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EFFECT OF MINERAL FERTILIZER RATES APPLIED IN CONTINUOUS RICE CULTIVATION AND CROP ROTATION SYSTEMS ON YIELD ELEMENTS OF RICE

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Abstract: It was found that the parameters of mineral fertilizers used in continuous rice and rotation systems affected the grain yield of "Iskandar" rice variety. In continuous rice cultivation, in the control, organic fertilizer (40 t/ha) and mineral fertilizer (N_{150} P_{120} K_{100} kg/ha) variants, the length of the rice grain was 17.5-20.6 cm, the number of grains per ridge was 51.2-81.1 grains on average, the weight of one ridge was 1.7-2.6 g/grain, and the weight of 1000 grains was 28.9-31.5 g. In the 1:1 soybean:rice system, the control and mineral fertilizers N_{50} P_{120} K_{100}, N_{100} P_{120} K_{100}, N_{150} P_{120} K_{100} kg/ha were used, the length of the rice grain was 19.2-21.9 cm, the number of grains per ridge was 73.4-95.8 grains on average, and the weight of one ridge was 1.7-2.6 g/grain. It was found that the average weight of the rumen was 2.3-3.0 g/piece, and the weight of 1000 pieces of grain was 31.0-32.1 g.

Калит сўзлар: continuous rice cultivation, crop rotation, soybean, mineral fertilizers, manure, panicle length, number of grains per panicle, weight of panicle and 1000 grain weight.

Introduction. Rice is the main food crop in Asian countries, and about 92% of the world's rice is grown and consumed in this continent [5]. Food products from it are distinguished by their rapid digestion, rice contains 75.2% carbohydrates, 7.18% protein, 0.26% oil, 2.2% fiber, 0.5% ash, 14% water and various vitamins. Rice porridge is also used as a medicinal agent in medicine.

Rice straw is used as fodder in livestock farming, and 1 kg of its straw contains 22 g of crude protein and 0.24 food units. In addition, rice straw is used in the clothing industry, in the manufacture of shoes, yarn, sacks, paper and compasses. Rice straw

contains 1% protein, 0.55% oil, and 30% carbohydrates. Rice straw is also used as a fertilizer, as 1 ton of straw contains 8 kg of nitrogen, 1 kg of phosphorus, and 12 kg of potassium. [1].

According to many reports, organic fertilizers, when supplemented with inorganic fertilizers, have a positive effect on crop growth. In this regard, the application of cow dung, poultry manure, rice straw, and rice husk significantly increased rice yield and morphological parameters of rice. The increase in rice yield may be due to an increase in parameters such as dry matter, total number of tillers, flag leaf length, number of productive plants per hill, and 1000-seed weight. Applying chemical fertilizers with farmyard manure or wheat straw under alternate wetting and drying conditions increased the uptake of N, P, and K by rice plants, increased 1000-grain weight, and increased grain yield of rice. Appropriate fertilizer application and irrigation in rice are important for maintaining yield and productivity. The addition of organic matter (FBM, rice straw, and rice husk) can increase fertilizer use efficiency and rice grain yield. These various organic materials improve the nutrient balance in the soil [7].

The level of study of the problem. As is known, one of the most important tasks in agriculture is to prevent the decline in soil fertility, the reduction of the amount of macro- and microelements necessary for plants. In the current conditions of acute shortage of organic fertilizers, one of the effective methods of maintaining soil fertility is the cultivation of green mass crops and the introduction of green mass into the soil as green manure by growing them. Growing soybeans as a main crop in areas with low soil fertility, and as a secondary and green crop in areas freed from winter cereal crops, increased the amount of humus in the soil in its arable (0-30 cm) layer by 0.025-0.029%, the total amount of nitrogen by 0.008-0.012%, and the total amount of phosphorus by 0.007-0.010% [4, 6].

Research conditions and methods. Our research was conducted in the experimental plot of the Rice Research Institute during 2022-2024. The experimental field was a meadow - swamp, and the effect of mineral and organic fertilizers applied on the yield elements of rice (Oryza sativa L.) plants - tiller length, number of grains per tiller, tiller weight and 1000 grain weight - was studied in a continuous rice and intercropped soybean background. Our research included 7 variants and was arranged in 3 replications.

The research was conducted based on the methodological manuals “Methods of conducting field experiments”, and plant analyzes “Methodology of state variety testing of agricultural crops” [2, 3].

Research results. In our study, it was found that the mineral and organic fertilizers applied during the cultivation of "Iskandar" variety of rice after continuous and previous crop (soybean) had an effect on the formation of its yield elements (Table 1).

It is known that the agrochemical properties of field soil treated with leguminous grain (soybean) grown as a predecessor crop have improved, positively affecting the growth and development of rice grown next year. As a result of the 2023 research, the average length of one furrow of a rice plant is 17.5-21.9 cm, the number of grains in one furrow is average 51.2-95.8 pieces, and the average weight of one rump was 1.7-3.0 g.

According to the results of the scientific research, when the pre-harvest biometric indicators were studied in the experimental field where continuous rice was grown, it was found that the average length of one furrow was 17.5 cm, the number of grains in one furrow was 51.2 grains, the weight of one furrow was 1.7 grams, and the weight of 1000 grains was 28.9 grams.

In the case where 40t/ha of manure was used, the average length of one furrow was 20.6 cm, the number of grains in one furrow was 81.1, the weight of one furrow was 2.6 g, and the weight of 1000 grains was 31.5 g.

In our variant using N_{150} P_{120} K_{100} mineral fertilizer, the average length of one tiller was 19.9 cm, the average number of grains per tiller was 78.2 grains, the average weight of one tiller was 2.5 g, and the weight of 1000 grains was 31.3 g.

The control, organic, and mineral fertilizer variants of the experimental field with continuous rice cultivation were compared. When comparing the variant using organic fertilizer at a rate of 40 t/ha with the control and mineral fertilizer variants, it was observed that the average length of one tiller increased by 3.1 cm, the average number of grains per tiller by 29.9 grains, the weight of one tiller by 0.9 g, and the weight of 1000 grains by 2.6 g compared to the variant without fertilizer.

Compared to the variant using the NPK 150:120:100 ratio, the average length of one tiller was 0.7 cm, the average number of grains per tiller was 2.9 grains, and the average weight of one tiller was 0.1 g, and the 1000-grain weight was 0.2 g.

In the experimental field where rice was grown the next year after soybean cultivation, the average length of one tiller was 19.2 cm, the average number of grains per tiller was 73.4 grains, the weight of one tiller was 2.3 g, and the weight of 1000 grains was 31.0 g.

In the case of alternating sowing, when rice was grown the following year after soybeans, in the variant using the NPK ratio of 50:120:100, the average length of a

single rice plant was 20.8 cm, the average number of grains per plant was 87.2, and the average weight of a single plant was 2.8 g. The weight of 1,000 grains was 31.9 g.

In the variant where NPK was used in the ratio of 100:120:100, the average length of one tiller of rice plants was 21.9 cm, the average number of grains in one tiller was 95.8 grains, and the average weight of one tiller was 3.0 g. It was determined that the weight of 1000 grains was 32.1 g.

In the experiment where soybeans were grown in the previous year, the next year rice was grown in the experiment where mineral fertilizers, namely NPK 150:120:100, were used, the indicators decreased significantly. That is, the average length of one tiller of rice plants was 21.2 cm, the average number of grains in one tiller was 92.4 grains, and the average weight of one tiller was 2.9 g. The average weight of 1000 grains was 32.0 g.

When analyzing the experimental options where rice was grown next year in the previous crop soybean field, it was found that the length of one furrow was 1.6 cm on average, the number of grains in a furrow was 13.8 grains, the weight of one furrow was 0.5 g on average, and the weight of 1000 grain grains was 0.9 g higher than the control variant. observed.

Compared to the control (no fertilizer) and 50 kg/ha nitrogen options, it was found that the length of one furrow was 1.1-2.7 cm, the number of grains in one furrow was 8.6-22.4 pieces on average, and the weight of one furrow was 0.2-0.7 g higher on average. The weight of 1000 grains increased by 0.2-1.1 g. As a result of the observations, it was observed that the indicators decreased as the amount of nitrogen fertilizer exceeded 100 kg.

In the experiment, in which rice was grown in the following year after soybeans, the fertilizer-free (control) variant of the continuous rice experiment was compared with the control variant, and the average length of one tiller was 1.7 cm, the average number of grains per tiller was 22.2 grains, the average weight of one tiller was 0.6 g, and the weight of 1000 grains was 1.1 g higher.

When rice was grown after the previous crop of soybeans, comparing the option where N_{50} P_{120} K_{100} mineral fertilizer was applied to the option where 40 t/ha of fertilizer was applied to the rice continuously, it was found that the length of one spike was 0.2 cm on average, the number of grains per spike was 6.1 on average, the weight of one spike was 0.2 g on average, and the weight of 1000 grains was 0.4 g higher. When comparing the 1:1 soybean:rice N_{100} P_{120} K_{100} and N_{150} P_{120} K_{100} mineral fertilizer applications with the continuous rice N_{150} P_{120} K_{100} mineral fertilizer application, it was

found that the average length of one tiller was 1.3-2.0 cm, the average number of grains in one tiller was 14.2-17.6 grains, the average weight of one tiller was 0.4-0.5 g, and the weight of 1000 grains was 0.7-0.8 g.

Conclusion. In continuous rice cultivation, in the variants where organic fertilizer (40 t/ha) and mineral fertilizer (N_{150} P_{120} K_{100} kg/ha) were used, the length of the rice grain was 17.5-20.6 cm, the number of grains per ridge was 51.2-81.1 grains on average, the weight of one ridge was 1.7-2.6 g/grain, and the weight of 1000 grains was 28.9-31.5 g. In the 1:1 soybean:rice system, the control and mineral fertilizer rates of N_{50} P_{120} K_{100}, N_{100} P_{120} K_{100}, N_{150} P_{120} K_{100} kg/ha were used, the length of the rice grain was 19.2-21.9 cm, the number of grains per ridge was 73.4-95.8 grains on average, and the weight of one ridge was 1.7-2.6 g/grain. It was found that the average grain weight of 1000 grains was 31.0-32.1 g. Based on the data obtained, it can be concluded that the correct selection of intercrops and mineral fertilizer rates is important in rice cultivation. Growing the main crop (rice) after the intercrop (soybean) is more effective than growing rice continuously, even without fertilizers. The application of mineral fertilizers in the amount of N_{100} P_{120} K_{100} to rice in short rotation cultivation showed the highest indicators of yield elements. The use of large amounts of nitrogen fertilizers has a positive effect on the development of vegetative organs of the plant, but has a negative effect on the development of generative organs.

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