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APPLICATION OF LOCAL AND MINERAL FERTILIZERS DEPENDING ON THE LEVEL OF SOIL SUPPLY

Kh. Muydinov,
Associate Professor

G. Rakhmatullaev,
PhD, Andijan Regional Branch of the Institute of SSAR
muydinovxoshimjon@gmail.com

Abstract

This study examined the impact of soil reserves and soil minerals on improving utilization efficiency. This work shows the importance and benefits of local and mineral fertilizers for improving soil quality, plant growth and development. In addition, the study focuses on the differentiated use of local and mineral fertilizers depending on the level of their availability.

Keywords: Soil fertility, local fertilizers, mineral fertilizers, fertilizer efficiency, soil nutrients, plant growth support, soil structure, agrochemical research, soil protection.

Introduction

In order to ensure the implementation of the Decree of the President of the Republic of Uzbekistan “On the State Program for the Implementation of the Strategy of Actions on Five Priority Areas of Development of the Republic of Uzbekistan in 2017-2021 in the “Year of Active Investments and Social Development” dated January 17, 2019 No. PF-5635 and the Resolution “On Measures for the Development of Agricultural Cooperation in the Fruit and Vegetable Sector” dated March 14, 2019 No. PQ-4239, as well as to maintain and increase soil fertility, constantly monitor the level of soil nutrient supply in agricultural lands, develop agrochemical cartograms to determine the scientific demand of agricultural crops for mineral fertilizers, and establish a system for the stratified use of mineral fertilizers in contours in accordance with the condition of the soil and the type of crop, the Cabinet of Ministers of the Republic of Uzbekistan Research is being conducted to ensure the implementation of Resolution No. 510 of June 18, 2019 "On measures to improve the agrochemical analysis system of soil in agriculture and increase soil fertility on arable land."[1]

This is aimed at determining the level of humus, mobile phosphorus and exchangeable potassium in soils on the basis of conducting agrochemical research on not less than 20% of irrigated agricultural land annually, and on this basis, developing a scientific basis for annual mineral fertilizers for agricultural crops. As a result, it will be possible to improve soil fertility, crop yield and the balance of nutrients in nature.

That is why in ancient times, various means (manure, ash, lime, food waste) were used to increase soil fertility and restore the amount of nutrients lost from the soil. Over time, the demand for plant nutrients was studied by a number of scientists, and a new method was developed - namely, a

[1] https://lex.uz/docs/4380635?ONDATE=22.04.2024

system of mineral fertilizer application. Until now, the productivity of cultivated crops in all regions of the globe did not differ sharply from each other.

The great agrochemical scientist of the 20th century D.N. Pryanishnikov stated that the expected result can be achieved by determining the annual rate of mineral fertilizers, taking into account the amount of nutrients that plants can absorb in the soil, the demand for nutrients by crops, and the amount of their output with the crop and various parts. The reason for this opinion is that the correct application of mineral fertilizers is very complicated, it requires taking into account many factors and conditions. Today, intensive farming has developed all over the world, including in our republic, and has reached a new stage, and it has become clear that in all parts of the Earth's crust, plants are mainly grown in soil conditions (99.6%). Therefore, it has been scientifically substantiated that it is possible to provide the population with safe, environmentally friendly food products only by increasing the amount of yield per hectare. This indicates the need to increase crop yields through the widespread use of modern techniques and technologies. In addition, nitrogen, phosphorus, potassium and other fertilizers are used in different amounts and proportions every year. As a result, the amount and proportions of nutrients in intensively cultivated, i.e. irrigated, soils change from year to year, moving from a group of low to a group of very low nutrient supply.

Therefore, it is very important to establish the annual norms of mineral fertilizers based on agrochemical maps and re-establish this system. Determining fertilizer norms based on agrochemical maps will increase not only crop yields, but also soil fertility and fertilizer efficiency, ultimately saving the economy of all land users, maintaining the fertility of irrigated arable land, and improving the balance of nutrients in nature from year to year.

Mineral fertilizers are of great importance in obtaining abundant and high-quality crops from cotton and winter wheat crops. When phosphorus-containing mineral fertilizers are applied in appropriate rates and terms, the average cotton yield increases from 3.6 to 7.8 tons/ha. The effectiveness of phosphorus fertilizers largely depends on the soil-climatic region, soil type, level of cultivation, applied agrotechnics and the amount of mobile phosphorus and exchangeable potassium in the soil. In order to obtain high results from the applied mineral fertilizers, it is necessary to correctly and effectively use the recommendations and instructions for fertilizer application.

To achieve this goal, set by our government on the basis of relevant resolutions, the following tasks were set, including the development of agrochemical maps of soil in irrigated agricultural lands, the introduction of a system for determining the residual amount of pesticides, nitrates and heavy metal salts in agricultural products, the determination of the score of agricultural lands, the creation of agrochemical maps by the level of phosphorus and potassium supply, the development of recommendations for the effective use of organic and mineral fertilizers, the creation of electronic maps by the level of nutrient supply, the creation of an agrochemical database based on modern geoinformation technologies, and the analysis of their periodic changes.

LITERATURE ANALYSIS AND METHODS

The following geomorphological regions were distinguished on the territory of Karakalpakstan by N.V. Kimberg, M.I. Kochubey, S.A. Shuvalov:

1. The "Living" part of the current delta of the Amu Darya;

2. The current modern delta of the Amu Darya;
3. The ancient delta of the Amu Darya (Amu Darya delta);
4. Kyzylkum;
5. Ustyurt;
6. Supa - the relict plateau of the peak;
7. The Sultan Uvays lowlands;
8. Togaldi plains;
9. Marine deposits of the Quaternary age.

Soil-geographic zoning was carried out according to the geomorphological regions distinguished by the above-mentioned authors and the following soil-geographic regions were distinguished:

I. Amu Darya Delta

1. The region of "Living" delta semi-alluvial soils;
2. The region of "Living" delta automorphic soils;
3. Modern delta irrigated meadow soils region;
4. Modern delta automorphic soils region.

II. Ancient delta of Akcha-Darya

1. Irrigated meadow soils of the Kara-Ozek region;
2. Irrigated meadow soils with a thick agroirrigation horizon of the Tortkul region;
3. Automorphic soils of the Akcha-Darya region.

III. Ustyurt

1. The region of upland brown soils of the eastern part of Central Ustyurt;
2. The region of saline-sandy lowlands of North Ustyurt (Zharin-kuduk);
3. The region of Borsa-Kelmas saline-sandy lowlands;
4. The region of Kara-Baur upland brown soils;
5. The region of saline-sandy lowlands of Assaka-Kaudan and Sarikamysh;
6. South Ustyurt upland with grayish brown soils.

IV. Kyzylkum plateau

1. Karakalpakstan red sand grayish brown soils and sands region;
2. Beltog upland with grayish brown soils region.

V. Sultan Uvays lowlands

1. Grayish brown soils, partly rocky mixed rocks, steep slopes and boulders region;
2. Grayish brown soils region of the foothill plains.

VI. Aral Seaside Accumulative Plain

Seaside salt flats region.

For example: Karakalpakstan has lost the importance of its hunting (hunting) sector, including the fishing sector, the quality of pastures has deteriorated, the number of cattle has decreased, and the production rates of livestock products have sharply decreased Kamalov, 1998.

Estimated amount of nitrogen, phosphorus and potassium removed from the soil per unit yield (t) of certain crops, kg (N.M.Gorodniy, 1990)

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Table 1

Crop type		N	P_2O_5	K_2O
Autumn rye		31.0	14.0	26.0
Autumn wheat		37.0	13.0	23.0
Bakhorgi wheat		47.0	12.0	18.0
Barley		29.0	11.0	20.0
Oatmeal		33.0	14.0	29.0
Tariq		33.0	10.0	34.0
Grechikha		30.0	15.0	40.0
Russian peas		30.0	16.0	20.0
Peas		66.0	16.0	20.0
Linen fiber		80.0	40.0	70.0
Cultivated cannabis		15.0	7.0	12.0
Cotton		45.0	15.0	50.0
Potatoes	Bokhorgi	5.0	1.5	70,
	autumn	6.0	2.0	9.0
Sugar beet		6.0	2.0	7.5
Corn (green mass)		2.5	1.0	3.5
Hashaki beetroot		4.9	1.5	6.7
Hashaki turnip		4.8	1.7	5.7
Carrot soup		3.2	1.6	5.0
White head cabbage		3.3	1.3	4.4
Tomato		2.6	0.4	3.6
Cucumber		1.7	1.4	2.6
Onion		3.0	1.2	4.0
To Sebar hay		19.7	5.6	15.0
Alfalfa hay		26.0	6.5	15.0
Black how hay		15.5	7.0	24.0
Vika hay		22.7	6.2	10.0
Meadow hay		17.0	7.0	18.0
Tea		50.0	7.0	23.0

RESULTS

Our research has obtained the following data on the content of humus, mobile phosphorus and exchangeable potassium in irrigated soils of the Karauzek district.

The research was carried out in irrigated agricultural lands of the Karauzek district, and in order to compile an agrochemical cartogram, the content of humus, mobile phosphorus and exchangeable potassium in the soil was determined in laboratory conditions. The total irrigated land area of the district is 32759.0 hectares, and it was determined that 4869.7 ha of humus is very low, 12928.9 ha is low, 12483.1 ha is medium, 2337.0 ha is high, and 140.4 ha is high. According to the levels of supply of active phosphorus, it was determined that 21519.5 ha of the area were very low, 9652.3 ha of the area were low, 1485.6 ha of the area were medium, 61.1 ha of the area were high, and 40.5 ha of the area were very high. It was determined that 198.8 ha of the area were very low, 21675.7 ha of the area were low, 9831.3 ha of the area were medium, 807.4 ha of the area were high, and 245.8 ha of the area were very high.

So, it is clear from the above data that in order to achieve high efficiency from crops and soil, it is necessary to apply mineral and local fertilizers in a differentiated manner.

Differential stratification of local and mineral fertilizers in the cultivation of cotton and wheat crops.

It requires the implementation of special agromelioration, physico-chemical and agrochemical scientific-based agro-measures in the management of agriculture. The level or amount of humus and nutrient elements of soils determines their reserves in genetic layers. This is of great importance in determining annual local mineral fertilizer standards and setting fertilizer standards on this basis.

In our study, the use of local fertilizers on soils with different levels of humus was given

- *very little supply* of humus ;
- 25 t/ha to areas with ***low supply*** of humus
- 20 t/ha to areas with ***average supply*** of humus ;
- 10 t/ha to areas with ***more humus;***
- it is recommended to apply 5 t/ha of local fertilizers (manure) once in 3 years to areas rich in humus (table 2 ***)*** .

Table 2 The amount of local fertilizers required according to the level of humus supply, *t/ha*

No	Availability level and in the soil hummus quantity		Learned area , ga	Recommendation done local fertilizer (manure) quantity , ***tons per hectare***	Total demand to be done local amount of fertilizer (manure) , ***in tons***
	group	supply , %			
1.	Very less	< 0.40	**4869, 7**	30	146091
2.	Few	0.41 - 0.80	**12928.9**	25	323222.5
3.	Average	0.81 - 1.20	**12483, 1**	20	249662
4.	More	1.21 - 1.60	**2337 .0**	10	23370
5.	A lot	1.61 – 2.00	**140, 4**	5	702
6.	High	> 2.01			
total :			**32759.0**		**743047.5**

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Table 3 Depending on the level of availability of mobile phosphorus, the rate and annual amount of phosphorus mineral fertilizers required for the formation of 1 quintal of cotton and wheat crops

No	Availability level and in the soil mobile phosphorus quantity		Learned area , *to*	1 centner for spend to be **pure without** phosphorus , ***kg/ ha***	1 centner for total to the field demand to be done **pure in case** phosphorus quantity , ***tons at the expense of***	1 centner for spend to be **pure without** phosphorus , ***kg/ ha***	1 centner for total to the field required **pure in case** phosphorus quantity , ***tons at the expense of***
	group	supply , mg / kg					
1.	Very less	< 15	**21519.5**	7.40	159.2	4.60	99.0
2.	Few	16 - 30	**9652.3**	5.70	55.0	3.60	34.7
3.	Average	31-45	**1485.6**	4.10	6.1	2.60	3.9
4.	A lot	46-60	**61.1**	2.50	0.2	1.50	0.1
5.	Very a lot	> 60	**40.5**	1.5	0.1	0.9	0.0
total :			**32759.0**		**220.6**		**138.0**

According to the above results,

- ***kg /ha for 1 quintal*** of cotton, and 4.6 kg/ha for wheat;
- ***kg /ha for 1 quintal*** of cotton, and 3.6 kg/ha for wheat;
- ***kg*** /ha for 1 quintal yield of cotton, and 2.6 kg/ha for wheat ;
- ***kg*** /ha for 1 quintal yield of cotton, and 1.5 kg/ha for wheat ;
- 1.5 kg/ha of cotton and 0.9 kg/ha of wheat are required for the formation of 1 quintal of cotton grown in areas with a high supply ***of mobile*** phosphorus (Table 3).

Table 4 of exchangeable potassium, the rate and annual amount of potassium mineral fertilizers required for the formation of 1 quintal of cotton and wheat crops

No	Availability level and in the soil exchanger potassium quantity		Learned area , *to*	1 centner for spend to be **pure without** potassium , ***kg/g***	1 centner for total to the field demand to be done **pure in case** potassium quantity , ***tons at the expense of***	1 centner for spend to be **pure without** potassium , ***kg/ ha***	1 centner for total to the field demand to be done **pure in case** potassium quantity , ***tons at the expense of***
	group	supply , mg / kg					
1.	Very less	< 100	**6601.6**	2.11	13.9	1.08	7.1
2.	Few	101-200	**18091.4**	1.67	30.2	0.79	14.3
3.	Average	201-300	**7249.5**	1.25	9.1	0.52	3.8
4.	A lot	301-400	**576.0**	0.83	0.5	0.39	0.2
5.	Very a lot	> 401	**240.5**	0.42	0.1	0.26	0.1
Array according to total :			**32759.0**		**53.8**		**25.5**

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- 11 kg/ha for the formation of 1 quintal of cotton ***, and*** 1 , 08 kg/ha for wheat ;
- 1.67 kg/ha for 1 quintal yield of cotton cultivated in areas with ***low supply of*** **exchangeable** potassium , and 0.79 kg/ha for wheat;
- **kg** /ha for 1 quintal yield of cotton, and 0.52 kg / ha for wheat;
- 0.83 kg/ha and 0.39 kg/ha for wheat for 1 quintal yield of cotton grown in areas rich ***in*** **exchangeable** potassium ;
- 0.26 kg/ha of potassium mineral fertilizer are required for the formation of 1 quintal of cotton grown in areas with ***abundant supply of*** **exchangeable** potassium. (Table 4).

CONCLUSION

Based on the information obtained, it is necessary to use scientific recommendations to obtain high yields from agricultural crops and to maintain and increase soil fertility.

1. The implementation of the crop rotation system in practice and its development, based on the quality assessment of soils, will lead to planting cotton and wheat crops in areas with high soil quality, and salt-tolerant food crops and legumes in areas with low soil quality, which will lead to the health (desalination) of the land in a short time. It will also ensure the economic stability of all land users and the production of high-quality and significant yields from agricultural crops will also create a basis for improving soil fertility.

2. To compensate for the lack of local fertilizers in the regions, it is necessary to grind the stalks and residues of cultivated cotton and other agricultural crops and put them under the plow, and to eliminate the cases of burning the stalks of grain crops in order to avoid severe damage to organic matter that increases soil fertility and the living phase of the soil.

3. In lands moderately affected by irrigation erosion, the cotton yield decreases by 5-6 t/ha, and in lands severely eroded by 8-10 t/ha, that is, the cotton yield decreases, and its quality also decreases. To prevent and reduce this, it is necessary to set irrigation standards depending on the slope of the soil surface, and in addition, apply organic and mineral fertilizers in layers depending on the degree of leaching.

4. For the productive and effective use of land, it is advisable to regularly inventory (inspect) irrigated arable land in the existing areas of the district, first of all, identify lands in need of improvement, conduct agro-ameliorative measures in such areas that improve the amelioration condition of the soil and ensure high productivity, and conduct periodic observations on the ameliorated areas.

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