Research of the main segments of the fertilizer market

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Abstract. This article is devoted to an overview of the main segments of both the global market and the Russian fertilizer market. The main trends occurring in these markets have been identified. The market for organic fertilizers was studied as an integral part of the global fertilizer market. Positive dynamics towards the development of organic farming in the world have been noted. Factors influencing the dynamics of development of the fertilizer market in general and the organic fertilizer market in particular have been identified.

Key words: development dynamics, fertiliser market segments, biofertilizer from sewage sludge, organic fertilizer market, organic farming, eco-positive principle.

1 Introduction

The development of agriculture at the present stage is unthinkable without the application of fertilisers. Fertilisers contain the main three nutrient elements: nitrogen, phosphorus and potassium. Accordingly, the production of appropriate types of fertilisers is based on these elements. The elements must be added in certain proportions to the soil. Lack of one of the elements leads to significant losses in productivity.

Ammonia is used to produce nitrogen fertilisers, which contain nitrogen. Nitrogen production is not at all an environmentally friendly process, as it involves the emission of carbon dioxide. However, there are other processes for nitrogen production that involve the electrolysis of water.

The production process of phosphate and potash fertilisers is linked to the mining industry. The extracted industrial ore is subjected to a number of chemical transformations. Thus, the process of mineral fertiliser production itself is quite toxic and is not combined with the processes of greening the production of agricultural areas.

As nitrogen fertiliser production is dependent on natural gas production and therefore its cost, nitrogen fertiliser prices are directly correlated with natural gas prices. Natural gas costs are estimated to account for between 70% and 90% of the costs of nitrogen fertiliser production.

The cost of phosphate and potash fertilisers is not so much dependent on the cost of raw materials as it is on the supply-demand balance in the fertiliser market. The price formation for these types of fertilisers depends on the location of the required resources. As their extraction and production is located where the necessary resources are available, and delivery significantly increases the final cost of fertilisers due to significant transport costs. Thus, the logistics infrastructure has a strong impact on the fertiliser industry.

Thus, fertiliser pricing is influenced by: gas prices; supply and demand volumes; and logistical supply conditions.

Global fertiliser consumption is at a relatively high level. For the 2020/2021 season, the consumption volume was 203.8 million tonnes. (Figure 1). [1-5] The majority of 113.7 million tonnes are nitrogen fertilisers. Phosphate and potash fertilisers account for 24% and 20% respectively. The consumption of nitrogen fertilisers is higher than other types of fertilisers because these fertilisers are applied to the soil every year, due to the fact that nitrogen does not linger long in the soil. Nitrogen reserves are replenished annually. Potash and phosphate fertilisers remain in the soil for up to three years, which is why there is a lower demand for these types of fertilisers.

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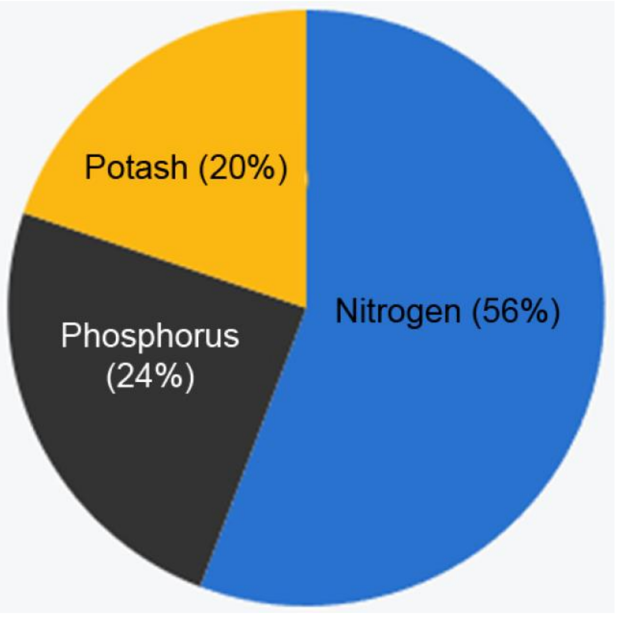

Fig. 1. World consumption of mineral fertilisers for the 2020/2021 season

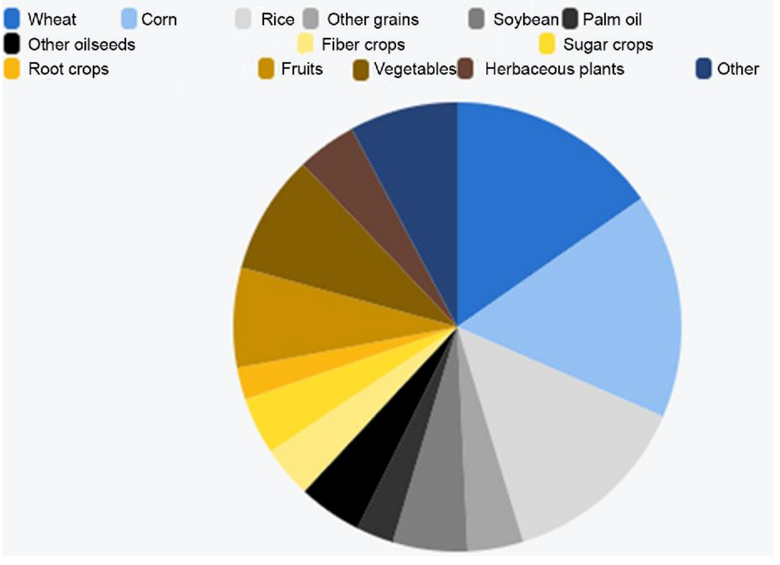

Fig. 2. World Fertiliser Consumption by Crop

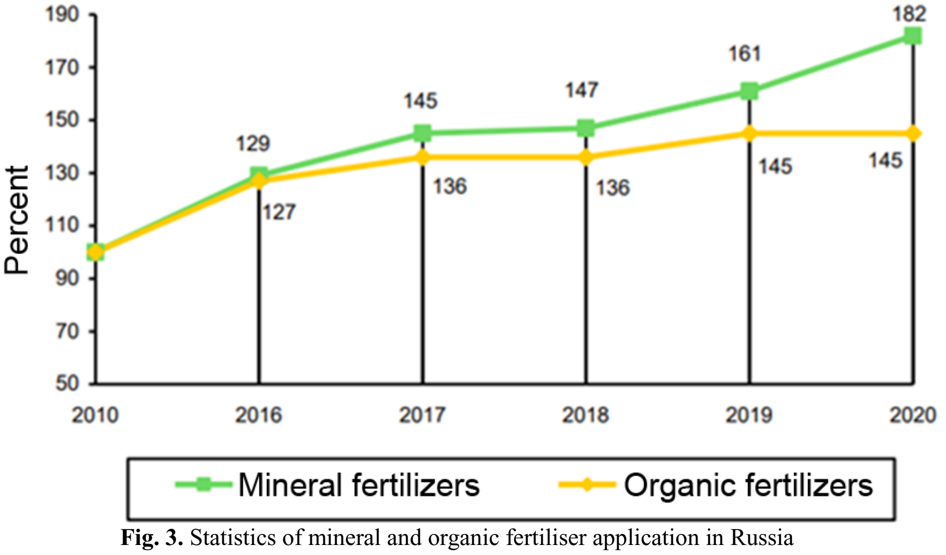

Fig. 3. Statistics of mineral and organic fertiliser application in Russia

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2 The main part

Grain crop producers consume the most fertiliser. The main cereal crops in the world are corn, wheat and rice. They account for the bulk of fertiliser application. On average, farmers' operational costs for fertiliser purchases range from 15 to 35%, depending on the type of crops (Figure 2) [6-9].

As fertiliser is largely consumed by producers of major cereal crops, the factors that affect the food commodities market also affect the global fertiliser market. Specifically, fertiliser demand is influenced by:

- dynamics of population growth in the world;
- dynamics of countries' GDP growth and, in general, their economic development;
- availability of accessible areas for sowing crops;
- weather conditions in different parts of the world;
- changes in the norms of fertiliser use;
- global economic conditions;
- geopolitical situation in the world;
- farmers' income dynamics;
- the ratio of the level of world grain reserves to the level of consumption;
- government policies to protect their markets and impose sanctions on other producers from other countries.

Fertilisers can be different in their composition, as well as in their method of origin and production. Let's take a look at the other segments of fertilisers[10-13].

The main segments in the fertiliser market are mineral fertilisers, but organic fertilisers also stand out.

Organic fertilisers are produced from biological components. These fertilisers are derived from living materials, or materials that were once living. The development of organic fertiliser application promotes the development of organic farming. The main request of such farming is to eliminate the use of synthetic fertilisers or other chemicals in growing crops. The product created contains only organic materials.

This trend in the use of organic fertilisers in the world is gaining momentum and the share of products grown in this way in the world is increasing.

Treated sewage sludge is quite suitable as fertiliser according to chemical and bacteriological parameters. The use of treated sewage sludge as one of the components of an innovative "organic fertiliser" is in line with the principles of eco-positivity.

Treated sewage sludge contains a higher concentration of nutrients than other types of organic fertilisers. Thus, the use of treated sewage sludge as an organic fertiliser makes it possible to grow plants within the "organic farming" approach. Such biofertilisers provide an opportunity to regenerate the natural soil layer. Organic fertilisers can make nutrients more available in the soil, improve cation exchange, and induce the growth of microorganisms that increase the availability of a range of nutrients to plants.

But not all organic additives can cause this effect. For example, fresh sawmill waste can reduce the acidity of the soil.

Thus, nitrogen, phosphorus and potassium are key nutrients for plant growth and increased yields. These substances can be found in both mineral, chemical fertilisers and organic fertilisers.

Russia is one of the largest producers and exporters of mineral fertilisers on the global market. The production of mineral fertilisers is also constantly growing. Consequently, the organic fertiliser segment does not receive high dynamics of development. But despite this, the volume of areas with organic fertiliser application is constantly increasing. According to Figure 3, the statistics of mineral and organic fertiliser application in Russia is ascending. But the growth rate of mineral fertilisers is higher.

Table 1. Use of organic fertilisers in Russia

Organic fertilisers applied	2010	2016	2017	2018	2019	2020
total, mln tonnes	53.1	65.2	66.8	68.8	70.7	70.5
per hectare, tonnes:						
Total sown area	1.1	1.4	1.5	1.5	1.6	1.6
Grain and leguminous crops	1.0	1.2	1.2	1.2	1.3	1.2
Sugar beet	2.2	2.5	2.2	2.2	2.3	2.1
Sunflower	0.5	0.9	0.9	1.0	1.0	1.0
Soybeans	0.3	1.6	1.5	2.0	2.0	1.8
Vegetables	3.7	2.8	2.6	2.1	3.0	2.3
Potatoes	9.1	5.8	6.1	4.8	3.5	3.2
Forage crops	1.0	1.6	1.7	1.9	2.1	2.3
Share of organic farming area, per cent	7.5	9.3	9.2	9.4	9.5	9.4

According to statistical observations of Rosstat, the use of organic fertilisers in Russia has decreased since 1990. While in 1990, 389.5 million tonnes of organic fertilisers were applied, in 2010 only 53.0 million tonnes were applied. 389.5 million tonnes of organic fertilisers were applied, while in 2010 only 53.0 million tonnes were applied. This is a decrease of more than 7 times).

However, since 2010, there has been a return to growth in the share of organic fertiliser application. According to Table 1, the volume of organic fertiliser application in Russia is constantly growing.

According to Rosstat data, the application of organic fertilisers in 2022 increased by 0.8% to 70.9 million tonnes. Including for agricultural crops, it was applied by 0.7% more – 70.6 million tonnes against 70.2 million tonnes in 2021[14-16].

Thus, the main factors influencing the growth of organic fertiliser use can be identified:

- lower production cost of biofertilisers [17];
- the widespread adoption of organic farming practices or the principle of ecopositivity;
- reduction of soil regeneration costs with the systematic use of biofertilisers.

Disadvantages of organic fertiliser application:

- inefficient production method, unable to produce sufficient capacity to meet fertiliser demand;
- the effect of chemical fertilisers is stronger, which contributes to obtaining quick results, but due to soil depletion, the same leads to more expensive restoration of the fertile layer;
- high demand for organic fertilisers per 1 hectare.

3 Conclusion

Thus, we have come to some conclusions. The agricultural market is subject to many factors, both predictable and unpredictable. Over the last decade, many agribusinesses have adopted organic practices. Following their successes, others have seriously considered converting to organic farming.

The switch to organic fertilisers is an important trend of the last decade. The key factors for the spread of organic fertiliser use are: the growing need to increase agricultural production; the spread of information about the negative health and environmental impacts of chemicals; the growing demand for organic products; and the growing area of organically cultivated agricultural land.

All of the above factors have a positive impact on the international demand for organic fertilisers.

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