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ECONOMIC EFFICIENCY OF ORGANIC PRODUCTION IN KAZAKHSTAN

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Content

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Abstract: The study provides an overview of sources of information on statistics of organic production and identifies certified organic producers and a survey of organic agricultural formations. Financial and economic data of individual peasant farms, statistical reporting, and technological maps made it possible to determine the economic efficiency of the production of organic agricultural commodity: spring wheat, oilseed flax, mustard, peas, and other crops.

Key words: organic products, organic agriculture, economic efficiency, grains and oilseeds.

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NOTATIONS AND ABBREVIATIONS

FiBL - Research Institute of Organic Agriculture (Switzerland)

FIEC - Foundation of Integration of Ecological Culture (Kazakhstan)

IAF - International Accreditation Forum

IFOAM - International Federation of Organic Agriculture Movements

KAZFOAM - Kazakhstan Federation of Organic Agriculture Movements

NOP - US National Organic Program

APD - German-Kazakh Agricultural Dialogue

EU - European Union

IE - Individual Entrepreneur

KazRI of Economics and AIC and RD – Kazakh Research Institute of Economics of the Agro-Industrial Complex and Rural Development

P.F. - Peasant Farm

MoA - Ministry of Agriculture

NACEKS - National Center for Expertise and Certification

NAC - National Accreditation Center

UN - United Nations

UNDP - United Nations Development Program

RoK - Republic of Kazakhstan

LLP - Limited Liability Partnership

FAO – Food and Agriculture Organization of the United Nations

PRODUCTION AND CERTIFICATION OF ORGANIC PRODUCTS

Key stages in the development of the organic sector

The first producers to receive organic certificates were represented by large agricultural formations - exporters, who independently searched for new sales markets and opportunities for adding value to their products. While promoting their products at international exhibitions and trading platforms, they faced the demand for organic products in the international market, which led to the emergence of interest in this sector. Some of them turned to international consultants, others invested in training their own employees abroad. Then they turned to the certifying authorities and started the certification process.

Since 2003, the first organic farms have been certified by the Italian control body Suolo e Salute, which by the mid-2000s opened a representative office in Almaty.

Kostanay region was one of the first to develop organic production.

By the end of the 2000s, Suolo e Salute certified up to 120 thousand hectares of land in Kostanay and Almaty regions, but then, due to the reorganization, shut down its foreign branches and confined its work to Italy. Producers switched to other control bodies.

In the late 2000s, in addition to Suolo e Salute, certification was carried out by SGS-Moldova certification body, under the control of which there were about 12 thousand hectares in Kostanay region.

The implementation in 2008-2010 by the Foundation for the Integration of Ecological Culture (FIEC) and Agro Eco-Louis Bolk Institute (Netherlands), the European Union project "Development of organic agriculture in the Republic of Kazakhstan" highlighted the beginning of the next round of development of the organic sector.

Within the framework of this project the 3rd International Conference on "Development of the organic sector in Central/Eastern Europe and Central Asia" was held in 2010 in Astana, organized in cooperation with Organic serves (Germany), and the Federation of Organic Movement (Ukraine). The conference was attended by representatives from 22 countries, 44 speakers, more than 120 participants, including certification bodies.

After the conference, the certification body ETKO (Turkey) began to certify a group of producers in Kostanay region.

By 2014, this group accounted for the largest number of certified organic lands in Kostanay region, about 200 thousand hectares.

In 2015, the European Commission terminated the approval of ETKO for certification around the world due to the revealed violations of the certification procedures. Farms that were certified by ETKO came under the control of other certification bodies [1].

In 2014, under the initiative of a group of MPs, which was previously addressed by the Kazakhstan Federation of Organic Agriculture Movements - KAZFOAM, the development of the Law of RK "On Organic Production" has begun. International organizations, the Food and Agriculture Organization of the United Nations (FAO), the United Nations Development Program in Kazakhstan, and the German-Kazakh Agricultural Dialogue were actively involved in this process.

In 2015, Kazakhstan adopted the Law "On Organic Production". As part of its implementation, the regulatory and legal framework has been improved, roadmaps and pilot programs have been developed, which gave hope for a new impetus for expanding the scale of organic production.

In 2017, organic production standards were adopted, and the producers got the opportunity to certify their products according to national organic standards.

In 2021, for the first time in the framework of the implementation of the competition for special-purpose financing for scientific, and scientific and technical programs for 2021-2023, the development of technologies for organic agriculture was announced as a priority program. It is expected that the implementation of this program will solve a number of technological problems associated with the transition of agricultural formations to organic production, which will contribute to the further development of the sector.

Certification of organic products

To determine certified organic producers, we will consider the current requirements in accordance with the legislation of the Republic of Kazakhstan.

As part of the implementation of the norms of the Law "On organic production" in Kazakhstan, rules for the turnover of organic products and standards were developed [2-5].

The above laws and regulations set the requirements for certification of organic products by conformity assessment bodies. According to the Law "On Accreditation of Conformity Systems Assessment", conformity assessment bodies must be accredited in the Republic of Kazakhstan by the relevant authorized body. This body today is the National Accreditation Center (NAC) under the Technical Regulation Committee of the Ministry of Investment and Development.

The National Accreditation Center operates in accordance with the RoK Standard ISO/IEC 17011-2006 "Bodies that assess and accredit conformity assessment bodies. Basic Requirements" and other laws and regulations of the Republic of Kazakhstan, as well as the requirements of international accreditation organizations. It is a full-fledged member of the International Accreditation Forum (IAF MLA), the Pacific Accreditation Cooperation (PAC), the European Organization for Accreditation (EA), and the International Laboratory Accreditation Cooperation (ILAC).

Figure 1 Labeling of organic products in Kazakhstan

At present, NAC has accredited the only conformity assessment body - JSC "National Center for Expertise and Certification" (NACEKS), which now has the right to assign the status of organic production according to national standards.

To obtain international certification, Kazakhstani agricultural producers and processing companies turn to certification bodies with a request for certification. They are certified depending on the target market: under the terms of Regulation (EU) No. 834/07, 889/08 for exporting products to the European market or under the

terms of the NOP for exporting products to the North American market. The certificate allows manufacturers to label their products abroad as an “organic product” [6].

According to the Regulation of the European Union No. 125/2013, 12 control bodies, which are competent to inspect, certify and issue certificates of equivalence of manufactured products to EU regulations, are accredited in the European Union for certification of organic products in Kazakhstan [6].

These control bodies have a different area of accreditation in organic production, below are the codes of areas of accreditation [7]:

- A - Unprocessed plant products;
- B - Live animals or unprocessed products of animal origin;
- C - Aquaculture products and algae;
- D - Processed agricultural products for use as food;
- E - Processed agricultural products for use as feed;
- F – Seed products.

Table 1 shows the certification bodies accredited to work in Kazakhstan, and the codes of the areas of accreditation.

Table 1. - List of accredited control bodies in accordance with the regulations of the European Union for certification in Kazakhstan.

№	Control body	CODE	Code of the area of accreditation					
			A	B	C	D	E	F
1	Organic Standart (Ukraine)	KZ-BIO-108	x	x	-	x	x	-
2	Bioagricert S.r.l. (Italy)	KZ-BIO-132	x	-	-	x	x	-
3	Ecocert SA (France)	KZ-BIO-154	x	-	-	x	x	-
4	Ecoglobe (Armenia)	KZ-BIO-112	x	x	-	x	-	-
5	Ekoagros (Lithiania)	KZ-BIO-170	x	x	-	x	-	x
6	Letis S.A. (Argentina)	KZ-BIO-135	x	-	-	x	-	-
7	ORSER (Turkey)	KZ-BIO-166	x	x	-	x	x	-
8	CCPB Srl (Italy)	KZ-BIO-102	x	-	-	x	x	-
9	Kiwa BCS Oko-Garantie GmbH (Germany)	KZ-BIO-141	x	-	-	x	x	-
10	Control Union Certifications (The Netherlands)	KZ-BIO-149	x	x	x	x	x	x
11	Bio.inspecta (Switzerland)	-	x	x	-	x	x	-
12	STC (Latvia)	KZ-BIO-173	x	x	-	x	x	-

Thus, NACEKS is the source of information on certified organic agricultural producers according to national standards, and the control bodies indicated in Table 1 are considered the

source of information according to European requirements. Based on the data of these organizations, it is possible to identify organic producers and generate production statistics.

Organic production statistics

On December 18, 2015, by order of the Minister of Agriculture of the Republic of Kazakhstan, the Rules for maintaining the register of producers of organic products were approved. This register, in accordance with the rules, is formed by local executive bodies that provide information on organic producers to the Ministry of Agriculture and it is updated weekly.

According to the above register of organic producers, published by the Ministry of Agriculture on the e-government website, there are 18288 organic producers in Kazakhstan [8].

However, according to the data of NACEKS, the only accredited conformity assessment body in Kazakhstan, there is not a single organic producer certified according to national standards.

It should be noted that in accordance with the legislation of the Republic of Kazakhstan, agricultural producers, certified in compliance with organic standards of other countries, are not recognized as organic.

In 2020, for the first-time the Committee on Statistics of the Ministry of National Economy published data on the gross harvest of organic crop production in 2019 (Table 2).

Table 2. - Gross harvest of organic crop production in 2019

Thousands of tons

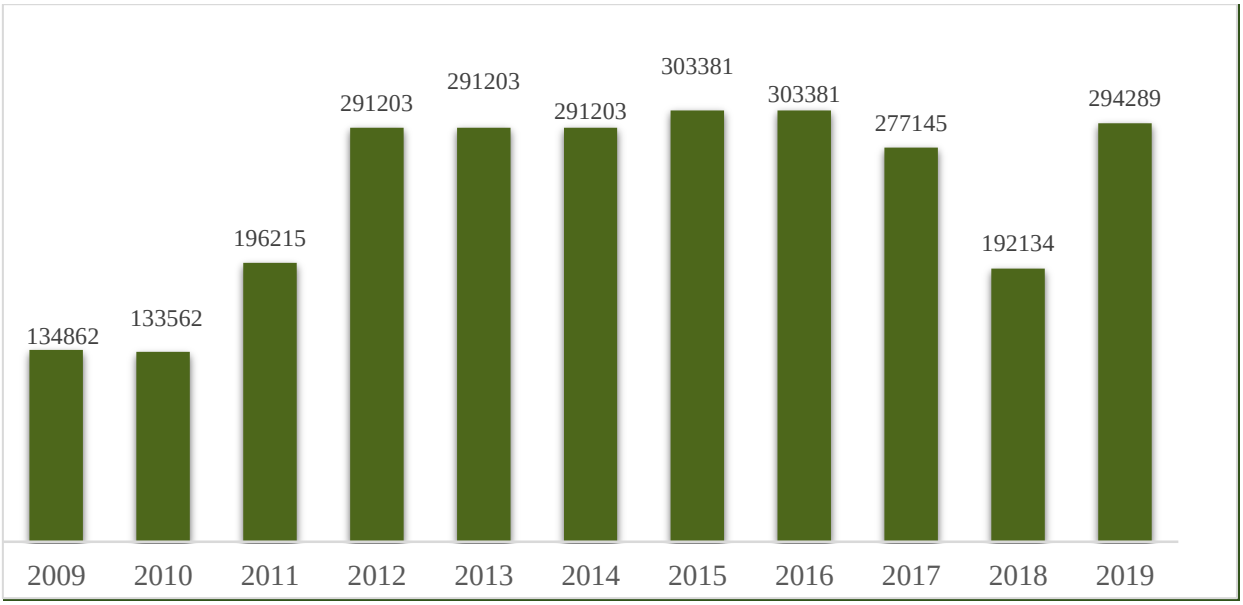
	Grain crops (including rice) and legume crops	including			Oilseed crops
		Wheat	Sorghum (sorghum cernuum), millet and other grain crops*	Vegetables Dried legumes	
Republic of Kazakhstan	1 43,9	1 05,9	38,0	0,08	0,57
Akmola	8,1	8,1		0,08	0,57
North Kazakhstan	1 35.8	97,8	38,0		
Share of organic crop production	0,8	0,9	0,7	0,0	0,0
*-grain crops and etc. (buckwheat, triticale, spiked cereals)					

Data are presented only for two regions: Akmola and North Kazakhstan. However, there are no indicators for Kostanay region, which in previous years was the leader in both the number of organic producers and the volume of production [9]. According to our information, in 2019 there were about 20 operators of organic producers in Kostanay region. They were also main exporters.

There is no official statistics of agricultural producers certified according to international standards. Therefore, we used statistics published by FIBL, the Research Institute of Organic Agriculture, and IFOAM, the International Federation of Organic Agriculture Movements (FiBL & IFOAM).

According to FiBL & IFOAM (2021), there are about **294,289 hectares of land** in Kazakhstan [10] certified according to standards equivalent to the European Union Regulations No 834/07, 889/08.

Figure 2. - Area of organic land in Kazakhstan (according to EU definition), hectares.



Source: Statistics of FIBL& IFOAM 2011-2021

According to FIBL & IFOAM 2011-2021, the peak of the area of organic land was reached in 2015, in subsequent years it was reduced by almost half and in 2019 began to approach the indicators of 2015

The following certification bodies were the sources of statistics for FIBL & IFOAM:

1. Bioinspecta
2. Letis S.A.
3. CCPB Srl
4. Ecocert
5. Ekoagros
6. Organic Standard

In fact, data on the area of FIBL & IFOAM certified land were obtained from only half of the control bodies indicated in Table 1. The author contacted the control bodies not covered by the survey and found another 132,229 hectares certified by other control bodies.

Thus, according to the data received, at least **426 518 hectares of land** have been certified in accordance with European requirements in Kazakhstan. Mostly these are lands for the production of grain and oilseeds.

List of organic producers

Based on the results of appeals to the control bodies indicated in Table 1 and an analysis of their publications on the Internet, a list of organic producers certified in accordance with the regulations was compiled and indicated in the table below.

Table 3. - List of organic producers certified in accordance with EU Regulations.

№	Company name	Product	Area of work	Region
1	Zaverukha Yegor I.E.	flax, milk thistle, spring wheat, peas	Trade, Export, Import	Kostanay region, Fedorovsky area and village
2	Kuzovaya L.L., peasant farm	golden flax, spring wheat, thistle, peas	Crop production, Export, Import	Kostanay region, Fedorovsky area, Fedorovka village
3	Metelitsa, peasant farm	spring wheat, golden flax, millet, peas	Crop production, Export, Import	Kostanay region, Fedorovsky area, Fedorovka village
4	Kovrizhnyh T.A., peasant farm	flax, spring barley	Crop production, Export, Import	Kostanay region, Fedorovsky area, Fedorovka village
5	Bekseitov A.Z., peasant farm	golden flax, spring wheat, peas, oats, vetch, brown flax	Crop production, Export, Import	Kostanay region, Fedorovsky area, Fedorovka village
6	Altyn zhaz-2004, LLP	flax, spring wheat, lentils, oilseed rape, sunflower, flax, millet, buckwheat	Crop production, Export, Import	Kostanay region, Fedorovsky area, Uspenovka village
7	Kvarta, peasant farm	flax, spring wheat	Crop production, Export, Import	Kostanay region, Fedorovsky area, Fedorovka village
8	Uspenovskoye, peasant farm	flax, spring barley, spring wheat, spring lentils, oats, chicken - peas, buckwheat	Crop production, Export, Import	Kostanay region, Fedorovsky area, Fedorovka village
9	Kovrizhnyh O.A., peasant farm	flax, spring wheat, false flax	Crop production, Export, Import	Kostanay region, Fedorovsky area, Kachar village
10	Chapayevskoe, LLP	flax, spring wheat, barley	Crop production, Export, Import	Kostanay region, Kostanay
11	Novomarkovka-2002, LLP	wheat (2020), flax (2020), mustard (2020), lentils (2020)	Crop production, Export, Import	Akmola / Ermentau area, Novomarkovka village
12	Snezhko Vera, peasant farm	wheat, flax	Crop production, Export, Import	Kostanay region, Fedorovsky area, Fedorovka village
13	Kyzyl Agro, LLP	spring barley, spring wheat, oilseed rape, lentils, flax	Crop production, Export, Import	North-Kazakhstan region, Zhambyl area, Kazanka
14	ECO GRAIN EXPO, LLP	safflower	Crop production, Export, Import	Akmola region, Akkol area, Akkol
15	Tsilke Anatoly Karlovich, peasant farm	safflower, millet	Crop production, Export, Import	Karaganda region, Osakarovka village, Sunkar village
16	Qazaq Organic Trade, LLP	flax	Trade, Export, Import	Kostanay region, Kostanay
17	Bon-Agro, LLP	sunflower, safflower, flax, barley	Crop production	Pavlodar Region, Terenkul area, Voskresensky rural area, Berezovka village

№	Company name	Product	Area of work	Region
18	Lepsinsk Onimi, LLP	cherry plum, fruits, barberry, fruits, hawthorn, fruits, strawberries, raspberries, leaves, blackberries, wild apple (malus sieversii), plum (wild), wild currants, rowan fruits, cherry, oregano, fruit, St. John's wort, leaves, inflorescence, willow herb, leaves, lime, inflorescence, filipendula, leaves, mint, chamomile, hops, sage, wild rose, cherry plum jam, wild barberry jam, cherry jam, forest blackberry jam, wild strawberry jam.	Wild; Processing; Export; Import	Almaty region, Alakol, Lepsy
19	Velyontina, peasant farm	oats, spring barley, spring wheat, flax	Crop production, Export, Import	Kostanay region, Fedorovsky area, Pridorozhnoe settlement
20	Temir Servis, LLP	Phosphorite flour		Aktobe
21	BUNIYAD, peasant farm	Amaranth	Crop production, Export, Import	Turkestan region, Sairam area, Mankent settlement
22	Institute AgroEcosystem, LLP	Organic fertilizer, soil conditioners, biostimulants, biofungicides. Preparations: Agroflorin and Auxinolen.	Production, Export, Import	Auezzov, Almaty
23	TNS Afro Arpo, LLP	lentils, spring wheat	Crop production, Export, Import	Akmola region, Bersuat
24	Novomarkovka-2010, LLP	flax, spring wheat	Crop production, Export, Import	Akmola region, Ereymentau area, Novomarkovka
25	NGO "Bsolbi.KZ", LLP	microbiologicals	Trade	Kostanay
26	Xi'an Aiju Grain and Oil Industry Group	Linseed oil, rapeseed oil, sunflower oil, linseed cake, rapeseed cake, sunflower oil.	Crop production	33 Beskaraga Street, Llishova Village, Tynsa Twon
27	Asia Gold	Wild crops, licorice	Export / Import / Trade, Processing, Wıldcollection	Almaty region, St. Raiymbek batyr, 2
28	SULU, LLP	flax, spring wheat	Export / Import / Trade, Crop production	Kostanay region, Krasnoselsky village, Taranovsky area
29	VEDENOVKA BIO PRODUCT, 1	grain and oilseeds	Crop production	Akmola region, Vedenovka village
30	Otan-Agro 2050 LLP	grain and oilseeds	Crop production	North Kazakhstan region, Vozvyshenka village
31	Sokolovskoye Agro	grain and oilseeds	Crop production	Kostanay region, Ulyanovskoye village
32	Enbek LLP	grain and oilseeds	Crop production, Processing, Export / Import / Trade	Akmola region, St. Beibitshilik 39, Enbek village
33	«Zernovoy pul» LLP	Sunflowers, SUNFLOWER CAKE, RAW SUNFLOWER	Farmer, producer / processor	Samarskoye Highway 17, Ust-Kamenogorsk
34	Prima Grano Trade LLP	Fallow, flaxseed, spring soft wheat, wheat	Farmer, wholesaler / trader	Samarskoye Highway 17, Ust-Kamenogorsk
35	Grain Agro Trade LLP	Sunflower seeds	Crop production	Samarskoye Highway 17, Ust-Kamenogorsk

№	Company name	Product	Area of work	Region
36	"MAXIMUS" LLP	Vodka	Processing / Export	Aktobe
37	GEOM LLP	Wheat	Processing / Export	Aktobe
38	Kazekotrade LLC	Wheat	Processing / Export	Kostanay
39	Kentavr LLP	Processed food	Processing / Export	Aktobe region, MUGALZHAR DISTRICT, KANDYAGASH, St. PROMZONA, 18V
40	«UMET» LLP	Flax seeds, wheat, emmer wheat, rapeseed, peas, rye, millet, barley, mustard	Trade / Export	Petropavlovsk
41	Peasant farm of Peter Nikolaevich Chepovsky	Spring barley, peas	Producer / Exporter	Petropavlovsk
42	Peasant farm "ALIBI"	Barley, perennial grasses, flax	Producer / Exporter	Kosobo village, Karabalik area, Kostanay region
43	«Kazecotrade» LLP	Flax, wheat, barley, peas	Export	North-Kazakhstan region
44	Zauresh Mukusheva, peasant farm	Grain crops	Crop production	North-Kazakhstan region
45	AL-FARIS LLP	Flax	Producer / Exporter	Akmola region, Shchuchinsk
46	“ZhNV” LLP	Oats, oat-pea-barley mixture, rye, peas	Crop production	North-Kazakhstan region
47	FIRMA DIKANSHI LLP	Emmer wheat, wheat, oat, rye	Storage	North-Kazakhstan region
48	“Shapagat” peasant farm	Grain and oilseeds	Crop production	North-Kazakhstan region
49	“Zhiger” peasant farm	Grain and oilseeds	Crop production	North-Kazakhstan region
50	“Orlyansky V.G.” peasant farm	Grain and oilseeds	Crop production	North-Kazakhstan region
51	ALTYN ER LLP	Flax seeds, barley	Trade / Export	Kostanay
52	Masak Export LLP	Flaxseed, Barley, Wheat, Soybeans, Peas, Emmer Wheat, Oats, Barley and Pea Mix, Sunflower	Trade / Export	PEtropavlovsk
53	Kieli Zher LLP	Grain and grain legume crops	Crop production	North-Kazakhstan region, Yessil area
54	“Asia-Tarangul” LLP	Grain and grain legume crops	Crop production	North-Kazakhstan region, Yessil area
55	“Agromin” LLP	Flax seeds, rapeseed, wheat, soy	Trade / Export	Almaty
56	“Bredun” peasant farm	Spring and winter wheat, spring rape, autumn fallow, brown flax, spring barley, perennial grasses, peas, soybeans	Crop production	North-Kazakhstan region
57	KH Yuri Del T’V	Rapeseed, flaxseed, sunflower, wheat	Crop production	Pridorozhnoye, Kostanay
58	AZIYA TARANGUL	Rapeseed, flaxseed, wheat, peas	Crop production	North-Kazakhstan region, Tarangul village
59	TOO GOLD HARVEST	Wheat - Rapeseed - Sunflower - Green peas - Flaxseed	Processing	Almaty
60	Too Orient Trade Company	Wheat, rapeseed, sunflower, green peas, flaxseed	Crop production	Almaty

№	Company name	Product	Area of work	Region
61	MANSHUK ZHEKSEMBEKOVA peasant farm	Soybeans, wheat, barley	Crop production	Almaty
62	Grain Partners	Flaxseed, Milk Thistle, Lentils, Oats, Peas, Soft Wheat	Trade	Almaty
63	“KOAT” LLP	Chickpeas, flax (golden, brown), lentils (green, red), oats, peas, wheat	Preparation, Trade	Nur-Sultan
64	“Novo-Prirechnoye” LLP	Barley, Durum, Oats, Peas, Sunflower, Wheat	Production	Esil area, Yubileinoe village
65	Naidorovskoe LLP	Barley, Lentils Oats, Peas, Sunflower, Wheat	Crop production	Osakarovsky area, Karaganda region
66	Agrimer Astyk LLP	wheat, barley, sunflower, flax, rapeseed, mustard, peas, alfalfa, oats	Processing	Kokshetau
67	Agrimer Avto Ulitsa LLP	wheat, barley, sunflower, flax, rapeseed, mustard, peas, alfalfa, oats	Storage	Almaty region, Beskol street
68	“Astagra” LLP	wheat, barley, sunflower, flax, rapeseed, mustard, peas, alfalfa, oats	Export	Almaty
69	Cargo Distribution LP st. Zhambyl/111 Almaty	wheat, barley, sunflower, flax, rapeseed, mustard, peas, alfalfa, oats	Export	Almaty
70	Granart Ltd.	wheat, barley, sunflower, flax, rapeseed, mustard, peas, alfalfa, oats	Storage	Kostanay
71	KORN ASTYK LLP	wheat, barley, sunflower, flax, rapeseed, mustard, peas, alfalfa, oats	Crop production, production	Almaty

ASSESSMENT OF ECONOMIC EFFICIENCY OF ORGANIC PRODUCTION

Methodological approaches

To assess the economic efficiency of organic production, the same system of indicators is used to assess the economic efficiency of traditional production. The main indicators characterizing the economic efficiency of an entity that operates in accordance with the standards of organic production or the production of a certain type of organic product are profit and profitability.

Features of the calculation of profit. Profit is an indicator that shows the difference between the proceeds from the sale of commercial products and their cost.

Based on the experience of developed countries, to stimulate the development of organic production, certified producers are provided with budget subsidies, the amount of which ranges from 100 to 900 euros/hectare in the EU countries. Subsidies significantly affect the level of profitability; therefore, it is important for an enterprise to determine the amount of profit received with and without subsidies.

Cost of production and additional costs. The cost of organic products is usually higher than the cost of traditional products. In particular, such additional elements appear in the cost structure as: costs of certification and inspection; consulting support; additional costs for packaging and storage of products; costs for the purchase of biological crop protection agents, biologicals; costs associated with the use of green manure crops in crop production.

Production costs per unit of production in organic agriculture are significantly higher due to a number of factors: low yields; a lower yield of marketable crop and livestock production per unit of arable land, due to the need to comply with scientifically grounded crop rotations and a sharp limitation or lack of purchased feed, as well as higher labor costs. The increase in costs is caused by the expansion of areas under fallow, since these areas do not provide marketable products [11].

In the structure of expenses of organic products, in comparison with traditional products, there will be no such cost elements as: the cost of chemical mineral fertilizers, pesticides and other chemical crop protection agents, the use of which is not allowed in organic agriculture; antibiotics in animal husbandry, etc. (fig. 3).

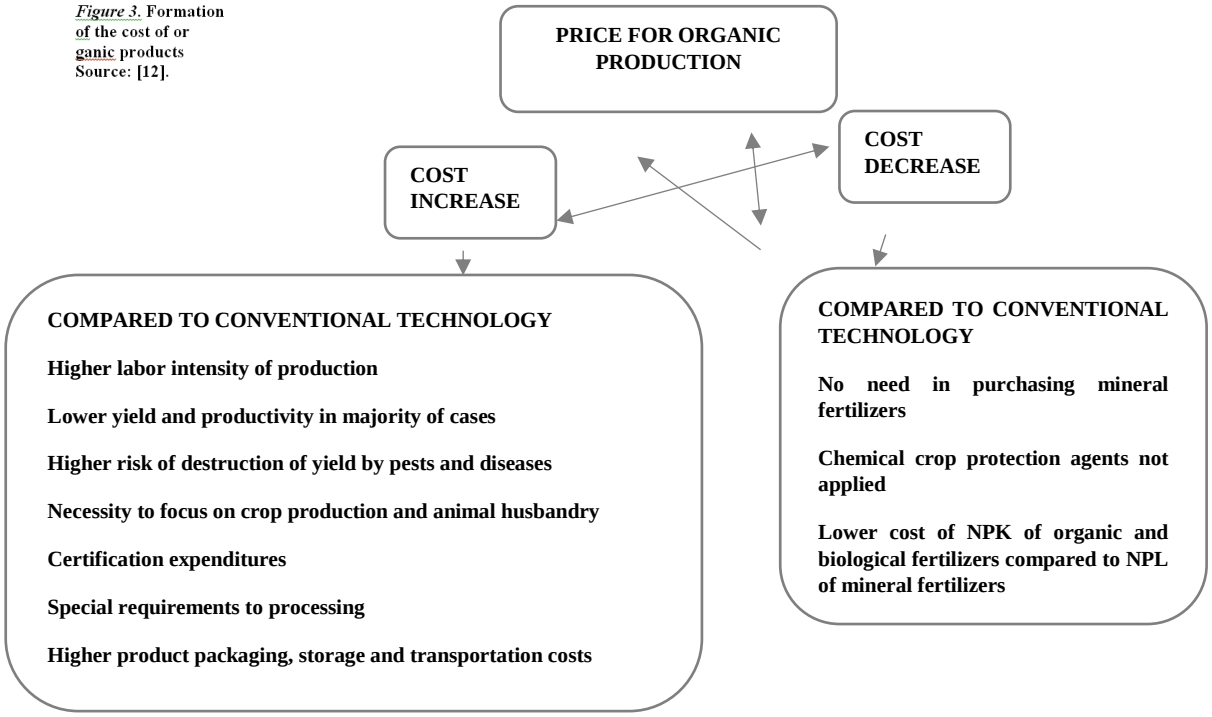


Figure 3. Formation of the cost of organic products
Source: [12].

Pricing for organic products. Organic products are an alternative to traditional ones, which in their essence are environmentally friendly products grown taking into account the technological requirements of organic production, which is confirmed by the appropriate labeling. They are of a higher quality than traditional products, therefore, it is logical that organic products should be more expensive than traditional products.

Nevertheless, there are cases, especially in countries with a developed market for organic products, when the price for organic products is lower than the traditional one, but only if this organic technology is more efficient or there are significant subsidies for the production of organic products.

The main feature in determining the environmental characteristics of a product is its partial or complete safety for the environment and human health. This is what forms the additional consumer value of organic products in comparison with other competing products. The environmental criterion has a significant impact on the process of pricing of organic products, and this influence (towards an increase in prices) has a completely logical justification. Although organic products are more expensive than traditional ones, they can reduce a number of transaction costs, in particular for treatment and health support, prevention of soil erosion, purification of drinking water from pesticide residues, and other environmental protection measures.

Unfortunately, traditional pricing methods cannot be used directly to determine the price of organic products. Considering that organic production is an alternative to traditional one and is chosen by an economic entity at its own discretion, it should provide no less profitability than traditional agricultural production. Higher production costs for organic products requires higher prices. Since it is too early to talk about the mass consumption of organic products, it is obvious that the level of effective demand of the population has a decisive influence in this case.

Agrarian producers must be interested in organic production, otherwise there will be no proper incentive to change the established production technology and management methods. The price for organic products, on the one hand, should provide the farmer with a profit at a level not lower than in traditional production, and on the other hand, be affordable for the consumer.

In theory, the formula for calculating the equivalent price for organic products would be as follows:

$$Ц_O = (C_H + [K_{НП} \times (O_{ПФ} + O_C) \times K_{TO}]) \times H_O \quad (1)$$

where: $Ц_O$ –the equivalent price of 1 ton of organic products, tenge;

C_H – the standard (total) cost of 1 ton of organic products (including rent in the amount of 3% of the cost of land), tenge;

$K_{НП}$ – the standard rate of return;

$O_{ПФ}$ – the average annual cost of fixed assets paid in advance for the production of 1 ton of products, tenge;

O_C – the average annual cost of working capital paid in advance for the production of 1 ton of products (full cost without depreciation and rent), tenge;

K_{TO} – the technological turnover ratio (determined by dividing the duration of the technological cycle (in days, months) by the number of days, months in a year);

H_O – the organic product premium.

Suppose that the planned total costs per hectare of organic spring wheat sowing are 44,000 tenge, and the predicted price for 1 centner will be 6,000 tenge, then the breakeven level of production will be 7.3 centner/hectare (44,000: 6,000).

Thus, the company will make a profit until the yield drops to 7.3 centner/hectare. Beyond the specified level, grain production for the company will be unprofitable.

According to these data, with a yield of 13 centner/hectare, the minimum selling price, ensuring a breakeven production, is 3385 tenge/centner (44,000: 13). The above methods of using prices as a tool for analyzing, assessing and forecasting economic and production parameters of organic production do not exhaust the entire range of possible areas of such use and can be expanded.

Object and subject of research

In Kazakhstan, according to the data obtained as a result of a study of the domestic market, most of the areas for organic production are located in the Kostanay, Karabulak, Taranovsky, and Fedorovsky areas of Kostanay region.

In accordance with the compiled register, there are 18 agricultural enterprises in Kostanay region certified according to organic standards of the European Union. They mainly produce oilseeds, grains, and legumes. The manufactured products are export oriented. There was no certified organic livestock production at the time of the study.

In addition, in Kostanay region, on the basis of "Zarechnoye Agricultural Experimental Station" LLP, since 2012, scientific research has been conducted on organic production using various agrotechnical methods. At the moment, this is the only identified scientific institution in Kazakhstan, where the study of the production of grain and legumes using organic technology is accepted as a field of long-term scientific research.

In connection with the above, Fedorovskiy area in Kostanay region was chosen as the location for the study.

It should be noted that many agricultural producers working in organic production refused to cooperate, referring to lack of motivation and unwillingness to replicate their experience, which could contribute to the development of competition in this sector.

Sources of data for analysis. The study uses data from the Agency of Statistics of the Republic of Kazakhstan, the results of field trials of the "Zarechnoye Agricultural Experimental Station" LLP for 2020-2021, the results of a survey of the heads of agricultural formations of Fedorov and Karabulak areas of Kostanay region and the production cost standards compiled taking into account the zonal features by the Kazakh Research Institute of Economics of the Agro-Industrial Complex and Rural Development (KazRI of Economics and AIC and RD).

Research results

Based on the results of a survey of heads of agricultural enterprises, a comparative analysis of the costs and incomes of growing traditional and organic spring wheat, oil flax, barley, peas, mustard, and oats was prepared.

Production cost standards were used for traditionally grown products, where crop cultivation technology has become a fundamental factor in generating production costs. The set of technological operations, their labor intensity, and the equipment determined the summary elements: yield, sowing methods, seeding rates, labor costs, wages, fuels and lubricants, mineral fertilizers, protective equipment, depreciation deductions (maintenance of fixed assets), maintenance, and others cost items associated with the cultivation of crops.

In the standards of production costs under consideration, the following were also taken into account: the type and number of fertilizers, pesticides, herbicides, seeds, labor costs and its payment, based on the recommendation of scientific institutions, as well as the current units and standards of expenditure of inventory items, taking into account zonal features and specific economic factors of management.

The calculation of the amount of production costs was carried out according to flow charts for each type of work (operation) separately. As a result, the calculation of costs for all production processes using unit cost rates, the standards for labor costs in man-hours, payment according to the tariff, expenses on fuel and lubricants, deductions for depreciation, and maintenance were obtained.

According to surveys of agricultural enterprises, the price premium for organic products, or the so-called “organic premium”, on average, is from 20% to 60%, in comparison with the market value of traditional products. The exception is oil flax, for which the organic premium exceeds 200%, and it is the main export crop for producers. For the crops under consideration, the actual sizes of the organic premium based on the results of 2020 are taken. Below is a comparative analysis of economic efficiency by crop.

Wheat

Table 4 shows the comparative efficiency of spring wheat production using traditional and organic technology.

Table 4. - Comparative efficiency of spring wheat production using traditional and organic technology, per 1 ha

Cost item	Unit of measurement	Conventional technology	Organic technology	Difference between organic technology and conventional technology, (-, +)
Crop yield	centner /hectare	10,2	9,5	-0,7
Labour cost	thousand tenge	3,6	5,8	2,1
Seeds, planting material	thousand tenge	10,8	12,5	1,7
Fuels and lubricants	thousand tenge	6,1	9,8	3,7
Mineral fertilizers	thousand tenge	11,5	0,0	-11,5
Biologicals, organic fertilizers	thousand tenge	0,0	7,8	7,8
Herbicides, pesticides	thousand tenge	8,8	0,0	-8,8
Maintenance, depreciation	thousand tenge	2,7	4,0	1,3
Other costs	thousand tenge	5,7	7,4	1,7
Organic certification, laboratory research	thousand tenge	0,0	1,7	1,7
Total direct costs per hectare	thousand tenge	49,3	48,9	-0,4
Standard per 1 centner	thousand tenge	4,8	5,1	0,3
Selling price 1 centner	thousand tenge	7,4	8,7	1,3
Profit	thousand tenge	2,6	3,6	1,0
Profitability	%	53	69	16
Organic premium: 0%				

In order to grow organic wheat, an agricultural producer spends 5147 tenge per centner, while a traditional farmer spends about 4829 tenge. In organic production, there is a decrease in costs due to the exclusion of the use of synthetic chemical fertilizers, instead of which organic

producers use biofertilizers and biologicals; in this case, the manufacturers had experience in using the enzyme preparation Agroflorin based on a fungus strain, and preparations based on Basillus subtilus.

It should be noted that organic producers must agree with the certifying company on the choice of preparations and fertilizers since there is a requirement for their mandatory certification.

Refusal of mineral fertilizers, herbicides and pesticides is accompanied by a decrease in yield by 0.7 c/ha. To control weeds, farmers use various agricultural techniques, for example, mulching, steam, mechanical processing, which ultimately affects costs.

Additional costs for organic farmers are associated with additional labor, organic certification and product quality control.

Organic producers carry out laboratory analyzes of products in the countries of the European Union, since in Kazakhstan, according to them, there are no laboratories with international accreditation that are capable of doing the entire range of analyzes required for organic products. For example, about 500 indicators are tested for the glyphosate group in the EU, while there are no more than 10 of them in laboratories in Kazakhstan.

Thus, the total direct costs for the production of organic wheat are 1% less in comparison with the conventional technology of wheat production, and as a result of a comparative analysis of the production of organic wheat and traditional production it was revealed that the economic efficiency from 1 hectare of organic wheat is 16%. This is achieved not through organic premiums, but through improved product quality. For example, in “Metelitsa” peasant farm grain had the following quality indicators: gluten -36; nature - 800; protein 18.

As for the organic premium, the producers were unable to sell their products for export due to a decrease in demand for organic wheat in the importing countries, and they sold it as traditional in the domestic market.

According to the Union of Organic Producers, the total export of organic wheat in Kazakhstan in 2020 decreased 5 times compared to 2019.

Let’s consider the results of scientific research carried out on the basis of “Zarechnoye Agricultural Experimental Station” LLP. Since 2012, this station has been researching the technology for the production of organic wheat while combining technologies of biologized steam, mulching and other agrotechnical methods. Biologicals and organic fertilizers are not introduced, and the farm is not certified. It is important to note that, according to the station staff, research on organic technology has not been funded for the last three years and it is ongoing only due to the enthusiasm of scientists who do not want the experience of previous years to be lost. Cost-benefit assessment and cost accounting were not carried out in 2020. Only the yield was recorded - 13 c/ha.

In addition, “Zarechnoye Agricultural Experimental Station” LLP is conducting long-term research on the production of spring wheat using zero-treatment technology (No till) with an assessment of economic efficiency.

It should be noted that in this case, the applied zero-treatment technology is more expensive in comparison with organic technology, not only due to the abandonment of mineral fertilizers and pesticides, but also due to the costs associated with their introduction (fuels and lubricants, wages, etc.). However, due to the lack of data, the author decided to level the costs of organic technology and No-till, excluding only the costs of mineral fertilizers and pesticides. The results are presented in the table

Table 5. - Comparative efficiency of spring wheat production using organic technology and No-till technology, per 1 ha.

Cost item	Unit of measurement	Conventional technology	Organic technology	Difference between organic technology and conventional technology, (-, +)
Crop yield	centner /hectare	13	21	-8
Payroll with accrual	thousand tenge	7,4	7,4	0,0
Seeds, planting material	thousand tenge	9,8	9,8	0,0
Fuels and lubricants	thousand tenge	12,9	12,9	0,0
Mineral fertilizers, pesticides	thousand tenge	0,0	30,4	-30,4
Biologicals, organic fertilizers	thousand tenge	0,0	0,0	0,0
Maintenance	thousand tenge	5,0	5,0	0,0
Other costs	thousand tenge	7,1	7,1	0,0
Organic certification, laboratory research	thousand tenge	0,0	0,0	0,0
Total direct costs per hectare	thousand tenge	42,2	72,5	-30,4
Standard per1 centner	thousand tenge	3	3	-0,2
Selling price 1 centner	thousand tenge	7,4	7,4	0,0
Profit from 1 centner	thousand tenge	4,2	3,9	0,2
Profit from 1 hectare		54,1	82,9	-28,8
Profitability	%	128	114	14,0
Organic premium: 0%				

Thus, according to Table 5, despite the fact that the author deliberately established overestimated costs of growing wheat using organic technology, its profitability of production of 1 centner in comparison with the No-till technology is 14% higher. The developed organic technology of Zarechnoye requires at least 58% less costs per hectare than No-till, but the profit per hectare 65% lower.

Let’s consider the situation of producers who are transitioning from traditional to organic production. Typically, this period lasts from 1 to 3 years, depending on the history of the use of synthetic chemicals in the fields. During this period, the producer cannot sell his products with an organic premium, since there is practically no market for transitional wheat, so let's assume that it will be sold as traditional without an organic premium. Despite this, the economic efficiency of organic wheat remains 14-16% higher.

This analysis showed that even during the transition and/or a decrease in yields, the profit of an organic producer remains higher than that of the traditional one, since he does not bear high costs for mineral fertilizers and pesticides.

Flax

Flax is one of the most demanded highly profitable crops on the world market.

It is important for organic farmers that flax crops free the soil from heavy metals and radionuclides. After sowing it, a minimum number of pathogenic infections and pests remains in the fields. It can be sown after almost any crop, then any crop can be placed. However, flax can be returned in the same field of crop rotation no earlier than after 5-7 years, which, as can be seen from the presented data on areas, is not observed by producers. This will lead to problems associated with "flax fatigue", which is understood as a decrease of yield due to root exudates, and the accumulation of pathogenic microorganisms in the soil, especially pathogens of fusarium wilting, which remain viable in the soil for 5 to 7 years. For this reason, flax requires large areas for the production. At present, Kazakhstan is the world leader in the export of oil flax and the vast majority of organic grain farms in Kazakhstan grow oil flax. Let's consider the economic efficiency of organic flax (see Table 6)

Table 6. - Comparative efficiency of oil flax production using conventional and organic technology, per 1 ha

Cost item	Unit of measurement	Conventional technology	Organic technology	Difference between organic technology and conventional technology, (-, +)
Crop yield	centner /hectare	8	7,2	-0,8
Labor cost	thousand tenge	3,6	5,8	2,2
Seeds, planting material	thousand tenge	5,9	15	9,2
Fuels and lubricants	thousand tenge	5,6	9,8	4,2
Mineral fertilizers	thousand tenge	8,2	0	-8,2
Biologicals, organic fertilizers	thousand tenge	0,0	14	14,0
Herbicides, pesticides	thousand tenge	6,8	0	-6,8
Maintenance	thousand tenge	2,7	4	1,3
Other costs	thousand tenge	4,1	7,4	3,3
Organic certification, laboratory research	thousand tenge	0,0	2,5	2,5
Total direct costs per hectare	thousand tenge	36,9	58,5	21,6
Standard per1 centner	thousand tenge	4,6	8	3,5
Selling price 1 centner	thousand tenge	15,0	30	15,0
Profit from 1 centner	thousand tenge	10,4	18	8,0
Profit from 1 hectare	thousand tenge	83	133	49,5
Profitability	%	225,4	227	1,4
Organic premium: 100%				

The costs of using mineral fertilizers and pesticides are reduced in the production of organic flax, which get replaced by organic preparations. Seed costs increase as organic seeds are more expensive than traditional seeds. Costs for certification and quality control are added. At the same time, the yield of flax, at the end of 2020, using organic technology was lower by

0.8 c/ha, which increased the cost of production of 1 centner. It should be noted that the demand and price for traditional flax has increased significantly compared to previous years, but the price for organic flax changed slightly. If 3-5 years ago the organic premium reached 150%, then last year it was 100%.

Thus, there is an increase in the total costs per hectare for the production of organic flax and a slight decrease in yield. At the same time, despite the organic premium of 100%, the level of profitability is practically the same. In the future, with an increase in prices for traditional flax, which is already observed in 2021, the level of profitability of organic flax may be lower, if the organic premium does not increase.

Peas

Peas are one of the rotary crops that provide crop rotation and the introduction of nitrogen-containing substances. Peas and other legumes are ideal crops for crop rotation, and they meet all organic standards for many crops. When using the correct agricultural technology, they grow well, but it is better to place them in a crop rotation after crops that thoroughly clear the fields of weeds, in particular, spring wheat. Peas themselves are an effective precursor for many agricultural crops, as they accumulate nitrogen in the soil by fixing atmospheric nitrogen (up to 200 kg per hectare from the air). Estimates for growing peas were taken from a survey of farmers. The results are shown in Table 7.

Table 7. - Comparative efficiency of pea production using traditional and organic technology, per 1 ha

Cost item	Unit of measurement	Conventional technology	Organic technology	Difference between organic technology and conventional technology, (-, +)
Crop yield	centner /hectare	10	9,2	-0,8
Labor cost	thousand tenge	3,4	5,0	1,6
Seeds, planting material	thousand tenge	20,0	25,0	5,0
Fuels and lubricants	thousand tenge	9,6	12,0	2,4
Mineral fertilizers	thousand tenge	9,2	0,0	-9,2
Biologicals, organic fertilizers	thousand tenge	0,0	6,0	6,0
Herbicides, pesticides	thousand tenge	7,0	0,0	-7,0
Maintenance, depreciation	thousand tenge	3,4	5,0	1,6
Other costs	thousand tenge	2,3	3,6	1,3
Organic certification, laboratory research	thousand tenge	0,0	1,4	1,4
Total direct costs per hectare	thousand tenge	55,0	58,0	3,0
Standard per1 centner	thousand tenge	6	6	0,8
Selling price 1 centner	thousand tenge	6,7	10,0	3,4
Profit from 1 centner	thousand tenge	1,1	3,7	2,5
Profitability	%	21	59	37,8
Organic premium: 50%				

Thus, based on the results of this benchmarking, it becomes clear that due to the lower costs of chemicals and the increased income from the organic premium, the organic producer receives a profitability level of 37.8% higher than the traditional farmer.

Mustard

Gray mustard (Sarepta) is well adapted to the continental climate, it is cold-resistant and capable of withstanding extreme heat and alkalinity of the soil. In the crop rotation scheme for organic production, the best predecessor for mustard is winter wheat, barley, and oil flax.

Table 8. - Comparative efficiency of mustard production using traditional and organic technology, per 1 ha

Cost item	Unit of measurement	Conventional technology	Organic technology	Difference between organic technology and conventional technology, (-, +)
Crop yield	centner /hectare	5,8	5,6	-0,2
Labor cost	тыс. тенге	3,6	5,8	2,2
Seeds, planting material	thousand tenge	1,4	2,3	0,9
Fuels and lubricants	thousand tenge	5,6	9,8	4,2
Mineral fertilizers	thousand tenge	8,1	0	-8,1
Biologicals, organic fertilizers	thousand tenge	0,0	3	3,0
Herbicides, pesticides	thousand tenge	6,8	0	-6,8
Maintenance	thousand tenge	2,7	4	1,3
Other costs	thousand tenge	4,1	3,6	-0,5
Organic certification, laboratory research	thousand tenge	0,0	1,4	1,4
Total direct costs per hectare	thousand tenge	32,3	29,9	-2,4
Standard per1 centner	thousand tenge	6	5	-0,2
Selling price 1 centner	thousand tenge	10,0	10,0	0,0
Profit from 1 centner	thousand tenge	4,4	4,7	0,2
Profitability	%	79	87	8
Organic premium: 0%				

Based on the analysis of the efficiency of mustard production using traditional and organic technology, it can be concluded that the profitability of organic mustard production is 8% higher.

Barley

Let’s consider the cost-effectiveness of barley.

Table 9. - Comparative efficiency of barley production using traditional and organic technology, per 1 ha

Cost item	Unit of measurement	Conventional technology	Organic technology	Difference between organic technology and conventional technology, (-, +)
Crop yield	centner /hectare	10,2	9	-1,2
Payroll with accrual	thousand tenge	3,6	4,8	1,1
Seeds, planting material	thousand tenge	7,3	8,5	1,2
Fuels and lubricants	thousand tenge	5,6	9,8	4,2
Mineral fertilizers	thousand tenge	9,1	0,0	-9,1
Biologicals, organic fertilizers	thousand tenge	0,0	3,0	3,0
Herbicides, pesticides	thousand tenge	8,8	0,0	-8,8
Maintenance, depreciation	thousand tenge	2,7	4,0	1,3
Other costs	thousand tenge	4,3	7,4	3,0
Organic certification, laboratory research	thousand tenge	0,0	1,5	1,5
Total direct costs per hectare	thousand tenge	41,4	38,9	-2,5
Standard per1 centner	thousand tenge	4	4	0,3
Selling price 1 centner	thousand tenge	5,5	6,5	1,0
Profit	thousand tenge	1,4	2,13	0,7
Profitability	%	34	49	15
Organic premium: 20%				

Based on the analysis of the efficiency of mustard production using traditional and organic technology, it can be concluded that the profitability of organic mustard production is 15% higher.

FINDINGS AND CONCLUSION

Within the framework of this study five crops were analyzed: wheat, flax, peas, barley, and mustard. It was found that the profitability when growing using organic technology for all crops is higher than with traditional technology:

- the profitability of organic wheat is 16% higher than the traditional one excluding the organic premium;
- taking into account the organic premium of 100%, the profitability of organic flax is 1.4% higher than that of traditional flax.
- with an organic premium of 50%, the profitability of organic peas is 38% higher than the traditional one;
- the profitability of organic mustard is 8% higher than that of traditional mustard;
- the profitability of organic barley is 15% higher than that of traditional barley.

Thus, as the results of the study show, the economic efficiency of organic production is higher than the traditional one due to a decrease in direct costs; as well as an organic premium that can be obtained when exported to international markets.

The study also analyzes the transition period, during which the products are sold as traditional, if there is no market for “transition” products, and the decrease in yield is caused by a number of reasons. Even under these unfavorable circumstances, the organic producer suffers from minimum losses compared to the traditional one, since most of the costs are related to chemicals.

Therefore, organic production can be considered profitable/cost-effective, therefore, more beneficial. Once the domestic market for organic products begins to develop in the country, it will be much easier and more profitable for producers to produce organic products for their own market.

Since the organic market is currently underdeveloped in the country, the possibility of entering international markets should be considered, bearing in mind the associated costs.

In conclusion, it should be noted that the organic form of production affects environmental and social factors, which may be the subject of further research.

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