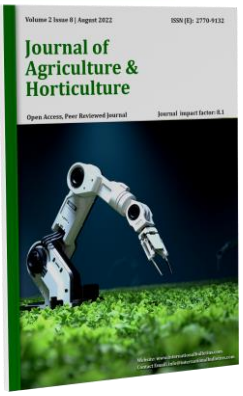

THE IMPACT OF NUTRIENT ELEMENTS ON THE MECHANICAL COMPOSITION, WATER-PHYSICAL PROPERTIES AND MELIORATIVE STATUS OF IRRIGATED MEADOW BROWN AND MEADOW SOILS

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Abstract. Soils are diverse in terms of type and composition. Under the influence of various factors (fertilizers, irrigation, etc.), soil properties can change. Soil fertility depends more on the nutrients added to the soil during tillage. The demand for organic food production is increasing, which requires a revival of the practice of using organic fertilizers, including non-conventional fertilizers. One of these organic amendments is compost made from waste and plant residues. In this research, we investigated the effect of compost ratio and amount on the physicochemical properties of irrigated meadow-brown and irrigated grassland soils. The relevance of the topic is that the mechanical composition, water-physical properties and meliorative condition (used fertilizers) of irrigated meadow-brown and grassland soils studied in the research were influenced by nutritional elements.

Key words. Irrigated meadow-brown and grassland soil, water-physical properties and meliorative status, salinity level and type, nutritional elements.

Introduction.

The distribution of the world's soils is not the same, but the soils of each region are appropriately divided into types, and the climate always has an effect them. Changes in soil properties under the influence of climate will also change future crop yields. In addition, under the influence of the human factor, soil cultivation (fertilization, agrotechnics, irrigation and other agro-measures) changes the properties of soils.

Regarding maintaining and increasing soil fertility in our republic, for example, in the research conducted by J.S. Sattorov, R.Q. Kuziev, O.K. Komilov [1, 51 b] on soil reclamation and improvement, came to the conclusion that the specific priority aspects of irrigated soil types were not taken into account. Therefore, research is aimed at taking into account the genetic properties and characteristics of the soil type, the health-geographical conditions, especially the soil-climatic conditions.

The selected research area is located on the desert zone, and occupies the lowlands of the western part of the Zarafshan valley and the territory up to the eastern part of the Kyzylkum desert (Plateau). [2-36 p.]

As the object of the research, the irrigated meadow-brown and meadow soils distributed in the Kyzyltepa district of Navoiy region were chosen.

Research methods. Field research, taking soil and plant samples, agrochemical analysis, phenological observations, based on the methodical manual "Methods of conducting field experiments", "Metodika polevogo opyta" (B.A. Dospekhov, 1985) [3, 248-255 p], chemical analysis of soil samples " Methods of agrochemical analyzes of soils and plants in Central Asia", [5, 12-18 p].

Results: The irrigated soils of the Toshrabot area, Kyziltepa district, Navoi region, where field research is being conducted, are the soils of the Malikchol region. It is located in the desert region, occupying the low plains of the western part of the Zarafshan Valley and the territories of the eastern part of the Kyzylkum desert. The place where the field experiment was conducted is the third geomorphological structure: the place in the trough-shaped bend of the Oftobachi plateau. In the next period, i.e. in the 60s and 70s of the 20th century, the exploitation of large areas of brown soil with a reddish hue caused the groundwater to settle near the surface of the earth. As a result, the development of secondary salinization processes began in irrigated lands. The processes of formation of the initial automorphic yellowish brown soils change to the processes of formation of hydromorphic, semi-hydromorphic soils. Although irrigated meadow-brown or irrigated meadow soils have been studied by many scientists, they have not yet been thoroughly analyzed for this area in terms of genetic-geographical and ecological reclamation.

Based on long-term observational data, conducting an experiment in the region of Malikchol has gained special importance. If we compare the surface temperature of Malikchol soil with the air temperature, we can see that it is higher than the air temperature in the top layer of the soil for 10 months, and only in November and December the negative indicator is observed. In autumn and winter, the difference between the soil surface and the air temperature is not very big. Based on long-term observational data, conducting an experiment in the region of Malikchol has gained special importance.

From the selected "base areas" for field experiments, i.e., in irrigated meadow-brown and meadow soils, soil sections (2A and 2B) were placed, and soil and seepage water samples were taken from their genetic horizons for chemical analysis, and the necessary types of analysis were carried out.

Description of morphological characteristics (morphological characteristics) of irrigated meadow-brown soils of irrigated fragment color 2 A section taken on 08.09.2022:

0-28 sm. Yellowish brown, very weakly moistened, light sand, granular lumps, less compacted, small roots of plants, tracks of underground insects are found. Transition to the next layer by color and density.

28-52 sm. Brownish brown, weakly moistened, light sand, fine powdery, moderately saline, compacted, plant roots with traces of underground organisms. The transition to the next layer is obvious according to the density and mechanical composition

52-90 sm. Dark brown, moist, medium sand, moderately saline, granular-powdery weakly compacted, fine roots very few, subterranean insect tracks present, carbonate stains occur. The transition to the next layer is clearly defined by the sharp mechanical composition, color and moisture content.

90-130 sm. Dark brown, strongly moistened, slightly sandy, moderately saline, of unknown structure, strongly thickened, plant roots are almost absent. Transition to the next layer depends on the mechanical composition and moisture content.

130-163 sm. Brownish brown, very strongly moistened, the thick part of the horizon is wet, sandy, weakly saline, the activity of plant roots and insects is not noticeable.

Seepage water is observed from 163 sm.

Description of morphological features (morphological characteristics) of irrigated meadow soils 2 B cross-section taken on 08.09.2022:

0-29 sm. Brown arable layer, weakly moistened, medium sand, medium salinity, compacted with weak powdery-granular structure, traces of insects, plant roots are found a lot. The transition to the next layer is clear in terms of color and moisture.

29-50 sm. Brown subsoil, weakly moistened, medium sand, weakly saline, granular structure, moderately compacted, earthworm traces (tracks) and many small roots. The transition to the next layer is clear in terms of mechanical composition and density.

50-82 sm. Brownish, dull color, moistened, medium sand, weakly saline, strongly compacted, granular structure, porous, earthworm insects, traces and small roots are found. The transition to the next layer is clear in terms of mechanical composition and moisture content.

82-131 sm. Brown, moderately moistened, medium sand, weakly saline, weakly thickened, traces of underground insects, gray spots, occur. There are very few plant roots. Transition to the next layer depends on mechanical composition, humidity and color.

131-174 sm. Brown, strong moisture, medium sand, thickened. Porosity is very low, large granular structure, not clearly defined, carbonate concretions are observed, traces of insects and roots are not found. Transition to the next layer is based on mechanical composition and moisture content.

174-225 sm. Brownish-gray, moisture increases towards the bottom, thickened, medium sand, weakly salty.

Muddy (liquid soil) mixed seepage waters are observed from 215 sm.

The mechanical (granulometric) composition of the soil is of great practical importance in irrigated agriculture, it has a different effect on a number of properties of the soil, including physical, hydro-physical, chemical, biological properties and meliorational conditions, and it affects the ability to hold and filter water. Also, the movement of saline solutions in the soil profile, the rates of salt accumulation and secondary salinization processes, the water-salt balance and the level of nutrient supply to plants are directly related to the mechanical composition of the soil.

According to the mechanical composition of irrigated brown-meadow soils, mainly light and medium loam, meadow soils are composed of medium loam, and the amount of physical clay particles (<0.01 mm) is 19.4%, respectively (2A-K, 130-163 cm¬), 31.8% (2A-K, 59-92 cm) were recorded. The amount of Il particles (<0.001) varies from 5.63% (2A-K, 130-163 cm) to 9.2% (2A-K, 59-92 cm).

Among the mechanical elements, the amount of large dust particles (0.05-0.01 mm), which is typical for loess and loess-like sands, takes the leading place and makes up 33.3-42.8% in irrigated brown-meadow soils. , followed by fine sand particles (0.01-0.005 mm), their amount is 4.8-12.2%, respectively (Table 1).

Table 1

Mechanics of irrigated meadow-brown soils information from 08.09.2022)

Fragment №2	Depth sm	Particle size in mm, quantity in %							Physic clay < 0,01 мм	The name of the soil according to its mechanical composition
		sand			dust			clay		
		>0,25	0,25 - 0,10	0,10 - 0,05	0,05 - 0,01	0,01-0,005	0,005 - 0,001	< 0,001		
2 A	0-28	4,6	8,3	26,4	33,3	9,6	9,4	8,4	27,4	light sand
	28-52	3,6	9,2	24,4	33,7	12,2	10,4	6,5	29,1	light sand
	52-90	4,6	3,8	20,8	39,0	10,1	12,5	9,2	31,8	medium sand
	90-130	5,4	6,2	21,0	42,8	7,1	10,6	6,9	24,6	light sand
	130-163	6,4	6,5	26,7	41,0	4,8	9,0	5,63	19,4	sand

According to the mechanical composition of the irrigated meadow soils, they are mainly medium loam, meadow soils are composed of medium loam, and the amount of physical clay particles (<0.01 mm) is 36.6%, respectively (2B-K, 29-50 cm), 44, 7% (2B-K, 50-82 cm) was recorded. The amount of Il particles (<0.001) varies from 9.6% (2B-K, 0-29 cm) to 14.8% (2B-K, 50-82 cm).

Among the mechanical elements, the amount of large dust particles (0.05-0.01 mm), characteristic mainly for loess and loess-like sands, takes the leading place and is 29.5-38.7% in irrigated meadow soils, followed by fine there are sand particles (0.01-0.005 mm), their amount is 10.3-15.8%, respectively (Table 2).

Table 2

Mechanical composition of irrigated grassland soils (in % of dry soil. Data from 08.09.2022)

Fragment №2	Depth sm	Particle size in mm, quantity in %							Физик лой < 0,01 мм	The of the soil according to its mechanical composition
		sand			dust			clay		
		> 0,25	0,25-0,10	0,10-0,05	0,05-0,01	0,01-0,005	0,005-0,001	< 0,001		
2B	0-29	6,9	5,4	19,4	29,5	14,9	14,3	9,6	38,8	medium sand
	29-50	7,0	7,1	14,8	34,5	12,6	12,8	11,2	36,6	medium sand
	50-82	4,4	3,9	10,4	36,6	15,8	14,1	14,8	44,7	medium sand
	82-131	4,6	2,4	12,5	38,4	13,0	15,6	13,5	42,1	medium sand
	131-174	4,8	4,7	11,4	38,7	10,7	18,3	11,4	40,4	medium sand
	174-225	1,3	14,1	10,4	35,0	10,3	17,1	11,8	39,2	medium sand

According to the general physical properties of the described soils, the volume weight of the soils is 1.32 and 1.48 g/cm3 in the irrigated brown-meadow soils in the vertical profile of 163-225 cm, and 1.34-1.52 g/cm3 in the meadow soils. , the specific gravity is 2.62-2.68 g/cm3 in irrigated brown-meadow soils and 2.64-2.68 g/cm3 in irrigated meadow soils. Total porosity ranges from 50-47% in irrigated brown-grass soils to 48-41% in irrigated grassland soils. Soil moisture levels, including maximum hygroscopic moisture, wilting moisture, and field moisture capacity, did not differ significantly (Tables 3 and 4).

Table 3

Water-physical properties of irrigated brown-meadow soil (09.08.2022)

Fragment №2	Depth sm	Volune weight, g/sm³	Relative weight g/sm³	Total porosity, %	Moisture, %		
					Maximum hygroscopic moisture	Withering moisture	Field wet capacity
2A	0-28	1,32	2,62	50	4,52	6,68	18,5
	28-52	1,48	2,63	44	4,40	6,60	20,4
	52-90	1,44	2,66	46	4,94	5,91	21,6
	90-130	1,46	2,68	47	4,75	5,22	22,2
	130-163	1,42	2,67	43	3,27	4,90	22,0

Table 4

Water-physical properties of irrigated grassland soils (08.09.2022 y.)

Fragment №2	Depth sm	Volume weight g/sm³	Realative weight g/sm³	Total porosity, %	Moisture %		
					Maximumhygroscopic moisture	Withering moisture	Field wet capacity
2 Б	0-29	1,34	2,65	48	3,90	5,81	22,8
	29-50	1,48	2,66	42	4,10	6,21	24,0
	50-82	1,50	2,64	43	4,60	6,70	26,1
	82-131	1,46	2,67	45	4,81	7,54	27,0
	131-174	1,52	2,68	42	5,00	7,46	26,2
	174-225	1,44	2,65	41	5,21	8,10	25,6

In the irrigated meadow-brown soils, the recorded depth of groundwater was 163 sm, the total amount of easily soluble salts in water was 3,390 g/l on a dry basis. 1.680% (dry residue), 0.329 g/l (chlorine) and 1.352 g/l (sulfate) in irrigated grassland soils at 225 cm (depth) and 2.989 g/l, respectively. The chemistry (type) of salinity is chloride-sulfate in both

cases, depending on the degree of salinity, the brown-meadow soils are medium and low salinity. (Table 5)

Table 5

Water absorption content of irrigated brown-meadow soils (09.08.2022)

Fragment №1	Depth sm	Dry residue	HCO_3^-	Cl^-	SO_4^-	Ca^{++}	Mg^{++}	Na^+	The sum of ions	Salinity	
										type	level
2A	0-28	0,912	0,038	0,130	0,450	0,143	0,031	3,97	0,883	with chloride - sulphate	moderate
	28-52	0,605	0,025	0,110	0,270	0,084	0,015	3,71	0,589	with chloride - sulphate	moderate
	52-90	0,480	0,022	0,059	0,222	0,062	0,009	2,81	0,439	with chloride - sulphate	moderate
	90-130	0,319	0,030	0,022	0,170	0,040	0,012	1,67	0,312	with chloride - sulphate	
	130-163	0,290	0,018	0,026	0,155	0,010	0,018	3,76	0,295	with chloride - sulphate	slightly
	Chemical composition of underground water, g/l										
	163	3,390	0,286	0,260	1,680	0,218	0,313	10,35	2,995	with chloride - sulphate	moderate

In irrigated meadow soils, the total amount of easily soluble salts in water was 0.198-0.340%, the amount of chlorine ion was 0.020-0.059%, sulfates were recorded in the amount of 0.096-0.149%. The chemistry of salinity in the subsurface layers of both soil types consists of chloride-sulfate salinity, and the soils are moderately to weakly saline (Tables 6). grassland soils are weakly saline

225 cm (depth) and 2,989 g/l in irrigated meadow soils, respectively. Water is considered the main factor determining the reclamation condition of irrigated soils, including the degree of salinization process, its condition changes throughout the year, vegetation rises close to the surface during irrigation during irrigation.

Table 6

Water absorption content of irrigated meadow soils (09.08.2022)

Fragment №2	Depth sm	Dry residue	HCO_3^-	Cl^-	SO_4^-	Ca^{++}	Mg^{++}	Na^+	The sum of ions	Salinity	
										type	level
2Б	0-29	0,340	0,031	0,059	0,149	0,017	0,043	0,89	0,319	with chloride - sulphate	moderate
	29-50	0,270	0,033	0,039	0,116	0,039	0,021	0,38	0,257	with chloride - sulphate	slightly
	50-82	0,270	0,029	0,038	0,117	0,039	0,021	0,31	0,251	with chloride - sulphate	slightly
	82-131	0,255	0,029	0,030	0,119	0,028	0,024	0,43	0.240	with chloride - sulphate	
	131-174	0,234	0,034	0,024	0,121	0,026	0,021	0,73	0.243	with chloride - sulphate	slightly
	174-225	0,198	0,028	0,020	0,096	0,021	0,019	0,41	0,193	with chloride - sulphate	slightly
	Chemical composition of underground water, g/l										
	225	2,989	0,384	0,329	1,352	0,160	0,149	23,47	2,91	with chloride	slightly

									4	- sulphate	

Analytical data of seepage water obtained for laboratory analyzes after the end of vegetation irrigation (09.08.2022) are reflected in Tables 5 and 6.

Conclusion. The place of field research is the irrigated soils of the "Toshrabot" massif, Kyziltepa District, Navoi Region, in the Malikchol region, the western part of the Zarafshan Valley and the eastern part of the Kyzylkum Desert. The site of the field experiments is the third geomorphological structure: the trough-shaped bend of the Oftobachi plateau. In the next period, i.e. in the 60s-70s of the 20th century, the development of many areas with reddish brown soils led to the rise of seepage waters close to the surface of the earth [4,17-18 b]. As a result, the development of secondary salinization processes began in the irrigated lands, the initial processes of formation of automorphic brown soils changed to the processes of formation of hydromorphic and semi-hydromorphic soils.

Irrigated meadow-brown and meadow soils are considered to be soils with relatively acceptable properties in irrigated agriculture, mainly light, medium and some layers consist of heavy mechanical composition, with relatively favorable water-physical properties, mostly weakly saline, humus and nutrients (NPK) is moderately provided. It turned out that Sizot waters are weakly mineralized.

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