

Apricot Production in Bulgaria, Opportunities for Organic Production and Comparison with Other Main Producing Countries in the World

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Abstract

The apricot is a well-known, preferred and very tasty fruit in Bulgaria. Its homeland is northeastern Armenia, but the largest number of apricots in the world are still grown in Turkey. The purpose of this article is to determine the amount of harvested areas in the country from this type of permanent planting, to determine the dynamics of the change in the amount of production in different years in the period from 2015 to 2020 y., what are the average yields, which are the main producing countries, what quantities of apricots in tons do they produce and to offer opportunities for biological cultivation and processing of this tasty and irreplaceable fruit in valuable minerals and vitamins. The scientific methods used in the article are methods of analysis, synthesis, deduction, extrapolation, comparative method, method of weighted average values, as well as other statistical and mathematical methods.

Keywords: apricots, agriculture, organic production, agriculture

JEL: Q11, Q13, Q17

Introduction

Apricot is a fruit tree species that belongs to the Rosaceae family. It originated in northeastern Armenia. Its life cycle is 40-60 years, with its most active fruiting period after the sixth year and continuing to its twenty-fifth year (Ivanova, 2006). More than 90 varieties of apricots are grown in Bulgaria, with apricot tree cultivation originating back after liberation from Ottoman rule.

There are also many wild representatives of this species known as “zarzali” in our nearby southern neighboring country – Turkey, and also in Armenia. They date back to a period more than 3,000 years ago, approximately when the cultivation of apricots began (Ilieve et al., 1970). The spread of apricots in neighboring countries started in Armenia. In the Himalayan region, apricots grow at an altitude of 4,000 meters (Donev, 2015). Cultivation of apricots in Europe began after the excellent taste of the fruit and its abundance in trace elements and vitamins have been discovered (Malinov, 2003). It originated in monastery gardens and princely courts. Later, it was also cultivated in orchards in Germany, France, and Hungary (Surányi, 1999), which determined the further spread of the apricot worldwide, beyond Europe and Asia and ensured that the apricot would reach the Americas, Africa, and even Australia.

1. Apricot cultivation technology in Bulgaria

Apricot is a heat-loving, drought-tolerant plant that loves light. It withstands low temperatures, but during forced and dormant periods its frost resistance decreases sharply, and it really tolerates summer heat. Apricot prefers light, deep soils with low water table and very good aeration. For an optimal economic and business results, apricot trees should be planted four on five, four on six and five on six meters (Mihajlov, 2020). For the proper creation of apricot plantations and apricot orchards, they are planted following the single trees pattern, with spacing four by five meters, and sites with a gentle slope are selected, with a north, northeast or northwest exposure (Johans, 2014). Apricots can be grafted onto an apricot, zarzala, or wild plum rootstock. It likes

growing on an improved level structure and a freely growing tree crown, with a maximum stem height of 80-90 cm., with moderately developed 5-6 main branches. The crown is potentially formed as a semi-flat, which facilitates mechanized spraying, pruning, and specialized treatments. For the survival and healthy development of apricot orchard, after fall foliage it must be sprayed appropriately, which is spraying with a bordelaise solution against powdery mildew and other infections typical of apricot trees, such as, for example, early brown rot. Spraying during flowering against the same diseases is also undertaken (Nikolov, 2022). Some of the major issues in maintaining the health of apricot trees are related to aphids, fruit maggots, peach rootborer, and some other apricot pests. The stem and main skeletal branches have to be limed, using lime solution or lime, in order to protect the plant parts from overheating and prevent the trees from coming out of deep dormancy early.

The fertilization of apricots does not differ from that of other fruit crops. Again, nitrogen and phosphorus are mainly applied, with rates of 10-12 kg per acre. N under non-irrigated and 15-16 kg under irrigated conditions. Every 2-3 years, about 25-30 kg fertilizer should be applied. P₂O₅, 35-40 kg. K₂O and 3-4 tons of manure. Nitrogen fertilizer is applied twice – half in March, and the other half at the end of May. The improved level crown usually consists of 6 to 8 main branches, of which 3 to 4 form the first level, and the rest are placed singly on the leader; the formation of the crown, depending on the growth strength, takes 3 to 4 years. In the first years of fruiting apricot trees have a strong growth. After full fruiting, stronger pruning begins, cutting in two- and three-year-old wood. In order to achieve good fruiting, a growth of not less than 30-40 cm of main branches must be maintained. For intensive apricot orchards with denser planting, a semi-flat crown provides good results. Pruning in the apricot tree is limited to removing or shortening strong branches pointing towards the inter-row, with the purpose being skeletal branches pointing in the direction of the row. Apricots are sensitive to drought during the vegetation season. In the absence of sufficient rainfall, it is imperative to irrigate, and soil moisture must be maintained above 70% of the field moisture limit. Attention should be paid to watering 2-3 weeks before harvesting, rainfall in our apricot growing areas is 350-450 cubic meters. This causes the need for additional watering and irrigation. With insufficient soil moisture, the apricot has difficulty overcoming the persistent hold of high summer temperatures and low atmospheric humidity. The best method for controlled and efficient irrigation is drip irrigation. The harvesting period depends on the destination of the production. Apricots intended for fresh consumption, and especially those to be transported further afield, should be picked 3 to 5 days before full ripeness. When the produce is to be used for processing, it should also not wait for full maturity. Only apricots intended for marmalade, nectar, juice, compote, and brandy are harvested when fully ripe. Maturity is determined by the appearance and texture of the fruit flesh. Harvesting can be more efficient if tractor platforms are used, from which harvesting is carried out simultaneously on both sides of the row spacing at different heights.

2. Apricot production in Bulgaria for the period 2015 and 2020, average yields, harvested areas, imports and exports, comparison with the main global producing countries

Apricot is a delicious fruit, well-known and very liked in Bulgaria. It is the only stone fruit, the pit of which could also be used for food. Apricot is very rich in proteins, fats, salts and in nutritional value is not inferior to almond nuts, even successfully replacing them in the confectionery industry. There are several differences between zarzali and apricots. Size is one of the most important differences. Apricots are always a little larger than zarzali. In addition, there is also a color difference in the coloring of the fruit itself. Zarzali are lighter yellow in color, with almost no red or dark orange coloring, that is very characteristic of apricots. The latter are more orange, and some varieties are almost entirely red. Other than being smaller than apricots, the zarzali are

also have a sourer taste. Those of us who cannot distinguish between the two on the outside have another way of telling one fruit from the other. When the pit of the fruit itself is broken, the zarzala pit is very bitter, almost inedible, while that of the apricot is sweet, and tastes like an almond kernel. It can be eaten both raw and lightly baked. The most cultivated apricot varieties in Bulgaria are: Kišnevska ranná, Hungarian apricot, Karaskál, Roxana and Silistra kompotena. Almost all the varieties of apricots that are widespread in Bulgaria ripen in July, in particular in the second half of the month, moreover, almost all the varieties except Silistra kompotena, are also grown in Macedonia and other Balkan countries (Mitreski, 1990) .

The largest volume of apricots and zarzali in Bulgaria was in the North-Eastern regions, in particular in the Silistra region. For 2020, this ratio is maintained and of the nearly ten tons produced in the country, more than half are produced in the north-east and north-central part of Bulgaria.

Figure 1 below shows the extremely reduced apricot production in Bulgaria for the period 1980 to 2020.

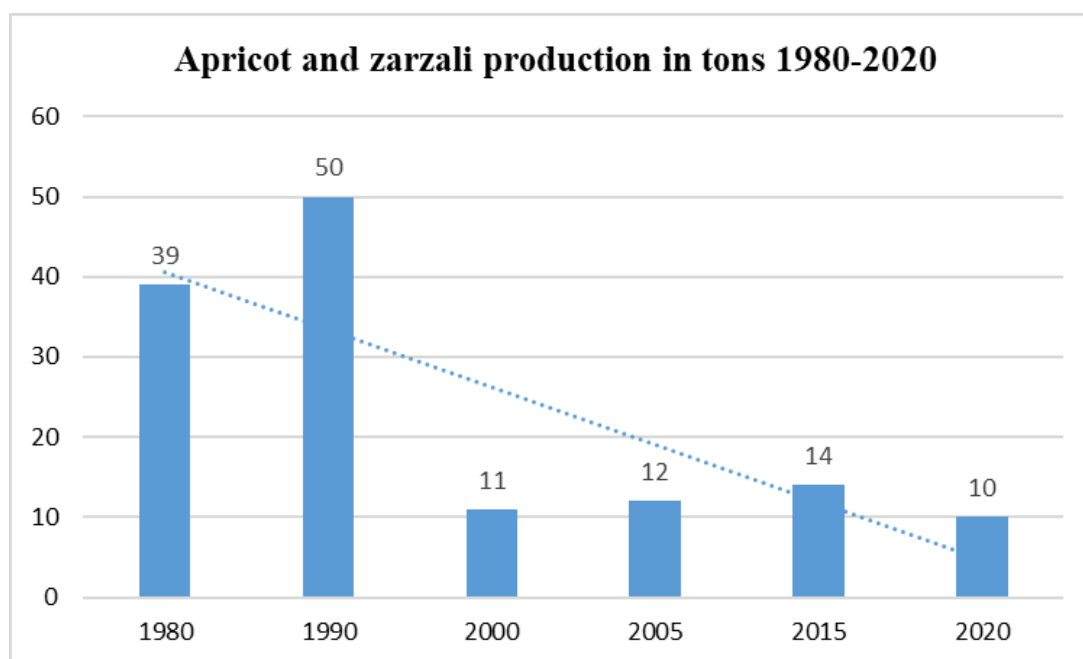


Figure 1. Apricot and zarzali production in tons 1980-2020

Figure one shows that apricot production has been reduced almost four times currently compared to the 1980s, and the reduction is five times, compared to the 1990s. What are the most important reasons for this?

First of all, apricots are not a crop subsidized by the European Union. Secondly, they are harder to grow than other fruit crops because they are more prone to frost. Thirdly, there is a large import of Turkish apricots in our country, which are constantly applying a price dumping on our domestic market of apricot production. Fourthly, the cost of apricots grown by 2022 ranges between one point thirty and one point fifty leva, and the producer purchase price is, at most, one point twenty leva. All of this contributes immensely to a contraction in production of up to five times over the forty-year period of analysis.

The following table presents the main economic and production indicators for harvested area, average yield, harvested production in tons and imports and exports of apricot fruit and zarzali for the period 2015 to 2020.

Table 1. Harvested area, average yield, and production in tons of apricots and zarzali for the period 2015-2020

Year	Harvested areas (in hectares)	Changes in harvested area (%)	Average yield (kg/hectare)	Change in average yield (%)	Production (in tons)
2015	2,481	-	5,715	-	14,179
2016	2554	2.9	6,070	6.2	15,503
2017	2,898	13.5	7,778	28.1	22,542
2018	2,550	-12.0	5,330	-31.5	13,592
2019	2,910	14.1	6,957	30.5	20,244
2020	1,838	-36.8	5,177	-25.6	9,516

Table 1 and Figure 2 show that the largest negative change in apricot harvested area occurred in the last period of analysis in 2020, compared to 2019, with a full 36.8 percent lower share in harvested area. This is largely due to the fruiting out of some of the apricot orchards established in the period of the eighties and also the final decision of some of the growers to cut down their orchards for timber due to unreasonably low farm gate prices, which were higher than the prime production costs. It is also observed that the share of harvested areas is highest in 2018 and 2019, which is when new apricot plantations, created during the first and second programming periods under the EU's Operational Programme for Rural Development, started fruiting.

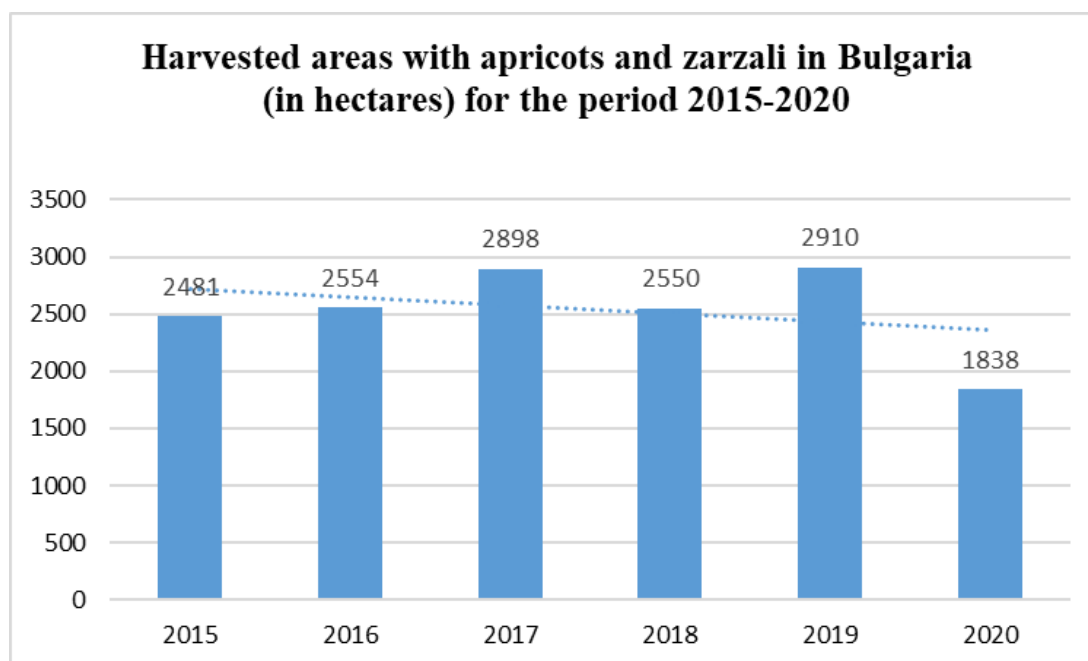


Figure 2. Harvested areas with apricots and zarzali in Bulgaria (in hectares) for the period 2015-2020

Table 1 and Figure 3 showcase the average yield, which was highest in 2017, followed by 2019. The main reasons for this, apart from the fruited young apricot perennials, are the new apricot varieties, which have been planted during the second programming period that have a much higher yield, and the more favorable weather conditions in these two years. The winter of 2022 was similar – much milder and favorable from a climate point of view, and apricots throughout the country had a stronger and more intense fruiting.

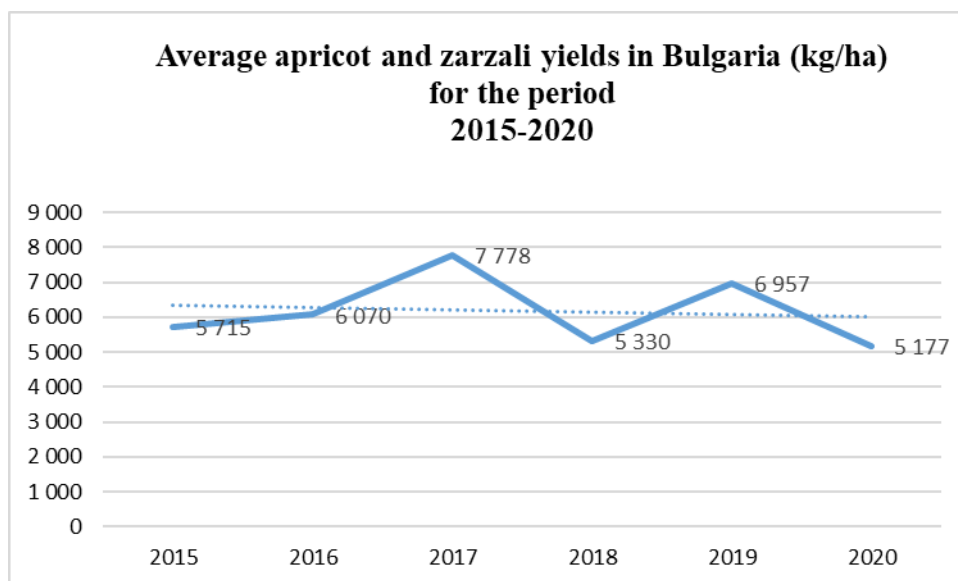


Figure 3. Average apricot and zarzali yields in Bulgaria (kg/ha) for the period 2015-2020

Table 1 and Figure 4 showcase that this trend is also evident in the amount of production in tons produced over the period 2015-2020, with the highest production levels once again in 2017 and 2019, and a positive change compared to the previous period.

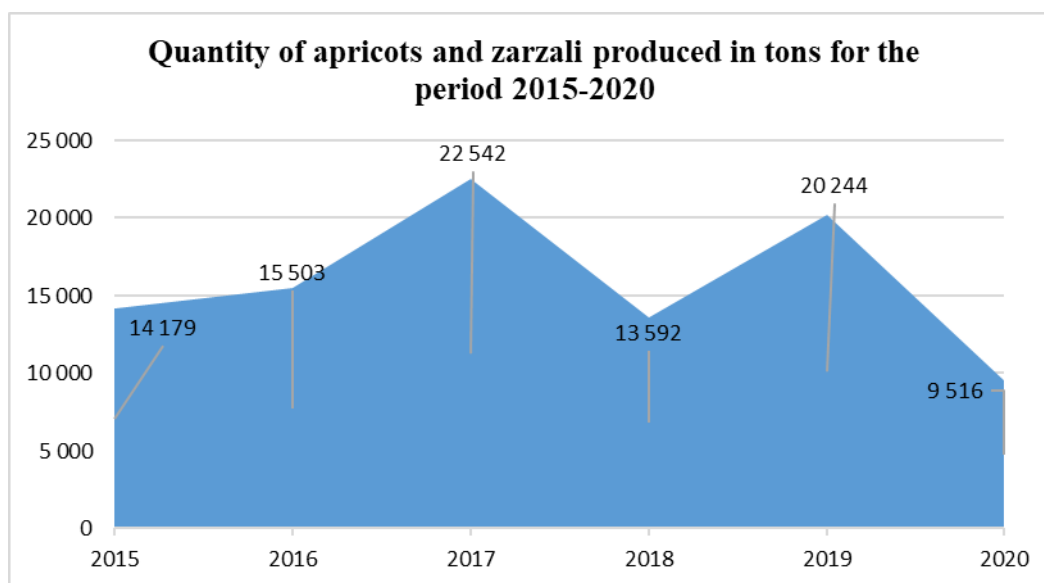


Figure 4. Quantity of apricots and zarzali produced in tons for the period 2015-2020.

However, things do not have the same positive outlook when it comes to the import and export of apricots in Bulgaria. With the exception of 2017, which is when Bulgaria exported nearly two thousand tons of apricots and zarzali, the export rates in the other periods were more or less identical, varying between 600 and 700 tons. Unfortunately, Bulgaria cannot compete with the other main apricot producing countries in the world, which have maintained their top ten positions over the last three years in the following ascending order presented in Table 2. In recent years Bulgaria has produced between 9 and 10 thousand tons of apricots and zarzali together, compared with the countries listed in Table 2 it is clear that we produce approximately 99 times less apricots than Turkey and 11 times less than Morocco. Certainly, this ratio does not allow us to compete on the merits with our neighbor to the south – a neighbor that is very quickly conquering the apricot

market in our country and can afford to apply price dumping strategies due to the lower cost of its production.

Table 2. Major apricot producing countries in the world in 2020

No.	Producing countries	Production in tons
1.	Turkey	985,000
2.	Uzbekistan	532,565
3.	Italy	266,372
4.	Algeria	256,890
5.	Iran	239,712
6.	Pakistan	178,957
7.	Spain	162,872
8.	France	148,500
9.	Afghanistan	131,816
10.	Morocco	112,538

The average prices at which apricots are exported from Bulgaria to countries in the European Union range from 80-euro cents per kilo in 2017-to-1.20-euro cents per kilo in 2016 and 2019. The largest volume of apricots exported in tons was recorded in 2017 at 2,000 tons, but that price is much lower than the average, 75–80-euro cents per kilo. Regarding imports, the largest imports are seen in 2018 and 2021, 380 and 420 thousand tons respectively at one euro per kilogram. It is interesting to know that countries such as Ireland, Luxemburg, Finland, Belgium, and England are willing to pay higher prices for imported apricots, but the quantity demanded is less. In the language of numbers, the prices they can pay range from 1.80-euro cents per kilo to 2.6-euro cents per kilo¹().The quantities demanded are less than five thousand tons. At the same time, however, Germany is looking to import over 60 thousand tons, but at a price of 0,50-to-1,60-euro cents.

The following figure shows Bulgaria's extremely small share of production compared to the other main apricot producers in the world. For 2020, it is only 9,516 tons.

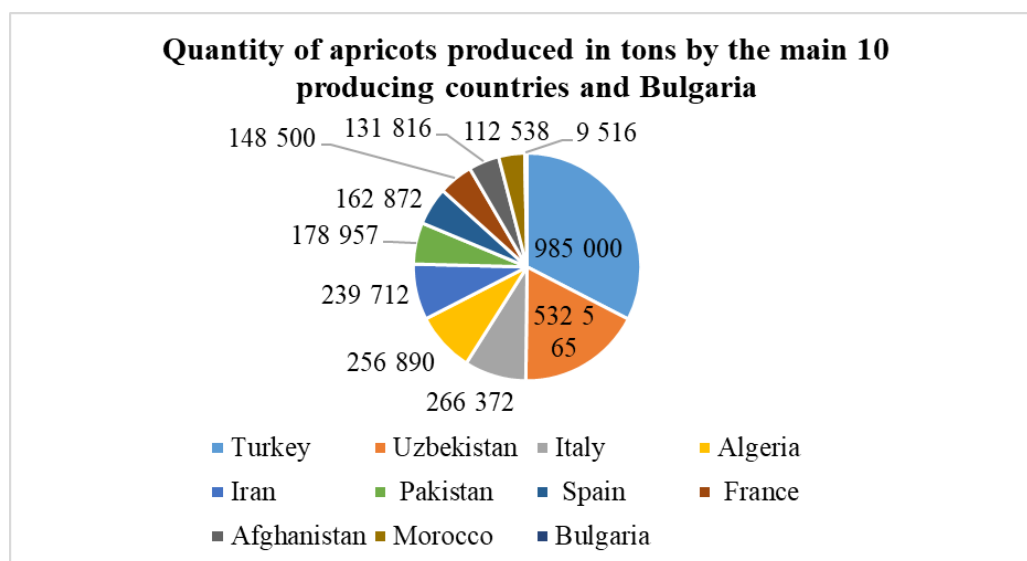


Figure 5. Quantity of apricots produced in tons by the main 10 producing countries and Bulgaria

¹ Data for 2019 and 2020.

Organic production is a type of production supported by the Rural Development Programme in the second and third programming periods, but in order for a farmer or an agricultural cooperative to convert to organic farming, they must have a minimum of three years of adaptation and soil restoration from conventional type of production. The transition period requires about 3 years according to regulation 834/2007 and if the RDP applicants do not carry out the activity in the same area, they could not achieve the effect of clearing the soil and achieving organic production. The funds earmarked for organic farming for the second programming period 2015-2020 are presented in the following Table 3

Table 3. Budget for the organic farming measure and for the whole operational RDP for the second programming period (2014-2020)

CODE	Measure	Public funds, in euro	Share of EAFRD funding
Measure 11 – Organic farming		102,906,495	75.00%
Total for RDP		2,847,811,150	82.13%

Table three shows that nearly 103 million euros are allocated to agriculture in the country, out of a total of two billion eight hundred million euros. However, it is important to note that organic farming is not easy or low cost. Other than requiring a certain period of adaptation, it also requires the application of only permitted integrated and biological protection, which very often makes production more expensive and increases costs and respectively selling prices. Clearly, the benefits of organic farming are many, but apricot farmers need to get a clear picture and assessment of whether it is effective and profitable for them. If so, implementation will require time, patience and more financial resources, and farmers could apply for it under the RDP in the third programming period – 2021 to 2027.

3. Results and discussion

Based on everything presented so far and on the comparative and benchmarking analyses completed, we can summarize some interesting results and facts:

- Apricot acreage in Bulgaria is much lower compared to 40 years ago, with average yields slightly higher than that period, due to a better varietal structure;
- The largest producer of apricots to this day is Turkey, followed by a number of southern European countries, such as Italy, Spain, France, with countries such as Uzbekistan, Algeria and Iran ranked higher;
- The purchase price for apricots by 2021-2022 is BGN 1.00-1.20 per kg and the prime cost of Bulgarian production is BGN 1.30-1.50 per kg, which clearly shows that producers have been selling their apricot production at a loss in recent years;
- For Turkey, this purchase price is relatively better as their cost is lower and ranges between 80-90 cents Bulgarian.
- All material inputs are increasing in price due to high inflation in Bulgaria and Europe, including fertilizers, plant protection products, fuel, saplings, and workforce wages, as well as social security contributions, while the price of apricot has remained unchanged in the country for the last 30 years.
- The biggest markets for Bulgarian apricots in the last 5 years have been in Germany, Romania, Czech Republic, Austria, and Belarus.
- Germany is the largest producer of apricots in Europe, producing 60,000 tons in 2019. In 2017, exports from Bulgaria to Germany were 600-700 tons.

- Austria appears to be a market with great potential and good market prices – significantly higher than the EU average, but the demand on that market is mostly for organic apricot production. At the same time, organic production is much more labor intensive and expensive, which explains why our local producers are not easily redirected towards it. Due to a number of specific requirements in the cultivation of crops, due to the impossibility of spraying with chemical preparations, and also due to the fact that a certain period of adaptation from conventional agriculture to organic agriculture is needed and this period is not very short (3 to 5 years), and for better and higher yields – a minimum of 5 to 10 years.
- In addition to being rich in many substances and minerals, useful for a healthy diet, apricots are also widely applicable in the production of cosmetics and are used to make a series of: masks and creams, shampoos, conditioners, lotions, and shower gels.
- It is interesting to know that apricots are recommended for the consumption of a series of unpleasant ailments, as natural medicines on an entirely organic basis. Such body conditions and diseases are anemia, lack of appetite, cardiovascular disease, liver and kidney disease, cancer, vision impairment, depression, insomnia, nervous tension, emotional strain, and cumulative fatigue.
- Intelligent systems for digital prediction of apricot yields have already been developed (Blagojevic Soorer et al., 2016) and can be successfully implemented in Bulgarian production.

Conclusion

There is a tradition of apricot cultivation in Bulgaria, more specifically in the region of North-Eastern Bulgaria and Silistra, but along with the favorable climate conditions in this micro-region and good agronomic knowledge for the cultivation of this type of fruit crop, the farmers face a series of fundamental issues. The main issues in apricot production and the marketing of finished products are: High risk of freezing during period of prolonged frost; low purchase prices; high production costs; high profit margins for traders, but not for producers; high prices for inputs of plant protection products and mineral fertilizers; price dumping of apricot production from Turkey, Moldova, Serbia, North Macedonia, Albania. Given all these adverse situations and issues, is there a solution for apricot producers, and if there is, what is it? The solution lies in adding value to the apricot produce and reaching the end customer with a finished and processed product, such as juices, nectars, compotes, apricot purees, jams, jams, dried fruits, and apricot brandy. Many of the farmers working in this sub-sector have already taken conscious action in this direction and are quite successfully producing apricot preserves and apricot brandy. After a thorough study of the market conditions in our country and the import and export of apricots, what we can say for sure is that apricot production or dried apricots alone will have a very hard time succeeding in the apricot market, mostly due to the much lower prices of imported apricot production from Turkey, but the production of organic fruit directed subsequently to the production of apricot purees for babies and children, as a market segment is not completely full, both in and outside of Bulgaria, it is an optimal solution for Bulgarian producers, and it adds value to the production of a final product to reach the final customer, reducing the possibility of resellers earning more than producers in this sector.

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