ECONOMIC EFFICIENCY AND RESOURCE POTENTIAL OF ORGANIC PRODUCTION IN RUSSIA

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ABSTRACT

Today, the degree of development of agriculture, and in the future, the level of food security of the country, the health of the population and its quality of life are largely determined by innovative developments in the field of alternative agriculture, the preservation of natural resources and, above all, the main production facility – land. Along with this, the unfilled market capacity of organic products and the significant land potential for the development of organic farming create all the necessary prerequisites for improving the competitiveness of Russian rural manufacturers.

Keywords: Organic Agriculture, Organic Products, Land Resources, Fallow Land, Zonal Agro-Eco Cluster, Land Use Ecology, Food Security.

1. INTRODUCTION

In modern society, there is an awareness of the current environmental situation in the world. As a result, over the past two decades, the interest of agricultural manufacturers in organic or environmentally oriented land use methods, which provide a gradual natural restoration of soil fertility and help maintain the balance of natural ecosystems of territories, has noticeably increased [1; 2]. This agricultural technology of agricultural production serves as an alternative to modern industrial land use [3; 4].

As a result, the development of issues related to the prospects of environmentally friendly agricultural production and the rationale of the feasibility of involving fallow and unused agricultural land for the making of environmentally safe food becomes relevant.

2. METHODOLOGY

The theoretical and methodological basis of the study consisted of the works of domestic and foreign scientists on the problems of agricultural production of organic food; land development issues; scientific research and recommendations of the Russian Academy of Agricultural Sciences, laws of the Russian Federation, decrees of the President and resolutions of the Government of the Russian Federation, regulations of the constituent entities of the federation, the EU regulations on the development of ecological agriculture, IFOAM standards.

The source materials were annual reports of agricultural organizations, materials of the Russian Federal Register, the Russian Geographical Society, data from the Federal State Statistics Service of the Russian Federation, the Ministry of Agriculture of the Russian Federation, materials of authoring, technical and reference literature. The methodological basis was a systematic approach, which ensured comprehensiveness and purposefulness. Analytical, abstract-logical, economic-statistical, economic-mathematical, monographic and experimental research methods were also used in this research.

3. RESULTS

The generalization of foreign experience in the production and consumption of organic food suggests that the greening of agricultural production is a dynamically developing direction. The situation in the market for organic products is as follows: the leaders in consumption of organic products are the most developed countries and the leaders in producing are the developing countries [5; 6].

Despite the attractiveness of the market for organic products, its formation in Russia is not proceeding at a fast enough pace. Russia has all the prerequisites for the production of ecologically clean food: long-term agrarian traditions, labor resources of rural areas, huge (often unused) land resources, and also relatively small, in comparison with economically developed countries, use of agricultural fertilizers and chemical plant protection agents in agricultural production. Organically oriented agriculture is a closed production cycle, where a significant proportion of manual labor is used instead of chemical methods of crops treatment [7].

Russian agricultural manufacturers of environmentally friendly products need a unique segment of the food market, oriented to consumers who care about their health and ecological safety of the environment [8]. Consumers of environmentally friendly products can be children (baby and diet food); people with poor health; patients on rehabilitation; persons suffering from food allergies; people who adhere to a healthy diet, and other categories of users. The demand for organic products in Russia is satisfied only by 30% [9].
Russia has a unique natural potential; it has enormous resources for the production of environmentally friendly products. This is 20% of the world’s freshwater reserves, 9% of the arable land of the planet (115 million hectares), 58% of the world’s black earth reserves. In the world, the main volume of production of environmentally friendly crop products falls on farms and private subsidiary farms. In the Altai Region, these categories of farms account for a third of all arable land, and in the production of potatoes, vegetables and melon crops, farms and private farms account for more than 90% of the total production [10].

Arable land abandoned or unused in agricultural production for more than one year theoretically refers to fallow land, which in turn can be an important territorial reserve in the direction of greening land use and producing environmentally safe food. In the Altai Region, a significant part of arable land emerged instead of destroyed steppes during the development of virgin and fallow lands in the middle of the last century.

Undoubtedly, fallow and unused arable land should play a significant role in the transition of agricultural enterprises to environmentally oriented land use. In the Russian Federation, a vast array of data on land statistics and land records is regularly compiled. The main problem is that it is not possible to find out the real area of fallow lands on the basis of data provided by land records. Thus, in the statistical data, fallow lands are put into a separate category, but only that part of unused arable land, which is officially transferred from arable land to fallow, is included in this category of land [11].

The authors have attempted to estimate the actual area of fallow and unused lands on the basis of statistical materials, and specifically on the basis of the digital array of annually provided information on the number and structure of sown areas by regions of the Russian Federation. Thus, by comparing the total area of arable land for land registration and the sown area, it is possible to identify unplanted or unused arable land [12]. However, in order to give a realistic estimate of the total area of unused arable land, it is required to isolate the disused area from the total arable land out of crop.

As the upper limit indicator of the disused area, one can apply the prevailing indicator of the pre-reform level. By the beginning of 1990, the average arable land out of crop share in the main agricultural regions was about 13%. Taking this value as the upper limit of the technologically justified disused area, one can try to estimate the real area of unused arable land. By calculating the difference between the total area of arable land and the sown area of the corresponding year, adding to the obtained value the officially registered area of fallow land less the potentially possible disused area (+13% to the sown area of the corresponding year), one obtains the value to which the authors have applied the term "reserve of lands suitable for organic products", of which 10% of arable land is recommended to be left disused [13].

In the Russian regions, the area under crops decreased most rapidly from 1990 to 2000, followed by a three-year stabilization period, then again there was an insignificant decrease, and starting from 2007, a short increase followed, and the last years of observation saw approximately the same level [14; 15; 16; 17; 18]. In fact, since 2003, the sown area in the regions of the Russian Federation has been approximately 76.7 million hectares. The area of non-sown arable land over this period also changed little, remaining approximately at the level of 38.5 million hectares.

According to the authors’ estimates, approximately 10 million hectares of this area may be the maximum for agricultural fallow land. The calculations showed that the actual area of unused and fallow land in the regions of Russia by 2016 was almost 33 million hectares. Of these, the official fallow area is 4.4 million hectares, or about 13.3% of the actual value, and a small part is officially transferred to hayfields and pastures.

Studies show that about a quarter of the total area of arable land in the Russian Federation is not used for its intended purpose – agricultural food production. Of course, it can be assumed
that, in the first place, unproductive and inconveniently located areas of arable land left the industrial circulation, but this was not always the case. However, the analysis conducted in the context of administrative districts of the Altai Region showed that there is no clear relationship between the productivity of arable land and the degree of its use.

According to a leading agricultural scientist, academician of the Russian Academy of Agricultural Sciences V. Miloserdov, one of the measures necessary for the release of the Russian agro-industrial complex from a protracted crisis is the development of neglected agricultural lands [19]. Thus, the averaged data indicate that at present in every constituent entity of the Russian Federation approximately 28.5% of the arable land is not sown and is not used in agricultural production. However, the gap between individual regions is very significant. In five regions of Russia, 60-75% or even more arable land was fallow. Almost half (43-47%) of the main area of arable land is not used in agricultural production in the Volgograd, Tula, Krasnoyarsk and Trans-Baikal Regions. It should also be noted that, of all the regions of the Russian Federation, only in the Trans-Baikal Region and the Republic of Tyva the area of unused arable land currently exceeds the sown area. In these regions of Russia, the decrease in acreage over the past two decades shows a kind of negative anti-record – more than 90% in the Tyva Republic and about 85% in the Trans-Baikal Region.

To estimate the actual area of unused arable land, the authors have proposed a technique that allows one to estimate the reserve for increasing the area under crops from the number of unused arable and fallow lands. The presented method assumes taking into account the area disused, on the basis of scientifically based standards of agrotechnical requirements, as applied to a specific soil-climatic zone.

\[
Rs = Sp - Sy - Sk + Sz
\]

where

- \( Rs \) – reserve for increasing the area under crops,
- \( Sp \) – arable land area assigned to a business entity, administrative district, group of districts, region of Russia,
- \( Sy \) – all sown area of a business entity, administrative district, group of districts, region of Russia,
- \( Sk \) – the upper limit of the scientifically based norm of the disused area, in relation to a specific soil-climatic zone,
- \( Sz \) – fallow land area assigned to a business entity, administrative district, group of districts, region of Russia.

To assess the economic efficiency of parallel agricultural production using organic and traditional systems, the authors propose to optimize the structure of sown areas in economic and mathematical modeling, where an additional block of organic criterion constraints is introduced into the value of the objective function: reserve of lands suitable for the production of organic products, gross organic production, costs of organic production.

In the authors’ opinion, it is possible to ensure a gradual transition to the principles of organic agricultural production and increase the competitiveness of Russian agricultural makers of organic products in the organization of local agricultural, scientific and innovative formations (clusters) focused on the production, processing, storage and sale of environmental agriproducts, to which the authors propose to apply the term "zonal agro-eco cluster".

Based on general interpretations, the authors define a "zonal agro-eco cluster" as a local agrarian, environmentally oriented scientific and innovation integrated formation, which includes agricultural production, processing and marketing organizations, scientific and
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educational production facilities of regional research centers and universities, marketing and analytical, laboratory and certification, tourist and recreational, cultural and educational sectors, exhibition center, developed infrastructure of logistics and warehousing.

In contrast to traditional cluster network-centric structures, the creation of laboratory-certification, tourist-recreational, and environmental-cultural-educational sectors is justified in the project of the zonal agro-eco cluster. The expediency of carrying out an "umbrella certification" of organic products and production systems of the agro-eco cluster has been rationalized.

In zonal agro-eco clusters, all processes related to planning, scientific substantiation, production, processing, storage, sale, and certification of ecological products of the agro-industrial sector, i.e. from the inception of the business idea to its realization in the final product, are united into a single cycle. The zonal approach to the formation of agro-eco clusters is due to the significant differences in the individual territories of the regions in terms of their natural and climatic potential, soil fertility, population density, level of infrastructure development, road and transport accessibility, availability of markets for products, and the tourist and recreational potential of the area. The formation of zonal agro-eco clusters, in the authors' opinion, is of particular importance for the development of the economy of an agro-industrial region and the attraction of investment to the agro-industrial sector [20]. Moreover, public support for the creation of zonal agro-eco clusters and an awareness of their role in the strategic development of the country's agriculture will be important here.

The developed model of the zonal agro-eco cluster includes the following key sectors: production and processing, supply, transport and logistics, service, marketing, and sales, which allows building an effective chain "production – processing – sales of organic agricultural products". To ensure the vital activity of the zonal agro-eco cluster and the development of additional areas of its activity, the following are highlighted: the sector of management, coordination, finance, and personnel; innovation and research and education sector [21]. In the draft structure of the zonal agro-eco cluster, the creation of laboratory-certification, as well as tourism, recreation, and environmental cultural and educational sectors was proposed.

The formation and development of agriculture, focused on the production of organic products, based on the involvement of fallow and unused land resources in the turnover, is possible through the promotion of organic agricultural technologies, alternative farming methods and agricultural innovations through the system of agricultural information and consulting centers, organization of presentations of organic products, advertising campaigns, participation in trade fairs at the regional and national levels.

The authors believe that the activities of the zonal agro-eco clusters can have a significant positive effect on the level of economic, social and environmental development of rural administrative territorial entities of the region by enhancing the regional market of both organic and traditional agricultural products, full and ecologically balanced use of land resources, development of innovative agrarian technologies, increasing the level of employment of the rural population, activation of agro-tourism, formation of ecological infrastructure of the territory, expanding the taxable field, increasing the sustainability of agricultural organizations and innovative activity in the region.

The relatively healthy ecological position of the foothill zone of the Altai Region, its tourist and recreational, as well as land and resource potential, were the main criteria for choosing this territory in the development of the project of the zonal agro-eco cluster. In the process of scientific research, it was substantiated that the formation of agriculture, focused on the production of organic products, does not mean the abandonment of industrial agricultural production. In connection with this conclusion, the authors have developed an economic-mathematical model of the functioning of the zonal agro-eco cluster "Foothills of Altai" based...
on the parallel functioning of both the traditional industrial land use system and the ecologically oriented, or organic, system.

It seems expedient to compile three variants of an economic-mathematical model for the agro-eco cluster "Foothills of Altai". The first option provides for the optimization of the existing structure of sown areas while fully preserving the traditional system of farming. The second option is the introduction of a reserve of land suitable for the production of organic products in the amount of 50,000 hectares. The third option is the involvement into the agricultural turnover of the whole area of land reserves suitable for the production of organic products in the foothill zone of Altai Region – 87,463 hectares. In the second and third variants, it is provided to obtain organic products from the area of the reserve of lands suitable for making organic products (Table 1).

The calculations with the use of an additional block of organic criterion constraints in calculating the economic and mathematical model allow concluding that only by optimizing the structure of the sown areas of the traditional agricultural production system, an increase in the level of profitability is observed to 17.3%, while in 2013 it was at the level of 14.9%.

Table 1 Draft structure of the acreage of the agro-eco cluster "Foothills of Altai", taking into account the introduction into production of a reserve of land suitable for the production of organic products (economic-mathematical model)

<table>
<thead>
<tr>
<th>Indicators</th>
<th>1st option: optimization of the traditional system of agricultural production</th>
<th>2nd option: additional introduction of 50,000 hectares from a reserve of land suitable for the production of organic products (parallel production)</th>
<th>3rd option: additional introduction of 87,463 ha from a reserve of land suitable for the production of organic products (parallel production)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ha</td>
<td>%</td>
<td>ha</td>
</tr>
<tr>
<td>Grain</td>
<td>456,988</td>
<td>62.8</td>
<td>462,454</td>
</tr>
<tr>
<td>Engineering</td>
<td>75,671</td>
<td>10.4</td>
<td>76,925</td>
</tr>
<tr>
<td>Potatoes and vegetables</td>
<td>10,475</td>
<td>1.4</td>
<td>11,227</td>
</tr>
<tr>
<td>Feed crops</td>
<td>141,752</td>
<td>19.5</td>
<td>165,135</td>
</tr>
<tr>
<td>Disused</td>
<td>43,093</td>
<td>5.9</td>
<td>62,238</td>
</tr>
<tr>
<td>Total acreage under crops</td>
<td>727,979</td>
<td>100</td>
<td>777,979</td>
</tr>
<tr>
<td>Reserve of lands suitable for the production of organic products, ha</td>
<td>87,463</td>
<td>37,463</td>
<td>0</td>
</tr>
</tbody>
</table>

Under the second option – with the partial introduction into the agricultural turnover of the reserve of lands suitable for the production of organic products, profitability was 22.9%, and under the third option, taking into account the full involvement in the production in agricultural turnover of the reserve of lands suitable for the production of organic products, it approached 40%.

The calculation of three variants of the economic and mathematical model showed the economic efficiency of a gradual transition to agricultural production of organic products. When calculating economic and mathematical models, the authors developed and applied a method of parallel optimization of the structure of sown areas with the traditional system and the system of organic farming. The calculation of the proposed options for optimizing the
structure of sown areas, including partial and full involvement in the agricultural turnover of the reserve of land suitable for the production of organic products, suggests the viability of the proposed project of the zonal agro-eco cluster "Foothills of Altai".

4. DISCUSSION

For a systematic transition of part of agricultural organizations to the principles of organic agricultural production, successful experience in the functioning of organizations focused on the production of organic products, as well as innovative developments in the agricultural sector, which can be implemented at the regional level through a system of zonal agro-eco clusters, is necessary [22; 23; 24]. All of the above is possible with an appropriate level of coordination of participants and an effective organizational and economic mechanism of state support and stimulation of agricultural entrepreneurship activities focused on the production of organic products, which, in turn, should be considered as an important component of the domestic organic products market structure being in the stage of dynamic development [25; 26; 27; 23].

Actual deposits, or unused arable lands, where they have not been chemicalized for a long time, are an important strategic reserve of agriculture in the Altai Region for the production of environmentally friendly and safe food. With a competent marketing strategy that focuses consumers on the ecological purity of the Altai nature, the products of Altai manufacturers will be in demand outside the region. The economic efficiency of the greening of land use is due to higher prices for the sale of certified environmentally friendly (organic) products, compared with products manufactured via traditional technologies [28; 29]. The gradual involvement of fallow lands in agricultural turnover will create a positive multiplicative effect in the farming, processing and marketing branches of the agro-industrial sector [30]. Thus, the unemployment rate in the region will be partially reduced, many agricultural manufacturers of the region will be able to find their niche in the market for organic food, and consumers will be able to get food that is safe for health.

It is advisable to consider the direction of ecologization of land use as an integral part of the system of sustainable agricultural development and environmental protection. Organic (environmentally friendly) agricultural products are those, the technological chain of making which, starting with the preparation of raw materials and ending with the last technological operation, must meet environmental requirements, which are reflected in environmental standards [31]. Therefore, for the successful development of markets for organic products, a system of national certification of environmentally friendly (safe) food, harmonized with international standards, must be created.

In the authors’ opinion, it is necessary to develop and introduce a mechanism of state support for domestic agricultural manufacturers of organic food. Indirect support can be provided in the form of assistance in passing the certification of organic products, conducting laboratory studies, providing information and consulting services, financing scientific research, insurance, carrying out measures to restore and improve soil fertility, environmental protection [32-39]. According to the WTO requirements, the scope of this support is unlimited.

5. CONCLUSION

The authors believe that an important task of modern agrarian economic science is a comprehensive substantiation of the formation of the process of development of an agricultural economy of a new type – more highly efficient and environmentally oriented, serving as an important part of the national economy. In the authors’ opinion, the integrated development of organizational and economic principles of the gradual involvement of unused and fallow arable land in agricultural circulation in the direction of the ecological and economic sustainability of
land use will increase the country's domestic food security, as well as open access to foreign organic food markets for domestic agricultural manufacturers. The concentration of land, material, financial, labor resources in the direction of agricultural development, focused on the production of organic products, not only opens up the possibility of increasing the production of domestic organic products but also reduces the dependence on imports, and will also contribute to improving the quality and environmental safety of products, development of the diversification processes in agriculture and related branches of rural areas.

REFERENCES


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