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INNOVATION PROCESSES ECOLOGIZATION AS THE COURSE OF THE REGIONAL AGRO-INDUSTRIAL COMPLEX DEVELOPMENT

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Abstract

The article presents an assessment of the market of the organic products in Russia and in the world, an assessment of traditional technologies of production and processing of agricultural products, and an analysis of existing scientific research results in the field of ecologization of agriculture. The basic principles of organizing the organic agriculture are determined, the results of the studies of the modern industrial-chemical method of farming influence on the human health and nature are presented; these data made it possible to justify the need for ecologization of the innovative development of the agro-industrial complex in the region. The problems preventing the organization of the organic agriculture in the regions of Russia are revealed and structured. The main conclusions and proposals of the ecologization of the innovative development of the regional agro-industrial complex are presented, and the measures necessary for the promotion and development of the organic market are proposed.

Keywords: Innovation, ecologization, organics, development, agriculture. .

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1. Introduction

Currently, the Russian consumer has no opportunity to choose high-quality, safe and healthy food in the shop. Unfortunately, there is no efficient certification system guaranteeing the buyer the absence of produce harmful to his health. The buyer has to rely on the reliability of the manufacturer. A lot of manufacturers who write on their products “eco”, “bio”, “Non-GMO”, “farmer”, “natural”, “meet the standards”, “made according to the traditional recipes”, use it only as a sales tool, as the regulatory and legal framework prohibiting to do it appeared only in 2018. The consumer doesn’t even imagine how carefully the manufactures hide the technology of production of many food items ranging from dairy produce (milk, kefir, cheese, curd, butter), bread, meat to tea and coffee. In fact, the manufacturer trying to get the profit, the price advantage over the competitors, maximum sales strives to reduce his own costs and make his produce cheaper. To do this, he has to go for all sorts of tricks: change the composition of food items by adding artificial substitutes or using cheaper synthetic analogues instead of expensive natural raw materials; use large doses of preservatives (antibiotics) to increase the shelf life and the market for produce; use the flavor enhancers (sweeteners) to attract and retain customers, etc. Having seen the rate and scale of the familiar food change, a lot of scientists began to study how harmful or useful such changes are for the human health. These studies led to the conclusion that the modern industrial chemical agriculture was a “vicious circle” and had no future prospects if the innovative development of the agro-industrial complex “was not green”.

2. Problem Statement

Currently, in this country there is practically no literature that would bring to a simple consumer the information about organic produce, principles of organizing its production and sale. As a rule, the majority of people living in this country have no idea about the organic movement, its purpose, and the ideas it is based on. Moreover, the consumer often does not even know the difference between organic products and ordinary agricultural products. It is not surprising, as very little is being done in Russia to increase the consumption culture and the level of the people’s environmental awareness. Moreover, the Russian universities do not train specialists in organic agriculture, consequently, farmers do not know how to develop the correct technological chain of the organic production. The technologies of growing organic produce in the Russian conditions are not sufficiently developed.

3. Research Questions

Organic farming is a special system of the agricultural items production that strictly prohibits the usage of synthetic chemicals (Sokolova, 2012). Synthetic chemicals are understood as substances that have a harmful effect on the environment and human health. The organic agriculture is based on the system of food production, which also improves the soil fertility and maintains the ecosystem balance (Voronkova, 2014). This is achieved by using organic farming technologies, that is, instead of agrochemicals and synthetic fertilizers one applies biologicals and bio-fertilizers, crop rotation cycles are stuck to, methods of minimal tillage are applied, green manure is grown on this soil, etc. The organization of organic agriculture does not only involve the cultivation of organic products and their sale, but it also is a great independent social movement.

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In Russia, since 2014 a lot of regulatory documents have been adopted, including the national standard *Organic Products. Rules of Production, Storage, Transportation* (*GOST R 56508 …,* 2015). And one of the most important things was the adoption of the federal law *On the Production and Circulation of Organic Products* (*Federal Law …*, 2018).

The organization of organic agriculture is "a huge unexplored space" for the science where it is necessary to research, study, test various opportunities of growing plants and animals without using any synthetic chemical growth stimulants, toxic fertilizers, genetically modified organisms and materials, as they are to be replaced with environmentally friendly biologicals and bio-fertilizers. And on the top of that, the organic agriculture allows farmers to do their work without harming the environment, meets the social requirement of moving to the responsible, respectful attitude to the land that feeds people, and, besides, meets the consumer demands for ensuring the quality and safety of food.

1. Organic agriculture emerged as an alternative to chemical, industrial agriculture and its main goal is to preserve the consumers' health and not to get the agricultural producer's profit Grigorian, Sungatullina & Kulagina 2009).

It is necessary to determine the basic principles of the organic agriculture organization (Yugai, Sokolov & Chernikov, 2014):

A) Care of the human health. The main feature of organic agriculture is the rejection to use artificial and synthetic substances.

B) Harmony with nature. In organic agriculture the treatment of diseases and pest control are carried out exclusively by biological methods that do not disturb the natural balance and affect the environment in the best way.

C) Economic efficiency. The organic agriculture organization is a new economically efficient business model for the small and medium-sized farms in the Russian agrarian sector. As a rule, organic farms are diversified, waste-free, and have a full production cycle.

D) Prevention. When switching to organic farming, the main issue is not so much the rejection to use agrochemicals, as the search for correct and useful technologies of growing plants and animals to checkout and prevent various diseases. For example, instead of thinking how to grow healthy chickens without using antibiotics and growth hormone, one should take care of creating the life environment where there is no need for the use of antibiotics.

E) Ecology-oriented innovation processes. The development of new agricultural technologies, labor productivity increase, crop yields rise, work with natural systems, continuous experimentation and improvement of skills should be always environmentally safe.

A lot of research compared the nutrient contents in organic products and products manufactured with the usage of industrial chemical technologies. The experiments confirmed that the content of such nutrients as vitamin C, iron, phosphorus is 25-30% higher in organic products than in conventional products. They have more fiber, natural qualities (smell, color, taste); they do not contain residue pesticides and nitrates, and, consequently, they are cleaner and healthier.

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4. Purpose of the Study

Surely, a lot of people think about the harm to the health when buying products grown in the fields poisoned by agrochemicals, or produced in livestock feeding complexes where hormone supplements and antibiotics are actively used. More and more people are starting to experience health problems. There is an unprecedented growth of such diseases as allergy, obesity, cardiovascular diseases, diabetes, cancer. It is mainly caused by the pollution of air, water and soil, industrialization of the food and agricultural complex. Agrochemicals, artificial food substitutes, preservatives (antibiotics), growth hormones are used in large doses without any control. Their residues can be found in drinking water, in crop and livestock products, and even in the house dust. The awareness of the harmful effects of agrochemicals on the soil, the entire ecosystem and the human health made the authors start looking for a solution to this problem. Consequently, the question arose: how to use agricultural land safely both for the soil itself and for people? All these issues made the authors to write this article in order to assess and justify the efficiency of ecologization of the agro-industrial sector innovative development, to bring information about organics, organic products and organic movement to the attention of the potential producers and consumers clearly, correctly and objectively.

5. Research Methods

When preparing this article, the general scientific methods of comparative, systemic, statistical analyses in economics were used. Besides, the methodological basis is the works of the Russian and foreign economists, ecologists, agricultural workers, the guidelines and conclusions of the scientists involved in the problems of environmental development of the agro-industrial complex.

6. Findings

The whole documented history of mankind is connected with the struggle for food. Hundreds of generations of people were chronically undernourished. Initially, there was no system of agriculture. For about 2000 years the mankind has survived due to hunting and gathering. A man threw seeds into the soil about 10000 years ago for the first time; the cultivation of plants and the domestication of animals began (Potravny, 2010). Over time, the most attentive farmers and ancient plowmen noticed that the application of manure, animal bones and ash into the soil increased yields; growing green crops and spreading them back to the soil increased fertility, etc. The knowledge of farmers was carefully kept and passed on from generation to generation. This agricultural practice formed the basis of modern organic agriculture.

The search for the most cost-efficient and less labor-intensive method of producing agricultural products gave rise to the modern industrial-chemical method of farming. In the 20th century the German chemist Fritz Gaber created the first artificial fertilizers – nitrates (Levchenkov, 1992). The emergence of chemical fertilizers was met with great enthusiasm. Their mass production began. The farms were equipped with efficient special equipment, they began to receive maximum yields due to the usage of the artificial fertilizers, pesticides, herbicides and other chemicals. These changes led to the creation of giant agro-industrial complexes. The era of wealth came, the powerful agricultural machinery processed millions of hectares of the soil, sowed, harvested. The new canning technologies emerged, thus, the markets expanded. Genetics also contributed to the development of agriculture; high-yielding hybrids of wheat, corn, rice and

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other crops were developed. Consequently, the rapidly growing population of the planet (in 1930 – 2 billion people; in 2000 – more than 5 billion people) was provided with food and millions of people were saved from starvation. In the beginning the majority of people did not think that intensification and chemicalization could become dangerous and detrimental to the human health, soil and nature as a whole. The victory over hunger, harvesting high yields ensured the victory of the industrial chemical revolution.

Along with the industrialization, intensification and chemicalization of agriculture, organic agriculture began to develop. At first, it was weak and insignificant, but gradually the increasing number of farmers, scientists (Rudolf Steiner – *Biodynamic Agriculture*; Jerome Rodale – *Organic Agriculture and Gardening* and many others), ecologists and people with healthy lifestyle began to develop organic agriculture. When the harm of conventional agriculture was assessed, the organic movement became a powerful civil social movement in most developed countries. In 1962 Rachel Carson, a minor official from the US Environmental Protection Agency, published the book called *Silent Spring*, where she described the influence of the most popular pesticide at that time, dichlorodiphenyltrichloroethane (DDT) on nature. She discovered that DDT entering the food chains remained in the organisms of living beings gradually destroying them. In her book she justified and proved that excessive application of agrochemistry to the soil kills the soil slowly, its residues remain in the produce, which is detrimental to people's health. Her book was the beginning of the organic agriculture development.

The largest transnational corporations producing synthetic fertilizers and agrochemicals (the USA – Dow Chemical, EI du Pont de Nemours and Monsanto; EU – BASF, Bayer, LyondellBasell Industries, Air Liquide, Linde and Syngenta; Saudi Arabia – Saudi Basic Industries; China – Sinopec and many others) tried to stop the organic agriculture development using such tools as black PR (fabricated research results, newspaper and magazine campaigns), lobbyists' activity, lawsuits, discrediting organic agriculture supporters; and, currently, the situation remains the same. However, despite the multi-billion payments of the chemical industry the organic movement is rapidly developing worldwide. In the European countries and the United States thousands of small organic farms are successfully working and developing. The first organic food stores and organic departments appeared in the supermarkets in the 1980s in the developed countries of the world. Then these countries began to adopt laws on organic production, national standards and requirements for organic products, technical regulations. Control and certification authorities were established whose functions included monitoring the compliance with the standards and requirements for organic products in the processes of production and marketing, as well as issuing quality certificates. At the present stage when the agricultural industry works under the market conditions, the culture of sowing is mainly determined by the law of "supply and demand", not by the need for crop rotation, therefore, the elements necessary for the soil are applied with synthetic fertilizers. In the areas with the fertile soil and good climatic conditions it is so far possible to obtain high yields. However, according to Rosstat's data, about 40 million hectares in Russia are not used for agriculture due to aridity and other adverse conditions in these areas. These lands have not been used in agriculture for the last 20-30 years, thus, no agrochemicals and synthetic fertilizers were applied there. According to many scientists-farmers, these lands are ideal ones for the organic agriculture organization. It is a huge competitive advantage of our country, along with the reserves of oil, gas, forests and fresh water.

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In Russia the demand for organic products is rapidly growing, consequently, the interest of the agrarian business community in the organic production is growing as well. The normative and legal acts related to the functioning of the organic products market were developed and adopted at the level of federal and regional authorities.

The above mentioned aspects show that the development of the agro-industrial complex in the regions of Russia should take the path of the modern development introducing the system of ecological farming along with intensive technologies. This course will contribute to the development of a new brand of the agricultural products in the regions and in the entire country, it allows obtaining high-quality products with higher added value, preserving the environment and improving the quality of people's life. The need for producing ecologically safe agricultural products is clearly understood by the Russian public. The need for the development of environmentally-friendly agricultural technologies is unanimously recognized. However, a lot of problems are identified in the process of transition to resource- and energy-saving, environmentally-friendly agricultural technologies, that cannot be solved without the involvement of authorities, science and agricultural producers. It creates the essential prerequisites for the invention and implementation of tools contributing to the development of the organic market.

The main problems hindering the organic agriculture organization in the regions of Russia are as follows:

- lack of the skilled workers and experience in organic farming. Farmers do not have enough knowledge to create a correct technological chain of organic production. The Russian universities do not train specialists in organic agriculture.

- lack of government support and subsidies. After the adoption of the national standard *Organic Products. Rules of Production, Storage, Transportation* and the Federal Law *On the Production and Circulation of Organic Products* in Russia in 2016-2018 one should have expected the development and adoption of measures of the organic farms financial support. However, currently, there is no such support in Russia.

- lack of sales channels. There is no basis for the relations with the trading networks that require large and constant supply. There are no specialized shops where the environmentally-friendly, organic products are exclusively sold. Only those farmers who create the product themselves and find the market for it are successful.

- low consumer culture and level of environmental awareness of the population. The complexity also comes in the fact that the farms with the approved production technology refuse to risk for the sake of producing organic products. There is a lack of interest among the private agricultural producers due to the uncertain possibility of the profitable sale of the organic products. The vagueness of the terms with the prefix "eco-" without the clear advantages of the goods causes distrust and skepticism among the customers, which ultimately influence the interests of conscientious suppliers.

In some regions of the Russian Federation (Belgorod, Oryol, Rostov oblasts, Tatarstan, etc.), the transition to organic production began to form and the definite experience of using the organic technologies was gained. However, an effective mechanism of organizing organic agriculture has not yet been found.

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7. Conclusion

In this context it is possible to derive the main conclusions and develop some proposals for the popularization of the ecologization of the agro-industrial complex innovative development in the region:

1. Creating a training and experimental farm based on public-private partnership. This farm must do the following things:

- approbation of the organic production technologies;

- free provision of the organic production technologies to the producers of eco-products in the region;

- advisory services to the producers of agricultural products, as well as practical training of students of the regional agricultural institutions.

2. Introduction of the master's degree programme on *Management of Environmentally-Friendly Food Chains* and the Department of Organic Technologies in Agriculture for training and retraining of the specialists in the regional agrarian universities.

In 2017 in Kabardino-Balkarian Agrarian University named after V. M. Kokov on the basis of Kabardino-Balkarian Scientific Center of the Russian Academy of Sciences the specialized Department of Smart Agroecosystems was founded in order to train specialists of the following directions: management of environmentally-friendly food chains; agroecology and organic farming; organic agriculture and environmental protection; engineers in the field of agricultural robotic. The department prepared the educational and methodical courses of the following disciplines: Economic Bases of the Production of Environmentally-Friendly Crop and Livestock Products; Marketing of Organic Agricultural Production; Plant Protection in Organic Farming. In the future it is planned to prepare courses of such disciplines as: Organic Cattle Breeding; Technologies of Growing Organic Products; Technology of Organic Food Production; Biologicals and Bio-Fertilizers; International Standards and Requirements for Organic Products. If this department is financed and it employs scientists and experienced specialists of the Institute of Agriculture of the KBSC of RAS and Kabardino-Balkarian Agrarian University named after V. M. Kokov, it will be able to provide the agricultural industry with experts in the field of organic farming via coordinating research in the industry and teaching master's degree students of the program *Management of Environmentally-Friendly Food Chains.*

3. Adoption of the regional program *Ecologization of the Agro-Industrial Complex of the Region* by the regional Ministry of Agriculture, where it is necessary to provide for: subsidies and tax preferences for producers of organic products, biologicals and bio-fertilizers. It is important to create a professional organization at the ministry supervising the production of organic products with a transparent working system, later it will take charge of the work quality. The advantage will be the involvement of the public environmental organizations and scientists of this area. Briefly describing the activities of this regulatory organization, the following aspects can be mentioned. The agricultural producer will have to agree the participation in the program with the supervising organization, then submit an application and an organic production project. To receive subsidies for these purposes it will be necessary to submit a package of documents to the Ministry of Agriculture of the region, as the work is performed: a project of the organic production, a certificate of completion, approved by the established controlling organization in the regional Ministry of Agriculture.

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4. For the successful organization of organic agriculture in the region, it is necessary for each municipality to develop and adopt the agricultural development project which will contain the measures mandatory for implementation with the determined criteria and deadlines. The authors believe that the project should provide for the creation of a certain number of new farms, including organic ones, in each municipality, and for the allocation of land for this purpose.

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