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U.B. Kunnazarov
Nukus branch of Tashkent State Agrarian University
Doctoral candidate at Investment activities in melioration and water management Department
Uzbekistan, Nukus

K.J. Kunnazarova
Karakalpak State University named after Berdakh
Magister student at Biology Faculty
Uzbekistan, Nukus

INFLUENCE OF AGROCHEMICAL PROPERTIES ON GROWTH AND DEVELOPMENT OF CORN PLANT

Abstract: *The article provides information on the agrochemical properties of corn in the northern region of the Republic of Karakalpakstan. Chimbay district was selected as an experimental area. When studying the agrochemical properties of irrigated weakly saline meadow-alluvial soils, the amount of humus in the upper layers in the spring was up to 0,84%, in the under arable layer - up to 0,58% and in the autumn from 0,78% in the 0-28 cm layer and up to 0,51% in the 28-43 cm layer. The data obtained show that the soils of the studied area are characterized by the fact that they are not very rich in humus. The distribution of humus in soil profiles is based on certain laws. In all soils, large amounts of humus are distributed in the upper horizons, while very small amounts of humus are observed in the lower layers.*

Key words: *Agrochemical properties of soil, irrigated land, soil fertility, the mechanical composition of the soil, soil profile.*

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Introduction

Globally, 40% of food and 60% of cereals come from irrigated land. The high efficiency of irrigated lands provides an incentive to increase their area around the world. Although crop yields have increased by 40% in the last 20 years, the amount of water consumed per hectare has remained largely unchanged over the last 100 years. Globally agricultural land area is approximately five billion hectares, or 38 percent of the global land surface. About one-third of this is used as cropland, while the remaining two-thirds consist of meadows and pastures) for grazing livestock. [2]. Today, there is a shortage of clean drinking water and shortage of water resources irrigation of agricultural crops among the world's population.

In our country, 90-120 days after the harvest of autumn wheat is a non-cold period, which allows to grow crops. One of the important tasks is to cultivate high and quality products on the basis of a positive or active temperature supply of water to the areas freed from autumn wheat, the growing season of crop varieties, improving the technology of cultivation, taking into account the characteristics of their yield. In this regard, there is a need to identify an irrigation system for corn varieties grown in Karakalpakstan, and to develop an improved irrigation system for water-consuming associations. Today, more than 600 million tons of corn is grown in the world, and it is traditionally ranked first in terms of cultivation compared to the main grain.

Corn is a versatile agricultural crop and is widely used for fodder, technical and food purposes. Corn is

one of the main grain crops, its cultivation area is spread almost everywhere. This crop, according to FAO, ranks third in the list of cultivated crops by area and leads the world in gross grain yield, second and third [2].

By 2020, it is planned to plant 29929 hectares of corn in the Republic of Karakalpakstan, of which 3,840 hectares will be planted in Chimbay district from the Northern districts. As a secondary crop, it is planned to plant 5600 hectares of land in the country, including 550 hectares of corn varieties and hybrids in Chimbay district [1].

Materials and methods

Optimal norms and timing of irrigation of newly created corn varieties are being developed and applied to a wide area. In order to study the effect of irrigation methods of corn on the agrophysical properties of the soil in 2019-2020, the Karakalpak Agricultural Research Institute conducted scientific research in the conditions of meadow-alluvial soils of experimental fields. Agrophysical properties of soils were studied in the experimental fields in early spring, after each irrigation, and at the end of the season (table 1).

Agrochemical properties of soils were conducted in accordance with the Methodological Manual of Determination of Agrophysical, Agrochemical and Microbiological Analysis of the Uzbek Cotton Research Institute [7]. Observations on the growth and development of corn were conducted in accordance with the methodological manual "Methods of conducting field experiments" (UzPITI, 2007) [8].

The study of agrochemical and chemical properties of soil determines soil fertility, saturation with essential nutrients and organic matter, as well as the amount of salts in it, which determines soil fertility and can greatly contribute to quality, abundant yields.

Humus is a substance that determines the fertility of the soil, i.e. a high or low amount of humus is an indication of whether its fertility is high or low. Therefore, many scientists have noted in their scientific work that the formation of humus, its role in soil formation, plays an important role in the smoothing of microbiological processes, improving agrophysical properties and nutrient regime.

Table 1. Agrochemical properties of soils in the Northern region of the Republic of Karakalpakstan

Depth of layers, sm	In the spring					
	Humus, %	Gross, %			Movable, mg/kg	
		N	P	K	P_2O_5	K_2O
Average, 2020						
0-28	0,84	0,089	0,163	1,63	16,0	136
28-43	0,58	0,056	0,139	1,51	10,20	125
43-55	0,49	0,040	0,118	1,18	8,10	105
55-61	0,29	0,022	0,090	1,08	3,30	94
61-73	0,33	0,018	0,066	1,00	3,10	86
73-91	0,26	0,010	0,048	0,80	2,50	75
91-131	0,24	0,012	0,045	0,80	2,30	78
131-160	0,22	0,010	0,043	0,80	2,00	77
Depth of layers, cm	In the autumn					
	Humus, %	Gross, %			Movable, mg/kg	
		N	P	K	P_2O_5	K_2O
Average, 2020						
0-28	0,78	0,055	0,120	1,31	13,00	103
28-43	0,51	0,038	0,100	1,20	9,00	90
43-55	0,43	0,036	0,079	1,12	6,50	78
55-61	0,28	0,022	0,060	1,00	3,43	54
61-73	0,26	0,014	0,050	0,90	2,74	40
73-91	0,10	0,010	0,032	0,60	2,10	38
91-131	0,10	0,011	0,030	0,40	2,20	42
131-160	0,10	0,010	0,030	0,31	2,00	39

The data obtained show that the soils of the studied area are characterized by the fact that they are not very rich in humus. The distribution of humus in soil profiles is based on certain laws. In all soils, large amounts of humus are distributed in the upper

horizons, while very small amounts of humus are observed in the lower layers (Table 1).

The experimental field soils are light in mechanical composition, heavier on the lower side, meadow-alluvial soils, low and moderately saline. The groundwater level was 1.7-2.0 m at the beginning of the period and 2.3-2.6 m at the end of the period.

Results

When studying the agrochemical properties of irrigated weakly saline meadow-alluvial soils of the Karakalpak Agricultural Research Institute in the northern region, the amount of humus in the upper layers in the spring was up to 0,84%, in the under arable layer - up to 0,58% and in the autumn from 0,78% in the 0-28 cm layer and up to 0,51% in the 28-43 cm layer (Fig. 1).

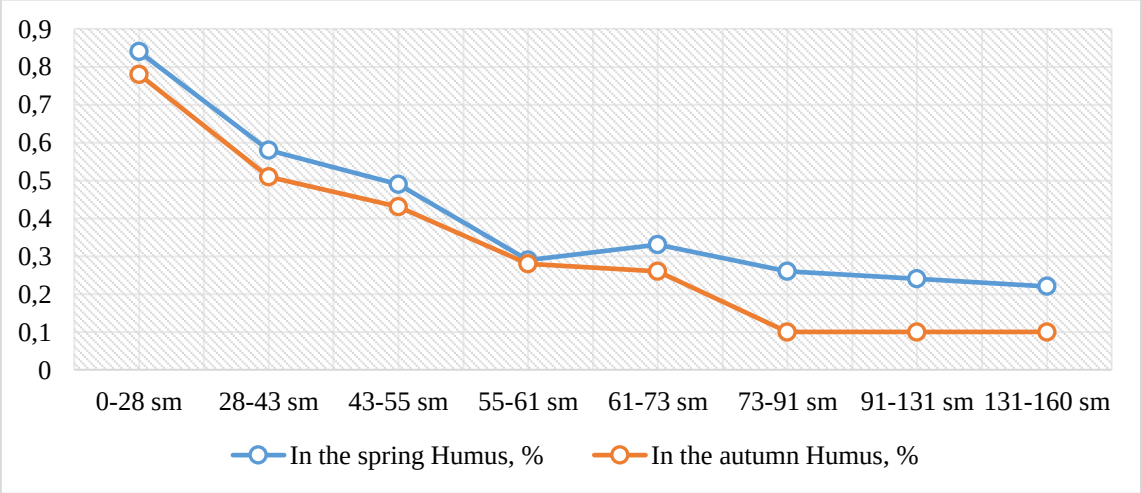

Fig.1. The amount of humus in the soil

Here the amount of humus in the under arable layer and in the deep horizons its amount gradually decreases. The distribution of the amount of humus in these soils along the profile is explained by the mechanical composition of the soil, the duration of the irrigation period and the salinity properties [3, 4, 5].

The humus layer is visible in short horizons, while the amount of humus in the deep layers decreases sharply. Lack of humus is primarily due to low vegetation cover, a decrease in microorganisms and enzymes in the soil [6, 9]. This indicates that the melioration status of these soils is much heavier.

Many scientists have done research on the effects of nitrogen on plant growth and development. Nitrogen is divided into insoluble species by hydrolysis with water-soluble acid in the soil. The plant assimilates the mineral state of nitrogen (ammonium and nitrate state) better than organic compounds. Among the organic compounds, urea, asparagine, and glutamine are more easily absorbed by the plant. Nitrogen is rapidly released from these compounds, and the plant assimilates it. The plant assimilates nitrate and ammonium nitrogen in the same way, but the plant consumes much energy until it converts the nitrate form to the ammonium state. The more potassium and nitrates in the soil, the better the plant absorbs nitrate nitrogen, the more magnesium cations in the soil, the better the absorption of ammonia. In terms of humus content of the studied soils, it was found that the total nitrogen content in these soils was also not very high due to their poverty. According to the data obtained, the highest values of gross nitrogen were observed in the upper 0-28 cm layer of all studied soils, 0,089% in spring and 0,055% in autumn. It was found that the amount of nitrogen gradually decreased as it deepened along the profile, according to the table, the lowest value was observed in the 73-91 cm layer of the soil layer was 0.010%. The distribution of the total amount of nitrogen in these soils along the profile is explained by the mechanical composition of the soil, the degree of salinity.

Phosphorus is the second most important nutrient in plant nutrition after the nitrogen. It is believed to contribute to the faster ripening of the plant's fruits [10]. The amount of total phosphorus in the swampy meadow-alluvial soils of the experimental areas of the Karakalpak Agricultural Research Institute in the northern region is 0.163% in the arable layer and 0.120% in the autumn, while in the lower horizons their content decreased. The fact that the total amount of phosphorus is mainly high in the upper horizons can be attributed to its biological accumulation in these layers.

The element potassium plays a special role in the growth and development of the plant. This element

accumulates more in the young organs of the plant, enters the chlorophyll composition and actively participates in photosynthesis processes. In the northern region, potassium was found to fluctuate in the upper layers of soils by 1.63% and in autumn by 1.31%, and as it deepened along the soil profile, its amount decreased depending on the amount of humus and mechanical composition in the soil.

Conclusion

In saline meadow-alluvial soils, the volume mass, specific gravity and porosity of the soil vary depending on the irrigation system of the corn. When we carried out the irrigation system of corn in the order of 80-80-60 % relative to the Limited Field Wet Capacity, it was observed that the agrophysical properties of the soil were acceptable.

The main source of phosphorus nutrition for plants is its movable forms. Its amount was found to be around 16,0 mg/kg in spring and 13,0 mg/kg in autumn in the upper layer of soils of the Northern region.

It is known that the amount of exchangeable potassium plays an important role in plant nutrition. It is also one of the elements of great importance in the life of plants, along with a positive effect on their physicochemical properties. Thus, it was found that the amount of exchangeable potassium in the soils of the Northern region fluctuates between 75-136 mg/kg in spring and 38-103 mg/kg in autumn. Hence, the arable layer of the experimental field was moderately supplied with mobile phosphorus and lowly supplied with nitrate-nitrogen exchangeable potassium.

The following conclusion can be drawn from the given data: To get a high and quality crop of corn, it is necessary to feed it more with nitrogen and potassium, moderately with phosphorus.

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