
NON-CONVENTIONAL AGRICULTURAL LAND USE: A WAY TO ACCELERATE ECOLOGIZATION AND CAPITALIZATION

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Abstract

The article is devoted to the prospect of introducing innovative measures in agriculture, which will contribute to the growth of agricultural production in Ukraine. In particular, the authors researched the development of non-conventional land use as a path to greening and capitalizing land use of peasant farms and individual farms, as well as small and medium-sized enterprises in the context of growing organic and niche products. In the course of the analysis, the article examines the state of the use of the land fund in Ukraine, namely, by grouping of the average size land plots of agricultural shares owners. Which made it possible to divide the regions into six groups and show that with an increase in the area of agricultural land in the regions, the intensity of its use also increases, this contributes to degradation processes and, in general, less efficient use of land. As an example, the share of sunflower in the total crop structure is presented, and it exceeds the standards by almost 2 times. The authors of the article noted the fact that the forms and sizes of land use of agricultural enterprises are of great importance for the efficiency of land use. In particular, the structure of operating agricultural enterprises in Ukraine by the size of agricultural land is presented, which made it possible to note a significant percentage of small farms (56.7%). This allows us to conclude that the current trends require a reorientation of the development of land use by individual farms, peasant farms, as well as small and medium-sized enterprises to non-conventional, which foresees the use of innovative measures for the production of organic and niche crops, this will allow them to exist in the agricultural market. From an environmental and economic point of view, the cultivation of organic and niche products will contribute to an increase in labor productivity in rural areas, an increase in the production at individual farms, peasant farms, as well as at small and medium-sized enterprises, and in general, will accelerate the greening and capitalization of land use. As the land use is both a place of work and a territory of residence for land share owners and farmers. The authors present agricultural crops that are in demand both for export and for consumption inside the country.

Key words: non-conventional land use, organic products, niche products, capitalization of land use, individual and peasant farms, small and medium enterprises.

INTRODUCTION

Today, with the dynamic development of agriculture, the competition between enterprises in the agricultural market is growing. Despite this, in the international economic space, in particular in the context of the instability of the global economic environment and geopolitical exacerbations,

weak economic growth is observed in many countries. A similar situation is developing in Ukraine, in particular in rural areas and the agricultural sector of the economy, where jobs are created extremely slowly and working-age rural population is losing sources of income. Business diversification and increased productivity of individual and peasant farms, as well as small and medium-sized enterprises

can provide a positive socio-economic effect, as a result of attracting additional labor force (in particular women and youth in rural areas), increasing income levels, in turn, this leads to an improvement of demand structure and to an increase in the production of high added value products. According to economists, an increase in labor productivity at individual and peasant farms, as well as at small and medium-sized enterprises, for example, by 1% leads to an increase in the productivity of large companies by 0.2%, and nationwide - by 0.7% [3].

Such issues preceded the study of the implementation of innovative measures in agriculture, which will contribute to the growth of labor productivity in rural areas, saving material, labor and financial resources, increasing production of individual and peasant farms and, in general, the economic growth of the country.

The solution to these problems can be the intensive introduction of innovations in the specialization for individual and peasant farms, as well as for small and medium-sized enterprises; in the production and export of organic and niche products, which makes it possible to avoid unequal competition with agricultural holdings and expand sales markets in the context of a narrowing domestic segment of agricultural products.

Under conditions of unequal competition with agricultural holdings, the main goal for individual farmers and peasant farms, as well as small and medium enterprises should be to make a profit not so much from quantity as from quality and exclusivity of goods; this will form their competitive advantages on international markets [4].

It is the production and sale of organic and niche goods that can become such an area of activity, in which there has been a growing interest in the global agri-food market in recent years. Thus, a study of the competitiveness of individual and peasant farms, as well as small and medium-sized enterprises in 12 countries in various industries (countries of the G-7 and BRIC), conducted by the international agency DHL showed that enterprises engaged in foreign economic activity show better economic

results. In particular, among the most efficient, 26% - economic entities implemented foreign economic activity and only 13% - were focused on the domestic market [1].

In addition, it should be noted that individual and peasant farms, as well as small and medium-sized enterprises, have environmental functions, as agricultural land use is their place of work and residence of the owner and employees.

MATERIALS AND METHODS

In the study process, the materials used were scientific publications on the prospects for the use of organic and marginal niche crops.

In order to reveal the importance of the use of non-traditional agricultural production in Ukraine by individual and peasant farms, as well as small and medium-sized enterprises in Ukraine, an analysis of the state of the land fund in Ukraine was carried out. The statistical base was the official materials of the State Statistics Service of Ukraine, reports of the State Service of Ukraine on Geodesy, Cartography and Cadastre and information documents of FAOSTAT and the Federation of Organic Movement in Ukraine.

During the study, the regions of Ukraine were grouped taking into account that Ukraine has a large territory with different physical, geographical and climatic zones.

When determining the required number of groups, the Sturges formula was used, where the average size of the land share (pai) was chosen as a grouping feature:

$$n = 1 + 3.322 \lg N \quad (1)$$

the "N" is a total number of observations of the quantity.

This grouping made it possible to draw conclusions about the prevailing negative trends which show the need of optimization of the land fund of Ukraine and about the ineffective use of agricultural land.

RESULTS AND DISCUSSIONS

From the ecological and economic point of view, the condition of agricultural lands in Ukraine is in a critical state. Thus, according

to our research in 6 regions of Ukraine, land use is ecologically unstable, which negatively affects the quality of agricultural products. This is due to the fact that today the crop rotation, the introduction of chemical fertilizers, the monocultural nature of production and other harmful factors are uncontrolled. In this regard, the attention should be paid to the positive dynamics of greening of agricultural land use through the use of non-traditional land use [12].

According to the State Geocadastre of Ukraine, in 2017 the share of plowed land was almost 80%, which negatively affects the quality of the products due to the destruction of natural resources of agriculture by the predominance of intensive farming.

Excessive plowing leads to an increase in the area of eroded agricultural land, which in our country is already about 15 million hectares. With irrational use, arable land is subject to

degradation processes; their surface is exposed to water and wind erosion, acidity increases, etc.

The regions were grouped for analysis of the land fund of Ukraine and the intensity of its use. To determine the required number of groups the Sturges formula (formula 1) was used:

$$n = 1 + 3.322 \lg 24 = 5.6$$

So, we assume that the number of groups is $n \approx 6$.

The results allow us to form six groups at regular intervals, where an additional indicator for the analysis is the coefficient of plowing.

The results of grouping the regions of Ukraine, shows that with the increase in the area of agriculturally used areas by region also increases the intensity of their use (Table 1).

Table 1. Grouping of regions of Ukraine by the average size of land plots of owners of land shares (paiv) as of 2017.

Grouping by the average size of the land share (pai), ha	The average size of the land share (pai) in the region, ha	Region	Plowing ratio, %	The average size of an agricultural enterprise, ha	The average size of the individual farm, ha	Profit of agricultural enterprises, per 1 hectare	Average level of profitability (loss) of enterprises in the agricultural sector, %	Physico-geographical zoning	Share in the of sunflower in the structure crops, %	
									regulatory standard *	as it is actually
1.1-2.38	1.10	Ivano-Frankivsk	64.5	882.2	1,220.7	-242.6	-1.5	Partly the Ukrainian Carpathians	-	6.5
								Partly the Forest-steppe zone	5-9	
	1.40	Transcarpathian	44.4	438.6	486.8	384.2	22.2	Ukrainian Carpathians	-	1.4
	1.40	Chernivtsi	70.4	604.5	800.2	200.9	4	Partly the Ukrainian Carpathians	-	6.3
								Partly the Forest-steppe zone	5-9	
	1.90	Lviv	62.2	1,063.1	1,550.8	640.4	10	Partly the Ukrainian Carpathians	-	5.0
Partly Polissya zone								0.5		
Partly the Forest-steppe zone								5-9		
2.10	Ternopil	82.2	1,029.3	1,644.3	865.1	8	Forest-steppe zone	5-9	8.6	
2.38-3.67	2.50	Vinnitsia	86	776.8	1,046.3	3,906.7	23.9	Forest-steppe zone	5-9	15.9
	2.50	Volyn	64.2	1,235.3	1,745.8	938.2	19.2	Partly Polissya zone	0.5	4.2
								Partly the Forest-steppe zone	5-9	
2.60	Khmelnitsky	85	998.9	1,390.2	2,285.6	21.5	Partly Polissya zone	0.5	13.4	

								Partly the Forest-steppe zone	5-9	
	2.70	Rivne	71.4	1,669.1	2,479.1	1,303.5	23.4	Partly Polissya zone	0.5	4.3
								Partly the Forest-steppe zone	5-9	
	2.70	Cherkasy	87.8	762.1	1,111	4,161.4	32.4	Forest-steppe zone	5-9	17.0
	3.20	Kyiv	82.3	774.9	836.7	4,324.3	28.2	Partly Polissya zone	0.5	16.2
								Partly the Forest-steppe zone	5-9	
3.67-4.95	3.60	Zhytomyr	76.1	1,393	2,483.6	1,570.5	25.4	Partly Polissya zone	0.5	14.5
								Partly the Forest-steppe zone	5-9	
	4.00	Sumy	72.8	1,599.9	2,615.6	2,431.6	30.4	Partly Polissya zone	0.5	18.8
								Partly the Forest-steppe zone	5-9	
	4.10	Poltava	83.9	882.3	1,164.8	5,144	33.3	Forest-steppe zone	5-9	19.1
4.10	Chernihiv	70.7	1,877.9	3,297.6	2,080.5	21.3	Forest-steppe zone	5-9	16.4	
4.95-6.23	4.70	Odessa	80.2	538.5	647.7	1,970.4	35.6	Partly Steppe zone	10	22.0
								Partly the Forest-steppe zone	5-9	
	5.70	Dnepropetrovsk	84.7	636	778.8	1,965.3	25	Steppe zone	10	30.3
	5.70	Kirovograd	87.1	634.9	782.9	3,228.3	42.2	Partly Steppe zone	10	34.7
							Partly the Forest-steppe zone	5-9		
6.10	Donetsk	80.9	1,495.3	2,158.5	976.2	25.8	Steppe zone	10	31.1	
6.60	Kharkiv	81.3	1,250.7	1,915.3	2,208.1	27.3	Partly Steppe zone	10	29.7	
							Partly the Forest-steppe zone	5-9		
6.23-7.52	6.80	Kherson	90.7	769.3	951.4	2,154.6	35.6	South-Steppe zone	12-15	23.8
	6.90	Mykolayiv	85.4	505.2	591.9	1,798.1	30.5	South-Steppe zone	12-15	35.9
	7.20	Zaporizhia	84.9	829.1	1,093.1	2,024.2	39.6	Steppe zone	10	34.0
7.52-8.80	8.80	Luhansk	66.9	1,826.7	2,380.9	1,139.6	34.8	Steppe zone	10	44.4

* Regulatory Standards for the optimal ratio of crops in crop rotations in different natural and agricultural regions in accordance with the resolution of the Cabinet of Ministers of Ukraine of February 11, 2010 № 164 [11].

Source: calculated by the authors according to the State Geocadastre and State Statistics of Ukraine.

As the data in Table 1 show, the smallest land plots (from 1.1 hectares to 2.38 hectares) are observed mainly in the zone of the Ukrainian Carpathians and adjacent zones (Forest-steppe, Polissya), where a complex relief is inherent. The largest size (from 4.95 ha to 8.80 ha) in accordance with the grouping mainly in the Steppe and South-steppe zones and partly in the Forest-steppe.

The average size of agricultural enterprises, which are mainly established on the basis of land lease, and individual farms are not tied to the physical and geographical zoning. However, the profitability per unit of agricultural land area mostly correlates with the value of the average size of land plots of owners of land shares. Note the fact that the ecological situation is threatening, which is associated with the proportion of sunflower in the structure of crops, which exceeds the standards by almost 2 times.

This situation is explained by the high profitability of this crop (the level of profitability in 2016 was 63%, Table 2), respectively, affects the greening and capitalization of land use.

Table 2. The level of profitability (loss) of the main types of agricultural products in 2016

Crops	level of profitability (loss), %
Cereals and legumes - total	37.8
including	
wheat	31.7
rye	24.6
oats	34.4
barley	25.4
buckwheat	87.5
peas	76.8
millet	30.2
sorghum	21.4
rice	33.1
corn for grain	45.7
other cereals and legumes	41.1

Sunflower seeds	63.0
Soybeans	52.0
Rapeseed	45.0
Flax seeds	10.1
Sugar beets (factory)	24.3
Potatos	-3.2
Vegetables	13.6
Cucurbits	17.1
Fruits	12.0
Berries	104.0
Grapes	74.6
Hop	100.4
Cattle for meat	-24.8
Pigs for meat	-4.5
Sheep and goats for meat	-35.2
Poultry for meat	5.0
Milk	18.2
Chicken eggs	0.5
Wool	-31.8
Honey	4.8
Fish farming products	-4.4

Source: according to the State Statistics Service of Ukraine

These tables also show significant prospects for organic and niche crops.

The forms and sizes of land use of agricultural enterprises are of great importance in the study of land use efficiency. As the dynamics of redistribution of agricultural land area among existing agricultural enterprises, in particular for individual and peasant farms, small and medium enterprises and large integrated companies, namely agricultural holdings, has a significant impact on the structure of the land fund in Ukraine.

In general, the analysis of the structure of agricultural enterprises in Ukraine shows that most farms have a small area of land use (Table 3). Its analysis shows that in Ukraine, there were 25,835 agricultural enterprises and farms with an area of agricultural land up to 100 hectares, which is 56.7% of their total number; they used 870.6 thousand hectares of agricultural land. Meanwhile, the 304 agricultural enterprises, which accounted for 0.7% of the total number, land use is more than 7,000 thousand hectares of agricultural land. Such enterprises accounted for 24% of the total area of agricultural land.

Table 3. Structure of operating agricultural enterprises of Ukraine by size of agricultural land as of November 1, 2017

The size of agricultural enterprises	Number	Percentage of total	Agricultural land area, thousand ha	Percentage of total agricultural land
Enterprises with agricultural land	40,735	89.4	19,960.2	100.0
in particular, with area (ha) up to 5.0	3,138	6.9	10.1	0.1
5.1–10.0	2,594	5.7	20.3	0.1
10.1–20.0	3,937	8.6	61.0	0.3
20.1–50.0	11,263	24.7	424.9	2.1
50.1–100.0	4,903	10.8	354.3	1.8
100.1–500.0	7,372	16.2	1,797.1	9.0
500.1–1,000.0	2,651	5.8	1,891.4	9.5
1,000.1–2,000.0	2,481	5.4	3,570.9	17.8
2,000.1–3,000.0	1,084	2.4	2,649.2	13.3
3,000.1–4,000.0	471	1.0	1,635.4	8.2
4,000.1–5,000.0	276	0.6	1,236.1	6.2
5,000.1–7,000.0	261	0.6	1,526.3	7.6
7,000.1–10,000.0	138	0.3	1,140.1	5.7
over 10,000.0	166	0.4	3,643.1	18.3
Enterprises that did not have agricultural land	4,823	10.6	–	–

Source: calculated by the authors on the main State Statistics of Ukraine

The Land Code of Ukraine [10] allows the plot size of up to 100 hectares, specifically for private property and this should have the greatest impact on the development of rural areas. Because it is in these farms that organic and niche crops are and can be grown, which

are highly profitable and the capitalization of land use is higher. Thus, the above determines the importance of reorientation in the structure of agricultural production to individual and peasant farms, as well as small and medium-sized agricultural enterprises,

which, accordingly, directly and indirectly affects the greening and capitalization of land use. Thus, these trends will reduce degradation processes due to uncontrolled application of fertilizers and non-compliance with crop rotations by monoculture production. This is due to the fact that peasant farms, as well as small and medium-sized agricultural enterprises have ecological functions, as agricultural land use is their place of income and territory of residence.

Note that in modern economic conditions, non-conventional land use in European agriculture is considered as one of the most environmentally and economically efficient land use. One of the main indicators for assessing the economic feasibility of non-conventional land use is the market capacity of niche crops and organic agricultural products.

Figure 1 shows the increasing dynamics of growth in the market capacity for organic products throughout Europe and in particular among the countries of the European Union.

For the Ukrainian economy, non-conventional land use, in particular for the production of organic products, is important, since this is one of the real ways to provide the population with environmentally friendly agricultural products.

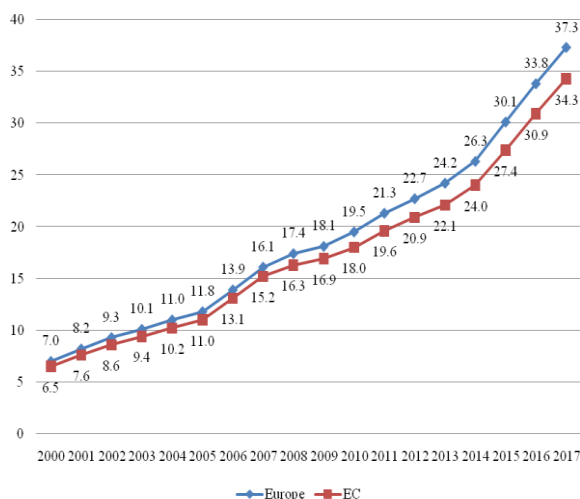


Fig. 1. Trends in the organic products market over a period from 2000 till 2017, billions of euros
Source: created using the data [14]

In addition, at the present stage, non-conventional land use, from the point of view

of increasing the level of efficiency of agricultural production, as already noted, is more promising while reducing anthropogenic pressure on the environment [13].

Until now, a specific feature of the production of organic products in Ukraine is that production was mainly concentrated in large farms. In particular, from 2003 till 2007 the average size of land use for the production of organic products was over 3 thousand hectares (Fig. 2).

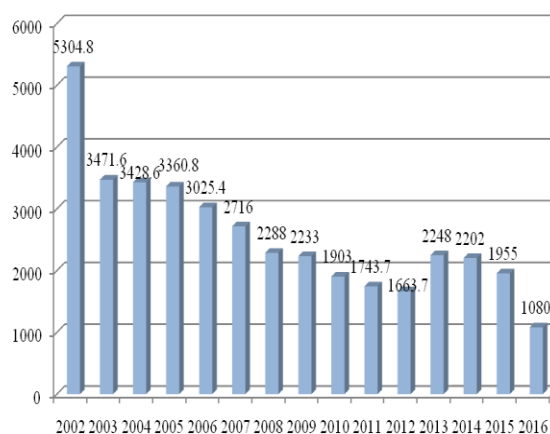


Fig. 2. Dynamics of the average size of land use for the production of organic products in Ukraine, ha
Source: built using data from the Federation of Organic Movement

In 2016, the average size was 1,080 hectares, which indicates a downward trend in land use for the production of organic products. Note the fact that according to European practice, the organic farming is characterized by a small size of land use.

According to FIBL and IFOAM [2], the total volume of organic food and beverages in 2014 reached almost 80 billion US dollars. The market has grown by 170% compared to 2004. The main sales volume is currently concentrated in developed countries in North America and Europe, which account for 90% of world sales.

As of the end of 2017, there were 375 certified farms in Ukraine that produced organic products (Fig. 3). Every year this indicator grows taking into account the environmental benefits of this method of land use, as well as economic and market prospects for European integration.

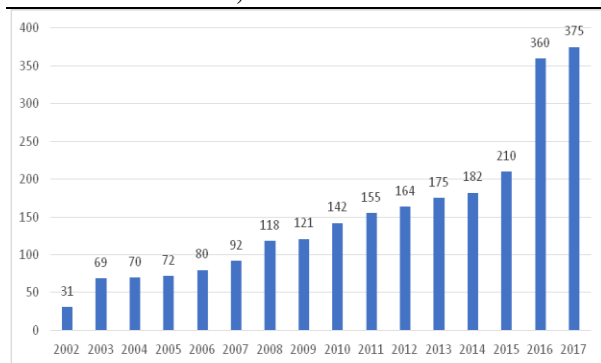


Fig. 3. Trends in the number of certified land users who produced organic products in Ukraine over a period from 2002 till 2017.

Source: built using data from the Federation of Organic Movement

Considering the trends in climate change, as well as the economic situation contributes to the emergence of crops that are not traditional for us, as noted in the scientific community [5; 6; 7; 9]. For example, peanuts, which until recently were never grown in Ukraine, are now cultivated because they grow well and are in demand on the market.

Thus, first of all, farmers' interest in producing such products should be dictated by the growing demand for it domestically, as most vegetables and fruits fall into the category of so-called "healthy products", the consumption of which is actively promoted by healthy lifestyle activists. In addition, such products are quite promising for growing with regard to exports. Because the demand for healthy vegetables, fruits and berries, which are rich in vitamins, amino acids, trace elements, antioxidants, etc., in the markets of different countries is increasing. The trend of a healthy lifestyle is rapidly gaining momentum in other countries.

As an example, a pear or a red currant is now quite well known to Ukrainians. These crops have been grown in Ukraine for some time, and the country still has a certain culture of consumption. However, until recently, commercial farms were almost not interested in their production, mainly these crops were grown by the population or small farmers, for a long time they remained niche crops. Only in the last few years have they been able to unleash their potential due to certain trends.

Sweet potatoes are also noteworthy, if a few years ago the vast majority of Ukrainians

considered sweet potatoes as a specialty that was available only as a premium product, now this crop is quite confidently conquering the Ukrainian market. The popularity of sweet potatoes in Ukraine is growing due to its beneficial properties. It contains a large number of vitamins and nutrients. It is these qualities that make sweet potatoes more and more popular among fans of healthy eating, who prefer this product as opposed to ordinary potatoes. In addition, for the successful production of such product do not require large areas. Sweet potatoes are quite suitable for growing in almost all regions of Ukraine, but in different areas the yield will vary: from 100 t / ha when grown in the southern region, to 35 t / ha if the plantations are located in the east. For comparison, in Belgium in 2016 the yield of sweet potatoes was recorded at 20-50 t / ha, depending on the variety and growing conditions.

Already in the first year of cultivation, the profitability of sweet potato production can be 180%. At the same time, retail prices for sweet potatoes on the Ukrainian market often reach 160 UAH / kg, and a significant amount of supply is imported products, which could potentially be replaced by locally produced sweet potatoes [8].

Thus, Ukraine has quite good prospects to establish itself in the foreign market of sweet potatoes, in particular in the EU market. According to the ITC, currently almost half of all sweet potato import to the European Union (in monetary terms) comes from the United States.

In addition, the climatic conditions of Ukraine allow it to grow asparagus almost throughout the country. Therefore, according to industry experts, the area under asparagus in Ukraine has tripled in the last 5 years. Moreover, already in 2016, this crop was included in the list of those for which farmers must report. Therefore, according to Ukrstat, last year asparagus plantations in Ukraine occupied 0.2 thousand hectares, and the harvest amounted to 1.09 thousand tons [8].

First of all, the low cost of this product and rather high prices for asparagus in retail chains encourage Ukrainian farmers to try their hand at growing asparagus.

In addition, asparagus has one of the highest export potentials in the industry. Moreover, the country has quite good prospects to conquer the EU market. According to ITC, the European Union annually buys almost 100,000 tons of asparagus on the foreign market.

Pumpkin deserves the next attention, although it is difficult to call it a novelty for the Ukrainian market, however, it remains a niche..

In addition, more and more commercial producers are beginning to share this view, considering pumpkin a very promising product in terms of exports due to its useful properties.

It should be noted that today Ukraine already has experience of quite successful supply of these products to European markets, in particular to the UK. For example, the company "Green Team" (Kherson region) has been exporting pumpkins in this direction for three years, so in this case we can say without exaggeration about systemic exports, rather than trial deliveries.

But it should be noted that the greatest demand in the EU market today are pumpkins of the premium segment of the so-called "portion" varieties, in which the weight of the fruit does not exceed 1 kg, such as Butternut squash [8].

Red and black currants can also be attributed to the crops, which are well known to Ukrainian consumers, but still remain niche. However, it should be noted that recently the cultivation of currants in Ukraine is gaining momentum, and these two segments are developing in quite different scenarios.

Thus, if the interest of farmers in growing black currants is caused primarily by the high demand of processing companies, the growth of red currant production provokes an increase in consumption in the fresh market.

In addition, according to industry experts, in the near future the red currant will be able to win a place in the TOP-5 of the main berry crops grown in Ukraine, along with strawberries, raspberries and blueberries. At the same time, black currants have already taken a place in the top five in terms of gross harvest.

Due to the high yield and fairly uniform ripening, it is not difficult to collect a commercial batch of products in rather short time. Moreover, with the right approach to post-harvest processing, the shelf life of red currant can reach 6 months. It should also be noted the increase in demand for Ukrainian currants in the foreign markets. Already in the summer of 2017, according to official data, Ukraine tripled the export of currants compared to last year; however, the main buyer remained Belarus. It should be noted here that only black currants were shipped for export [8].

Also today, you can safely attribute the sour cherry to niche crops due to a number of factors. First, in the past few years the share of professional producers has significantly decreased, since, as a rule, commercial farms are primarily aiming at selling the harvest on the fresh market, where the demand for sour cherries is falling every year.

Due to lack of supply of raw materials of appropriate quality, Ukraine is forced import to annually at least 2 thousand tons of frozen sour cherries [8]. The shortage of raw materials is confirmed by the prices for cherries in the procurement season, which in recent years have almost equaled the prices on the fresh market (Fig. 4).

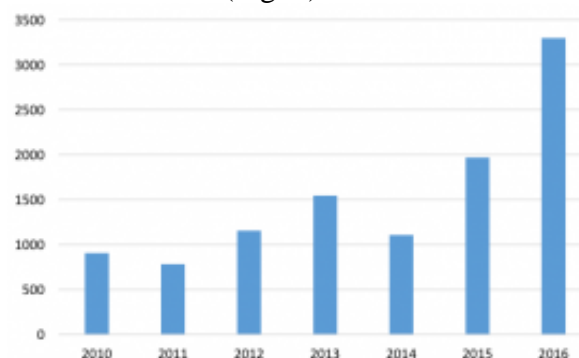


Fig. 4. Imports of frozen sour cherries to Ukraine over a period from 2010 to 2016.

Source: [8].

That is why individual and peasant farms, as well as small and medium-sized agricultural enterprises in Ukraine see an alternative in the so-called niche crops. At the same time, in this case we are talking about both cereals and vegetables, fruits and berries. In addition, it

will allow more efficient use of land resources of Ukraine.

CONCLUSIONS

The increase in greening and capitalization of land use leads to the search for ways to reduce the deterioration of land and other natural resources in rural areas, as well as the need to increase the profitability of agricultural land use, and reorientation of land use to less environmentally destructive and more efficient. Full use of the potential of agricultural lands in the traditional way is low effective in terms of greening and capitalization of land use at the level of developed European countries and in Ukraine this problem is relevant. To solve it effectively, the transition to ecologically safe non-conventional land use of individual and peasant farms as well as small and medium-sized agricultural enterprises extends.

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