AGRICULTURAL SCIENCES

AGROBIOLOGICAL AND ECOLOGICAL BASES OF PRODUCTIVITY INCREASE AND GENETIC POTENTIAL IMPLEMENTATION OF NEW BUCKWHEAT CULTIVARS IN THE CONDITIONS OF THE NORTHEASTERN FOREST-STEPPE OF UKRAINE

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Obtaining steady and high yields of agricultural crops is inextricably linked to the soil fertility, which depends on the intensity of organisms'processes in the soil.

It is known that the increase in plant productivity can be achieved not only by the introduction of necessary fertilizers rates and biological preparations in the complex of crops cultivating technological operations, but also by selection methods.

Improving the agrotechnical methods of buckwheat cultivation through the technology elements combination (choice of cultivars, biological preparations, mineral fertilizers, plant growth regulators, microfertilizers) will contribute to the implementation of its genetic potential [1, p. 350].

In the technology of growing crops, plant growth regulators are an important factor in controlling the growth and development of plants. Growth regulators give the opportunity to better realize the potential of plants, regulate the ripening periods, improve the quality of products and increase yields. The basis of microbiological preparations are live microorganisms, which are characterized by a complex of agronomic-beneficial properties – nitrogen fixation, phosphate mobilization, growth stimulation and antagonism to phytopathogens [2, p. 26-30].

Important role in the formation of crops is devoted to fertilizers, but there are questions remain of their interaction with microbial preparations and its impact on the productivity of buckwheat. By changing the chemical composition of the substances entering the plants, its number and time of receipt, it is possible to increase the yield, toenhance the growth, to improve the chemical composition and quality of the products, as well as to increase the plants resistance to adverse conditions.

The application effectiveness depends on the degree of its compliance with the biological requirements of agricultural crops in specific soil and climatic conditions [3, p. 140-142].

Literary data testify to the positive influence of microbiological agents and plant growth regulators on the production of grain crop yields [5, p. 96-100].

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Improvement of plant productivity can be achieved not only by breeding methods, but also by introducing the necessary fertilizer rates and incorporating biological preparations into a set of successive technological cultivation operations [4, p. 89-94].

The modern innovative way to increase the productivity of agricultural crops is thebiopreparations usage that improves the conditions of nutrients use from both fertilizers and soil. When using microbial preparations, the supply of useful microorganisms in the required amount is providedat the optimal period and in the right place [6, p. 22].

Creating a space for the domination of agronomically beneficial bacteria in the root zone of cultivated plants helps to ensure the mineral nutrition. At the same time microbial preparations, having in its composition physiologically active substances of bacterial origin (original growth stimulants, but not chemical), actively influence the root system growth and form the significant absorbent area, which, in general, contributes to the increase of fertilizer use degree by inoculated plants. In addition, vegetative treatments intensify the general development of plants with an orientation towards increasing their productivity and improving product quality [7, p. 17-19].

Experiments with buckwheat were conducted in the short-term field crop rotation of the Institute of Agriculture of the North East NAAS, which is located in the conditions of the northeastern Forest-Steppe of Ukraine. Research methods are field trials that included phenological, biometric observations and structural analysis of plants.

In the experiments of 2016-2018 it was found the influence of mineral fertilizers, biopreparation, microfertilizer and plant growth regulator on the formation of buckwheat inflorescences and its maintenance by photosynthetic leaf layer.

The greatest growth of leaf surface was observed during the period of flowering – beginning of fruit production. Subsequently, the leaf surface continued to increase, but the intensity of its growth was low.

The maximum leaf area of the buckwheat plants of Selyanochka cultivar was observed on the variant of complex application of seed inoculation with biopreparation, plant growth regulator and mineral fertilizer application (depending on the fertilizer rate varied within the range of 230.5-271.3 cm^2). The same variant with Slobozhanka cultivar formed the maximum leaf surface area depending on the fertilizer rate (308.4-321.4 cm^2).

The results of mineral fertilizers, biopreparation, growth regulator and micronutrient influence on the formation of buckwheat plants productivity in 2016-2018 years have revealed that the structure of the buckwheat crop was significantly influenced by the use of biomaterial. The intensity of plants growth and development was uneven and depended on hereditary properties and conditions of the environment.

The structural plants analysis was carried out in order to detect and characterize the influence of investigated factors on the elements of productivity in different buckwheat morphotypes cultivars. The inoculation of buckwheat seeds with the biopreparation increased the number and weight of buckwheat grains compared with the variant without biologic agent application.

Maximum number of grains per plant (48 pcs.) was recorded in variant of Selyanochka cultivar with plant growth regulator (Sodium humate 1.0 l/ha in the budding phase) in combination with mineral fertilizer $N_{16}P_{16}K_{16}$application into rows. Moreover, minimum number of grains per plant (40 pcs.)was formed by Selyanochka cultivarin variants without mineral fertilizers, seeds treated with water and seeds treated with Microhumin 200g/ha, which indicates a negative effect of additional mineral nutrition absence.

Selyanochka cultivar maximum weight of 1000 grains (26.3-27.5 g) was obtained in the variant with complex seeds inoculation by biopreparation, microfertilizer and plant treatment. These variants obtained maximum weight of grains from plant (1.27 g).

The dependence between the weight of 1000 grains and weight of grains per plant was not noted in Slobozhanka cultivar. The highest level of the weight of 1000 grains was formed in the with plant growth regulator on the background of $N_{30}P_{45}K_{45}$ + N_{15} – 25.9 g, while the weight of grains per plant was 1.12 g, which is average for experiment. Complex seed inoculation with biopreparation, micro-fertilizer and plants treatment by plant growth regulator provided the weight of grains per plant in the range of 1.18-1.21g, but the weight of 1000 grains was 25.1-25.6 g.

According to the results of the research, the use of the growth regulator, which was introduced separately as well as in mixtures with biopreparation, imposed a significant influence on the formation of buckwheat grains yield and exceeded the control variant.

Accorgingly to results of our research in the conditions of the northeastern forest-steppe of Ukraine Selyanochka cultivar was better responding to the use of seed inoculation and fertilizer application than Slobozhanka cultivar. The variant of complex use of seeds treatment with biopreparation, microfertilizer and introduction of plant growth regulator in the phase of budding of buckwheat plants, on the background of mineral fertilizers use $N_{16}P_{16}K_{16}$ + N_{15}achieved maximum yield – 2.20 t/ha, with increase from fertilizers –+0.42 t/ha, from biopreparation, microfertilizer and plant growth regulator –+0.27 t/ha.

The highest yield level of Slobozhanka cultivar (1.92 t/ha) was obtained in the variant with mineral fertilizers application into rows$N_{30}P_{45}K_{45}$ + $N_{15}$with increase – +0.41 t/ha compared to control. The yield increase from the use of plant growth regulator Sodium humate was 0.19 t/ha.

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EFFECT OF THE CULTIVATION OF LEGUMES ON THE DYNAMICS OF SOD-PODZOLIC SOIL FERTILITY RATE

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In order to preserve and increase soil fertility, as well as to increase agroecological resistance to adverse anthropogenic factors, it is essential to accumulate organic matter in the soil. Due to the sharp decrease in the number of livestock in the farms of Ukraine, it is almost impossible to address this problem only by introducing manure. Therefore, it is necessary to find ways to restore and maintain the optimal level of soil fertility by means of the application of alternative methods of accumulation in the soil. One of the main resources and promising direction in solving this problem can be the cultivation of perennial legumes [3, p. 106-110].

Perennial legumes are one of the factors, which enable to stabilize the processes occurring in the soil – plant – animal – human system. A large phytomeliorative role of perennial legumes on the arable land, the optimal ratio of plowed land, hayfields and pastures will contribute to the elimination of destructive processes that occur in agricultural landscapes, reduce erosion and increase soil fertility and crop yields [4, p. 18-21; 7, 30-34].

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