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The Effect Of Norms Of Mineral Fertilizers And Nitragin Used In Repeat Crop Bean On The Agrochemical And Microbiological Properties Of Soil

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ABSTRACT

It was found that inoculation with nitrogen and application of mineral fertilizers before sowing the seeds of bean crops grown as a secondary crop after winter wheat affected the agrochemical and microbiological properties of the soil. Inoculation of bean seeds with nitrogen before sowing and application of mineral fertilizers in different doses provided an increase in the amount of humus in the topsoil (0-30 cm) layer by 0.021-0.034% compared to the initial values, and the total nitrogen content by 0.006-0.009%. It was found that the increase in the number of mineral fertilizers in the background inoculated with nitrogen before sowing the seeds of beans grown as a secondary crop led to an increase in the number of ammonifiers, oligonitrophils, micromycetes, and actinomycetes compared to the control option.

KEYWORDS

Nitrogen, nitrogen, phosphorus, potassium, microorganisms, ammonifiers, spores, oligonitrophils, micromycetes, actinomycetes.

INTRODUCTION

The influence of legumes on the change in the general and mobile forms of humus, nitrogen, phosphorus, and potassium content in the soil from repeated crops planted after winter

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wheat has a special role. This is because the amount of root-stem residues left in legumes, which are quickly converted into various forms of nutrients, has a positive effect on soil fertility and increase the yield of crops planted next year [1, 7, 8, 9].

Also, if the agrophysical, water, water-physical properties of the soil are normal, the movement of microorganisms in it becomes more active, resulting in increased soil fertility. Therefore, it is important to study the level and scope of the impact of mineral fertilizer standards applied to the activity of microorganisms in the soil in the care of legumes grown as a secondary crop in short-crop rotation systems [2, 5].

The relevance of the problem. The decline in soil fertility is primarily due to chronic disruption of the system of continuous sowing of the same type of crop and crop rotation and agro-technical measures. Such negative conditions seriously damage the share of cotton, wheat, and other crops. It is known that the level of soil fertility in agriculture is directly related to the amount, ratio, and application of scientifically based mineral fertilizers, adherence to crop rotation, land and water conservation, and the introduction of other advanced technologies. According to numerous studies, 50 percent or more of the crop is formed at the expense of organic and mineral fertilizers. However, if these factors are carried out in the field of crop rotation, very favorable ecological conditions for plant growth and development will be created, and the highest and highest quality yields will be achieved [10].

It was found that oligotrophs increase the number of microorganisms in short-rotation crop rotation, increase the concentration of carbon-containing organic compounds, reduce the index of pedotrophils and denitrifiers, and reduce the amount of nitrogen-containing compounds in microorganisms [4, 5].

RESEARCH CONDITIONS AND METHODS

Our research was conducted in 2015-2017 in the conditions of typical gray soils of Tashkent region, the seeds of bean crops as a repeat crop were treated with nitrogen in the strain of Rhizobium phaseoli 143, and on the background of mineral fertilizers without the following fertilizers, PK 90:60, NPK 30:90:60, NPK 60:90:60 and NPK 90:90:60 kg/ha standards were tested.

The experiment included 8 options, each occupying an area of 240 m2, of which 120 m2 were taken into account. Three replications were conducted and the total area of the experiment was 0.576 hectares.

The research was conducted in the field and in the laboratory, where the placement of field experiments, calculations, and observations was carried out based on " Dala tajribalarini utkazish uslublari [Methods of field experiments]", soil and plant analysis "Metodi agrohimicheskih analizov pochv i rastenii [Methods of agrochemical analyzes of soils and plants] " [3, 6].

In the experiment, early ripening bean variety "Golden Hair" was planted in the first ten days of July at a rate of 100 kg per hectare, at a depth of 4-5 cm. Upon completion of planting, seed water was given to obtain full seedlings.

In the care of beans from mineral fertilizers: ammonium nitrate (N 33-34%), ammophos (N 11-12%, P2O5-46%), suprefos (N 5-6%, P2O5-32%), potassium chloride (K2O -60%)) was applied.

RESEARCH RESULTS

In 2016, the amount of humus in the 0-30 cm soil layer of the field was 0.725%, total nitrogen content was 0.061%, total phosphorus content

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was 0.116%, in the 30-50 cm layer these indicators, humus content was 0.598%, total nitrogen content was in the range of 0.053%, total phosphorus content was in the range of 0.099%. According to the data obtained on the mobile forms of nutrients, the amount of nitrate-nitrogen in the drive layer of the soil is in the range of 3.81 mg/kg, and in the subsoil layer in the range of 2.26 mg/kg, the amount of mobile phosphorus was found to be between 15.2 mg/kg and 11.8 mg/kg, respectively, while the amount of exchangeable potassium was 318 mg/kg in the 0-30 cm layer of soil and 282 mg/kg in the 30-50 cm layer.

It can be seen that the typical gray soils of the experimental field under study were found to be very low and low in nitrogen and phosphorus by classification, and high in exchangeable potassium.

It was found that inoculation with nitrogen and application of mineral fertilizers in different doses before sowing the seeds of bean crops grown as a secondary crop affected the number of nutrients in the soil. If the amount of humus in the soil at the end of the growing season of the bean crop planted as a repeat crop in 2016 was 0.721% in the 1st fertilizer-free control variant of the experiment in the topsoil (0-30 cm) layer of the soil, It was found that the norm of mineral fertilizers NPK 30:90:60 kg/ha was 0.746% in variant 2, beans were found to have increased by 0.021% compared to the initial values before planting. In the 3rd variant, where the norm of mineral fertilizers NPK60: 90: 60 kg/ha was applied, it was found that it increased by 0.026% compared to the initial values.

Seeds of bean crops were inoculated with nitrogen before sowing, and the application of mineral fertilizers in different doses also had an effect on the amount of humus in the soil. Bean crop seeds were treated with nitrogen in Rhizobium phaseoli 143 strain. This nitrogen strain was inoculated by specialists of the Research Institute of Microbiology under the Academy of Sciences of the Republic of Uzbekistan before sowing bean seeds. The amount of humus in the driving layer of the soil (0–30 cm) bean seeds treated with nitrogen, while no mineral fertilizers were applied in option 5, the amount of humus was 0.723%, in the background treated with nitrogen, the norm of mineral fertilizers NPK 30:90:60 kg/ha was found to be 0.759% in variant 7, an increase of 0.034% compared to the initial figure before sowing beans. In variant 8, where the norm of mineral fertilizers NPK60: 90: 60 kg/ha was applied, it was found that the amount of humus in the soil increased by 0.029% compared to the initial values. In the remaining years of the experiment, these regularities were maintained (Table 1).

The total nitrogen content was 0.057% in the fertilizer-free control variant, while the NPK 30:90:60 kg/ha norm of mineral fertilizers was found to be 0.061% in variant 2, which maintained the initial pre-sowing rate. In Option 3, where the NPK 60:90:60 kg/ha norm of mineral fertilizers was applied, it was found that it increased by 0.006% compared to the initial values.

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1-Table

Norms of mineral fertilizers in replanted beans and the effect of nitrogen application on the number of nutrients in the soil, %

(2016 year).

№ Var	Soil layers, cm	General shape, %			Mobile form, mg/kg		
		humus	N	P	$N\text{-}NO_3$	P_2O_5	K_2O
The beginning of the validity period (2016 y, summer)							
	0-30	0,725	0,061	0,116	3,81	15,20	318
	30-50	0,598	0,053	0,099	2,26	11,80	282
At the end of the validity period (2016 y, autumn)							
1	0-30	0,721	0,057	0,111	3,88	15,10	310
	30-50	0,594	0,050	0,095	2,30	11,61	275
2	0-30	0,746	0,061	0,116	4,20	15,97	319
	30-50	0,606	0,052	0,098	2,71	12,07	284
3	0-30	0,751	0,067	0,122	5,14	17,37	326
	30-50	0,608	0,054	0,101	3,00	12,90	291
4	0-30	0,748	0,065	0,118	4,97	16,20	321
	30-50	0,607	0,052	0,100	2,86	12,63	286
5	0-30	0,723	0,059	0,114	3,90	15,16	317
	30-50	0,596	0,051	0,097	2,32	11,88	280
6	0-30	0,750	0,064	0,119	4,32	16,80	323
	30-50	0,607	0,054	0,100	2,78	12,16	287
7	0-30	0,759	0,070	0,125	5,29	17,46	330
	30-50	0,614	0,059	0,104	3,11	12,96	295
8	0-30	0,754	0,068	0,121	5,06	16,37	326
	30-50	0,609	0,056	0,101	3,01	12,79	294

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Bean seeds were inoculated with nitrogen before sowing, and the application of mineral fertilizers at different rates was also found to affect the total nitrogen content in the soil. The total amount of nitrogen in the soil is inoculated with nitrogen before sowing bean seeds in its drive (0-30 cm) layer, if no mineral fertilizers were applied, the fertilizer-free option (option 5) was 0.059%, the NPK 30: 90: 60 kg/ha norm of mineral fertilizers against nitrogen inoculated background was found to be 0.070% in variant 7, beans were found to have increased by 0.009% compared to the previous figures before planting. Invariant 8, where the norm of mineral fertilizers NPK 60: 90: 60 kg/ha was applied, it was found that it increased by 0.007% compared to the initial values. The above laws were also observed in terms of the total amount of phosphorus in the soil and the mobile forms of nutrients. Similar data were obtained in the remaining years of the experiment (Table 1).

The soil microflora of the experimental field was determined from the main agronomic soil microorganisms - ammonifiers, spores, oligonitrophils, micromycetes, actinomycetes.

Ammonifiers convert organic nitrogen in humus into a plant-derived form.

Oligonitrophiles convert carbon in humus into a plant-derived form.

Actinomycetes are among the most common microorganisms in the soil, eliminate plant diseases, and assimilate organic and mineral forms of nitrogen [5].

Data on the microbiological condition of the soil and changes in it during the experiment are given in Table 2.

According to the results of the initial microbiological analysis of the soil of the experimental field, in the 0-30 cm layer of soil from microorganisms aminifiers 5.2x107 g/koe, spores 4.6x106 g/koe, oligonitrophils 3.1x106 g/koe, micromycetes 5.5x104 g/koe, actinomycetes were found to be 4.2x105 g/koe (Table 2).

2-Table

Norms of mineral fertilizers in replanted beans and the effect of nitrogen application on the number of microorganisms in the soil, koe/g in the soil (2016).

№ Var	Soil layer, cm	Ammonifiers	Spores	oligonitrophils	Micromycetes	Actinomycetes
The beginning of the validity period, 2016 year (summer)						
	0-30	$5,2x10^7$	$4,6x10^6$	$3,1x10^6$	$5,5x10^4$	$4,2x10^5$
At the end of the validity period (2016 year, autumn)						
1	0-30	$4,2x10^7$	$3,5x10^6$	$8,2x10^5$	$2,2x10^4$	$3,5x10^5$
2	0-30	$4,5x10^7$	$4,0x10^6$	$1,1x10^6$	$3,2x10^4$	$4,2x10^5$
3	0-30	$6,7x10^7$	$4,7x10^6$	$4,1x10^6$	$7,5x10^4$	$4,5x10^5$

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4	0-30	$7,5x10^7$	$4,5x10^6$	$4,9x10^6$	$5,5x10^4$	$4,3x10^5$
5	0-30	$3,0x10^8$	$3,5x10^6$	$4,7x10^6$	$6,5x10^4$	$4,5x10^5$
6	0-30	$6,7x10^8$	$4,2x10^6$	$5,2x10^6$	$7,5x10^4$	$5,5x10^5$
7	0-30	$9,0x10^8$	$4,8x10^6$	$7,5x10^6$	$8,5x10^4$	$5,7x10^5$.
8	0-30	$7,5x10^8$	$4,5x10^6$	$6,8x10^6$	$7,5x10^4$	$5,5x10^5$

At the end of the bean growing season, it was found that the number of microorganisms in the soil increased relative to the initial values. However, it was found that the number of microorganisms in the soil decreased in variant 2, which applied a fertilizer-free control option and a mineral fertilizer rate of PK 90:60 kg/ha in the background untreated with nitrogen before sowing bean seeds grown as a repeat crop. It was found that the increase in the number of mineral fertilizers in backgrounds inoculated with nitrogen before sowing the seeds of beans grown as a repeat crop led to an increase in the number of ammonifiers, oligonitrophils, micromycetes, and actinomycetes compared to the control option.

According to research data, if the ammonifiers in variant 1 (control) were 4.2x107 koe / g, which were not treated with nitrogen and no mineral fertilizers were applied before sowing the seeds of beans grown as a secondary crop, the NPK 30: 90: 60 kg/ha norm of mineral fertilizers in the background, which was treated with nitrogen before sowing the seeds of bean crop, was 9.0x108 koe / g in variant 7.

If the number of spores was 3.5x106 koe / g in variant 1 (control) that was not treated with nitrogen and no mineral fertilizers were applied before sowing the seeds of beans grown as a secondary crop, 4.8x106 koe / g in variant 7, where the norm of mineral fertilizers NPK 30: 90: 60 kg/ha was applied in the background, treated with nitrogen before sowing the seeds of bean crops formed.

If the number of oligonitrophs was 8.2x105 koe / g in variant 1 (control) that was not treated with nitrogen and no mineral fertilizers were applied before sowing the seeds of beans grown as a secondary crop, the rate of mineral fertilizers NPK 30: 90: 60 kg/ha in the background treated with nitrogen before sowing the seeds of bean crops was 7.5x106 koe / g in option 7, which was applied. The same laws were observed for micromycetes and actinomycetes.

CONCLUSION

Inoculation of bean seeds with nitrogen before sowing and application of mineral fertilizers in different doses increased the amount of humus in the topsoil (0-30 cm) layer by 0.021-0.034% compared to the initial values, and the total nitrogen content by 0.006-0.009%.

It was found that the increase in the number of mineral fertilizers in the backgrounds inoculated with nitrogen before sowing the seeds of beans grown as a secondary crop led to an increase in the number of ammonifiers, oligonitrophils, micromycetes, and

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actinomycetes compared to the control option.

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