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UDK 631. 81

NUTRIENT CONTENT IN IRRIGATED GRASSLAND SOILS OF THE BUKHARA OASIS

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Annotatsiya. There are presented data on the content and reserves of humus, gross and mobile forms of nitrogen, phosphorus and potassium in old-irrigated meadow alluvial soils of six districts of the Bukhara region of the Republic of Uzbekistan; an assessment of their current state in terms of provision with mineral nutrition elements is given. The content of humus in the arable layer in all areas is equal to 0,62–0,97 % and decreases along the soil profile to 0,20–0,53 % at a depth of more than 1.5 m. The gross amount of nitrogen in the arable layer is 0.049–0.088 %, phosphorus 0,21– 0,35 %, potassium 0,82–2,80 %. According to the content of nitrate nitrogen in the arable layer, there are significant differences between the districts of the region: in the northern 1,7–5,5 mg/kg of soil, in the southern 46,8–57,7 mg/kg. The content of mobile forms of phosphorus in the arable layer of all soils is 10,8–23,5 mg/kg of soil, potassium 108–150 mg/kg.

Key words: meadow soils, humus content and reserves, gross and mobile forms nutrients nitrogen, phosphorus.

Annotatsiya. Maqolada O‘zbekiston Respublikasi Buxoro viloyatining oltita tumanidagi eski sug‘oriladigan o‘tloqli allyuvial tuproqlarda gumus, yalpi va ko‘chma azot, fosfor va kaliyning miqdori va zaxiralari haqida ma’lumotlar keltirilgan; ularning mineral ozuqa elementlari bilan ta’minlanganlik jihatidan hozirgi holati baholangan. Barcha tumanlarda haydaladigan qatlamdagi gumus miqdori 0,62–0,97% ni tashkil qiladi va 1,5 m dan ortiq chuqurlikda tuproq profili bo‘ylab 0,20–0,53% gacha kamayadi. Haydaladigan qatlamdagi yalpi azot miqdori 0,049–0,088% ni; fosfor 0,21–0,35, kaliy 0,82–2,80% ni tashkil qiladi. Haydaladigan qatlamdagi nitrat azotining miqdori mintaqa tumanlari o‘rtasida sezilarli farqlarni ko‘rsatadi: shimoliy tumanlarda tuproqda 1,7–5,5 mg/kg, janubiy tumanlarda 46,8–57,7 mg/kg. Barcha tuproqlarning haydaladigan qatlamida mavjud fosfor shakllarining miqdori 10,8–23,5 mg/kg tuproqni, kaliy esa 108–150 mg/kg ni tashkil qiladi.

Kalit so‘zlar: o‘tloq tuproqlari, gumus miqdori va zaxiralari, o‘simlik mineral ozuqalarining yalpi va mavjud shakllari: azot, fosfor, kaliy.

Аннотация. Представлены данные по содержанию и запасам гумуса, валовых и подвижных форм азота, фосфора и калия в староорошаемых луговых аллювиальных почвах шести районов Бухарской области Республики Узбекистан; дана оценка их современного состояния по обеспеченности элементами минерального питания. Содержание гумуса в пахотном слое во всех районах составляет 0,62–0,97 % и уменьшается по почвенному профилю до 0,20–0,53 % на глубине больше 1,5 м. Валовое количество азота в пахотном слое 0,049–0,088 %; фосфора 0,21–0,35, калия 0,82–2,80 %. По содержанию нитратного азота в пахотном слое отмечаются значительные различия между районами области: в северных 1,7–5,5 мг/кг. почвы, в южных 46,8–57,7 мг/кг. Содержание подвижных форм фосфора в пахотном слое всех почв составляет 10,8–23,5 мг/кг. почвы, калия 108–150 мг/кг.

Ключевые слова: луговые почвы, содержание и запасы гумуса, валовые и подвижные формы элементов минерального питания растений: азот, фосфор, калий.

INTRODUCTION. Research work is being carried out around the world in a number of priority areas devoted to studying the state of soil fertility, its indicators and their relationship with other factors, and modeling processes of changes in soil fertility. In addition, when studying the agrochemical characteristics of soils and their assessment, modern geoinformation technologies are used, on the basis of which measures to manage soil fertility are developed and implemented in production in order to increase it. Today, in the development of agriculture in Uzbekistan, increasing soil fertility, cultivating agricultural land and using agrotechnical measures taking into account their specific properties are of particular importance. Some success has been achieved in this direction in the republic, but insufficient attention has not been paid to research on the use of modern geographic information systems. “The third direction of the development strategy of the new Uzbekistan for 2022–2026, consisting of seven priority areas developed on the basis of the principle “action strategy to development strategy”, consists of priority tasks identified for the development of the national economy, its growth rate at the level of modern requirements. As well as the introduction of market principles that ensure free competition in agriculture, in particular the abolition of state orders for the cultivation of cotton and grain, thereby increasing the economic efficiency of production and increasing the productivity of producers” are identified as important strategic objectives [1] this regard, scientifically based management of soil fertility plays an important role in increasing it, efficient use of land resources and the development of advanced

agrotechnical measures. Today, the world is conducting research in the following priority areas of preventing and combating soil salinization: developing technologies for reducing water consumption for filtration from irrigation networks on saline irrigated lands; increasing the efficiency of irrigation networks and improving technologies that prevent groundwater levels from rising; creation of various types of collector and drainage structures for the radical reclamation of saline lands; improvement of methods for washing saline lands; creation of salinity-resistant species and varieties of agricultural crops and development of agricultural technologies for their cultivation [2]. Based on many years of research, M.M.Tashkuziev, S.K.Ochilov [3] proposed a number of new theoretical questions for a comprehensive study of the chemical state of the main types of soils, in particular humus. As a result of studying the humus content, changes in the fractional and group composition of organic matter and the mobility ratios of humus depending on the granulometric composition of the soil, agricultural background, irrigation period and watering level, they identified mobile humic substances that are of direct importance for assessing soil fertility. They studied the patterns of changes in humus content under the influence of anthropogenic factors in intensive agriculture. M.Umarov, R.Kurvantaev [2] conducted scientific research on optimization and management of soil fertility in desert regions Uzbekistan. They found the boundaries of soils of different granulometric compositions with better capillary properties and concluded that with increasing density, the agrochemical properties of soils deteriorate and their salinity increases. Scientists of the republic [4–8] and others conducted a series of studies to study the features of the formation and development of soils in the regions of Uzbekistan, determine their morphogenetic structure, change their properties under the influence of irrigated agriculture, as well as develop measures to prevent soil degradation processes However, insufficient studies of agrochemical properties, features of the formation of agroirrigation horizons, and changes in the layers of the soil profile under the influence of anthropogenic impact have been carried out in the Bukhara region [11-17]. The purpose of our study was to assess the current state of irrigated meadow soils in various areas of the Bukhara region, to determine their characteristics in order to develop scientifically based recommendations for improving agrochemical properties.

MATERIALS AND METHODS. Old irrigated meadow soils formed on alluvial deposits were chosen as the object of research. The research was carried out in soil-field and laboratory conditions, according to the methodology of “Guide to chemical and agrophysical analyzes of soils when monitoring lands” [9], the reliability of the results obtained was assessed using the Microsoft Excel program on based on’s manual B.A.Dospehov [10].

RESULTS AND DISCUSSION. The table data shows that the humus content in the arable soils studied is in the range of 0.80–0.97%, with the exception of the Kagan district (Buston massif), where this figure is more significant and amounts to 0.62%. At the same time, under constant horizon conditions, a sharp change in the humus content in the soil between the studied areas is not observed (0,59–0,63%), except for Gijduvan Zarafshan massif, Bakhtishad Amon Zamini farm and Shafirkan Bobur massif, farm “Mirzo Jamshid”. Recently (Shafirkan region) the highest humus content has been recorded for all horizons of the soil profile - from 0,97% in the arable layer to 0,53% in the area of 115–156 sm (table).

Table.

Agrochemical composition of irrigated meadow soils in Bukhara region

Layer depth, sm	Humus, %	Gross, %			Mobile, mg/kg		
		N	P	K	NO_3	P_2O_5	K_2O
Gijduvan district massif «Zarafshan»							
0-33	0,86	0,049	0,26	0,82	1,7	23,0	150
33-48	0,72	0,031	0,26	0,73	3,1	19,0	135
48-74	0,62	0,019	0,21	0,74	2,0	13,0	90
74-105	0,53	0,014	0,19	0,72	4,8	12,0	60
105-132	0,33	0,013	0,15	0,60	3,7	10,0	55
132-170	0,27	0,012	0,12	0,67	1,4	9,0	40
170-200	0,20	0,010	0,10	0,60	4,2	6,0	30
Shafirkan district massif Bobur							
0-38	0,97	0,088	0,35	1,00	5,5	16,0	148
38-53	0,89	0,071	0,24	0,79	1,6	13,0	128
53-85	0,72	0,065	0,18	0,61	2,5	12,0	80
85-115	0,70	0,049	0,16	0,61	1,5	12,0	50
115-156	0,53	0,038	0,10	0,60	1,7	10,0	35
Vabket district massif I.Naimov							
0-27	0,94	0,058	0,26	2,30	46,8	11,5	108
27-42	0,63	0,056	0,24	2,10	45,7	10,0	103
42-70	0,41	0,048	0,27	2,40	25,7	8,0	80
70-105	0,37	0,040	0,23	2,10	20,4	8,0	70
105-135	0,31	0,040	0,20	2,00	17,5	7,3	65
135-155	0,30	0,029	0,19	1,80	14,5	6,0	60
Zhandar district massif «Istiklol»							
0-35	0,80	0,062	0,31	2,10	57,7	10,8	130
35-50	0,62	0,058	0,29	2,30	50,1	9,5	118
50-75	0,52	0,048	0,28	2,00	46,8	8,0	110
75-105	0,41	0,050	0,26	1,80	45,7	7,3	93
105-132	0,44	0,048	0,25	1,60	31,6	7,8	70
132-180	0,36	0,045	0,24	1,50	25,7	6,7	63
Kagan district massif «Buston»							
0-25	0,62	0,055	0,21	2,80	46,8	23,0	115
25-38	0,60	0,034	0,23	2,60	25,7	15,1	108
38-68	0,48	0,048	0,50	2,20	20,4	13,4	95
68-96	0,60	0,057	0,37	2,10	19,5	10,0	88
96-124	0,38	0,029	0,21	2,00	18,6	10,0	70
124-155	0,28	0,024	0,17	1,80	17,5	8,0	65
155-185	0,26	0,023	0,16	1,60	14,5	7,3	60
Karakul district massif «Dargali»							
0-35	0,86	0,056	0,29	2,10	50,1	23,5	140
35-62	0,59	0,045	0,23	2,00	46,8	18,3	115
62-90	0,40	0,045	0,25	2,00	31,6	11,5	128
90-115	0,50	0,050	0,24	1,80	20,4	11,5	115
115-147	0,46	0,048	0,21	1,60	21,9	10,0	103
147-186	0,38	0,029	0,16	0,80	12,9	7,5	93

By terms of the content of mobile forms of phosphorus in the arable and subarable soil layers, the soils of most regions are average (15–30 mg/kg), with the exception of Vabket (I.Naimov massif) and Zhandar (Istiklol massif) regions, where this figure is 9.5 –11.5 mg/kg soil. In all soils, the content of mobile phosphorus in the profile decreases to 6.0–10.0 mg/kg of soil at a depth of more than 1.5 m. In terms of the amount of mobile potassium in the arable and subarable layers (103–150 mg/kg), all soils studied are low-income. With increasing depth along the soil profile, the content of available potassium decreases to 30–93 mg/kg of soil.

CONCLUSION. According to the studied indicators of the content of humus and elements of mineral nutrition of plants, there are no sharp differences between the studied regions of the Bukhara region, but for each one can note a certain spe cificity of soil conditions. In old-irrigated meadow alluvial soils, the amount of humus in the arable layer is 0.62–0.97%, in

the sub arable layer – 0.59–0.89%. The gross amount of nitrogen in the arable layer is 0.049–0.088%; phosphorus – 0.21–0.35%, potassium – 0.82–2.80%. In terms of the content of nitrate nitrogen in the arable layer, there are significant differences between the regions of the region: in the northern, its content is 1.7–5.5 mg/kg of soil, in the southern – 46.8–57.7 mg/kg. The content of mobile forms of phosphorus in the arable layer of all soils is 10.8–23.5 mg/kg of soil, potassium – 108–150 mg/kg, which indicates a low supply of this element.

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