

RESEARCH OF SUPPLY OF BERRY PRODUCTS IN UKRAINE

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Abstract

The berry market is an important part of the Ukrainian food market. A complete nutrition of the population is impossible without berry products. Berries provide the human body with vitamins and mineral compounds. Also, they have therapeutic properties and are valuable raw materials for the processing industry. The Ukrainian territory by its soil and climatic conditions is favorable for the cultivation of berries not only for the maintenance of own needs but also for the formation of the export potential. Thus, the Ukrainian exports of berry products in 2010-2015 increased by 3.6 times to \$ 12.5 million US in 2015. Berry crops are characterized by early ripening, high yields, fast-growing, high reproduction rates, technological capacity and the ability to mechanized harvesting, as well as providing a quick turnaround of capital and return on investment. The special demand is the berry production grown by the organic production technology. However, at this time, the berry market is not optimal either for the structure or for volumes.

The berry supply in the market is formed by agricultural enterprises, households and import deliveries. A particular problem today is that the main entities forming berry supply in the market are households, accounting for about 97% of the output. The consequence is high labor costs, supply instability, poor quality of berries and low payback of their production. The high price of products leads to the fact that due to the low solvency of the Ukrainian population berry supply is provided only by half. The wholesale and retail trade is still underdeveloped. There are no diverse areas of industrial processing, as well as the range of products is limited. That is why the purpose of the article is to study the supply of berry products in the Ukrainian market and factors influencing its change.

Keywords: demand, elasticity, export, import, market of berries, price, supply

JEL Classification: O13, Q11, Q12, Q13, Q17

1 Introduction

The importance of berries in the human diet is constantly increasing. This is promoted by their properties which cannot be completely replaced by other products. They are a valuable dietary food product, a source of organic acids, sugars, tannins and aromatic substances. However, berries are the most appreciated for a significant amount of vitamins that have therapeutic value. The current increase in demand for berries is also due to the aggravation of environmental problems in the world, growth of stressful situations and, in general, the pace of life. Demand creates an offer. Therefore, there is a need to study the supply of berry products on the market in Ukraine and to study main factors influencing its change.

The market of berry production in Ukraine has a great potential for development both at the expense of domestic demand and the possibility of expanding export supplies. However, today it is in the formation stage and, therefore, the supply and demand are unbalanced. Despite growing demand for berry products, it cannot be called a product of prime necessity. The level of berry consumption is largely determined by the size of total income of the population. Low solvent demand of Ukrainians is one of the main reasons for the limited capacity of the domestic market. No category of people in Ukraine distributed by income level reaches the optimal berry consumption level of 4 kg and in the best case it corresponds to the indicator of 1.8 kg. Most consumers are forced to dwell on the marks of 0.8-1.6 kg (Mamalyga S.V., 2011). Current volume of production of fruits and berries in Ukraine is very low in comparison with countries with developed gardening. Even at the highest gross yield production of horticultural products per capita was about 50 kg, while in United States production of fruits and berries is 100 kg, in Austria - 134 kg, and in Holland - 149 kg. In recent years, the production of fruits and berries in Ukraine was slightly growing, yet in 2015 it amounted only 52.3 kg per capita, which is 36% less than consumptions rates for fruits and berries according to the Ministry of Health of Ukraine (Karpenko V., 2016).

The purpose of the study is to analyze the supply of berry products in the Ukrainian market and study main factors influencing its change.

1.1 Analysis of references

Irreplaceability of berries in the human diet prompts scientists to study the problems of functioning market of berry production at different levels. Thus, a group of scientists led by Kondratenko P.V. (2014) studied the current situation and prospects of berry production in Ukraine. In their opinion, these years the area under berry crops will increase significantly and their share in industrial production

will increase. However, they also note the negative trends hampering the development of the industry in the country. They include shifting the production of berry products to private households (about 70%), low rates of plantation reproduction, deficit of high-quality gardening material of modern domestic varieties and difficulty of the procedure for official import of seedlings from foreign countries, poorly developed infrastructure of the berry production market, etc.

V.A. Ruliev (2007) noted characteristic disadvantages of the market of horticultural products in Ukraine, namely not enough high quality of fruits, rather limited assortment, packaging shortage convenient for consumers, high regional fluctuations in prices and volumes of sales, decline of wholesale trade, limited credit resources, expansion of sales of products in spontaneous markets and highways and complete absence of domestic advertising of fruit and berry production.

According to the research of Sherstiuk S.V. (2012), the main operators in the berry production market in Ukraine are agricultural enterprises, farms, households and members of horticultural cooperatives. Due to the fact that products of private households and gardening companies are not actually taxed, they have significant competitive advantages over agricultural enterprises that is one of the reasons for the decline of industrial horticulture in Ukraine.

Formation and functioning of the gardening market is impossible without developing an effective organizational and economic mechanism. Marmul L.O. (2006) determines the following main elements: specialization and concentration of production, arrangement of horticultural farms, marketing activities and research. In addition, the author notes that the economic mechanism of state support plays an important role in the formation of the berry production market. This includes support the growing demand for berry products; stimulation of the stable development of the branch on the basis of legislative normative acts; improvement of innovation, pricing, credit, insurance policy and export-import regime.

Studies of Salo I.A. (2016) should be paid attention. She indicates that in order to fully meet the needs of consumers with fruits and berries throughout the year, there is a need for appropriate legislative regulation regarding the establishment of service cooperatives that would carry out wholesale purchases of products from the population during the period of mass fruiting and by arrangement and continue to be implemented through a wholesale or retail outlets. This would enable legalization of commodity flows of fruits and berries, control of their market entry of appropriate quality, introducing sorting and packaging and contributing to transparent pricing and income growth.

An important direction in the development of the berry production market is the production of organic products. The market of organic berries in Ukraine

grows by 2-3% annually and its volumes make up 200 thousand dollars or 180-190 thousand tons of berries (Marmul L.O., Novak N.P., 2016). At the same time, as noted by the authors, the area under organic berries in Europe is limited which creates additional opportunities for the development of the Ukrainian market of organic berry production.

Foreign scientists also pay considerable attention to the functioning of the market of berry production. The main factors influencing its development are introduction of innovative technologies and increased consumer demand for berries. Also, a group of American scientists Tourte L., Bolda M., Klonsky K. (2016) points out the importance of developing the organic berry sector. However, as rightly emphasized by Italian scientists Peano C., Baudino C., Tecco N. and Girgenti V. (2015), the market of berry production depends on the use of environmental brands and the application of “green marketing” methods.

According to Kulakov V. (2014), when forming parameters of the berry production market and definition of the demand level it is necessary to apply tools that would allow taking into account the impact of income level on the size of market demand.

The analysis of references on this topic indicates the relevance of the research topic not only in the Ukrainian market but also abroad.

2 Data and Methods

The theoretical and methodological basis of the research is a modern economic theory, a systematic approach to the study of economic and organizational aspects of the development of industrial horticulture and scientific works of domestic and foreign scientists on the functioning of the berry market.

The information base of the research was materials of State Statistics Committee of Ukraine and regions, primary records and annual reports of horticultural farms, results of sociological surveys and personal studies of the author.

In the process of research, general scientific and economic methods were used: monographic method (in problem statement and defining conclusions); calculation-constructive method and extrapolation method (in substantiating the supply dynamics and forecasting main economic indicators of the development of the domestic market of berries; in determining the berry export and import); index method (in the research of the current state of the berry market), balance method (in determining the level of self-sufficiency); grouping method for identifying factors that influence the berry supply; analysis of supply and demand elasticity (when assessing the impact of price and income on demand and supply on the market).

3 Results and Discussion

The effective functioning of any market depends on the ratio of demand and supply of a particular type of product or service on it. The supply of berries is the quantity of berry products that producers and sellers want and can sell on the market. According to Melnyk L.Y., the supply indicator should be thoroughly analyzed, as it is not expedient to produce at least one extra kilogram of product if it has no sales or causes additional losses (2001). The market supply of berry products is the total volume of individual offers of the producers of berries. The berry volumes on the market should guarantee:

- Provision of growing needs of the population and processing industries of Ukraine in the quality of berry products;

- Increase in the export of Ukrainian berry products in order to increase its producers' incomes, ensuring the effective functioning of the market infrastructure and increase in currency incomes in the country's economy.

Main producers of berries in Ukraine during the last period are agricultural enterprises and households. Also, the volume of berries entering Ukraine from other countries, that is, the size of imports, should be taken into account. Thus, the market supply of berry products can be represented by the following formula:

$$S = S_1 + S_2 + S_{\text{import}} \quad (1)$$

S_1 is supply of berry production by agricultural enterprises;

S_2 is supply of berry production by households;

S_{import} is supply of berry products at the expense of imports.

According to the Association "Ukrsadprom" (2017), in recent years in Ukraine the stable production is in the range of 120-125 thousand tons of berries. In the general structure of fruit and berry production, berries occupy about 6%. Strawberries and wild strawberries remain the leading crops among berries accounting for almost half of the total harvest. Although industrial enterprises produce only 10-15% of berries in Ukraine, the commodity structure of their production almost completely repeats the general one. Areas for berry crops in Ukraine are stable (within 20 thousand hectares); mostly they are used for growing strawberries, raspberries and currants. The average yield of berries is over 60 c/ha. Traditionally, the largest amount of berries is grown in 5 regions of Ukraine (Vinnytsia, Dnipropetrovsk, Donetsk, Zhytomyr and Kiev).

In Table 1 we consider the dynamics of changes in the supply of berries in Ukraine by agricultural enterprises and households.

Table 1 Dynamics of supply of berries in Ukraine (thousand tons)

	Supply of berry production by agricultural enterprises (S_1)	Supply of berry production by households (S_2)	Supply of berry production by all categories (S_1+S_2)
2001-2005	3.6	87.5	91.1
2006-2010	6.4	102.7	109.1
2011-2015	9.4	118.9	128.3
2016	12.6	115.1	127.7
2017	14.3	112.5	126.8

Source is proposed according to data of <http://agroua.net/economics/statistics/>.

Table 1 allows us to conclude that main suppliers of berry products in the Ukrainian market are households which share in the total production of berries ranges from 96% in 2001 to 89% in 2017. Of course, the concentration of berry production in private households is not a progressive phenomenon but under the condition of a crisis situation in Ukraine, it is with the help of private berry production, a considerable part of the existing problems is solved. According to Kropyvko M. (2012) and Svytnous I. (2010), households contribute to the provision of people with berries. According to domestic consumers, they are more qualitative than industrial production because they contain fewer residues of harmful chemicals for the human body. Also, this production is less dependent on the rising cost of energy carriers and other material and technical resources because manual labor dominates and is not taken into account in determining the expediency and efficiency of their economic activity. Berry sale provides the population with a certain additional income which is important enough with its low solvent demand.

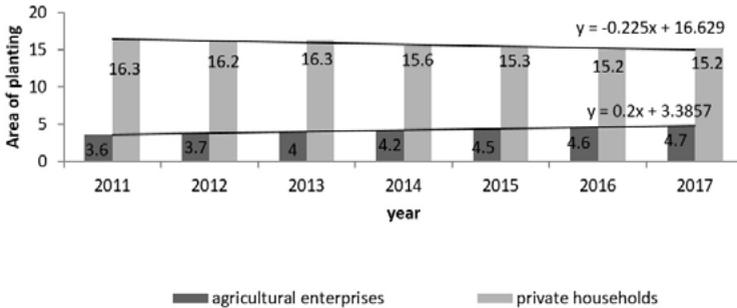
At the same time it is necessary to emphasize the opinion of Salo I.A. (2016) that berries grown by households are considered uncompetitive in the market under the WTO-EU agreements. Industrial enterprises can implement proper quality control at all stages of production, processing and marketing and it is practically impossible for households to do this. Even if the manufactured product meets the requirements for its qualitative indicators, there is no mechanism for quality control complicated by the presence of a large number of manufacturers. This is usually a negative factor. However, regardless of this, households occupy their niche in the domestic market of berries and significantly affect the formation of supply, demand and price situation.

One of the ways of development of private berry production may be unification of farms on the basis of cooperation which actively operate in economically

developed countries. These structures could carry out organizational policy, ensure implementation of technological processes in farms, monitor the quality of products, collect, store and sell berries.

The main factors affecting the supply of berries by agricultural enterprises and households are the area size for fruit bearing plantations and their yield. In recent years there has been a slight increase in the area of berry plantations in agricultural enterprises ($y = 0.2x + 3.3857$) and decline in households ($y = -0.225x + 16.629$), as shown in Figure 1. However, the total area of plantings has not changed much.

Figure 1 Trends in changing areas for berry plantations in Ukraine, thousand ha

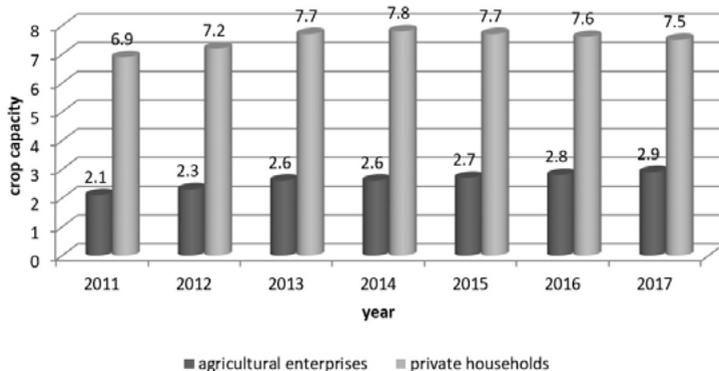


Source is proposed according to data of http://www.ukrstat.gov.ua/druk/publicat/kat_u/publ7_u.htm.

Regarding the structure of plantations, the conducted studies show that in 2017, areas for wild strawberry planting occupied 39% of all berry plantations, raspberry and currant plantations occupied 50% equally and gooseberry and blueberry plantations were 11% equally.

Regarding the yield of berry crops, it should be noted the paradoxical situation that has developed in Ukraine. Despite the lack of intensification, the yield of berries in small farms of the population predominates almost three times the yield in enterprises engaged in industrial horticulture (Figure 2).

Figure 2 Yield dynamics of berry crops in Ukraine, t from 1 ha



Source is proposed according to data of http://www.ukrstat.gov.ua/druk/publicat/kat_u/publ7_u.htm.

Therefore, one of the factors that directly influence the increase of the supply of berry products in Ukraine will be the increase in the productivity of berry plantations on an industrial basis of an intensive type. In Ukraine, an increase in the berry production is also restrained by the shortage of high-quality seedlings of modern domestic varieties and complexity of the procedure for the official import of seedlings from foreign countries. Today, there are only a few industrial nurseries that have seedling material of high quality and therefore the needs of producers of our country are only 30% provided with domestic seedlings (Konratenko P.V., 2014).

Obviously, that under current conditions of berry production in Ukraine neither agricultural enterprises, nor households can fully cover the demand of the population in berries and, therefore, it creates the preconditions for the development of trade in imported products. That is why the third component of the berry supply on the market is the supply at the expense of imports.

Comparing the volumes of imports and exports on the balance of fruit and berry production during the last five years, we found that the ratio of the volume of fruit and berry imports to Ukraine to its own production was from 47.5% in 2012 to 30.7% in 2016 (Table 2). This indicator tends to decrease by 16.8 points. It is also necessary to note the dynamics of the growth rate of the export coverage by importing fruit and berry products in Ukraine and it indicates the need to intensify its own production in the country with the maximum coverage of the needs of the population in consumption.

Table 2 Dynamics of volumes of fruit and berries at the expense of export-import operations

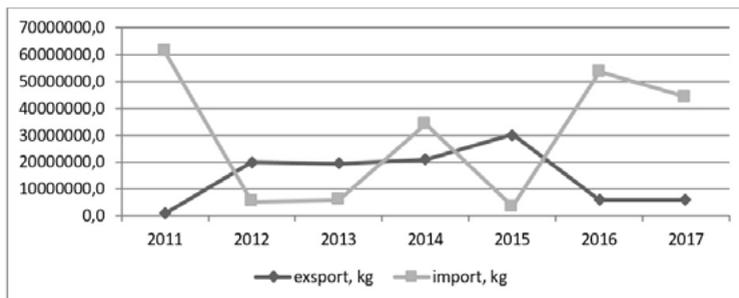
	2012	2013	2014	2015	2016	2016 в % before 2012
Production, thousand tons	2465	2871	2435	2539	2385	96.8
Imports, thousand tons	1171	1172	856	588	732	62.5
Exports, thousand tons	351	392	350	324	283	80.6
Ratio of imports to production, %	47.5	40.8	35.2	23.2	30.7	-16.8
Coefficient of export coverage by imports, %	30.0	33.4	40.9	55.1	38.7	8.7

Source is proposed according to data of <http://www.ukrstat.gov.ua>.

The main fruit importers are the countries of Europe: Poland, Germany and the Netherlands and among the CIS countries it is Georgia.

In 2011-2017, according to State Statistics Service of Ukraine, imports of fresh berries decreased by almost 30% (from 61053 to 44256 tons) and exceeded exports in 2017 by 7.5 times (Figure 3). The most amounts of fresh strawberries to the domestic market of Ukraine were from Greece, Turkey, Spain and the Netherlands. The main importers of frozen blackberries, raspberries, etc. for the Ukrainian market were suppliers from Poland (580.7 tons or 92.1%). It should be noted that in 2015-2016, the share of imports of strawberries significantly decreased compared to 2014 which allowed domestic consumers to consolidate in the domestic market.

Figure 3 Volumes of exports-imports of fresh berries in Ukraine, kg



Source is proposed according to data of <http://www.ukrstat.gov.ua>.

Analyzing Figure 3, it can be also concluded that export-import relations with suppliers of fresh berries in Ukraine and from Ukraine are at the stage of formation there is no systematic follow-up, etc. Therefore, under the modern conditions there are great prospects for carrying out foreign trade activities in the market of berries.

Having analyzed the supply of berries at the expense of imports into Ukraine (S_{import}), it is possible to determine the total volume of supply in the market of berries (Table 3).

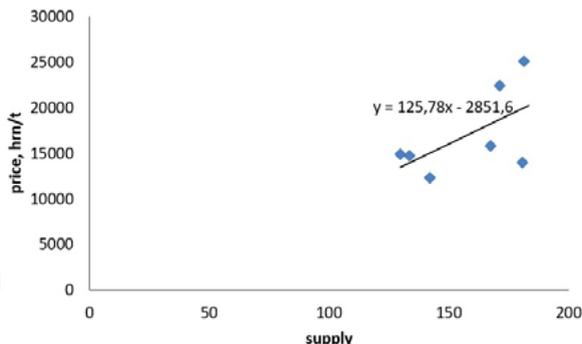
Table 3 Supply volumes in the berry market in Ukraine (thousand tons)

	Supply of berry production by agricultural enterprises (S_1)	Supply of berry production by households (S_2)	Supply of berry products at the expense of imports (S_{import})	Volume of supply in the market of berries (S)
2011	7.5	112.0	61.1	180.6
2012	8.3	116.2	5.3	129.8
2013	10.5	125.9	5.8	142.2
2014	11.1	121.8	34.3	167.2
2015	12.0	118.0	3.6	133.6
2016	12.6	115.1	53.6	181.3
2017	14.3	112.5	44.3	171.1

Source is proposed by authors according to data of <http://www.ukrstat.gov.ua>.

In recent years, the supply of berries in the Ukrainian market has a tendency to decrease. This happens under the influence of various factors. A factor that directly influences the volume of supply is the price of berries. We have found that there is a direct link between the supply of berry products and its price, as shown in Figure 4.

Figure 4 **Dependence of the berry supply and the price in Ukraine in period 2011-2017**



Source is proposed by authors according to data of <http://www.ukrstat.gov.ua>.

That is, the increase in the price of berries will encourage commodity producers to increase supply volumes. However, it is very important to analyze the dependence of the demand for berries on income from the population, since the berry production, despite its importance, is still not a product of first necessity. In this case, it is advisable to apply the theory of elasticity. In this case, it is advisable to apply the theory of elasticity. Elasticity of demand by income characterizes the degree of change in the value of demand for goods in response to changes in the size of consumer income. It is important to note that in view of the high inflation rates in Ukraine, in the calculations we used real income of the population (minus the level of inflation). Due to the lack of statistical data on the consumption of berries, calculations were made on all fruit and berry products, since, in our opinion, the trends remain the same (Table 4).

Table 4 **Elasticity of fruit and berry products in Ukraine by income (in 2012-2016)**

Year	Consumption of fruit and berries per person per year, kg	Real income per capita, UAH	Coefficient of elasticity of demand for fruit and berries by income
2012	53.3	28344.6	-
2013	56.3	28710.1	4.3
2014	52.3	23702.2	0.4
2015	53.9	24121.4	1.7
2016	49.7	36063.1	-0.2

Source is proposed by authors according to data of <http://www.ukrstat.gov.ua>.

The given calculations show that fruit and berries belong to a group of usual goods for which the demand of consumers will increase with income growth. Consequently, in Ukraine there are real opportunities for growing demand for berries due to the growth of consumer revenues. This will have a positive effect on the expansion of supply of berry production.

The increase of the berry supply in Ukraine will also be affected by the improvement of export opportunities of the studied branch. The factors contributing to the export orientation of the Ukrainian berry market are favorable climatic conditions for production; proximity to EU markets; high quality of products; decrease due to devaluation of the hryvnia; competitive prices; cheap labor force which contributes to the production of blueberries, blackberries, bilberries and raspberries. The low cost of manual labor remains the preponderance of Ukraine in terms of the industrial cultivation of berries. Foreign market prices for Ukrainian berry products are higher by 30% but only 8% of the cultivated berries are exported. The country has competitive advantages in growing labor-intensive berry crops such as blueberries, blackberries, bilberries and raspberries. These berries are the main product for export to the countries of the European Union. The main consumer countries of the Ukrainian fresh berries are Poland (1.6 million dollars) and the Netherlands (1.3 million dollars). As for frozen berries, Ukraine exports to Poland (\$ 3.4 million), Germany (\$ 1.0 million), Austria (\$ 0.7 million), the Netherlands (\$ 0.5 million) and France (\$ 0.4 million) (Mostoviak M., 2016).

An important direction in the development of the berry market in Ukraine is the cultivation of berry products by organic technologies. There is no official statistics on organic agrarian and food products in Ukraine. However, according to experts, the Ukrainian producers of organic berries are now exporting almost the entire harvest because there is no demand for it within the country. It is important that zero export duties are set for organic products in the EU and quotas are not subject to organic production. Consequently, the main obstacle to the export of domestic organic berry products to the EU is regulatory barriers. About 80% of organic berry products are grown by the population and small farms. A significant part of these farms are involved in projects for the implementation of organic berry growing in Ukraine and cooperate with foreign companies, primarily with companies from Germany. In Ukraine, the following types of organic berry crops are certified: raspberries, blackberries, wild strawberries, strawberries, blueberries, cranberries, guelder rose, cornelian cherries, black chokeberries (aronia), elderberries; fresh, dried, frozen berries and processed berries (jams, syrups, juices, canned berries, etc.). Organic berries can keep marketability for a limited period. Therefore, practically the only option to sell organic berries abroad is to freeze it with the appropriate technology. Such equipment is unprofitable for farmers

who grow berries on small plots of land (up to 50 hectares). Farmers are united in cooperatives to solve this problem in Europe. Domestic market of organic berry products in Ukraine is in the stage of formation. Therefore in the future there can be a significant part of the supply of berry products.

4 Conclusion

1. The supply of berries is the quantity of berry products that producers and sellers want and can sell on the market. The volumes of berry supply should guarantee the growing needs of the population and processing industries of Ukraine in berry products of the proper quality and increase the export of the Ukrainian berry products in order to have bigger income of its producers, ensure the efficient operation of the market infrastructure and increase the currency income in the country's economy.

2. The main components of the supply of berry products in Ukraine are the supply of agricultural producers, the supply of private households and the supply of berries at the expense of imports. The peculiarity of the berry market in Ukraine is that main suppliers of berry products are households which account for about 70% of the total volume. Specific weight of the output from agricultural enterprises is about 8% and imports are about 22%.

3. During the last decade, the supply of berries in Ukraine has a tendency to reduce, despite the dissatisfied consumer demand for berry products. This is due to reduced areas of fruit bearing plantations, low productivity of production and underdeveloped infrastructure in the berry market, etc. In addition, there is a direct dependence between the growth of consumer incomes and the consumption of berries. Under the conditions of the economic crisis that prevails in Ukraine, the income level of consumers does not allow them to eat enough berry products. However, there are significant prospects for the development of the berry market.

4. Competitive advantages of the studied branch beyond its borders will positively affect the expansion of berry supply in Ukraine. They include favorable climatic conditions for production; proximity to EU markets; high quality of products, decrease due to devaluation of hryvnia cost price; competitive prices, as well as cheap labor.

5. An important direction for expanding the berry supply in Ukraine is the production of organic products.

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