

DIRECTIONS FOR THE DEVELOPMENT OF ORGANIC FARMING IN SIBERIA ON THE INNOVATIVE AND INVESTMENT BASIS

Marina PETUKHOVA, Evgeniy RUDOY

Federal State Budgetary Educational Institution of Higher Education Novosibirsk State Agrarian University, 160, Dobrolyubov street, Novosibirsk, 630039, Russia, Phone: +7 (383) 267-38-11, Mobile: +79231061280, E-mails: russian_basket11@mail.ru, rector@nsau.edu.ru

Corresponding author: russian_basket11@mail.ru

Abstract

The transition to highly productive and environmentally friendly agricultural farming is one of the priorities of the Strategy for Scientific and Technological Development of the Russian Federation. In the current conditions of sanctions policy, the need for a large-scale transfer of agriculture to organic farming increases. The purpose of the article is to develop methods and tools for the development of organic farming on an innovation and investment basis to ensure sustainable development of rural areas. The article presents the evolution of views and methodological approaches to studying the relationship between organic agriculture and sustainable development. The global trends in the development of the organic products market are studied, the dynamics of organic production in Russia are presented both in general and in the context of grain crops, legumes and vegetables. It has been empirically revealed that the bulk of the harvest of organic grain crops remains on the domestic market, and most of the leguminous crops are exported. The article examines global trends in the development of the organic products market. Methodological approaches and principles for the transition to the Organic 3.0 concept, aimed at intensifying the growth of organic product production, have been developed. Promising forms of organizing organic farming have been substantiated and conditions have been created for increasing the efficiency of organic production on an innovation-investment basis, taking into account regional specifics. The economic, social and environmental role of organic farming as a driver of sustainable development in Siberia is substantiated. Methods and tools have been developed to improve the state policy for the development of organic farming in rural areas of Siberia, including subsidies, subsidizing the purchase of certified planting materials, developing competency standards, and improving the regulatory framework. The practical significance of the results lies in the development of theoretical and methodological approaches and methodological tools for sustainable development of rural areas, based on the introduction of advanced organic farming technologies, as well as targeted mechanisms for stimulating organic production.

Key words: *organic farming, sustainable development, innovation and investment support, global market trends, Organic 3.0 concept, government support*

INTRODUCTION

Solving the problem of the country's food security is closely related to the transition to a new, environmentally friendly type of production in all sectors of the economy. The relevance of this problem is confirmed by the sustainable development goals adopted by the UN General Assembly, one of which is to eliminate hunger, ensure food security, improve nutrition and promote sustainable agricultural development [35, 39].

According to FAO forecasts, agricultural consumption worldwide will increase by 15-17%, mainly due to increased labor productivity caused by increased investment,

as well as the efficient use of inputs. The increase in agricultural production volumes is associated with an increase in yields based on the intensive use of innovations, advanced production technologies, and digital tools.

Increased requirements for the safety of manufactured products, an increase in the anthropogenic load of the agri-food sector, as well as the deterioration of the global environmental situation act as significant restrictions on the growth of agricultural production.

According to the Global Footprint Network, food production accounts for about 30% of humanity's total ecological footprint, which is 3gha/person. The size of the ecological

footprint varies across continents. Thus, in North America, Oceania and Europe this value ranges from 5 to 7 global hectares per person, and in Asia, Africa, Latin America - from 0 to 3 gha/person. To increase the level of environmental friendliness of production, the transition to a low-carbon economy, increase the biocapacity of the land and increase the level of environmental friendliness of production, a focus on the mass introduction of environmental innovations and ensuring the sustainability of agri-food systems is required [5].

The search for a more sustainable form of agricultural organization aimed at preserving natural resources and biodiversity, producing healthy food, increasing environmental efficiency in agriculture is directly related to organic agriculture [10].

The founders of this direction were A. Howard, W. J. Northbourne, F. King, J. Rodale, I. B. Balfour and others [26].

Subsequently, the International Federation of Organic Agricultural Movement [8] the principles of organic agriculture were formulated. As a result of evolutionary transformations, the process of development of organic agriculture contributed to the formation of a growth trajectory for the supply of these products, as well as an increase in demand from end consumers [38].

According to Barrett [7] modern development of agriculture is closely related to the concept of sustainable development, which involves, along with an increase in production volumes, reducing the negative impact on the environmental situation, ensuring consumer health, balancing income from agricultural production and maintaining the vital activity of rural areas. The concept of sustainable development is implemented in three directions: economic, environmental and social dimensions [12]. The most important direction for implementing environmental innovation is to stimulate the growth of organic production as a source of new economically, environmentally and socially significant products and services that can ensure positive transformations both in the natural environment and in society [9, 34].

The purpose of the article is to develop methods and tools for the development of organic farming on an innovation and investment basis to ensure sustainable development of rural areas.

MATERIALS AND METHODS

The methodological basis of the study was state legislative acts, government regulations and decisions, scientific works of domestic and foreign scientists - economists and agricultural specialists on the problem under study. During the research process, monographic, abstract-logical, analytical, economic-statistical, and expert research methods were used. The materials and reports of the Global Footprint Network Grand View Research, FIBL, IFOAM – Organics International, as well as regulatory documents and materials of scientific literature and periodicals were used as the information base for the study.

The modern development of agri-food systems in most countries of the world is based on the concept of sustainable development. Sustainable development is based on a balanced distribution of economic resources in order to achieve economic growth, rural development and rational environmental management. The main objectives of sustainable development of agriculture in order to achieve food security for the country and regions are related to increasing the efficiency of resource use, achieving environmental safety in agriculture and ensuring social justice.

Theoretical and methodological approaches to the study of sustainable development are widely represented in the works of foreign scientists. The scientific approach of such authors as David William Pearce, Edward Barbier and Anil Markandya is based on the goal setting of meeting both current and future needs of the population, which presupposes the presence of a certain supply of economic resources [27].

William E. Rees explored the specifics of sustainable development in comparison with traditional development. He considered the

preservation of ecological diversity in underdeveloped regions to be one of the most important tasks of sustainable development [31].

H.Daly put forward various concepts of sustainable development, justifying the need to highlight environmental and social sustainability [11].

Thus, the concept of organic agriculture has a close relationship with the concept of sustainable development.

Foreign researchers consider three stages in the development of organic agriculture. The first stage (1924-1970) was characterized by the formation of theoretical approaches to the study of this issue, awareness of the need to change the traditional way of managing, and the creation of an image of organic products. The second stage covered the period 1970-1990 and was characterized by a significant expansion of the scale of production; creation of organic farming infrastructure, including non-governmental organizations; formation of the legislative framework. The ongoing third stage is associated with high growth rates and pronounced processes of globalization of organic farming [42].

Organic agriculture research methodology was developed in the first third of the twentieth century. The main element of a fundamentally new agricultural system was humus farming, designed to preserve soil fertility. Some scientists adhered to the principles of biodynamic production as a combination of the biological nature of crop cultivation and the influence of natural climatic resources [46].

W. Albrecht considered the ecological principle of production in close connection with organic farming [4].

The modern paradigm of organic agriculture defines this type of activity as a production system operating on the principles of sustainable development and efficient use of renewable production resources in order to preserve soil fertility and reduce anthropogenic load [21, 23].

Since 1980, organic agriculture has received legislative status at both the national and international levels. The use of international

standards for organic production has served as the basis for government support and subsidies for farmers.

Foreign scientists consider the effective management of environmental and biological processes as a necessary condition for the successful functioning of organic production with specified yield parameters and ensuring plant protection [22].

A. Aeberhard, S. Ristemphasize the interest of farmers in organic production due to higher profits compared to traditional production, which is largely due to subsidiary support from the state [2].

The diversity of agricultural production in European countries is based mainly on production technologies, which in recent years have focused on the use of intensive methods and high technology. Thus, organic agriculture in Romania is characterized by dynamic development, which is largely due to the presence of favorable natural and economic conditions.

The growth in demand for organic fuel has predetermined positive dynamic changes in the production and trade of organic products, including exports to the European market. The strategy for the development of organic production in Romania involves further expansion of agricultural areas under organic crops, improving the quality of products, increasing consumption of these products by the population and increasing exports. It is important to strengthen and ensure the acceleration of the development of organic agriculture on an innovation and investment basis [29, 30].

The study by the team of authors [15] is devoted to the development of organic farming in Romania. Romania has significant agricultural potential, including the provision of agricultural land, as well as a high level of scientific and intellectual potential. However, according to Aceleanu et al. (2015), there are still problems of insufficient level of financing of production activities, as well as problems of land management and land use, the impact of unfavorable natural and climatic conditions on production [1]. The possibility of ensuring sustainable development of rural

areas is substantiated based on the prospects for the implementation of organic farming projects [43].

The topic of organic production has been widely reflected in the research of the world scientific community, since it covers the problems of economic growth, sustainable development, and food consumption. Some authors [28] note that organic agriculture is a factor influencing consumer behavior by improving the quality of final products and the value of goods offered to consumers. According to some authors [3] agriculture and climate change are connected by a complex cause-and-effect relationship. The negative impact on the environment of gas emissions caused by intensive inorganic agriculture is well known. Other authors [14] analyzed the relationship between agricultural activities and environmental impacts in European Union countries and identified the relationship between agricultural production factors and the value of agricultural products. Thus, highly productive organic production [24] can be the result of optimization provided by the

development and implementation of multidimensional analytical systems, taking into account aspects of urbanization, innovation and investment support, safety of manufactured products, social and marketing aspects [44].

In the context of sanctions policy and geopolitical challenges, the effective development of the agri-food complex is closely associated with the use of innovative technologies, therefore the main priority of agricultural policy should be the formation of mechanisms for the introduction of innovative technologies that contribute to the active conduct of research and experimental work, as well as the commercialization of the results achieved [13, 45].

RESULTS AND DISCUSSIONS

The organic food market is one of the most dynamically developing in the world. From 1999 to 2020 it grew more than eightfold from 15.2 to 145 billion US dollars (Fig. 1).

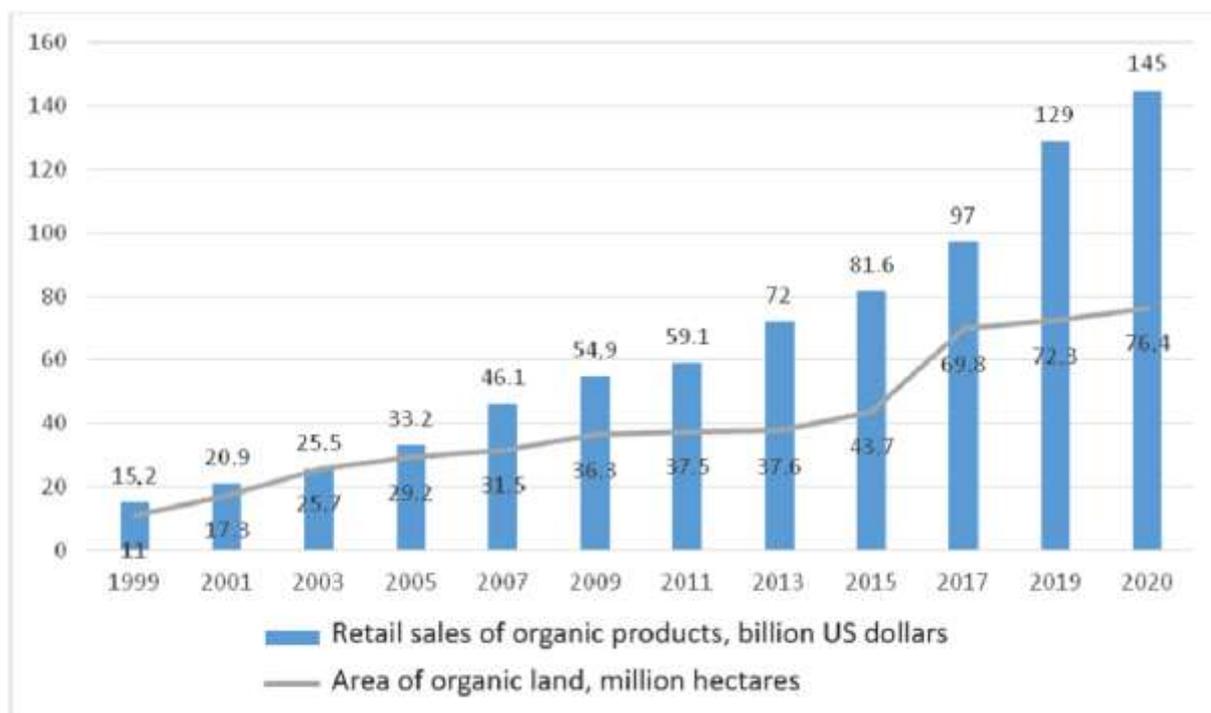


Fig. 1. Indicators of development of the world organic food market, 1999-2020.
Source: Own calculations based on data [40].

According to Grand View Research forecasts, the organic products market will continue to

grow at a rate of 12–13% per year, and its capacity in 2025 will be \$218–230 billion.

The share of the organic products market in the total global agricultural market products by 2025 it will reach by 3-5%. It should be

noted the growing demand for organic products in China (11.3 billion euros) (Fig. 2).

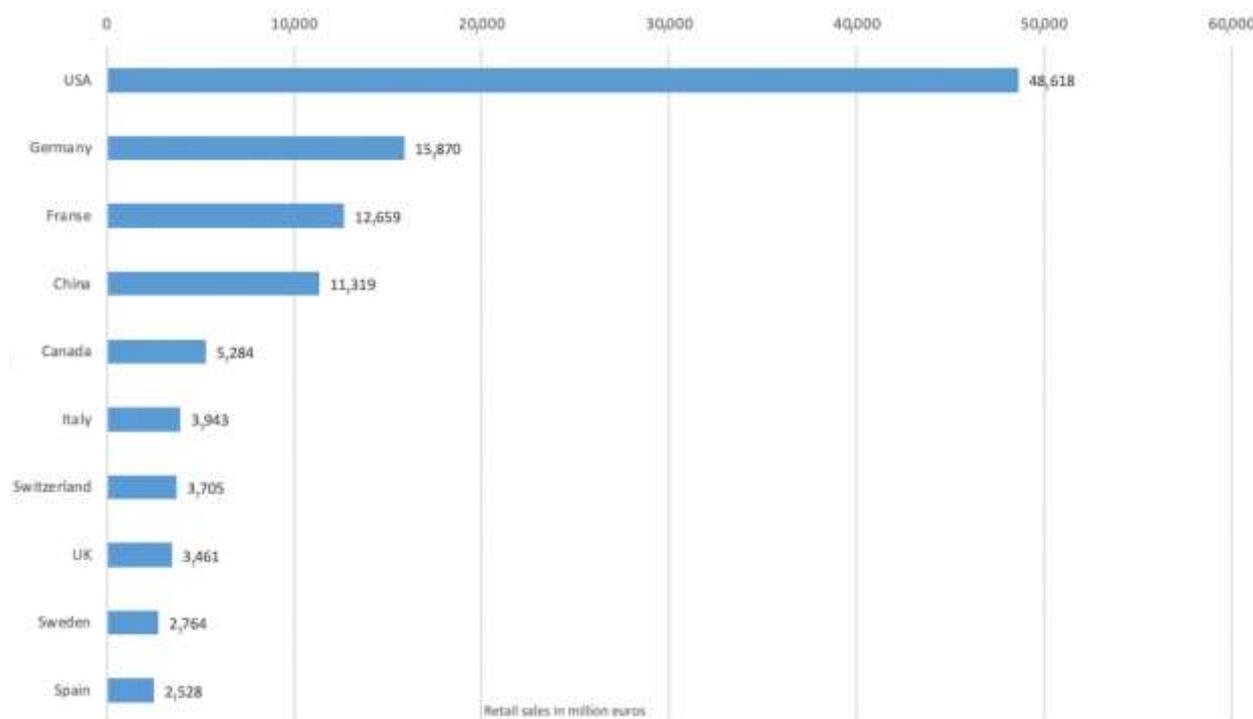


Fig. 2. Top 10 countries with the highest consumption of organic products
Source: Own calculations based on data [40].

Currently, innovation and investment activity in Russia is increasing, but the use of innovative and digital technologies in the production of organic products is in the development stage.

In accordance with the IFOAM report [17] for 2021, experts proposed the “Organic 3.0” Concept, the goal of which is to ensure the widespread dissemination of sustainable agricultural systems based on organic farming. In accordance with this concept, organic farming is an innovative agroecosystem, which includes environmental, social and economic-managerial components.

The evolutionary transformation of organic production covers a long time from the formation of ideas about the relationship between agricultural development and environmental conservation more than 100 years ago, expressed in the concept of Organic 1.0, to the creation of a global market

for organic products based on the Organic 2.0 product quality standards system.

The introduction of the Organic 2.0 concept made it possible to ensure positive changes from improving the well-being and health of consumers, increasing the income of producers to solving environmental problems of preserving biodiversity and protecting the environment. At the same time, limitations in the further development of this concept were also identified. They were linked to complex organic certification processes and mechanisms that automatically excluded small farmers from participating in the Organic 2.0 process, despite the fact that they make a huge contribution to feeding a large part of the world's population. In addition, the tools of this concept have not been fully harmonized and coordinated with other regulatory documents in the field of sustainable development and are not aimed at full compliance with agroecology standards, stimulating the development of small and

medium-sized farmers, and fair trade. In addition, the economic difficulties of production forced producers to specialize in certain areas and types of food, which did not allow for diversity and the use of new organic methods. As a result, despite significant changes, the world's certified organic agriculture is concentrated on less than 1% of the world's farmland [35].

The most important features of the Organic 3.0 concept are its innovative nature, active study of advanced foreign experience, assessment of opportunities and threats. According to the Organic 3.0 concept, food producers are required to be responsible and honest, as well as ensure transparency in terms of certification. In order to organize sustainable agri-food systems within the framework of the Organic 3.0 concept, it is important to interact and enter into agreements with various organizations and implement a marketing strategy that forms an eco-image. The idea of the concept also involves empowering all participants in the production chain - from farmers to final consumers. It is important to recognize interdependence and develop real partnerships between all participants. This could also be implemented on a territorial basis, where local communities and organizations collaborate to create sustainable and environmentally friendly agri-food systems.

Thus, the Organic 3.0 concept refers not only to an approach to organic production, but also to an innovative approach to the sustainable development of the entire production chain. The implementation of the concept aims to create sustainable and environmentally friendly agri-food systems that will contribute to the well-being of both producers and consumers [6].

The fundamental difference between the Organic 3.0 concept and previous approaches is that it pays attention not only to agricultural producers, but also attracts other interested participants. The organic production sector

should involve not only end consumers, but also intermediary organizations - the entire chain of stakeholders. One of the main problems slowing down the development of the organic sector is its isolation. Manufacturers, retailers and consumers are not communicating enough with each other. An important role in the development of organic production is also assigned to research organizations [32, 33].

They can conduct research, develop new technologies and methods of organic farming, and educate farmers and consumers [16].

In this regard, there is a need to create a single cluster in the regions [20].

In accordance with the Strategy for the development of organic production in the Russian Federation until 2030 [37] production of Russian organic products for sale to end consumers within the Russian Federation (excluding consumption within the industry) in 2021 amounted to 9.2 billion rubles, including the production of canned products, juices and other processed products of vegetables, fruits, grains and legumes (canned peas and corn) - 1 billion rubles, cereals, flour, cereals - 1.8 billion rubles, baby food - 1.1 billion rubles, dairy products - 1.4 billion rubles, drinking milk - 1.3 billion rubles, meat products - 1 billion rubles, alcoholic products - 0.6 billion rubles, vegetables and fruits - 0.6 billion rubles, food forest products - 0.3 billion rubles, other organic products - about 0.1 billion rubles.

The share of grains, legumes, oilseeds and feed crops accounts for 31% of all organic products produced; production of juices, butter, canned food - 17%; vegetables and fruits - 12%.

In 2021, the gross harvest of grain crops in the organic sector amounted to 45.3 thousand tons, including wheat - 31 thousand tons, barley - 2.7 thousand tons, buckwheat - 2 thousand tons, rye - 2.6 thousand tons, oats - 3 thousand tons, corn - 2.1 thousand tons (Fig. 3).

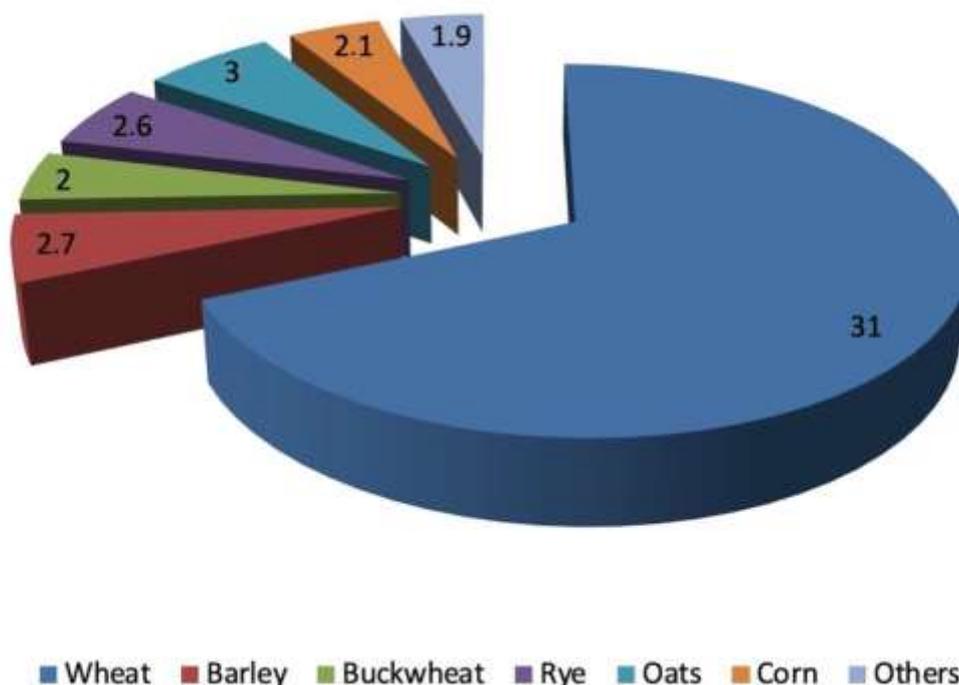


Fig. 3. Structure of grain production in organic farming in Russia, thousand tons (2021).
 Source: Own calculations based on data [37].

The gross harvest of grain legumes amounted to 63 thousand tons, including peas - 30.6 thousand tons, soybeans - 32.1 thousand tons,

other grain legumes (lentils, chickpeas, broad beans) - 0.3 thousand tons (Fig. 4).

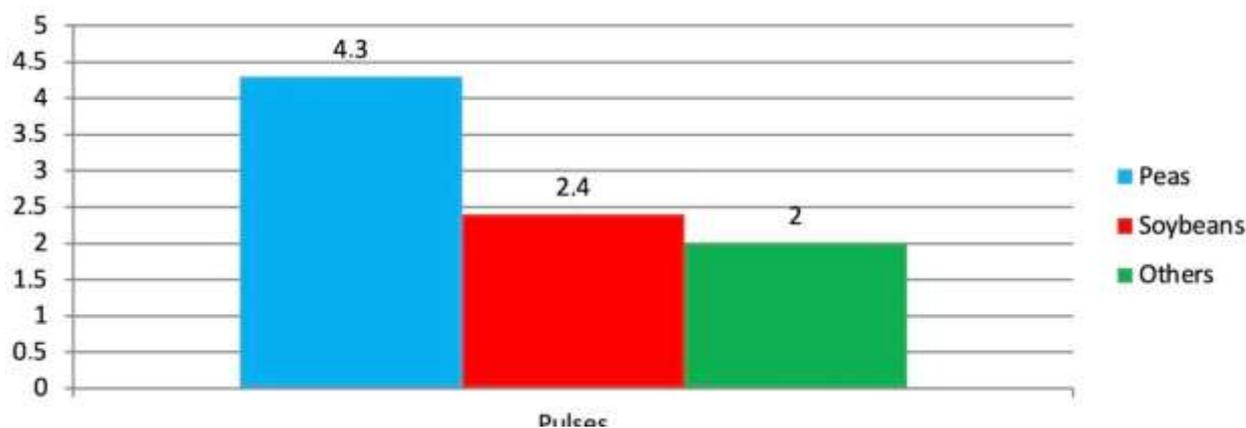


Fig. 4. Production of leguminous crops in organic farming in Russia, thousand tons (2021).
 Source: Own calculations based on data [37].

The average yield of grain and leguminous crops is 26 centners per hectare, including wheat - 30 centners per hectare; barley yield is about 22 quintals per hectare; buckwheat yield – 15 centners per hectare; peas - 25.8 centners per hectare.

The bulk of the organic grain crop remains on the domestic market, and most of the grain legumes are exported.

The gross harvest of organic vegetables in 2021 amounted to 7.1 thousand tons, including 4.5 thousand tons of potatoes, 0.6 thousand tons of beets, 0.6 thousand tons of onions and garlic, 0.5 thousand tons tomatoes, 0.4 thousand tons of carrots and 0.5 thousand other vegetable crops (pumpkin, cucumbers, cabbage, radishes, bell peppers, zucchini), Fig. 5.

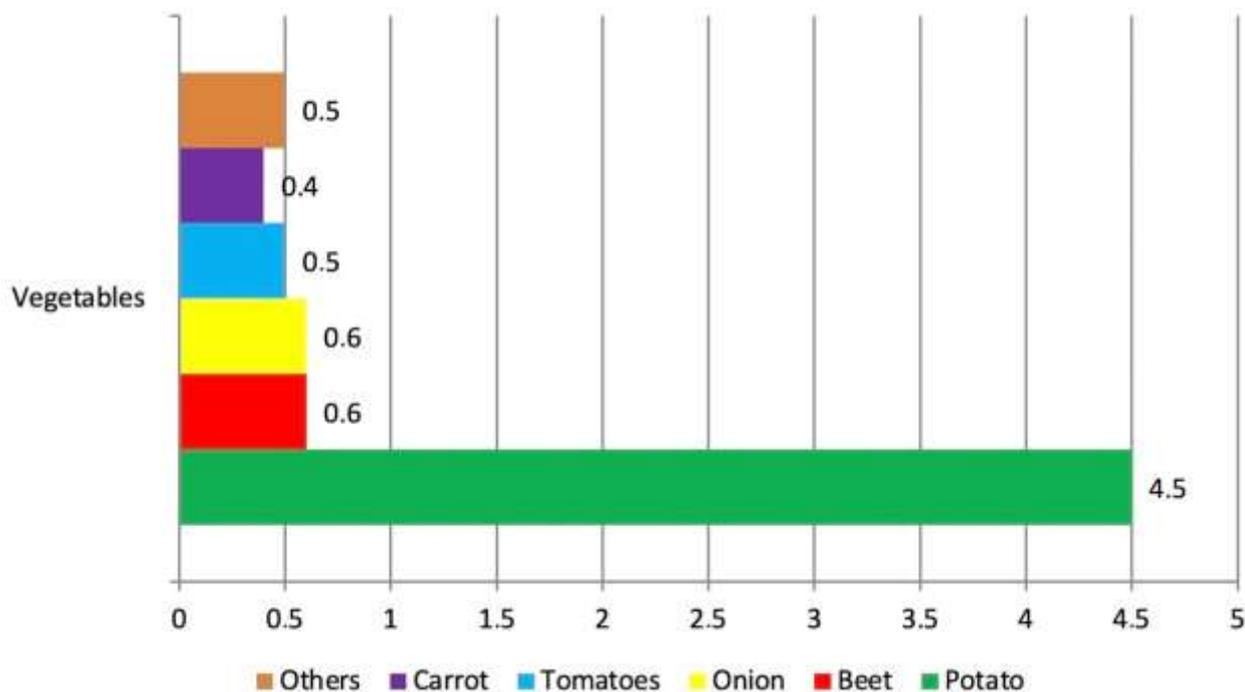


Fig. 5. Vegetable production in organic farming in Russia, thousand tons (2021).

Source: Own calculations based on data [37].

Organic agriculture is an opportunity to preserve natural resources as a result of reducing harmful emissions: preserving organic matter in the soil, which affects its fertility; increasing biodiversity. The positive impact of organic farming on public goods and services is estimated by international organizations at US\$40 per hectare per year as a result of reduced carbon emissions. Increasing biodiversity provides an additional benefit of US\$30 per hectare per year [25].

The social significance of organic farming is reflected in the creation of new jobs, as well as the formation of new competencies, skills and abilities of workers. Consumption of organic products has a positive effect on public health. With the development of organic agriculture, consumer demand for environmentally friendly products will also increase, which will significantly increase farmers' incomes. Organic farming and organic agriculture are important aspects of sustainable development in Siberia. There is positive experience in organic production in the Muromtsevsky district of the Omsk region, where a significant part farms abandoned the use of pesticides. As a result, the average harvest was higher than the

average for the Omsk region, and production costs decreased significantly, which provided the farms with additional profit [36].

Organic farming and organic agriculture are important aspects of sustainable development in Siberia. To organize their successful development, it is necessary to analyze the legal framework and develop targeted support programs. The regulatory framework should create conditions for the production of environmentally friendly food products.

The key tools to include in the support program are:

1. subsidizing agricultural producers specializing in organic farming. This method of farming involves avoiding the use of herbicides, pesticides and chemical fertilizers;
2. subsidizing part of the cost of purchasing certified environmentally friendly planting material and seeds by no more than 50%. This will allow agricultural producers to reduce the cost of purchasing necessary materials and stimulate the transition to organic farming;
3. informing the population about the benefits of ecological agriculture, organic farming and the consumption of organic food. The transfer of information will familiarize consumers

with the benefits of such products and promote their demand for them;

4. development and implementation of a certification system for organic products. This will help set quality and safety standards for organic products and also increase consumer confidence in such products;

5. holding promotional events, fairs, exhibitions, competitions will help to popularize and develop organic farming; the development and adoption of local regulatory legal acts in the constituent entities of the Russian Federation will allow the use of modern environmentally friendly biotechnologies, and will also accompany the implementation of various support measures [41]. To effectively manage organic production processes, it is necessary to organize an information technology system, including the use of special equipment and software that meets modern international standards [18,19]. Creating conditions for certification of production of products intended for export is also an important step in the development of organic farming in Russia. Thus, for the successful implementation of this concept, it is necessary to take into account the development features and natural and climatic conditions of Siberia. Funding for activities should come from the federal and regional budgets, as well as extra-budgetary funds. The development and implementation of a program to support the development of organic farming in Siberia contributes to the dynamic development of agriculture and is aimed at increasing the competitiveness of domestic products and their compliance with international requirements [35]. Organic agriculture as a priority for environmental investments in the Republic of Mordovia (development opportunities and challenges), The Eurasian Scientific Journal, Vol. 14(6): 1-11.

CONCLUSIONS

The article develops theoretical and methodological approaches to the transition to organic production as a priority of the Strategy for Scientific and Technological

Development of the Russian Federation. The need to develop methods and tools for the development of organic farming on an innovation and investment basis is substantiated. A study of global trends in the organic production market was conducted, which made it possible to determine the directions of development and stimulate demand for domestic organic products. The evolution of views and methodological approaches to studying the connection between organic agriculture and sustainable development is presented. The global trends in the development of the organic products market are studied, the dynamics of organic production in Russia are presented both in general and in the context of grain crops, legumes and vegetables. It has been empirically revealed that the bulk of the harvest of organic grain crops remains on the domestic market, and most of the leguminous crops are exported. The transformation of the Organic 3.0 concept is presented, approaches and principles for its implementation are developed. Organizational, economic and financial mechanisms and instruments for state support for the development of organic farming in rural areas of Siberia have been developed, including subsidies, subsidizing the purchase of certified planting materials, developing competency standards, and improving the regulatory framework. The economic, social and environmental role of organic farming as a driver of sustainable development in Siberia is substantiated. The practical significance of the results lies in the development of theoretical and methodological approaches and methodological tools for sustainable development of rural areas, based on the introduction of advanced organic farming technologies, as well as targeted mechanisms for stimulating organic production.

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