Economy of vegetable growing of the Russian Federation in modern conditions

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Abstract. The financial and economic crisis of the last four or five years and the economic sanctions imposed on our country have had a positive impact on the development of national vegetable production, in particular, and agricultural production in general. There is a slight increase and stabilization of the gross harvest of vegetables. Greenhouse vegetable growing is developing dynamically. The area under winter greenhouses is growing by 10-15% every year, and the gross harvest of vegetables in protected soil exceeded a billion tons last year. The level of import of vegetables has sharply decreased, to 1 billion dollars, and exports of products have grown by two or three times. Unfortunately, the weak point in the industry is still seed production; the dependence on seed imports is high – up to 25%. Import substitution for seeds is slower than for vegetable products. At the same time, there is both scientific and production potential for successful national seed production. The plan has been developed to improve the situation by 2025.

1. Introduction

In recent years, due to the rise in the standard of living of the population and the growth of scientific knowledge, the attitude and demand for food among people has been changing. More and more often, the medicinal value and dietary properties of food are declared, and in this context, vegetables are given a dominant position. Let us say more - the level of consumption of vegetables by the population has become an indirect indicator of the well-being of society, and in international practice, the degree of development of states or regions is often measured by this indicator.

The aim of the research is to analyze the economy of vegetable growing of the Russian Federation in modern conditions.

2. Materials and methods

In the process of work, the methods used in economic science are used: general scientific (dialectical, analysis and synthesis, comparison and analogy, tabular, graphic); special (system, comparative analysis, statistical-economic, economic-mathematical). The information base of the study was official state statistics; normative legal acts of Federal and regional levels; data from the Ministry of Agriculture of the Russian Federation; reference materials of specialized publications on the subject under study; materials received from participants in the market of protected soil vegetables, their own research; Internet data (industry portals, websites of producers of protected soil products, articles and reviews).
3. Results
In the Russian Federation, the level of vegetable production has stabilized recently and is slightly more than 16 million tons [1, 2] (table 1).

**Table 1.** Indicators of turnover of vegetable products in the Russian Federation, thousand tons.

| Indicators                  | 2011  | 2012  | 2013  | 2014  | 2015  | 2016  | 2017  | 2018  |
|-----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Production                  | 16271 | 16079 | 16109 | 15500 | 16110 | 16300 | 16332 | 16458 |
| including in protected soil | 532   | 545   | 615   | 691   | 710   | 814   | 946   | 1100  |
| Import                      | 3155  | 2806  | 2817  | 2548  | 2607  | 1724  | 2391  | 2433  |
| Export                      | 860   | 890   | 658   | 640   | 1196  | 1331  | 1563  | 1685  |

Although Russia is one of the top ten vegetable producing countries, it is still a little short of products for consumption by the population according to medical standards. With population of 146.3 million people [3], it turns out that for each person about 110 kg of products is produced, at a rate of 120 to 140 kg per year, according to various estimates [4]. The lack of manufactured products is covered by imports, the level of which has decreased slightly over the past 2-3 years.

Greenhouse vegetable growing is actively developing. The area under winter greenhouses is growing rapidly. Last year, 300 hectares of winter greenhouses were built and put into operation. The total area of protected soil in the country has reached about 2.5 thousand hectares, which is 10% more than in 2017 [5]. The level of self-sufficiency for cucumbers of protected soil, as a whole, reaches 90%, for tomatoes the indicators are still lower, at the level of 60%. According to the Association “Greenhouses of Russia”, by 2020, the area of greenhouses in Russia will be 3.2 thousand hectares, which will produce at least 1.5 million tons of vegetables. And the supply of greenhouse products to the population of the country based on a scientifically based rate — 14 kg/person. It will be about 75% per year [6].

The economic sanctions imposed on our country were a powerful impetus for the development of the national economy, including agricultural production. The day before, the State Program for the Development of Agriculture for 2013-2020 was adopted, for the implementation of which 2,482 billion rubles were allocated from the Federal budget (in current prices). The industry is actively subsidized [7].

The taken measures are fully justified, and their positive impact has been already observed in various sectors of agricultural production [8]. In the vegetable industry in recent years, there has been a drop in the level of imports of products, both in value – by more than 1 billion dollars, and in their weight – by more than 700,000 tons (Fig. 1). In parallel, the volume of exports of vegetable products is growing – by more than 250 million dollars over five years [9].

![Figure 1. Dynamics of import and export of vegetable products in Russia in 2013-2018.](image-url)
A huge share in imports, almost half, is occupied by tomatoes, and together with sweet peppers they occupy 2/3 of the entire import market (Fig. 2). This can be explained by the thermophilic nature of these cultures [10]. At the same time, we import a significant amount of carrots, cabbage and onions. In the case of cabbage, if it is an early harvest, and carrots and cabbage are imported all year round, which is economically impractical. We hope that the measures taken in recent years on import substitution should give a positive result. The Russian Federation has huge natural resources. With proper management of zonal vegetable growing, it is possible to expand significantly the calendar of receiving of national vegetable products.

The structure of vegetable exports is also poorly balanced (Fig. 3). More than 80% of all supplied products are dried bean vegetables [5]. At the same time, our country with moderate climate in most of its regions can grow cabbage, root vegetables, potatoes for delivery to the southern neighboring states. As you can see, the resources for the development of the industry are huge.

![Figure 2. Structure of imports of vegetable products in the Russian Federation for 2016-2018.](image)

Vegetable growing is a specific branch of agriculture, where it is almost impossible to mechanize fully the production cycle. The share of manual labor in production is still high. At the same time, manual labor becomes more expensive and unacceptable every year. On the other hand, vegetable products are mostly perishable, which does not contribute to a high concentration of production. These circumstances ultimately determine the structure of production: 70% of all vegetable production in the country is produced in private farms. Suburban vegetable growing was widely developed around capitals and large cities. Fresh products were delivered from the fields directly to the retail trade, bypassing distribution points and bases. The revival of everything rational that was in the industry is an urgent need. Therefore, there are reserves for optimizing the production structure [11].

Labor costs of production are also associated with seedling technology for the production of many types of vegetable crops, which is inevitable for northern latitudes and the middle zone. In the southern regions, where industrial vegetable growing is concentrated, more people are switching to the technology of direct seeding of vegetable crops seedlings into the ground. This is also facilitated by the production of modern types of machinery and equipment. The economic effect of the reception is obvious; there is a huge saving of energy and labor costs associated with growing seedlings, maintaining greenhouses. On the other hand, there is a growing demand for the quality of seed material. For direct seeding into the ground, biologically and physically uniform seeds must be used.
Seed production is the most important and problematic sector in vegetable production. Complexity and problems are also related to the specifics of the industry. Vegetables have a large variety of species; each type has a different amount of demand. The network of specialized seed farms has been destroyed, which complicates the competent organization of work. Seed production of two-year vegetable crops is associated with high material and labor costs, the maintenance of storage facilities for brooders. Most low-spread and green crops have a long period of fruiting, their seed production is carried out in the southern regions, and because of the small volume of harvesting, it is difficult to mechanize the production process and ensure a competitive price. In this situation, foreign seed producers are active.

On July 24, 2019, the Federation Council of the Federal Assembly of the Russian Federation held parliamentary hearings on ensuring the accelerated development of domestic seed production and selection. According to the first Vice-speaker of the SF Nikolay Fedorov, despite the efforts made, it was not possible to overcome the stable technological dependence of domestic farmers on foreign breeding achievements. The share of seeds of foreign selection is 97% for sugar beet, 73% for vegetable crops, 61% for sunflower, 55% for potatoes, and 49% for corn [12].

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To provide scientific support for vegetable growing, FSBSI “Federal Scientific Center for Vegetable Growing was established in 2017 by combining two All-Russian institutes (AURIVBSP and ARRIVG) and seven vegetable experimental stations located throughout the country [14]. The center with its branches has established both primary seed production of author’s varieties and commercial vegetable seed production. A modern seed cleaning complex with a capacity of 300 tons/year was built and put into operation [15]. There are reserves for both increasing production volumes and expanding the range of seeds produced.

Figure 3. Structure of exports of vegetable products in the Russian Federation in 2016-2018.
4. Summary
The Ministry of Agriculture of the Russian Federation, with the active participation of the “Federal Scientific Center for Vegetable Growing” and a number of other specialized research institutions, developed and adopted a Comprehensive research plan (CRP) on the topic: “Development of vegetable breeding and seed production in the Russian Federation”. The most important expected results of implementation of the Comprehensive plan are ensuring the needs of the domestic market in seeds and planting material of vegetable and melon crops by 2025 at the level of 40-50 and 60-70%, respectively, in commercial horticulture and personal households, bringing the volumes of production of the above crops to 70% of the consumption level of the population of Russia, while reducing to a minimum the dependence of domestic vegetable production from import of seeds [16]. By 2025, we should achieve the production of more than 20 thousand tons of seeds of vegetable crops of domestic varieties and hybrids. Today, we can say that the task is ambitious, but it is quite feasible due to the availability of material and scientific basis for its implementation [17].

In general, in the Russian Federation, vegetable growing of both open and protected soil is developing dynamically.

5. References
[1] Chekmarev P A 2018 Development of the market of vegetables and fruits in Russia in modern conditions (In the book. Food independence of Russia. Under of the ed. of A.N. Tkachev) 2 353-363
[2] Razin A F, Shatilov M V, Razin O A 2018 Vegetable growing in the gross product of Russia (Russian agricultural Economy) 5 60-64
[3] Electronic resource: http://ru-stat.com/ access date 07.04.2020
[4] Greshonkov A M, Merkulova E Yu 2014 Analysis of consumption of basic food products by regions of the Russian Federation (Socio-economic phenomena and processes) 9 11 54-62
[5] Electronic resource: https://mcx.ru/ access date 09.04.2020
[6] Electronic resource: https://www.agroinvestor.ru/ access date 10.04.2020
[7] Ushachev I G 2015 Russia’s agricultural sector under international sanctions and embargoes: challenges and prospects (Agribusiness:Economy, management) 5 9-23
[8] Soldatenko A V, Razin A F, Pivovarov V F, Shatilov M V, Razin O A, Rossinskaya O V, Bashkirov O V 2019 Problems of production of competitive vegetable products (Vegetables of Russia) 145 3-7
[9] Soldatenko A V, Razin A F, Pivovarov V F, Shatilov M V, Ivanova M I, Rossinskaya O V, Razin O A 2019 Vegetables in the food security system of Russia (Vegetables of Russia) 2 (46) 9-15
[10] Electronic resource: https://agrovesti.net/ access date 10.04.2020
[11] Rodionova L A, Kopnova E D 2017 Statistical analysis of the characteristics of rational nutrition of the Russian population (Questions of statistics) 7 28-40
[12] Electronic resource: http://council.gov.ru/ access date 09.04.2020
[13] Ushachev I G, Maslova V V, Chekalin V S 2019 Import substitution and ensuring food security of Russia (Vegetables of Russia) 2 3-8
[14] Pivovarov V F, Soldatenko A V, Musaev F B 2018 Modern rates of development of vegetable growing in the Russian Federation (Proceedings of the Kuban State Agrarian University) 72 293-298
[15] Sirota S M, Kozar E G, Nikolaev Yu N 2017 State of seed production of vegetable and berry crops in the Russian Federation and food security of the country (Vegetables of Russia) 2 7-13
[16] Electronic resource: http://www.vniiossk.ru/ access date 10.04.2020
[17] Pivovarov V F, Soldatenko A V, Pyshnaya O N, Gurkina L K 2018 Federal Scientific Center of Vegetable Growing as an integral part of the scientific support of the industry (Vegetables of Russia) 3 3-10