins depends on the purpose of cultivation. In the case of gourds grown for oil extraction, harvesting is extremely labor-intensive and requires a lot of attention. In order to achieve a good (excellent) quality final product, it is important to obtain a product with a low water content, ready for pressing, as soon as possible after the beginning of the harvest.

In the beginning, seed cultivation with shell, later seed without shell, was typical in Romania. The unshelled seeds are dark green, whole, and weigh 100-500 grams per thousand seeds, depending on the variety. Pumpkin seeds can be stored in a cool, dark place for a long time without going rancid, they usually contain 40% oil. Its oil has a darker greenish-yellow color and belongs to the semi-dry oils. About a quarter of it is saturated (palmitic and stearic acid), and the rest is unsaturated (linoleic and oleic acid).

Production possibilities of pumpkin seed oil

In Hungary, mainly in the villages of Zala and Órség, while in Romania in Cluj county and around Bucharest, the production of solid oil is of greatest importance. In both countries, the cultivation of pumpkins and the pressing of pumpkin seed oil from pumpkin seeds go back to a tradition of approximately one hundred years. In the beginning, farmers grew pumpkins with pumpkin seeds in their shells, but nowadays farmers have switched to pumpkin seeds without shells. The goal in the production of pumpkin seed oil is to extract fine and premium oil from the valuable seeds.

Oil can be produced from pumpkin seeds using two processes (cold pressing and hot pressing). In the case of warm pressing, the seeds collected from the pumpkin are first washed, then dried, and the product is sent to the pumpkin seed oil press, where the seeds are first ground, and then the ground material is mixed with salt and water. In addition to the addition of water, they are roasted over a fire in a metal pot and the lightly roasted mince is put into a pressing press, which squeezes out the precious oil. The aim is for the finished material to be clean and to be sold free of all substances. The end result is a particularly characteristic substance (viscous liquid), which has a silky taste, in many cases it has a taste reminiscent of walnuts. The smell is spicy, with a characteristic aroma, and the color is very dark green. A significant part of its fat content (approximately 55%) is polyunsaturated fatty acids. The other technology is cold pressing. The essence of this is that cleaned and dried seeds are squeezed out using a closed press. This technique is used because they can produce a much more valuable oil in terms of physiological effects. In this case, there is no high temperature, no added additives, only 100% pure, naturally pressed, deep green-reddish-brown oil, which preserves the vitamin and mineral content of the oil thanks to the cold storage technology.

Of the two technologies, the aroma of cold-pressed pumpkin seed oil is more natural, and more vitamins remain in the final product. However, the disadvantage is that it can be produced in smaller quantities. Oil made with this technology is mainly used for salads (salad oil), and thanks to the approximately 25 types of alkaloids in the oil, it has a "robotic", anthelmintic and anti-inflammatory effect. A larger quantity can be

produced from hot-pressed pumpkin seed oil, since with this technology the oil is extracted by adding salt and water. The taste of the product obtained by warm pressing is more delicious (this product sells better among consumers).

The use of the seed meal remaining during oil pressing is also significant, as it can be used in several sectors: (1) it can be used as a raw material for the confectionery industry, (2) it is one of the basic elements of concentrated protein feed, (3) cooking vegetables, baby food, and pickles can also be made from the semolina made from the fruit of the seed. Of course, in animal husbandry, it also plays a significant role in the feeding of cattle, since when fed during the pregnancy period, due to its high vitamin E and β -carotene content, it can contribute to the improvement of reproductive biological indicators.

Overall, it can be concluded that a very tasty oil can be made from pumpkin seeds, which has many beneficial effects on hair and skin. In many cases, it is also recommended to improve circulation, and it also alleviates the symptoms of menopause and prostate diseases. In some specialist literature, I have come across pumpkin seed oil as a "miracle for masculinity". Based on previous studies, 2.5 kg of pumpkin seeds are needed to produce 1 liter of high-quality pumpkin seed oil.

The price of pumpkin seed oil

The price of pumpkin seed oil (as well as all other foods) showed a continuous increase. In the year 2021, based on the FAO database, the producers asked for 3-5 euros per bottle. Despite its high price, more and more areas are trying to introduce the production of pumpkin (pumpkin seeds) into the production structure. The drought of 2022 resulted in a lower yield for this crop as well, as a result of which the price of pumpkin seed oil increased greatly by the end of 2022. By way of comparison, I mention that in the last 12 months, compared to August 2021, the price of food has increased by 30.9% (Babrik, 2022). Based on the KSH database, the largest increase was observed in the case of the following products compared to August 2021 data: margarine (+66.9%), bread (+64.3%), cheese (+61.0%) , dry pasta (+57.9%), dairy products (+54.7%), butter and butter cream (+54.5%), pastries (+45.4%), eggs (+42.0 %), rice (+40.9%), poultry and confectionery flour (+40.4%). After examining the data, I was surprised to find that the small increase occurred in the price of potatoes, fresh vegetables, and fruit.

Pumpkin production and its market

In Hungary, pumpkin seed oil was first dealt with at the western border (Vas and Zala counties), but now, in addition to Transdanubia, the Great Plain and the Northern Hungarian region are also becoming increasingly important. Production started to increase in the Great Plains and the Northern Hungarian region because it is possible to carry out pressing in these territorial units as well. One of the receiving markets for pumpkin seed oil produced in Hungary and Romania is Austria, followed by Slovenia.

Due to the pandemic situation and the war situation, those Austrian oil producers who were unable to produce due to the drought and were unable to procure the seeds from Ukraine, in 2022 and 2023, the territories of Hungary and Romania can provide the missing amount. However, buyers also have to take into account that due to the drought, less quantities are available in both Hungary and Romania (and the available quantities are available at a higher price).

In a subsequent part of the analysis, I examined Romania's gross production value for pumpkin and butternut squash products (Figure 1). Gross production value refers to the total production value during a specific period of time, which can be used to characterize a sector for a given country. Based on the calculation, it is the sum of the net sales and the capitalized own performance (the change in stock of own-produced stocks and the capitalized value of the own-produced assets together).

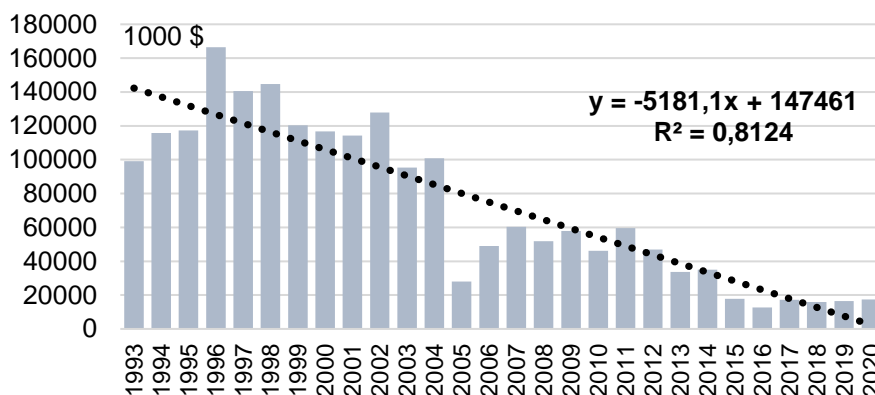


Figure 1: Development of the gross production value in Romania for pumpkin and butternut squash products from 1993 to the present day
 Source: Own calculation based on FAO.org data

In the case of commercial activities, this value must be reduced by the purchase value of the goods sold, and in the case of other service activities by the value of the mediated services. Calculation of gross production value:

Net sales

- purchase value of goods sold

- mediated services

+ Capitalized value of self-produced assets

+/- Stock change of self-produced stocks

Gross production value

As a result of the analysis, it can be concluded that from 1993 to 2020, an average annual decrease of 6.23 percent occurred. It can be established with 81.24% certainty, taking into account past data, that the gross production value from pumpkins and oil pumpkins in Romania will decrease by an average of 5 million USD per year.

European Union overview of the situation of olive oil

Based on EUROSTAT statistical data from 2019, the largest number of pumpkins (or pumpkins) in the European Union are in France (129 thousand tons), Spain (129 thousand tons), Germany (86 thousand tons), Portugal (72 thousand tons), Poland (68 thousand tons) and were produced in Romania (21 thousand tons) (Figure 2). In the case of each of the listed countries, an average increase of 5-7% can be observed compared to the base year of 2010 (with the exception of Romania, since there was an average annual decrease of 13% from 2010 to 2019). Among the European Union member states, compared to the 2010 base year, the largest increase occurred in Spain, which is due to continuous developments.

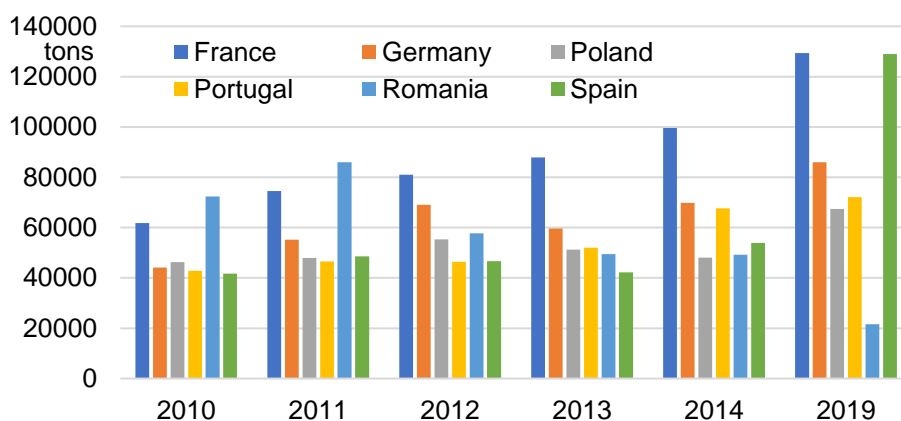


Figure 2: Evolution of the size of the harvested area of oil gourd in the most important oil gourd producing countries

Source: Own calculation based on FAO.org data

In the European Union in 2019, approximately 25,000 hectares of pumpkins or pumpkins were produced (Roman Journal, 2020). Spain had the highest harvested area in 2019 (approximately 10,000 hectares). It is followed by France (5.5 thousand hectares), Germany (3.8 thousand hectares) and Portugal (2.2 thousand hectares) with almost half the harvested area (Figure 3).

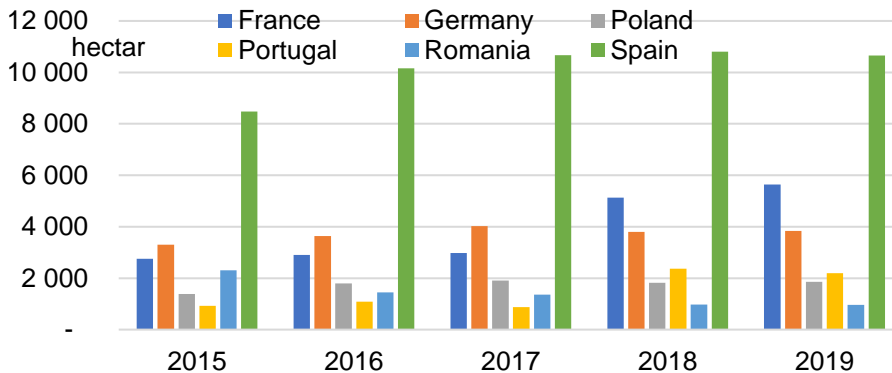


Figure 3: Changes in the size of the harvested area of oil gourd in the most important oil gourd producing countries

Source: Own calculation based on FAO.org data

In order for the European Union to have the necessary amount of pumpkins for the processing industry, 31 thousand tons of pumpkins were imported from countries outside the European Union in 2019. This value is approximately 81% higher than the volume 10 years ago. The largest part of the import volume came from South Africa (approximately 17%), followed by Panama and Morocco (with a share of 11-10%). The quantities of pumpkins in the United Kingdom, Argentina and Brazil are also slightly behind, but significant, accounting for 8-10 percent per country in 2019. Pumpkin varieties that were not used by the European Union are imported to countries outside the European Union. The most important importing country has been Spain for years, as this country accounts for almost 36% of the volume delivered to countries outside the European Union. Spain was followed by Portugal (30%), France (12%) and Greece (10%). Based on the 2019 EUROSTAT data, 22,000 tons of pumpkins (oily pumpkins, pumpkins) were exported to one of the countries outside the EU. This value is among the 10 it was 64% more compared to 2019. The United Kingdom accounted for almost 2/3 of the importing countries in 2019, followed by Switzerland (16%) and Israel (11%).

The situation of pumpkins, olive pumpkins and pumpkins in Romania

I took into account the Romanian pumpkin, pumpkin, and pumpkin data based on the Selina Wamucii databases. In some cases, I also used the values in the Eurostat and FAOSTAT databases. When searching for data, I found data on pumpkins in the following category: Fresh or chilled pumpkins, squash and gourds "Cucurbita spp." (HS code 070993).

Based on the FAOSTAT database, I looked at the role of pumpkin in Romania over a long period of time. It can be clearly seen here that the historical peak was recorded in 1961, when the amount of pumpkin produced was 1,823 thousand tons (of course, this only includes consumption-based pumpkins). Its importance shows a continuous

decrease. Today, the amount of pumpkin produced barely reaches 19,000 tons (Figure 4).

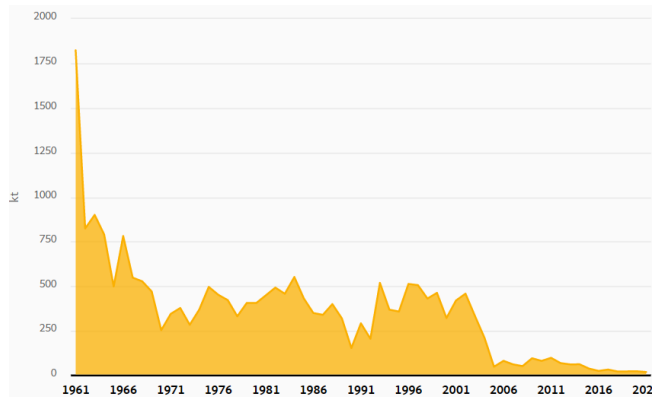
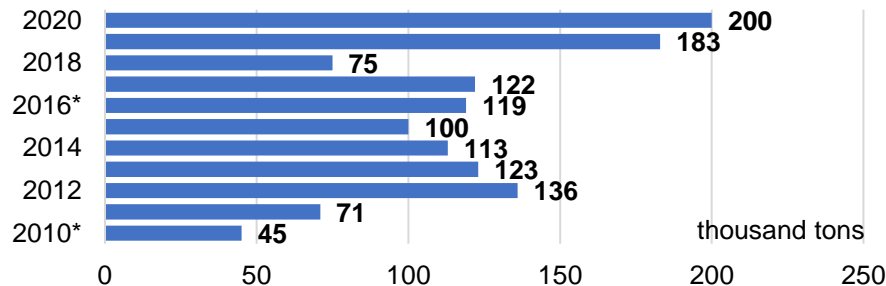


Figure 4: Production of pumpkins (oil pumpkins, pumpkins) in Romania from 1961 to the present

Source: Figure based on FAOSTAT data

In 2019, approximately 22,890 tons of crops were produced from the 1,350-hectare area in Romania, which showed an increase of 3% for the year 2020 (almost the same area size). Based on the 2021 FAOSTAT data, there was an 18% decrease compared to the 2021 harvest, so the size of the total harvest was 19,300 tons.

In terms of exports, based on the 2019 data, we can talk about 183 thousand tons of pumpkins, butternut squash and pumpkins (Figure 5). This value is 44% higher than the quantity exported in 2018.



*: Adjusted values

Figure 5: Export quantity of pumpkin in thousands of tons to countries outside the European Union in 2019

Source: Own compilation based on Selina Wamucci and Eurostat data

The amount of exports in 2019 amounted to 140 thousand dollars, which was 70% higher compared to the value of 2018. Of course, this export value was higher for the years 2020, 2021 and 2022, as a liter of pumpkin oil represented a higher value on the market due to the drought and pandemic closures.

The UK, Latvia, Bulgaria, Moldova and Greece have been considered the most important buying markets in Romania for years.

In the year 2021, the countries producing the largest amount of pumpkins and pumpkins in the world were: China, India and Ukraine. These 3 countries accounted

for approximately half of world production. Of course, thanks to the war, the amount of pumpkin production in Ukraine will also decrease by 2023.

According to Indexbox's survey, based on past data, the size of the pumpkin market in Romania is predicted to stagnate or decrease by 2023. Since, in addition to advanced technologies and tested seeds, unfavorable weather is also a big source of risk in terms of crop area and crop volume, therefore the prepared forecasts can only be accepted with great uncertainty. Compared to the 2020 data, the Romanian pumpkin market showed a 9.5% decrease for the years 2021 and 2022 as well. In addition to the decrease in the quantity produced, consumption also fell. Based on the data of the last 10 years, Romania can boast the highest pumpkin harvest in 2012 (since then a decrease has been observed). In 2021, the average yield of pumpkins and oil gourds increased per hectare thanks to continuously developed seeds (a 2.5% increase compared to the base year of 2020). It is also due to this that, based on the data of the last 10 years, the average annual growth rate of the yield indicator is 2.8%.

Since more than one type of pumpkin is used in each country, it is possible to talk about both export and import in the case of Romania. In terms of value, Turkey can be considered the most significant country among Romania's suppliers, as this country accounted for 65% of the total import volume in recent years. The next country with a large gap is Germany, which accounted for approximately 18% of the volume of milk imports, followed by Spain with 4.5%. Based on last year's data, the average import price for pumpkin/oil squash was \$909 per ton (in contrast, the export price was around \$1,100 per ton during the same period).

In conclusion

After reading the article, it is clear that Austria (more precisely, Styria) has been the most important producer and user of pumpkins for the last 10 years. This is where the cultivation of pumpkins originated in Hungary and Romania. In Hungary, it is more important in Western Transdanubia, while in Romania it is more important in the areas around Cluj County and Bucharest. In Austria, pumpkin seed oil is mainly used for meals, as pumpkin seed oil is rich in polyunsaturated fatty acids. In Hungary and Romania, the dietary use is to a lesser extent, instead, consumers mostly use its medicinal effects. (in the form of a dietary supplement). During the review of the literature, it can be seen that when pumpkin seed oil is consumed, harmful cholesterol levels in the blood can be reduced, and bladder and prostate complaints can also be improved with it (the pharmaceutical industry recommends pumpkin seed oil capsules for the treatment of urinary tract complaints).

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