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CLIMATE FACTORS OF COMPETITIVENESS OF THE RUSSIAN AGRI-FOOD COMPLEX

Sergey ANDRYUSHCHENKO

Institute of Agrarian Problems of the Russian Academy of Sciences, 94, Moskovskaya St., 410012, Saratov, Russia, Phone: +78452263179, Fax:+78452264768, Mobile:+79873093797, Email: andrapk@yandex.ru

Corresponding author: andrapk@yandex.ru

Abstract

After the signing of the 2015 Paris Climate Agreement, the documenting decline in the carbon balance will play an increasingly important role in strengthening the competitiveness of products in the global market. In early 2021, the Russian Federation clarified the methodology for accounting for the deposition of greenhouse gases by natural ecosystems, which takes into account forests on agricultural land as part of "managed forests", which allows agricultural producers to demonstrate their contribution to reducing greenhouse gas emissions. A significant reduction in the area of agricultural crops in Russia at the beginning of the XXI century opens up the possibility of expanding the area of "managed" forests on agricultural land. In the Russian Federation, the accounting of emissions into the atmosphere of combustion products, including carbon dioxide, has been conducted for several decades. In modern conditions, it is worth studying the experience of monitoring forests planted in the late twentieth and early twenty-first centuries in Russia as part of the implementation of the Kyoto Protocol in order to sell carbon sequestration quotas. The implementation of the RUSAFOR – SAP project has shown the feasibility of using unused agricultural land for afforestation using technologies that provide the maximum increase in carbon dioxide deposition. This experience can be used to finance carbon-dependent forest plantations to confirm the commitment of food producers to zero carbon emissions. To implement the identified opportunities, it is necessary to take a set of organizational measures, including combining the results of monitoring the state of agricultural land and the impact of agricultural production on the environment in a single information system.

Key words**:** *carbon tax, agriculture, forest, mitigation, monitoring, agrolandscape*

INTRODUCTION

In the present conditions of the first quarter of the XXI century, producers and consumers of food products pay increased attention to reducing the negative impact on the environment, including climate change. Such attention is manifested in the desire to achieve a zero balance of greenhouse gas emissions, primarily carbon dioxide, in the production of their products. Documentary evidence of a reduction in the carbon balance is also important for improving the competitiveness of products on the world market. In early 2021 in the Russian Federation, the methodology for accounting for the deposition of greenhouse gases by natural ecosystems has been clarified, which takes into account forests on agricultural land as part of "managed forests" [12], which allows agricultural producers to demonstrate their contribution to reducing greenhouse gas emissions.

The possibility of expanding the area of "managed" forests on agricultural land in Russia is associated with the reorientation of agricultural producers to intensify production, which led to a significant reduction in the area of agricultural crops (Figure 1). In 2019, the area of crops decreased by 36% compared to 1980, including grain crops decreased by 38%, but sunflower crops - the most profitable crop, increased by 3.6 times. Uncultivated land is often overgrown with random forest-shrub vegetation, in many cases such land is transferred to the forest fund lands. Only in 2008, agricultural companies, by decision of federal, regional and municipal authorities, transferred 647.8 thousand hectares from agricultural land to forest land, including 447 thousand hectares in the Nenets Autonomous District, located in the Arctic zone [8, p. 21].

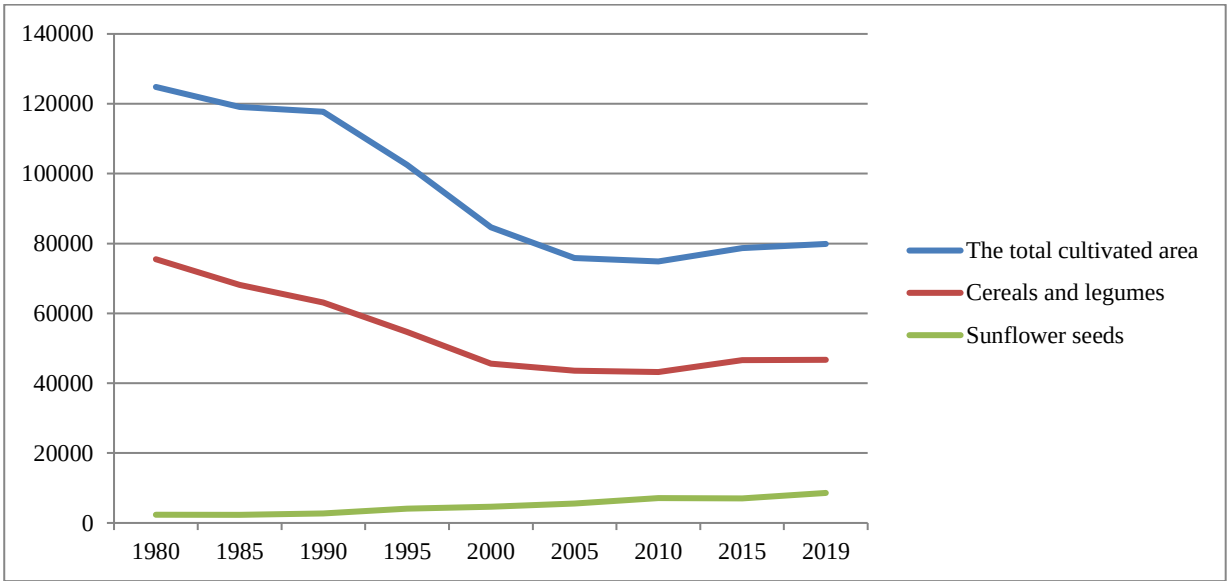

Fig.1. Dynamics of the area of agricultural crops, including cereals and sunflowers in Russia in 1980-2019
Source: [15].

The intensification of agricultural production has led to an increase in food production in Russia and to the expansion of its export opportunities [5]. In this regard, the Russian Federation faces the urgent task of overcoming future barriers to exports and deploying a domestic carbon monitoring system. It is necessary to combine the existing subsystems for collecting information on the state of environmental components, sources and depositors of greenhouse gases, and the best available technologies that help reduce their negative impact on the Earth's atmosphere. It is also necessary to create a subsystem for calculating "nationally determined contributions" to reducing carbon dioxide emissions in accordance with the Paris Climate Agreement of December 12, 2015 [18], adopted by the Government of the Russian Federation on September 21, 2019 [17].

The most important scientists of the country, such as A. M. Sergeev and V. A. Sadovnichy, point out the need to counteract a possible threat [11]. The seriousness of the European Union's intentions to increase the production of "green products" and, accordingly, to use economic instruments to protect its market from imported products that are not certified according to European "green" standards is confirmed by the EU Council's Recovery and Resilience Facility (RRF). The RRF was approved in February 2021 and provides for the use of €672.5 billion to help the 27 EU member states overcome the consequences of the COVID-19 pandemic, while simultaneously transforming the economy and society in a green and digital way. These funds will be allocated for the implementation of programs of the EU member states, provided that at least 37% of the costs are used for environmental transformation [20]. Most likely, compliance with this requirement will lead to an increase in the cost of food produced in the EU, and protective measures against imports will be required.

Calculations carried out by Russian scientists show that the application of an import duty in the form of a "carbon tax" to exported Russian products will lead to significant financial losses and slow down the renewal of production assets [3], while competing countries will have the opportunity to discriminate against Russian goods [14]. Carbon monitoring should provide reliable accounting of carbon dioxide emissions and uptake, and the Federal Scientific and Technical Program for Environmental Development of the Russian Federation and Climate Change for 2021-2030 is being developed in Russia to create it [4]. The aim of the study is to identify opportunities to improve the competitiveness of the Russian agri-food complex by implementing a targeted policy in the field of climate protection using the Russian experience gained in the creation

of carbon-depositing forests on agricultural land in the framework of the Kyoto Protocol.

MATERIALS AND METHODS

Accounting for emissions of combustion products, including carbon dioxide, into the atmosphere has been conducted for several decades in the Russian Federation. The tasks, structure and methodology of monitoring anthropogenic changes in the natural environment in Russia were formulated in 1974 [9]. This information was mainly used to calculate the amount of payments for emissions, which were used as an economic tool to stimulate the improvement of atmospheric air quality. The tasks of monitoring carbon dioxide emissions were radically expanded in 1997. After the Kyoto Protocol to the United Nations Framework Convention on Climate Change (adopted in 1992) was signed by most countries of the world. The Kyoto Protocol entered into force in 2005, this document provides for monitoring compliance with restrictions on greenhouse gas emissions and, in addition to monitoring emissions, monitoring commercial forest plantings that absorb carbon dioxide in the process of their growth. The volume of carbon dioxide uptake by such forests is considered as a commercial product that can be sold to industrial enterprises as quotas for additional emissions [2, p.389]. The potential possibility of obtaining financing for planting forests has aroused great interest among the owners of agricultural land in Russia. Forest plantations on agricultural land are carried out for various purposes: to protect arable land from dry winds, to combat soil erosion and the formation of ravines, to protect reservoirs, to create recreational zones near settlements, etc. The ability to sell quotas for deposited carbon allowed for additional investment to be raised to recover the cost of creating planted forests.

Under the current conditions of the Paris Agreement, the experience of monitoring forests planted in Russia in the late twentieth and early twenty-first centuries in order to sell carbon sequestration quotas can be used to finance carbon-depleting forest stands and confirm the desire of food producers to zero carbon emissions. In 2008-2012, it was planned to land 25 thousand hectares of carbon-deposing plants (Kyoto forests) in the European part of Russia, including 3 thousand hectares in the Saratov region [10], where a significant part of the new forests were planted on the land of agricultural enterprises that had gone out of circulation.

The creation of Kyoto forests was preceded by experiments on Joint implementation projects for the creation of carbon-intensive forests; one of the first was the Russian-American project "RUSAFOR-SAP" in the Saratov region. The aim of the project was to assess the biological and organizational possibilities of creating carbon-absorbing forests in the regions of Russia, as well as to assess the institutional and economic possibilities of managing such forests in Russia as elements of the CO_2 stocks system. The RUSAFOR-SAP project can be considered as a model for the formation of carbon units by forests on agricultural land, a total of 400 hectares of forest were planted on two plots. In the course of the project, approaches were developed to organize the interaction of stakeholders, methods for assessing the amount of carbon dioxide deposited by various tree species, assessing the expected results of planted forests, not only economic from the future sale of carbon units, but also water protection, recreational and others. As shown by economic calculations of the cost recovery for planting new forests and caring for them, taking into account the payback period of investments in different districts of the Saratov region, on the right bank of the Volga, where there is relatively sufficient precipitation, investments in new forest planting could be paid off by selling quotas for deposited carbon. In left-bank areas with arid climates, financial support from the federal or regional budgets is needed [21]. In general, the implementation of the RUSAFOR – SAP project has shown the feasibility of using unused agricultural land for afforestation using technologies that provide the maximum increase in carbon dioxide deposition.

The need to take into account the different carbon intensity of different tree species when planning protective forest plantations in agricultural landscapes is demonstrated by the results of studying the processes of accumulation of phytomass and carbon in the state protective forest strip in the steppe zone on the territory of the Stavropol Krai. These spaces more than 50 years survived in the steppe conditions, has approached or reached a ripe age, as shown by measurements taken by scientists of the Novocherkassk engineering and land reclamation Institute and the Don state agrarian University, the values of specific volume figure is the accumulated carbon per 1 ha of area different for different combinations of planted forest species is 2.4 times: from 80 to 195 t/ha. Thus, the specific costs of depositing 1t of CO_2 in protective forest plantings may differ several times, which makes it necessary to take into account the depositing capacity of different variants of the planned protective forest plantings [16].

Also, when assessing the effectiveness of planted forests, it is necessary to take into account the risks of partial or complete destruction of trees. The causes of death or damage to forest stands in the steppe zone can be the depressing effects of weeds in the first years of growth, drought, exposure to wild and domestic animals, diseases, insect damage. Steppe fires are particularly dangerous, and the probability of fires should be taken into account when choosing tree species. To counteract the existing threats, it is necessary to systematically implement measures for the care of forest stands, including annual plowing to protect against fire.

RESULTS AND DISCUSSIONS

Russia's agriculture sector has a whole range of opportunities to participate more actively in solving the problems of increasing carbon deposition in order to reduce the impact of the entire country's economy on climate change. As a rule, measures aimed at reducing greenhouse gas emissions simultaneously allow us to solve other environmental problems: to prevent soil degradation, to reduce the flushing of pollutants into water bodies. Comprehensive environmental protection measures contribute to a significant improvement in the quality of drinking water, create the possibility of organizing the production of organic and other "green" food products. To realize these opportunities, a set of organizational measures must be taken.

First of all, it is necessary to expand the tasks of federal and regional information and analytical systems on agricultural land in order to facilitate the collection of information on the emission and absorption of greenhouse gases, to identify areas of land where agroforestry measures are required, including the planting of forest stands, as well as to identify land masses suitable for the organization of the production of organic products or products with improved characteristics [1]. The Unified Federal Information System on Agricultural Land and Land Used or Provided for Farming as Part of Other Categories of Land (EFIS ZSN) has been functioning in the system of the Ministry of Agriculture of the Russian Federation (Ministry of Agriculture of the Russian Federation) since 2018, and more than 20 regional information systems containing information on the state and use of agricultural land are also functioning.

Noteworthy is the experience of the agro-industrial segment of the regional geoinformation system of the Moscow region, which contains data on agricultural land, including the contours of agricultural fields and their characteristics, on particularly valuable productive agricultural land, information on reclaimed land, unused land and their involvement in agricultural turnover. Based on the results of the work performed in 2018 and earlier, the data on the boundaries of 1.26 million hectares of agricultural land that are subject to mandatory use in crop production were clarified. In addition, contours were identified, including isolated coastal strips, which, as a rule, are planted with forest plantations in order to prevent soil flushing [8, p.258, 169]. FAO and UNECE studies indicate a direct relationship between water quality in reservoirs and the presence of forested coastal strips [7].

Another area of effective use of planted forests in agriculture is the transformation of degraded and unproductive arable land into pastures based on the principles of adaptive forest reclamation. Long-term research by scientists of the Federal Scientific Center for Agroforestry of the Russian Academy of Sciences allowed them to establish measures for the formation of adaptive agrolandscapes (forest pastures), where forest protective strips occupy up to 10% of the land. The risk of implementing agricultural landscape transformation projects is associated with the need for investments in the amount of several thousand rubles per 1 ha of land with the withdrawal of land from circulation for at least 4 years to ensure the safety of plantings [19]. At the same time, investments in forest pastures will increase the production of beef and lamb, which are in short supply in Russia. The ability to declare the amount of carbon deposited by new forests can serve as an incentive for investors, but state support will definitely be required, especially at the stage of developing science-based projects for the transformation of agricultural landscapes.

Government support measures can motivate investors to invest in the transformation of agricultural landscapes across the country, especially when choosing land areas are sufficient for the organization of commercial production of organic and other types of "green" food products, such as products with improved characteristics. For the preparation of such projects, it is necessary to unify information systems that ensure the storage and processing of monitoring results carried out by various departments, and to coordinate departmental projects in order to ensure a favorable state of the rural environment and preserve the competitive advantages of Russian food products. Accordingly, projects aimed at preserving soil fertility and reducing the negative impact on the environment should be carried out within the framework of integrated environmental projects (IEP) of the state programs for the development of agriculture and rural areas.

Performance indicator IEP can serve as an integral indicator of growth in the number of rural districts, which meet the requirements of an "favorable state of the environment" or "satisfactory state of the environment". The criteria for assessing the environmental friendliness of each rural district can be indicators of the state of soils, reservoirs, and atmospheric air in accordance with the standards of maximum permissible concentrations of harmful substances (MPC), requirements for reclaimed land and protected areas, as well as indicators of compliance with environmental requirements by agricultural producers [13]. Some of the requirements for farmers contained in the “statutory management requirements” (SMR) and the “good agricultural and environmental conditions” (GAEC), applied within the framework of the Common Agricultural Policy of the European Union, can also be used [6].

Information for the calculation of the integral performance indicator of the IEP should be generated automatically based on the data of the Unified Information System on Agricultural Land (EFIS ZSN), which will free potential investors from collecting additional documents when receiving state support or loans. Rural districts that meet the requirements of the "favorable state of the environment" can be recommended to investors for the development of organic production. A satisfactory assessment can serve as a basis for organizing the production of products with a geographically defined place of production. The ability to inform potential consumers about the degree of environmental well-being of production sites creates additional competitive advantages for the export of Russian products, organic and with a specific place of production.

CONCLUSIONS

One of the most important conditions for improving the competitiveness of the production potential of the country's agri-food complex is to increase the number of measures to transform agricultural landscapes in order to preserve soil fertility, reduce the negative impact of agricultural production on water resources; also, Russian agriculture has a whole set of opportunities for more active

participation in solving the problems of increasing carbon deposition in order to reduce the impact on climate change. Many conservation measures involve increasing the area of forests on agricultural land.

To fulfill this condition, we consider it necessary:

- to combine in a single information system the results of monitoring the state of agricultural land and the impact of agricultural production on the environment, conducted by various government departments, in order to coordinate departmental projects to ensure a favorable state of the environment in rural areas;
- to continue work on the establishment by the Agency for Water Resources of Russia and the subjects of the Russian Federation of the boundaries of water protection zones and coastal protective strips for water bodies in order to prevent the flushing of soils into reservoirs;
- to use the integrated indicator of the effectiveness of integrated environmental projects to evaluate projects aimed at preserving soil fertility and reducing the negative impact on the environment within the framework of the unified state program for the development of agriculture.

The practical application of the proposed approach to identifying opportunities for increasing the participation of agricultural enterprises in mitigating the negative impact of the economy on the climate is to modify the practice of planting carbon-depositing forests on unused agricultural land in accordance with the Kyoto Protocol, in the transition to integrated projects for the transformation of agricultural landscapes.

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