

# Genesis of Organic 3.0 agro-technologies to increase regional sustainability

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**Abstract.** Organic 3.0 agro-technologies have been gaining popularity over the last decades in light of the search for solutions for sustainable environmental management and sustainable development of territories. The International Sustainable Development Goals recommend the transfer and search for new agro-technologies of gentle impact on the environment in order to maximize resource conservation and minimize anthropogenic impact on nature for future generations. The trend of transition of many countries to organic production requires additional investment and building new mechanisms of interaction in the sphere of agro-industrial complex. The paper studies the established market of organic products, assesses its structure and makes a forecast of its future expansion. Climate change and the reduction of areas suitable for the production of food raw materials impose an additional burden on agricultural production, which should use more effective methods and technologies to increase productivity in the current conditions. The conclusions are drawn about the key role of Russia in the development of the organic trend of agro-industrial complex as a country with vast agrarian territories and resources.

## 1 Introduction

The current trend of expansion of organic agriculture continues to gain momentum and already covers more than 190 countries of the world by the end of 2022 [1]. The growing popularity of healthy eating and strengthening of the movement for environmental protection under the influence of international scientific organizations have led to the development of organic markets. The established global market for organic products over the past 20 years continues to develop – by 2025, sales of organic products will reach 212-230 billion dollars.

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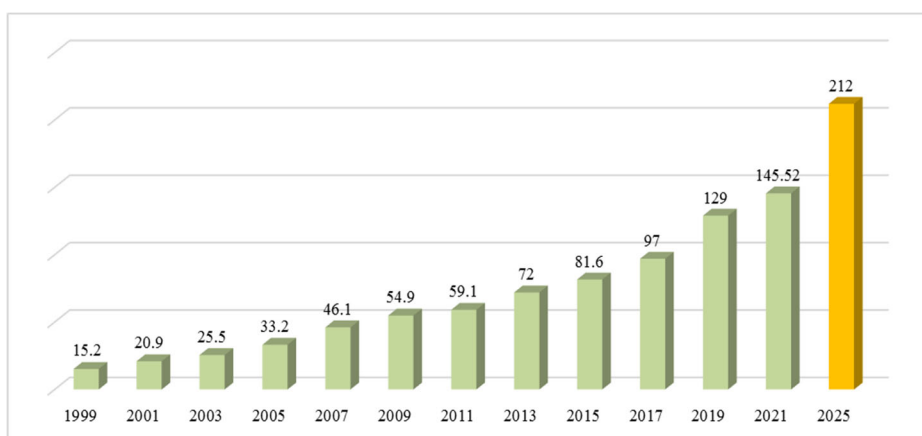
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[2]. The projected sales volume is not a limit, as a number of countries, including Russia, have not fully realized the existing domestic potential of organic agricultural production.

The global area of agricultural land under organic production in 2021 was 74.9 million hectares. At the same time, a large share of the area is in Australia and European countries, while America, Africa, Asia have less than 10 million ha of the total area under organic agriculture. Thus, the potential for increasing the area of organic production is quite large on these continents [3]. Organic agriculture (hereinafter referred to as OA) is a new direction of agro-industrial complex development in response to the ongoing climatic changes and depletion of agricultural areas. It is a new philosophy of agricultural production management in the light of biodiversity conservation and improvement of agroecosystems [3]. It can also be seen that OA will represent a new trend in the development of agro-industrial sectors, develop in the light of modern agro-ecological conditions and create a new platform for the development of rural areas. The uniqueness of this direction is due to the parallel development of existing agro-technologies, as well as a thrifty attitude to the environment. The basis of OA is the fundamental rejection of chemical fertilizers, GMOs, antibiotics, and food additives of artificial origin, as these substances eventually get into the soil, groundwater, air, and atmosphere.

Agro-technologies of organic agriculture are nature-like, i.e., harmoniously integrated into natural agro-biocenoses, do not disturb the balance of biodiversity between nature and anthropogenic activities. The use in organic agriculture of specialized varieties and breeds, prebiotics, probiotics, natural premixes, side rates, biological systems of plant protection by microorganisms, etc., all this allows to reduce harmful chemical inputs. — all this allows to reduce harmful chemical effects from intensive production of AIC products [4].

Modern fashionable trends in the popularization of healthy nutrition and longevity call for eating only environmentally friendly products produced without the use of chemical fertilizers and antibiotics. Since 2014, it is accepted to designate organic food as Organic 3.0, and the introduction of mandatory labelling of goods falling under the category of organic is regulated [5]. The dynamics of development of the organic market in Figure 1 shows its steady growth.



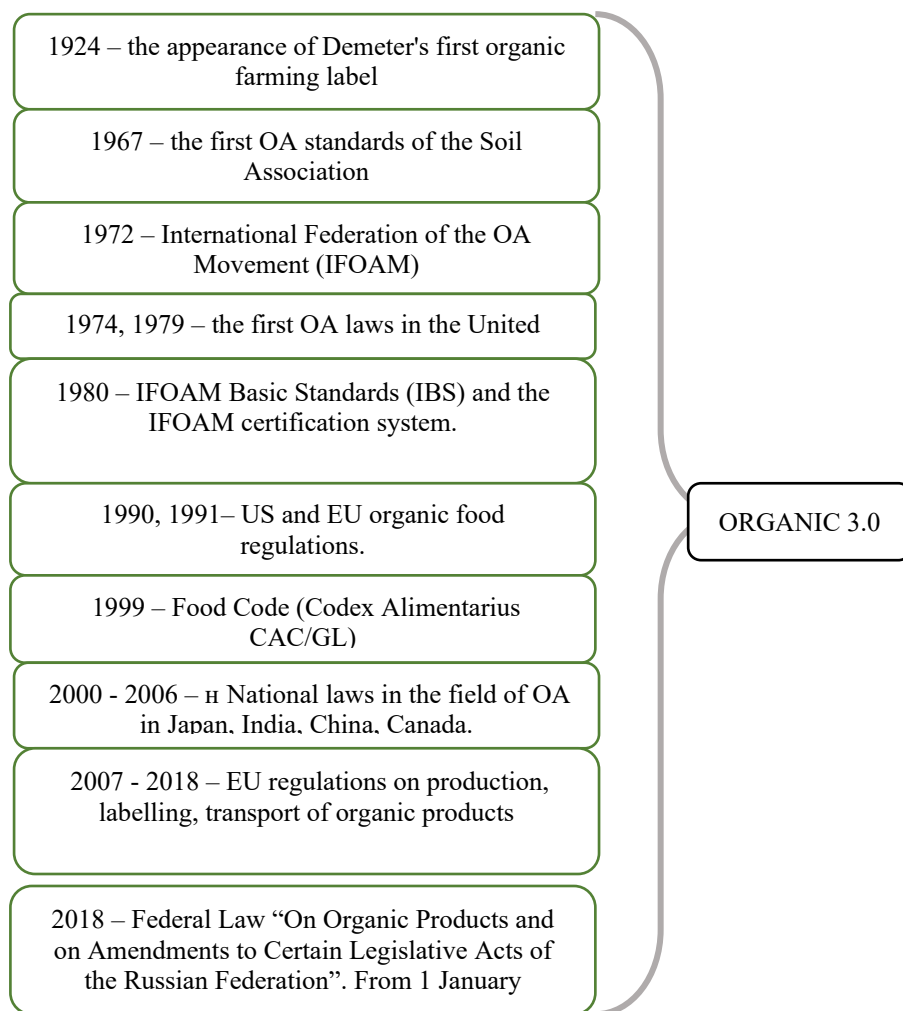
**Fig. 1.** Dynamics of sales of the global organic market, USD billion.

The trend of development of the global market of organic products presented in Figure 1 proves that the market growth dynamics is high and continues to grow. The population's focus on quality nutrition stimulates the development of this area in the food industry. In this situation, it is agricultural production that depends on the supply of quality food raw materials that meet all the standards of environmental friendliness and organics. It should be noted that

without quality food raw materials it is impossible to produce organic food products in accordance with the norms of organic production, which caused the emergence of OA in the world community [6, 7].

## 2 Results and discussion

The origins of organic agriculture date back to 1924, when the first Demeter label, which exists today, appeared. From this moment begins the history of the development of this trend in the global agro-industrial complex, which in recent years has spread to virtually all countries of the world. In Russia, for a long time there was no law on organic products, which significantly limited the world food markets for domestic producers. For the first time the Russian draft law on organic products was introduced to the State Duma in 2012, the law was adopted in 2018, and came into force in 2020 [8, 9]. Let us trace the genesis of the management system of this direction in the global agricultural production and highlight the key points (Figure 2).



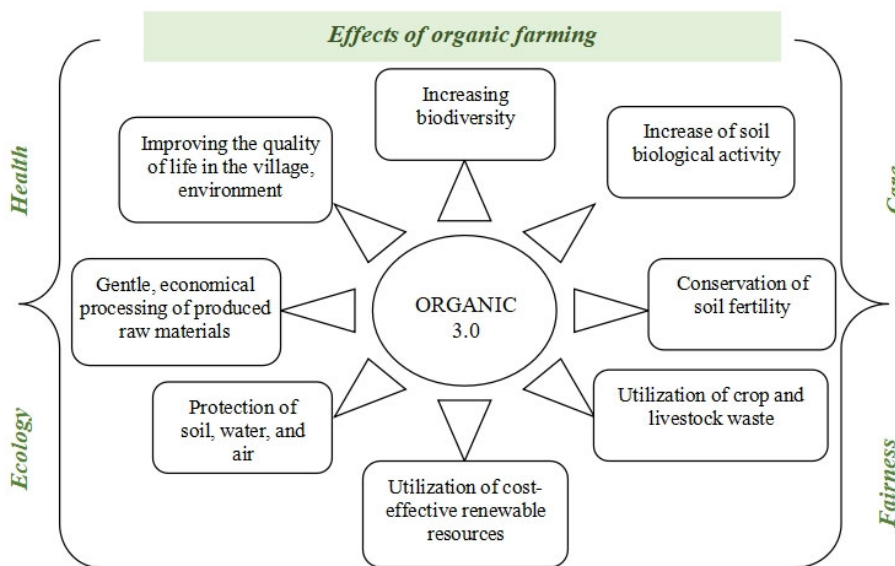
**Fig. 2.** The genesis of the organic farming management system.

The genesis of the OA management system proves the absence of a single mechanism for certification of products produced in different countries, a single standard for these products. Nevertheless, according to the Codex Alimentary (food code) a unified supranational system of management of all organic production should be built, which will be adapted to local regional natural, climatic, political and demographic conditions. Thus, it is necessary to build a unified base – a fundamental basis for the introduction of the philosophy of organic agricultural production of food raw materials with its subsequent adjustment to local conditions [10].

Analysis of the study of various practices of organic production organization allowed to identify some general principles of such enterprises. Organic production is actually a closed-cycle enterprise, in which animal and crop wastes are also processed and form the basis for subsequent production. The sectors of livestock and crop production are closely interconnected and create a single system of nitrogen cycling in the environment.

It is very important at the stages of production and processing of food raw materials to observe the basic principles of organic agriculture, as it is the absence of chemical additives, antibiotics, growth stimulants, etc. that allows the final product to obtain the status of organic [11, 12]. Therefore, at each stage of this mechanism there should be strict control of quality and purity of production from the position of environmental friendliness of the final product. The production of organic products will not only allow to occupy a certain niche in the food market of the country, but will also bring enterprises to a new level of international export of finished products under the national brand “Organic”.

Let's form the main generated effects of organic agriculture and present them in a complex with the principles of its organization adopted at the international level [13, 14] (Figure 3).



**Fig. 3.** Positive economic and environmental effects generated by OA.

In addition to environmentally friendly food raw materials, organic agriculture generates a number of positive effects that have a favorable impact not only on the environment, but also on the social climate of rural areas (new jobs are created, abandoned agricultural land is put into circulation, a favorable image of the territory and the country is formed) [15]. It becomes obvious that the implementation of the principles of organic agriculture is a new vector of development of global food production, in which an important role is assigned to the branches of agro-industrial complex as producers of food raw materials.

### 3 Conclusion

In conclusion, one of the global goals of sustainable development is the preservation of the ecosystem and its biodiversity. At the same time, there should be a balance of interests between humanity, its growing needs and the future of our planet. Therefore, the concept of sustainable development positions mankind as one of the key links in the biological system of life on Earth. Mankind in the process of production of food raw materials should not destroy the environment, cause irreparable damage to it and aggressively influence it with chemical and synthetic preparations, because without this system its existence will be impossible.

The implementation of the concept of ORGANIC 3.0, which is widely spread in Russia, is a new vector for the implementation of sustainable development principles in the agro-industrial complex. Since the entry into force of the national law on organic agriculture, there have been certain changes in the system of organic production management: national food quality standards have been introduced, in a number of regions regional laws on the turnover and regulation of organic markets have been adopted, a system of certification and labelling of organic products has been developed.

Thus, we can say that a new branch of agro-industrial complex – organic agriculture – has already been formed. There are examples of a complete production cycle: from cultivation of land, to the production of crop and livestock raw materials and its subsequent processing, and supply to specialized markets of organic products under a certain labeling. In the future, this area will only expand, as modern society is concerned about the environment and statistics of nutritional diseases. Therefore, the national market of organic products has prospects for expansion, globalization, and integration with other world markets.

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