MANIFESTATION OF THE GENETIC POTENTIAL OF NEW VARIETIES OF BUCKWHEAT IN THE CONDITIONS OF THE NORTH-EASTERN 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.

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. 320].

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

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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 [4, p. 96-100]. 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 [5, p. 89-94].

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. Soils of experimental plots– typical black soil, weakly evolved, large-pealmedium-loamed, the arable layer of which is characterized by the main indicators: content of humus – 4,1%, pH – 6,3, amount of absorbed alkaline– 31 mg equivalents, content of easy hydrolyzed nitrogen (by Cornfield) – 11.2 mg/100 g.

Weather conditions during research growing season of 2016-2018 were different and had a significant impact on buckwheat yield formation. That made it possible to investigate reaction of cultivars to the agronomic techniques that were studied in the experimental variants.

Studies with buckwheat were conducted in a three-factor experiment during 2016-2018, where: factor A –cultivars of different morpho-type; factor B –rate of mineral fertilizers ($N_{16}P_{16}K_{16}$, $N_{30}P_{45}K_{45}$, N_{15}); Factor C – biological preparation (Microhumin– 200 g/ha), microfertilizer (Reakom “Grain”–0.5 l/ha), plant growth regulator (sodium humate – 1.0 l/ha).

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.

According to the results, the average number of grains per plant and the weight of 1000 grains were higher in variants of Selyanochka cultivarcomparable with Slobozhanka.

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 200 g/ha, which indicates a negative effect of additional mineral nutrition absence.

Slobozhanka cultivar formed average 45 seeds perplant. Among the studied variants, the largest number of grains per plant (48 pcs.) was in the variants with plant growth regulator (Sodium humate 1.0 l/ha in the budding phase) on the background of $N_{30}P_{45}K_{45}$ and $N_{16}P_{16}K_{16} + N_{15}$.

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, microfertilizer 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 25.1-25.6g.

The results show that the Selyanochka cultivarhad better reaction to the use of seed inoculation and the fertilizer application comparable with Slobozhanka.The increase from this measure variedin the range of +0.05-0.27 t/ha, with average +0.14 t/ha. Mineral nutrition provided the average yield increase (+0.22 t/ha) which was 0.01 t/ha lower to compare with Slobozhanka cultivar and varied in range of 0.06-0.45 t/ha. The variant with complex use of seeds treatment with biopreparation, microfertilizer and application plant growth regulator in the phase of budding, on the background of mineral fertilizers ($N_{16}P_{16}K_{16}$ + N_{15}) formed maximum yield (2.20 t/ha) and increase from fertilizers was+0.42 t/ha, from biopreparation, microfertilizer and plant growth regulator – 0.27 t/ha.

A slightly lower yield (2.18 t/ha) was obtained in the variant with introduction of plant growth regulator into the phase of budding, with increase +0.25 t/ha, but from mineral fertilizers – +0.43 t/ha. Among the variants with inoculation of Selyanochka seeds, the highest yield was obtained after application of microfertilizer – 2.07 t/ha (increase to control (seed treated with water) was – 0.14 t/ha).

For seeds inoculation by Microhumin, the highest level of yield increase (+0.31 t/ha) was recorded with mineral fertilizers $N_{16}P_{16}K_{16}$ + N_{15}, which was 0.13 t/ha higher compared to control variant without seed treatment.

The highest yield level (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 to control. Plant growth regulator Sodium humate provided +0.19 t/ha. The yield level (1.89 t/ha) after application$N_{30}P_{45}K_{45}$ + N_{15} with inoculation of buckwheat seed with

microfertilizer was 0.38 t/ha higher than in variant without mineral fertilizers and 0.16 t/ha higher compared to the variant without seed treatment but with the same rate of mineral fertilizers.

The variant with complex application of biopreparation, microfertilizer and plant growth regulator Sodium humateformed 1.83 t/ha, increase to control (without fertilizers and seeds treatment with water) was+0.32 t/ha.

Seeds inoculation of Slobozhanka cultivar by Microhumin obtained the highest yield with application of mineral fertilizers $N_{16}P_{16}K_{16}$ + N_{15} (1.82 t/ha), which was 0.04 t/ha higher comparable to variant without seed inoculation and with the samerate of mineral fertilizers.

Comparing cultivars of different morphotypes to each other, the average yield for 2016-2018 of Selyanochka cultivar was 1.96 t/ha and ranged from 1.75 to 2.20 t/ha. But Slobozhanka cultivaraverage yield was lower – 0.23 t/ha (1.73 t/ha) and ranged from 1.51 to 1.92 t/ha.

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