

Potential of agricultural universities in the development of organic farming in Russia

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Abstract. This paper describes research on the readiness and potential contribution of agricultural universities dealing with organic farming in Russia. We have identified areas of training and academic disciplines incorporating organic farming issues and revealed the most demanded programs of further professional education in it. Best practices of scientific research in organic farming that can be conveyed in the training process have also been established. The authors have set goals in the near-term prospect for personnel training in Russian agricultural universities.

1 Introduction

Organic farmers in Russia operate in untypical natural and climatic conditions with high regional heterogeneity of soil and agro-ecological environments. Complicated inter-seasonal and seasonal weather dynamics are hard to predict. Agro-ecological quality of land, choices of variety, hybrids, breeds, and the best available agricultural technologies most suitable for the conditions of a particular farm all together determine productivity, quality, and production costs. The rapid development of agricultural technologies, high dynamics of demand and market prices, regional manifestations of global climate changes, the continuing national specificity of a considerable number of industry standards seriously complicate sustainable and cost-effective organic farming.

According to the National Organic Union [9], about 600 thousand hectares of land are certified for organic farming and 134 thousand hectares certified for organic wild crops in Russia. We rank 23rd in the world by the amount of certified land and are among the first by the growth rate of such territories. Since 2015, the annual increment in products grown to organic principles has been 8-10% per year (according to the National Organic Union).

Below there are the priority objectives for the development of organic farming and agriculture in Russia:

- increase of production efficiency;
- improvement of products' technological quality;
- expansion and optimization of production locations;
- adaptation to agrarian landscape conditions and climate changes;
- optimization and exchange of the best available agricultural technologies;
- quality certification of products and production facilities.

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Approximately 100 companies have been certified in Russia in 2021. To saturate the domestic market with organic food products, we need an annual certification of 200-300 companies over a medium-term horizon (according to the National Organic Union). We can resolve this problem only by training and retraining specialists and managers of agricultural enterprises based on organic principles.

Agricultural experts should be competent in various specialized subjects and improve their skills regularly. Adaptation of educational programs of higher and further professional education to problems of organic agriculture requires focusing on key issues of certification and labeling of organic products, special accreditation of enterprises - agricultural producers and laboratories engaged in quality control of organic products, employment of the best available agricultural technologies in organic farming for quick adjustment of the applied agricultural technologies.

This study aims to determine the readiness of educational instructions for developing human resources in the field of organic farming.

Objectives:

- to identify areas of training and academic disciplines incorporating the issues related to organic farming;
- to determine the most demanded programs of further professional education in the field of organic farming;
- to reveal the best research practices in the area of organic farming that can be applied in the training process;
- to establish priorities for the organization of higher education in the field of organic farming.

2 Materials and Methods

Methods used to examine the effect of various factors on training and scientific research in educational institutions have been described in various exogenous and endogenous models [1-8, 11, 12].

We have collected verified statistically significant information for this research from all 54 Russian universities and colleges subordinated to the Ministry of Agriculture of the Russian Federation (agrarian institutes of higher education) and agricultural institutions of the Russian Academy of Sciences (20 institutions), containing the following data:

- the number and names of core professional training curricula incorporating organic farming disciplines, pcs.
- the number and names of organic farming disciplines, pcs.
- the number of students (bachelor and master levels) majoring in educational programs incorporating organic farming disciplines, pcs.
- the number of postgraduate students carrying out research in the field of organic farming, persons.
- the number and names of additional education programs in organic farming, pcs.
- the number of students who completed their education under additional education programs in organic farming, persons.
- the number and names of research, development, and technological projects in organic farming, pcs.
- the number and names of intellectual activity outcomes in organic farming [10].

The statistical base for this research incorporates the data of the National Organic Union of Russia and the Association of Educational Institutions of Agro-Industrial Sector and Fisheries.

3 Results

Higher agricultural education in Russia is a network of 54 colleges and universities located in 8 federal districts. They have formed the Association of Educational Institutions of Agro-Industrial Sector and Fisheries since 1993. The Association's primary purpose is to strengthen cooperation between its members in terms of personnel training for the agro-industrial complex, promote scientific research, educational work, and support of young talents.

The most characteristic feature of agricultural education is its close connection to the farming industry. As of today, over 60% of agricultural university graduates are employed by farm enterprises. In addition, agricultural universities have significant scientific and pedagogical potential, including 82.6% of staff members with scientific degrees.

Training and research in agricultural universities are conducted in different areas, the key ones being as follows:

- agricultural sciences (55%);
- technical sciences (17%);
- economic sciences (7%);
- geosciences (7%).

Since 2017, agricultural universities have carried out intensive work aimed at introducing the results of advanced research in organic farming into programs of higher and additional vocational education.

In January 2020, Federal Law No. 280, "On Organic Products and Introduction of Amendments to Certain Legislative Acts of the Russian Federation," came into force. The Russian legislation defines organic farming as "a set of economic activities employing methods, techniques, and technologies to ensure favorable environmental conditions, improve human health, preserve and restore soil fertility". The objectives of the law are as follows:

- legal regulation of organic products manufacturing;
- setting the requirements for organic products manufacturing;
- regulation of compliance issues of organic products manufacturing;
- creation and maintenance of a single state register of organic product manufacturers;
- labeling of organic products;
- state support for organic products manufacturers.

Adopting the above-mentioned law has intensified the agricultural universities' work on revising the content and methods of personnel training for domestic agriculture. In the 2020/2021 academic year, more than ten areas of agricultural training cover the issues of organic farming; training includes more than 50 disciplines:

- organic farming;
- organic horticulture;
- organic vegetable production;
- organic livestock breeding;
- expert examination of organic agricultural products;
- and others.

Since 2017, Russian State Agrarian University - Moscow Timiryazev Agricultural Academy (RSAU-MTAA) and the Union of Organic Farming have developed and implemented a new unique discipline, "Organic farming".

The high demand for specialists in this area from real economy enterprises led to the admission of a group of bachelor program students by RSAU-MTAA in the 2021/2022 academic year, specializing in "Organic farming".

As of 2020, 54 agricultural universities in Russia have trained more than 15,000 graduates with competencies in organic farming.

More than 270 postgraduate students conduct applied research to promote agricultural production based on organic principles each year.

3,000 trainees - agricultural workers throughout Russia - have received advanced education and retraining in more than 90 organic farming programs, including such programs as:

- organic farming technologies: the basics of organic protection of plants from pests and diseases (Far East);
- crop rotation - the basis of organic farming in growing organic crop products (Far East);
- organic crop production technologies (Krasnoyarsk);
- development of maral farming in Krasnoyarsk region and organic maral products manufacturing (Krasnoyarsk);
- improvement of quality management system in organic agro-industrial enterprises (St. Petersburg)
- modern technologies of organic products manufacturing in agro-industrial complex (St. Petersburg)
- organization of organic farming (Yaroslavl);
- organic farming: apiculture (Yaroslavl).

Scientific research carried out by agricultural universities in the field of organic farming has a very vast reach. Thus, in the period from 2018 to 2020, agricultural universities conducted the following fundamental research:

- development of an organic farming model in the conditions of Stavropol Territory to obtain environmentally friendly crop production with preservation of soil fertility (Stavropol, Orenburg, Buryatia, Novosibirsk);
- soil monitoring and biologization of agricultural production of specific crops (Moscow, Yaroslavl, Altai);
- development of an innovative technology for the production of humic preparations from lowland peat processed by the method of physical and mechanical impact (Kazan);
- development of a technology for obtaining organic amaranth products with the subsequent deep processing (Novosibirsk);
- development and implementation of a set of technologies and technical means of crop cultivation in the system of organic farming with the use of innovative biological methods (Caucasus);

Develop a regional organic farming model aimed at boosting soil fertility, preserving agricultural lands, and obtaining environmentally friendly products (Voronezh).

A federal competence center with seven regional branches throughout the Russian Federation for scientific, technical, personnel, and methodological support of the development of agriculture, including organic farming, is now in the process of creation within the target program of the Ministry of Agriculture of the Russian Federation "Scientific and technical support for the development of agro-industrial complex" under the auspices of RSAU-MTAA.

Starting from 2020, a project has been implemented to establish an experimental organic field based on RSAU-MTAA Field Station to conduct research in the framework of world-class Scientific Center "Agrotechnologies for the future." The land has lied fallow for 17 years, making it an excellent model for an experimental organic field.

The experimental organic field will allow for:

- testing new crop cultivation technologies within the organic farming principles;
- verification of the most efficient methods of crop cultivation according to organic standards;
- students to have practice in obtaining organic production skills.

In close contact with universities, research in the field of organic farming is being conducted by specialized research centers and institutes of the Russian Academy of Sciences, as well as other agencies, including:

- development of fully automated pilot vertical farms combining the modern digital technologies and organic farming techniques;
- development of innovative biological preparations for plant protection;
- research and development in the field of global exports and imports of organic products;
- research in the field of organic seed production;
- research on the genetic potential of cultivated plants for their use in organic farming.

Domestic agricultural universities' research in organic farming includes over 200 registered patents, certificates, and breeding achievements in the field of organic farming; the attraction of more than 40 industrial partners to fund 220 scientific research programs.

4 Discussion

Intensification of highly qualified personnel training in the area of organic farming in the Russian Federation requires addressing the two priority problems.

1. Development and implementation of new educational standards for higher education in the field of organic farming in Russia.

By 2022, it is necessary to introduce five new educational standards for personnel training in organic farming:

- agronomist for organic products manufacturing;
- specialist in quality control of soils and organic farming products;
- process engineer for processing organic farming products;
- service engineer of agricultural machinery for organic farming;
- commodity expert for organic farming products.

Development of the system of target training and advanced training for specialists in organic farming requires prompt synchronization of educational programs with labor market demands, including:

- implementation of educational programs according to new academic standards and bringing the latter in line with periodically updated professional standards, which partially incorporate the demands of organic farming already;
- periodic revision of educational programs and introducing changes in accordance with the requirements of employers and new professional standards;
- initiation and preparation of proposals for partial changes in the list of training specializations in multiple directions and on various levels to meet the challenges of organic farming.

2. Accelerated improvement of talent management in the field of organic farming in Russia.

More than 25.5 thousand corporate leaders now manage agricultural enterprises in Russia. Realization of training and retraining of managers and specialists in accordance with the requirements of organic farming is the essential goal of agricultural universities and RSAU-MTAA.

It is necessary to develop and implement at least 20 programs of additional professional education for managers and specialists of agricultural enterprises by 2022, including those in the online format, and conduct advanced training and retraining of at least 5,000 managers and specialists of agricultural enterprises in accordance with organic farming standards in 2021-2022.

The priority objectives of the development of a unified system of professional development in organic farming include:

- staged and modular organization of specialization and advanced training programs;
 - thematic and functional variability of advanced training programs;
 - combining full-time and part-time modules in advanced training programs;
 - development of applied skills and competencies in the field of organic farming;
 - active use of the most advanced domestic and foreign experience;
- practical training organized in innovative industry-specific laboratories, research centers, and experimental facilities.

5 Conclusion

In conclusion, we must recognize the degree of readiness of educational organizations to personnel development in organic farming as high.

Areas of training and academic disciplines incorporating organic farming issues have been identified: over ten areas of training (Agronomy, Biotechnology, Agrochemistry, and Soil Science, Ecology and Environmental Management, Husbandry, Horticulture, Agricultural Engineering, etc.) and more than 50 academic subjects, including new ones (Organic farming, Organic horticulture, Organic vegetable production, Organic livestock breeding, Organic agricultural products expertise, Organic products certification, Storage of organic products, etc.)

We have determined the most demanded programs of further professional education in the field of organic farming, including training curricula of plant protection from pests and diseases, the principles of organic farming in growing organic crop products, improvement of quality management system in organic enterprises of agro-industrial complex, organization of organic products manufacturing in various sectors of agriculture.

The best research practices in organic farming that can be applied in the training process have been established. These are, first of all, projects devoted to verifying the most effective methods of growing crops by organic standards, innovative biological preparations for plant protection, research on the production of organic seeds, etc.

Among the priority tasks of higher education institutions in personnel training for organic farming, we can highlight the development and implementation of new educational standards of higher education in the field of organic farming in Russia. The introduction of such standards will allow students to master highly-sought competences nowadays.

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