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AGROCHEMICAL PROPERTIES OF RAINFED DARK SIEROZEM SOILS OF BOYSUN DISTRICT, SURKHANDARYA REGION

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Annotatsiya. Maqolada Boysun tumani "Sayrob" massivda tarqalgan lalmi to'q tusli bo'z tuproqlaridagi gumus, harakatchan fosfor va kaliyning miqdoriy ko'rsatkichlari to'g'risidagi ma'lumotlar keltirilgan. Tadqiqot hududida tarqalgan lalmi to'q tusli bo'z tuproqlardagi gumus va kaliy bilan o'rtacha va yuqori hamda fosfor bilan juda kam, kam ta'minlanganligi kuzatildi.
Kalit so'zlar: to'q tusli bo'z tuproqlar, tuproq qatlami, harakatchan fosfor, kaliy, gumus, oziqa moddalar, tuproq.
Аннотация. В статье представлены данные о количественных показателях гумуса, подвижного фосфора и калия в богарных темно-сероземных почвах, распространённых на массиве «Сайроб» Бойсунского района. Установлено, что данные почвы характеризуются средним и высоким уровнем обеспеченности гумусом и калием, тогда как обеспеченность фосфором оценивается как очень низкая и низкая.
Ключевые слова: тёмно-серозёмные почвы, почвенный слой, подвижный фосфор, калий, гумус, питательные вещества, почва.
Abstract. The article presents data on the quantitative indicators of humus, available phosphorus, and potassium in rainfed dark sierozem soils distributed in the "Sayrob" massif of Boysun district. It was observed that these soils are moderately to highly supplied with humus and potassium, whereas phosphorus availability is very low to low.
Key words: dark serozem soils, soil layer, available phosphorus, potassium, humus, nutrients, soil.

Introduction. Approximately 4.2 billion hectares (30%) of the world's land resources consist of rainfed agricultural lands. Such lands are mainly distributed in the foothill and oasis regions of neighboring countries such as Kazakhstan, Afghanistan, Iran, Turkey, the countries of Central Asia, and Transcaucasia. Therefore, increasing the

efficiency of the use of non-irrigated lands in different regions of the world remains one of the pressing issues [1].

Globally, scientific and practical research is being conducted in priority areas related to the effective use of non-irrigated, particularly rainfed, agricultural lands. Special attention is being paid to identifying negative processes occurring in non-irrigated croplands, restoring their productivity, improving their efficient use, and conducting land monitoring studies [2].

According to the land inventory report of the State Committee of the Republic of Uzbekistan on Land Resources, Geodesy, Cartography and State Cadastre as of January 1, 2024, rainfed lands occupy 783.5 thousand hectares, accounting for 3.0% of the total agricultural lands in the republic. At present, the major challenges in the rainfed farming zone of Uzbekistan include the accumulation and conservation of soil moisture, reduction of surface runoff and erosion, and improvement of the fertility of eroded soils, since cereal crops are predominantly cultivated in these areas [3].

Research Object and Methods. The object of the study was rainfed dark sierozem soils distributed in the “Sayrob” massif of Boysun district.

Field soil investigations and laboratory-analytical studies were carried out according to generally accepted methods developed by the Institute of Soil Science and Agrochemical Research and the Uzbek State Research Institute of Land Resources, particularly based on the “Guidelines for Conducting Soil Surveys and Compiling Soil Maps for Maintaining the State Land Cadastre” [4, 5, 6].

Research Results and Discussion. The conducted studies revealed that the agrochemical condition of rainfed dark sierozem soils distributed within the “Sayrob” massif of Boysun district is complex and heterogeneous. The humus content in the genetic horizons of the studied soils ranged from 0.741% to 1.558%, indicating that most horizons belong to moderately supplied groups, while some layers were characterized by high humus content. At the same time, the gradual decrease of humus content from the upper to the lower horizons is explained by the accumulation of organic matter mainly in the surface layer.

The content of available phosphorus in the soils of the study area ranged from 10.3 mg/kg to 29.8 mg/kg, corresponding to very low (<15 mg/kg) and low (15–30 mg/kg) supply levels. This indicates strong phosphorus immobilization under rainfed conditions and insufficient amounts of plant-available phosphorus forms in the soils.

The amount of exchangeable potassium varied from 137 mg/kg to 384 mg/kg, corresponding to low (100–200 mg/kg), moderate (200–300 mg/kg), and in some cases high (300–400 mg/kg) supply groups. Although certain soil layers showed relatively high potassium values, the general trend indicated unstable potassium availability within the soil profile (Table 1).

The vertical distribution of nutrients within the soil profile was uneven, with a clear decrease in humus and phosphorus content with increasing depth. This demonstrates that biological activity is mainly concentrated in the upper soil horizons, while deeper layers are characterized by insufficient nutrient availability for plants.

Table 1

Humus and Nutrient Content of Rainfed Dark Sierozem Soils of the “Sayrob” Massif

Profile No.	Depth, cm	Humus, %	Available nutrients, mg/kg	
			P_2O_5	K_2O

"Sayrob" massivi lalmi to'q tusli bo'z tuproqlari				
1 Northern slope 5-8^0 in some places severely eroded	0-15	1,507	29,3	384
	15-31	1,558	28,6	300
	31-65	1,323	14,5	281
	65-84	1,131	12,9	257
2 Southern slope 8-12^0 highly eroded	0-15	1,226	14,5	202
	15-35	1,516	20,3	384
	35-54	1,402	18,5	276
	54-74	1,106	16,1	252
3 Southern slope 8-12^0 highly eroded	0-15	1,103	14,8	264
	15-31	1,081	12,6	252
	31-54	0,997	10,3	281
4 Northern slope 5-8^0 moderately, in some places severely eroded	0-16	1,313	23,5	278
	16-34	1,082	19,5	250
	34-65	1,066	26,2	250
5 Northern slope 5-8^0 moderately, in some places severely eroded	0-12	1,510	29,8	199
	12-38	1,483	26,1	230
	38-65	1,362	22,5	209
6 Southern slope 8-12^0 highly eroded	0-14	1,127	22,2	317
	14-28	0,930	13,8	307
	28-54	0,993	10,6	252
7 Southern slope 8-12^0 highly eroded	0-17	1,023	24,5	230
	17-28	0,829	18,5	225
	28-54	0,823	17,5	288
8 Eastern slope 5-8^0 moderately, in some places severely eroded	0-16	1,295	26,1	252
	16-30	1,067	26,2	228
	30-65	0,903	10,9	170
9 Eastern slope 5-8^0 moderately, in some places severely eroded	0-15	1,298	27,5	314
	15-33	1,018	25,1	249
	33-62	0,974	12,5	192
10 Southern slope 8-12^0 highly eroded	0-10	1,247	22,8	187
	10-26	1,117	20,1	144
	26-55	0,741	14,9	137

Conclusion

In conclusion, it should be noted that the soils of Boysun district are moderately supplied with humus, poorly supplied with available phosphorus, and insufficiently supplied with exchangeable potassium. The distribution of nutrients within the soil profile is uneven, especially with respect to humus and phosphorus content, which decreases with increasing depth. This indicates the necessity of the effective application of organic and phosphorus fertilizers to improve soil fertility. Furthermore, it was substantiated that improving the agrochemical properties of rainfed dark sierozem soils can stabilize their agroecological condition and increase the productivity of agricultural crops.

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