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Effect Of Sıderates On Soıl Agrochemıcal Properties

Sh.K.Egamberdiev[1], H.H.Salimova[2], I.N.Bobobekov[3], Sh.Sh.Nafetdinov[4], M.M.Sattorova[5]
[1] *Bukhara State University, assistant,*[2]*Bukhara State University, researcher*
[3]*Samarkand Institute of Veterinary Medicine, Ph.D. candidate*
[4]*Bukhara State University, Associate Professor ,*[5]*Bukhara State University, assistant*

Abstract

This article describes the effect of siderate crops on the amount of humus and mobile nutrients in the soil in the conditions of typical gray soils of Samarkand region. According to the results obtained, the use of green peas and amaranth plants as siderate crops in typical irrigated gray soils has a positive effect on the amount of humus and mobile nutrients in the soil and increases their amount.

Keywords: *soil, irrigated typical gray soil, siderate, sideration, green peas, amaranth, humus, ammonium nitrogen, nitrate nitrogen, mobile phosphorus*

INTRODUCTION

In recent years, as a result of the adaptation of agriculture to market relations, a new system of agriculture is emerging in the country. To date, short-term rotation is being introduced instead of the current crop rotation. This, in turn, further increases the urgency of solving the problem of soil fertility in the industry.
At present, the system of crop rotation is mainly used in the country. Sideration of this crop rotation, ie the introduction of green manure, remains a requirement of the times. That is, the use of organic fertilizers in restoring nutrient deficiencies in the soil has always been a problem, as the manure that forms its basis is always in short supply. Therefore, the use of siderates in irrigated agriculture, firstly, compensates for the lack of organic matter in the soil, and secondly - has a positive effect on the physical, chemical, biological properties of the soil.
Therefore, we aimed to study the effect of siderates on the humus content of the soil and the amount of mobile nutrients (NPK) required for plants in the conditions of typical gray soils of the Zarafshan oasis.
Materials and methods: The research was carried out according to the methods developed by UzPITI [1] in the conditions of typical gray soils in the fields of the farm "Akbar" Payarik district of Samarkand region. In the experiment, cotton variety S-8284 was planted. Field experiments were conducted in 6 variants. The number of returns in the variants was 4, and the number of shares was 24. The following options were used in our experiments: 1. Fertilizer-free option (control); 2.P140K100-Fon; 3.Fon + N200; 4. Background + Blue Pea; 5.Fon + Amarant; 6. Background + Blue pea + amaranth
The typical gray soils of the farm where the field experiment was conducted contained 1.10% humus, 0.114% gross nitrogen, 0.19% gross phosphorus, 2.5% gross potassium, 21.65 mgkg of N-NH4, 30.5% N-NO3, 28.8 mg / kg mobile phosphorus, 250 mg / kg exchangeable potassium were detected.

In the experiments, the amount of humus in the soil - by the Tyurin method, gross NPK - by Maltsev Gritsenko method, N-NH4 - by Nessler's reagent in FEK, N-NO3 - by Grandvald-Lyaju method, mobile phosphorus - by Machigin method in FEK, exchangeable potassium - flammable photometer - Protasov method, the reaction of the medium (pH) - potentiometric method in the ionometer. The obtained data were analyzed mathematically statistically by analysis of variance [2].
Results and their analysis: It is known that siderates are annual plants and are grown temporarily in fields that are not mainly occupied by cultivated plants. When siderates are planted, weeds in the field are relatively reduced, soil structure is improved, and the soil is enriched with nitrogen. Therefore, these crops are the cheapest and most environmentally friendly organic fertilizer. They can be sown from early spring to late autumn. These crops include green peas, peas, oats, rye, oats, radishes, sebarga, kashkarbeda, espartset, soybeans, annual raygras, barley, oats, triticale, buckwheat, sunflower, alfalfa,

rapeseed, mosh and other crops [14].

The term sideration was first proposed in the 19th century by the French scientist J. Will. The use of plants as green manure was first used in China and India 3,000 years ago.

We all know that today a lot of attention is paid to organic farming around the world. According to the most important rules of organic farming, the land should never be left empty. Because when the soil is empty, the nutrients in it are washed away, weeds increase in the fields, the soil structure is disturbed, as a result the topsoil is covered with loam, soil erosion increases.

Siderates are distinguished by the fact that they grow faster than other plants and accumulate green mass. These crops develop into thick leaves, which soon completely cover the space between the rows. Some crops, such as rye, inhibit the germination of seeds of other plants and stop their growth. As a result, weeds in rye fields are sharply reduced. Siderates have a strong, well-developed and branched root system, which leads to an improvement in soil structure. Their root system also helps move the nutrients needed for plants in the soil from one place to another. This in turn leads to an increase in nutrient elements in the soil. Siderates accelerate soil microbiological activity and enhance the effect of fertilizers [14]

Many years of experience in the country have shown that in October-April, ie before the sowing period, it is possible to grow intermediate crops on cotton fields, which increase soil fertility and prevent erosion. Intermediate crops not only enrich the soil with organic matter, but also help to prevent soil erosion under the influence of precipitation. Experiments have shown that the cultivation of siderate crops with a mixture of autumn rye and rapeseed increases the fertility of eroded soils, and instead of cotton increases its productivity by an average of 3.1-4.9 quintals per hectare. determines the status. Green manure optimizes its overall condition. After the hardrates are crushed and plowed with a heavy disk, the agrophysical, agrochemical and biological properties of the soil improve and the yield of cotton increases by 2.8-4.5 ts / ha depending on the type of siderate crop [4].

Siderat recommended sowing cotton in the fall in early October in the Fergana region, and in the spring sowing siderates no later than the third decade of April.

Siderate crops are a factor in improving the agro-ameliorative condition and increasing soil fertility, accelerating microbiological processes. Siderate crops allow good use and maintenance of soil moisture during the growing season. Therefore, soil moisture is much higher before irrigating cotton and other agricultural crops planted after siderate crops. When siderate crops are added to the soil, the formation of humus is accelerated, soil nutrition, heat, weather conditions, aggregation, water permeability, water permeability and a number of other agrophysical properties are improved. As a result, the yield of agricultural crops increases.

It is known that one of the most important elements in determining soil fertility is the amount of humus in it. The amount of humus in the soil depends on factors such as its mechanical composition, soil formation conditions, topography, type of crop, cultivation technology. Humus firmly binds soil mineral particles together, making it a granular structure. Soils with a large amount of humus are compacted quickly, less power and energy are used in mechanical processing, soil density is reduced. Organic matter is also of great environmental importance, reducing the effects of many adverse effects that occur when mineral fertilizers are applied, retaining excess nutrients and preventing leaching, neutralizing harmful compounds.

However, in recent years, due to improper crop rotation and regular planting of inter-row crops (cotton) as a monoculture, the amount of humus in the gray soils of Uzbekistan has significantly decreased. Over the next 40-50 years, the amount of humus in many irrigated soils of Uzbekistan has decreased by 40-50%. The average humus content in the average one-meter layer of most pre-irrigated soils does not exceed 0.8-0.9% [5,6].

When intermediate crops are used as green manure, it is concluded that the amount of humus in the driving layer of the soil increases by 12-17% and the thermal properties of the soil are optimal. Green manure protects the soil from irrigation erosion and has a positive effect on the leaching of harmful salts in saline soils, reduces soil salinity, as well as improves agrochemical properties and has a positive effect on increasing the yield of future crops [9].

Of course, this is due to the deep driving of organic and green manure, because deep driving slows down the mineralization of organic matter. For this reason, it is advisable to dig deep into the areas where intermediate crops are grown. Surface plowing of intermediate crops results in 1.5 times less humus accumulation and 2 times less total nitrogen accumulation than deep plowing [3].

Our research shows that the use of siderates in typical irrigated gray soils of Payarik district had a positive effect on the amount of humus in the soil (Table 1).

Our experiments showed that the amount of humus in all variants was 1.1% before the experiment, but by the end of the experiment it remained unchanged against the background of phosphorus and potassium fertilizers.

As a result of application of phosphorus and potassium fertilizers with 200 kg of nitrogen fertilizers per hectare, the amount of humus decreased by 1.05%. This can be explained by the acceleration of the mineralization process of organic matter in the soil under the influence of nitrogen fertilizers. Against the background of phosphorus and potassium fertilizers can be observed a significant increase in the amount of humus in the soil as a result of the use of green peas and amaranth plant as a siderate. The combined use of green peas and amaranth with mineral fertilizers as a siderate further increased the amount of humus.

According to the results of experiments conducted on typical irrigated gray soils of Payarik district of Samarkand region, siderates had a positive effect on the soil nutrient regime (Tables 2,3,4).

It is known that the presence of more or less total and mobile nutrients (N, P, K) in the soil depends on soil-forming rocks, minerals and rocks, microbiological activity of the soil, as well as the presence or absence of humus.

Nitrogen in the soil is mainly in the form of the following compounds: nitrogen in humus, nitrogen in ammonium (NH4 +) and nitrate (NO3-) salts, organic nitrogen in proteins and amino acids, peptides, amides and amines in their decomposition products. Since most of the nitrogen in the soil is stored in organic matter, the amount of nitrogen also depends on the amount of organic compounds, including humus. In most soils, nitrogen makes up 1/40 and 1/20 of the humus. The role of microorganisms in the biological accumulation of nitrogen from the atmosphere is great. Nitrogen is very low in soil parent rocks.

Nitrogen in soil complex organic compounds (humus) is transferred to plants in the form of ammonium and nitrate compounds after mineralization. This process works well in conditions where there is enough moisture and air enters. Ammonium ions are well absorbed into the soil, exchangeable and partially non-exchangeable (fixed). Nitrate ion is mainly present in the soil solution and is easily absorbed by plants. In conditions of high humidity, nitrates are washed away. Nitrogen plays a key role in the life of living organisms. Nitrogen is present in all proteins. In chlorophyll, it contains nucleic acids, phosphatides and many other organic substances. Therefore, nitrogen reserves in the soil are increased by adding mineral and organic fertilizers to the soil and crop rotation of alfalfa.

Nitrogen content in soils is around 0.3-0.4%, often not exceeding 0.1%. In some soils of Central Asia, the nitrogen content is as follows: in light gray tillage - 0.04-0.07, in ancient irrigated typical gray soils 0 , 08-0.12, 0.10-0.15 percent in ancient irrigated meadow soils and 0.20-0.50 percent in dark gray soils. In addition to the application of nitrogenous mineral fertilizers to the soil, the introduction of cotton-alfalfa rotation allows to accumulate an additional 400-600 kg / ha of biological nitrogen. This ensures that plants are effectively fed with nitrogen and get high yields from them [11].

Based on the above data, we planned to study the effect of siderates on the amount of nitrogen in the form of ammonium and nitrate in the soil.

Experiments have shown that in the case of no fertilizer and siderate crops, the content of ammonium nitrogen in the soil was 20.1 mg per 1 kg of soil in the period of 3-4 leaves of cotton, 18.6 in the lactation phase; 11.8 in the flowering phase; was 10.5 mg during the coagulation phase (Table 2).

Against the background of 140 kg of phosphorus and 100 kg of potassium fertilizers per hectare without planting siderates, nitrogen in the form of ammonium in the soil was 22.0, respectively; 20.0; 16.1; 17.4 mg / kg. The use of 140 kg of phosphorus and 100 kg of potassium fertilizers per hectare with 200 kg of

nitrogen fertilizers and the use of green peas and amaranth crops as siderates without the use of nitrogen fertilizers, as well as the use of phosphorus and potassium fertilizers with green peas and amaranth crops increased the amount of ammonium nitrogen.

Our experiments showed that in the variant in which green peas were planted as a siderate crop, the amount of nitrogen in the form of ammonia was higher than in the variant in which amaranth was planted, and the highest amount was observed in the milking phase of cotton (27.7 mg / kg). As a result of sowing green peas together with amaranth as a siderate, the amount of ammonium nitrogen in typical gray soils increased to 28.5 mg per hectare. That is, the application of a mixture of amaranth and blue pea on the background of RK provided a clear advantage in increasing the amount of ammonium nitrogen in the soil.

However, in all phases of the cotton growth period, siderates were found to produce ammonium nitrogen amounts close to the full norm of mineral fertilizers.

Planting amaranth and green peas separately and in combination with phosphorus and potassium fertilizers from siderate crops under typical gray soil conditions also had a positive effect on the amount of nitrogen in the form of nitrate in the soil.

Experiments have shown that the maximum amount of nitrogen in the form of nitrate was obtained in the variant of mineral fertilizers applied per hectare on the background of P140K100 with 200 kg of nitrogen fertilizers. In this option, the amount of nitrogen in the form of nitrate in the soil was higher than in the other options. That is, the amount of nitrogen in the form of nitrate in this variant in 1 kg of soil is 27.8 in the phase of 3-4 leaves of cotton, 30.0 in the phase of mowing; 33.0 in the flowering phase; and 28.6 mg in the cocoon collection phase. The high content of nitrogen in the form of nitrate in this variant compared to other options is due to this applied nitrogen fertilizer.

Against the background of phosphorus and potassium fertilizers without the use of nitrogen fertilizers, the amount of nitrogen in the form of nitrate also increased in the variants applied to siderate crops, but slightly less than in the variant used nitrogen fertilizers. Of the siderate crops used, the nitrate nitrogen content was higher in the green pea planted variant than in the amaranth planted variant. This situation can be explained by the fact that blue peas accumulate more nitrogen than amaranth.

Many issues in agriculture can be solved through the extensive use of intermediate crops in crop rotation, first of all, crop rotation plays an important role in the management of the type and number of microorganisms in the soil. As a result of the separation of organic matter and roots due to the sowing of intermediate crops, microbiological processes are accelerated and soil fertility is increased. Also, as a result of the positive effect of intermediate crops on the same group of microorganisms in the soil, there is a reserve of phosphate compounds that are assimilated for the plant in the soil [7,8].

The total amount of phosphorus in the main soil types in Uzbekistan is 0.08-0.3%. In the tillage layer of irrigated light gray soils there is 0.4% of total phosphorus, while in light gray soils, which have been developed and irrigated for 30 years, it is 0.19; in true gray soils - 0.21; 0.8 in old irrigated meadow soils; in meadow marshy soils - 0.14-0.17 percent and in dark gray soils 0.15-0.17 percent.

If the total amount of phosphorus is taken as 100 percent, of which 10-20 percent is organic phosphorus, the rest (80-90 percent) is mineral phosphorus. Organic phosphorus in the soil plays an important role in plant nutrition. However, such phosphorus is assimilated by the plant only after it has become a mineral [10].

Phosphorus in soils is found in organic and mineral compounds. These compounds are insoluble in water and difficult to absorb by plants. The amount of phosphorus in organic compounds is much lower than in phosphorus in mineral compounds.

In our experiments on the driving layer of typical irrigated gray soils of Payarik district of Samarkand region, it was found that the siderate crops used have a positive effect on the amount of mobile phosphorus. Studies have shown that the amount of mobile phosphorus in the soil is 22.5-23.2 mg per 1 kg of soil before the experiment.

During the mowing phase of cotton, the amount of mobile phosphorus in the soil varied by variants and types of siderates, and the highest value was observed against the background of complete mineral fertilization and amounted to 32.1 mg / kg

The highest amount of mobile phosphorus in the studied siderate variants was observed in the amaranth and blue pea mixture variant of 30.1 mg / kg. By the time of the cocoon accumulation phase, the amount of mobile phosphorus in the soil was higher than in the variants where mineral fertilizers were applied in the siderate-planted variants. We believe that such action is due to the decomposition of organic matter in the soil and the course of chemical processes in the soil.

Conclusion

In general, the use of green peas and amaranth crops as a siderate has a positive effect on the amount of humus and mobile nutrients in the soil and significantly increases their amount.

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