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PROPERTIES AND GROUNDWATER LEVEL OF HUMOGLEY SOIL OF SOUTHERN BAČKA

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Introduction

Soils of the hydromorphic order of the middle Danube region have a different geographical position in relation to the river bed of the Danube. Gley soils occupy lower parts in the area of the alluvial plain, of which humogley soil is located in lower terraced areas and in closed depressions. According to Mrvić et al. (2016) many authors who have studied humogley soil classify it according to the IUSS Working Group WRB (2006) in Gleysols (Resulović et al. 2008) and Mollic Vertic Gleysol (Filipovski, 2006). These soils are characterized by a heavier mechanical composition and a powerful humus-accumulative horizon below which the G horizon is regularly located, so in these soils the groundwater is relatively close to the surface with an average depth of about 1 meter (Živanov and Ivanišević, 1986). In the part of the alluvial plain that is protected by the embankment from flooding, the only way to moisten these soils is through groundwater, and the water level of the Danube has a great influence on the variation of groundwater levels. In addition to the level of groundwater and its variation during the year, it is necessary to pay attention to the quality of groundwater, because as a significant factor in this area can affect the properties of humogley soil.

Materials and Methods

Humogley of the soil in the protected part of the alluvial plain of the middle course of the Danube River in the area of southern Bačka was examined. Three pedological profiles were opened in the vicinity of Bačka Palanka and Novi Sad (N 45016'15.8 " E 19032'56 "; N 45012'59.2 " E 19058'0.5 "; N 45013'5,2 " E 19058 ' 5.8 ") at altitudes from 73 to 77 m / nm. External and internal profile morphology is described. Soil samples were taken for laboratory analysis and standard analyzes were performed.

The groundwater level was measured using piezometers, and the variation of the groundwater level was obtained by calculation;

Groundwater samples were taken at these three sites in the summer, once in July

Results

Table 1. Chemical properties and granulometric composition

Profil	Horizon	Depth (cm)	pH	Humus (%)	Total salts (%)	Total sand	Total clay	Texture class
1/06	Aa	0-60	7,80	1,09	0,06	48,4	51,60	Sand clay loam
	Gso	60-90	8,47	0,09	<0,03	72,0	28,00	Sandy loam
	Gr	>90	8,17	0,07	<0,03	89,94	10,36	Sand
	Average		8,15	0,42	0,041	70,01	29,99	
2/06	Aa	0-45	7,56	2,63	0,09	27,64	72,36	Clay loam
	Gso	45-85	7,87	0,57	<0,03	67,44	32,56	Sandy loam
	Gr	>85	7,82	0,08	<0,03	98,44	1,56	Sand
	Average		7,75	1,09	0,05	64,51	35,49	
3/06	Aa	0-75	7,48	2,91	0,09	23,00	77,00	Clay loam
	Gso	75-120	7,89	1,41	0,04	66,00	34,00	Sandy loam
	Gr	>120	7,57	0,97	<0,03	85,32	14,68	Loamy sand
	Average		7,64	1,76	0,053	58,11	41,89	

Table 2. Correlation of water levels and groundwater levels

Profil	Distance from the Danube riverbed (m)	Coefficient r	Relative groundwater level (cm) max	average	min	amplitude
1/06	1890,00	0,88	44	87	110	66
2/06	1632,00	0,78	28	109	160	132
3/06	1916,00	0,67	70	142	175	105

Table 3. Groundwater quality and classes

Profil	Sampling depth	Na^+ (meq/l)	Ca^{2+} (meq/l)	Mg^{2+} (meq/l)	SAR (meq/l)	Electrical conductivity	Dry residue (mg l^{-1})	Water class (U.S. Salinity Laboratory)	Need to limit irrigation water (FAO classification)
1/06	78	0,84	2,46	8,77	0,36	1,29	915	C3S1	moderate
2/06	87	2,30	8,45	4,90	0,89	2,48	760	C4S1	moderate
3/06	131	3,69	11,66	6,46	1,23	1,53	804	C3S1	moderate
	maximum allowable value	0-40	0-20	0-5	0-15	0-3	0-2000		

Conclusion

The paper examines the properties of humogley soil, as well as the level and quality of groundwater of these soils in the middle course of the Danube in southern Bačka. According to the chemical properties, the reaction of these soils is weakly to moderately alkaline, with a slightly increased percentage of total salts in the humus horizon. The texture classes of the humus horizon are: clay loam to sandy clay loam, while the lower gley sub-horizons are the textural classes of sandy loam, loamy sand and sand. The influence of the Danube water level on the groundwater level is manifested in high correlation coefficients (r = 0.67-0.88). The groundwater level ranged at a maximum value of 28 cm to 70 cm depth, the lowest value of groundwater was 110 to 175 cm deep, and the amplitude of groundwater variation during the year ranged from 66 to 132 cm. Groundwater quality classes according to U.S. Salinity Laboratory are unfavorable and range from C3S1 to C4S1, and according to the FAO classification the water quality is such that there is a moderate need to limit water of this quality for irrigation. High groundwater level that is above the critical level, as well as watering the soil with water of this quality can have an impact on salinization of the surface horizon of the examined soil.

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