Analysis of the current positions of pea crop in the Russian market

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Abstract. The paper considers the current situation in the Russian Federation of such a crop as peas. Data on the area of crop cultivation is presented not only in the world, but also in the context of Federal districts and regions. In the world, the main producers of peas are countries such as Canada, Russia, China and India. In the Russian Federation, the main areas under crop are located in the Volga, Siberian, Southern and Central Federal districts. They are also leaders in the gross harvest of pea grains. It also shows data on the yield of peas sown in the leading regions of Russia for several years, which allows assessing more accurately the value of this indicator. So the highest yield of peas is obtained in the Oryol and Kursk regions, as well as in the Krasnodar territory. The dynamics of inclusion of pea breeds in the State register of breeding achievements allowed for use is analyzed. As before, national breeds prevail over foreign ones in terms of the total number in the register, but producers prefer Western European varieties to a greater extent. Due to its self-sufficiency in peas, Russia is an exporter to countries such as Spain, India, Turkey, Italy, etc. The reasons for the low competitiveness of national breeds are indicated.

1. Introduction

Peas – one of the oldest plants, its seeds were found in caves, the age of which was about 3 million years. The center of origin of the crop is considered to be South-West Asian [1]. In the European part of Russia, it was cultivated already in the VI-VIII centuries. Pea plants also served as an excellent object for a number of scientific discoveries. So the founder of genetics Gregor Mendel chose peas as a genetic object and was not mistaken, creating a work on hybridization and analysis of inheritance of traits [2]. Peas also played an important role for another genetic discovery; C. Hammerlund first found translocation [3].

In the modern world, peas (Pisum sativum L.) are a crop that includes three main areas of use. First of all, as a food product, pea seeds contain up to 32% protein; 1.5% fat; 40% starch and 7.7% fiber; and also contain vitamins A, B1, B2, C and some enzymes [4]. At the same time, the protein composition of amino acids is at the level of milk and meat protein, it is balanced and complete, so it is necessary for human and animal nutrition [5]. As a forage crop – as concentrate, compound feed, green feed, silage, hay, haylage, monofeed and grass flour for animals. Its use reduces feed consumption for livestock production by 22-25%, and pea straw contains up to 6-8% protein and up to 34% nitrogen-free substances, which would allow it to be successfully used for feed [6]. Peas are also
a medium – forming crop: after its cultivation, up to 150 kg/ha of biologically bound nitrogen remains
in the soil [7]. They are a good precursor and can be used as a fallow crop [8; 9; 10].

2. Methods
The paper uses a set of methods of economic research, general scientific methods of cognition, and modern methods of data analysis. Statistical data of Rosstat and international databases, scientific works of Russian scientists on the subject under study, materials of ministries and departments, and periodical literature served as the information base.

3. Results
Peas are cultivated in various soil and climatic conditions. Thus, the main acreage under the crop is concentrated in such countries as Canada, Russia, China, and India and in 2018 (of all crops in the world) accounted for 18.2%, 17.7%, 12.7%, and 12.6%, respectively (figure 1). Moreover, in Canada and China, over the past eighteen years, there has been a decrease in the acreage of peas, while in Russia, on the contrary, there has been a significant increase.

Figure 1. The dynamics of the acreage of peas in the world.

According to statistics, peas in our country are cultivated in all Federal districts and the area sown over the past four years has averaged 1,339.6 thousand hectares. However, the main production is concentrated in the Volga (320.5 thousand ha), Siberian (289.2 thousand ha), Southern (222.7 thousand ha) and Central (228.4 thousand ha) Federal districts (table 1).

Table 1. Dynamics of pea acreage in Russia by Federal district, thousand hectares (calculated by the authors on the basis of Rosstat data [11; 12; 13]).

| Federal district     | 2017  | 2018  | 2019  | 2020  | average |
|----------------------|-------|-------|-------|-------|---------|
| Central              | 269.1 | 248.7 | 205.4 | 190.4 | 228.4   |
| North-Western        | 5.7   | 3.5   | 4.6   | 3.7   | 4.4     |
| Southern             | 200.2 | 270.1 | 208.1 | 212.3 | 222.7   |
| North Caucasus       | 178.2 | 221.9 | 195.8 | 170.3 | 191.6   |
| Volga                | 303.7 | 340.6 | 320.1 | 317.6 | 320.5   |
Among the regions, the main leaders in 2020 in terms of acreage occupied by peas are the Stavropol territory - it owns 12.5% of the total area in the Russian Federation (figure 2). Then we can note the Rostov region (7.8%), the Altai territory (7.6%) and the Omsk region (7.1%). Next in the top ten are the Krasnodar territory (5.7%), the Novosibirsk region (5.5%), the Republic of Tatarstan (4.5%) and the Republic of Bashkortostan (4.4%). The Tambov region (3.0%) and the Republic of Mordovia (3.0%), which increased the area occupied under peas by 1.7 times compared to 2019, finish the rating. Also, almost all of these regions have high gross harvest of pea grains. However, this is primarily due to the large area of crop cultivation, but not to its yield. But it is this indicator that can be used to judge the ability of zoned pea breeds to realize their potential.

The analysis of annual indicators for several years makes it possible to exclude largely the influence of natural and climatic factors in the assessment of pea yield in the Russian Federation. Thus, the highest crop yield on average for three years was observed in the Orel region – 29.3 C/ha, Krasnodar territory – 29.1 C/ha and Kursk region – 28.9 C/ha (table 2). Moreover, only the Republic of Mordovia with an indicator of 24.4 C/ha was included in the rating for yield from the leading regions in terms of acreage.

**Table 2.** Top of regions-leaders in pea yield for 2017-2019, C/ha (calculated by the authors on the basis of Rosstat data [14; 15]).

| Region                | 2017     | 2018     | 2019     | Average value |
|-----------------------|----------|----------|----------|---------------|
| Orel region           | 30.4     | 30.8     | 26.6     | 29.3          |
| Krasnodar territory   | 38.8     | 21.1     | 27.5     | 29.1          |
| Kursk region          | 35.1     | 26.6     | 24.7     | 28.9          |
| Belgorod region       | 31.6     | 24.0     | 23.2     | 26.3          |
| Tula region           | 27.4     | 21.7     | 26.6     | 25.2          |
| Republic of Mordovia  | 30.1     | 20.7     | 22.4     | 24.4          |
| Smolensk region       | 23.7     | 21.0     | 27.9     | 24.2          |
Among the Federal districts, the Central (24.0 C/ha), North-Western (23.2 C/ha) and Southern (22.8 C/ha) were the leaders in pea yield on average over three years (figure 3). Thus, it can be assumed that in regions with high gross harvest of peas, either agricultural technologies are used that do not allow additional harvest, or breeds are used that do not fully realize their capabilities.

| Region            | 2017 | 2018 | 2019 | Average |
|-------------------|------|------|------|---------|
| Vologda region    | 20.9 | 22.7 | 28.0 | 23.9    |
| Tyumen region     | 26.5 | 20.3 | 24.9 | 23.9    |
| Bryansk region    | 28.0 | 22.5 | 20.5 | 23.7    |

A lot of importance in obtaining a high and stable yield and as a result of increasing gross harvest is played, first of all, by breeding, as well as seed production of peas, which allows creating more plastic and less susceptible breeds to diseases and pests. Analysis of the register of breeding achievements showed that at the moment it still includes 4 breeds of peas included in the period from 1963 to 1988 and 22 breeds included in the period from 1991 to 2000, and all these breeds are of national selection (figure 4). However, since the beginning of the 21st century, the Russian market has begun to receive breeds of peas of Western European selection, which are also currently allowed to use - from 2001 to 2010, and their number was 10, and from 2011 to 2020 - 25. However, the number of pea breeds included in the register of Russian selection currently prevails over foreign ones. However, Russian farmers prefer to sow seeds of foreign varieties to a greater extent. So in 2019, out of the top ten in terms of seeding, Western European breeds accounted for 64.4%. Consequently, breeds of foreign selection are more competitive than national ones.
Moreover, due to the fact that Russia fully provides itself with peas, the main share of imports is accounted for by seed material. The average national consumption of peas is about 1.2 million tons. While a significant share of the resulting crop is exported (table 3). Despite the fact that in Russia as a whole, the volume of exports of food products and agricultural raw materials increased before the introduction of sanctions in 2014, and then began to decline [17] this did not affect the export of dried peas in any way. Over the past ten years, there has been a significant increase in the volume of pea exports. The main buyers of Russian products in this market segment are: Spain – 20.7%; India – 16.5%; Turkey – 14.7%; Italy – 12.5%; Pakistan – 8.7%; Latvia - 7.44%; Bangladesh – 6.9%; Norway – 2.4%; Nepal – 2.0% and Germany – 1.7% [18].

![Figure 4. Dynamics of inclusion of pea varieties in the State register of breeding achievements approved for use (calculated by the authors based on the state register data [16]).](image)

Table 3. Export of dried peas from Russia in 2001 – 2018.

| Year | Amount, thousand tons | Year | Amount, thousand tons |
|------|-----------------------|------|-----------------------|
| 2001 | 19                    | 2010 | 152                   |
| 2002 | 131                   | 2011 | 461                   |
| 2003 | 44                    | 2012 | 593                   |
| 2004 | 88                    | 2013 | 336                   |
| 2005 | 90                    | 2014 | 312                   |
| 2006 | 92                    | 2015 | 589                   |
| 2007 | 21                    | 2016 | 702                   |
| 2008 | 41                    | 2017 | 1043                  |
| 2009 | 255                   | 2018 | 1144                  |

4. Summary
The results of the research showed that such a leguminous crop as peas is widely distributed in many countries of the world. Russia ranks second in terms of acreage. The main centers of crop production are the Volga, Siberian, Southern and Central Federal districts. However, high crop yields are
observed in the Orel region, Krasnodar territory and Kursk region. This may be due to the use of effective agricultural technology and breeds that fully realize their potential. Despite the predominance, in the State register, of peas breeds of national selection, producers prefer to sow varieties of foreign selection in a larger proportion. Due to Russia’s self-sufficiency in peas, most of the received products are exported. However, the problem of low competitiveness of national breeds and the development of effective agricultural technologies for them remains relevant.

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