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CHARACTERISTICS OF SOILS IN FOREST MANAGEMENT UNIT „MALA UKRINA“

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Abstract: *The paper presents the results of pedological research in the area of the forest management unit "Mala Ukrina", the forest management area "Usorsko-ukrinsko". The research covered five compartments. In each compartment, a basic pedological profile was opened, a detailed study of the external and internal morphology was carried out, as well as sampling of genetic horizons for laboratory study of physical and chemical properties. According to the Soil Classification of Yugoslavia (Škorić et al., 1985) distinguished three types of soil: ranker, dystric brown soil and ilimerized soil. The geological substrates of the open profiles are sandstone and peridotite. Vegetation in the studied sections consists of Austrian and Scots pine forest crops. The analysis of the pedological cover showed the presence of all types of soil that are characteristic for this area. The aim of the work is to analyse the characteristics of the soil in this forest management unit, while defining the ecological production value.*

Keywords: soil, ranker, dystric brown soil, ilimerized soil, characteristics.

KARAKTERISTIKE ZEMLJIŠTA U PRIVREDNOJ JEDINICI „MALA UKRINA“

Apstrakt: *U radu su prikazani rezultati pedoloških istraživanja na području privredne jedinice „Mala Ukrina“, šumskoprivredno područje „Usorsko-ukrinsko“. Istraživanjem je obuhvaćeno pet odjeljenja. U svakom odjeljenju otvoren je po jedan osnovi pedološki profil, izvršeno je detaljno proučavanje spoljašnje i unutrašnje morfologije, kao i uzimanje uzoraka po genetičkim horizontima za laboratorijsko proučavanje fizičkih i hemijskih osobina. Prema Klasifikaciji zemljišta Jugoslavije (Škorić i sar., 1985) izdvojena su tri tipa zemljišta: humusno-silikatno zemljište, kiselo smeđe zemljište i ilimerizovano zemljište. Geološke podloge otvorenih profila su pješčar i peridotit (serpentinisani). Vegetaciju u istraživanim odjeljenjima čine šumske kulture crnog i bijelog bora. Analiza pedološkog pokrivača pokazala je zastupljenost svih tipova zemljišta koji su karakteristični za ovo područje. Cilj rada je analiza karakteristika zemljišta u ovoj privrednoj jedinici, uz definisanje ekološko-proizvodne vrijednosti.*

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Ključne reči: zemljište, humusno-silikatno zemljište, kiselo smeđe zemljište, ilimerizovano zemljište, karakteristike

1. INTRODUCTION

The productivity of forest soils depends on physical and chemical properties, i.e. their variability (Kapović *et al.*, 2011). Soil with its ecological and productive values represents an important component of environment and forest ecosystems. It regenerates slowly, so its preservation requires application of principles of sustainable management, while respecting not only productive, but also ecological functions of the soil (Blagojević, 2016). Knežević & Košanin (2008) state that the soil is the basic factor of the habitat through which the influence of climatic elements and relief elements on the ecological conditions and production potential of habitat are refracted. The researched area is characterized by moderate continental climate. Geological substrate in the researched area consists of silicate and ultrabasic rocks. On silicate rocks (sandstones and cherts) dystric brown and ilimerized soils are formed, while on peridotite and serpentinized peridotite ranker and ilimerized soils are developed. Knežević *et al*. (2011) state that dystric brown soils are formed on different types of silicate rocks, while Kapović *et al*. (2011) highlight large distribution of dystric brown soil in submontane and mountainous area on terrains whose geological structure is made of silicate rocks. Ultrabasic rocks on our territory occupy the space from Kozara, Ljubić, Borja, then Ozren, Konjuh, Kladanj and Olovo, up to Višegrad (Pamić, 1964; Trubelja *et al.*, 1974; Kapović Solomun *et al*., 2015). Peridotites are igneous, ultrabasic rocks formed mostly from olivine, and contain pyroxene and chlorite, along with one important characteristic, that they have high percentage of magnesium (18-24%) and a significant presence of heavy metals (Novaković-Vuković, 2015). Altinözlü *et al.* (2012) state that soils on ultramafites can contain several hundred times more nickel than other soils, while Šumatić *et al*. (2013) state there is an increased content of nickel in certain plant species on different types of ultrabasic soils. The vegetation of the researched area consists of artificially raised forest cultures of Austrian pine and Scots pine, which are located in the belt of sessile oak and hornbeam forests (*Querco-Carpinetum*). Gačić & Govedar (2020) state that forest plantations on Forest management unit Usorsko-ukrinsko occupy 9.69% of the total forest growing stock. The research of the associations of Austrian pine and Scots pine in correlation with the research of properties and production potential of soil should be the starting point and the framework for long-term planning of management in these forests and preservation of their ecological and production value (Novaković-Vuković, 2015). Blagojević (2016) states the importance of determining the conditions which suit the best to the growth of useful forest plantations, which is realized with knowledge and respecting of pedological conditions. In order to minimize the risks, before erecting pure artificial stands, it is necessary to research ecological conditions of the given habitat, whereby the analysis of soil (depth, structure, texture, content of certain micro or macro elements) is indispensable. The quality of artificially raised stands can be significantly conditioned by physical and chemical properties of the soil (Kapović & Keren, 2012). The objective of the research in this paper is determining of the types

of pedological cover, the analysis of the properties of different types of soil, along with the estimate of ecological and production potentials of each type of soil on this area.

2. MATERIAL AND METHODS

Determining the types and properties of the soil in the territory of forest management unit Mala Ukrina was realized through the field research phase and laboratory soil analysis phase. The field research phase, within which collection of available references for the field of research was carried out, included reconnaissance of the terrain, getting to know the vegetation and orographic characteristics, then selection of locations for opening of pedological profiles, opening of pedological profiles, description of environmental conditions on the location of opening the profiles, separation of genetic horizons, analysis of the external and internal morphology and soil sampling in impaired condition for laboratory study of the soil properties. Five basic pedological profiles were opened, one profile in each of the compartments. Thirteen soil samples were taken for laboratory analyses. The laboratory analyses of soil samples, after the drying of sampled soil up to an air-dry state, were carried out in pedological laboratory of the Institute of Forestry in Belgrade according to the following methodology:

- Textural (mechanical) composition of the soil by sedimentation method with application of Na-pyrophosphate as a peptizing agent (Racz, 1971). Based on the textural composition of the soil textural class was determined using ISSS triangle.
- Active and substitutional acidity potentiometrically in H_2O and KCl (Cencelj, 1966; Živković, 1966), and classification of the soil according to the reaction of the soil solution was determined according to the US Natural Resources Protection Service (Knežević & Košanin, 2007).
- Hydrolytic acidity (Y1) and sum of adsorbed alkali cations (S) by Kappenn method (Živković 1966).
- Content of total humus was determined by wet combustion in the mixture of potassium dichromate ($K_2Cr_2O_7$) and sulfuric acid (H_2SO_4) by Tyurin method (Škorić & Racz, 1966), and classification of soil according to the content of humus was determined by Gračanin method (Škorić & Sertić, 1966).
- The content of total nitrogen by Kjeldahl method (Džamić *et al*., 1966), and classification of soil according to the content of total nitrogen according to Wohltmann (Knežević & Košanin, 2007).
- Carbon and nitrogen ratio – computationally.
- The content of phosphorus and potassium easily accessible to plants by AL-method according to Egner-Richm, using colorimetric technique of phosphorus determination and flame photometric technique of potassium determination, and supply of these elements in the soil according to the limit values for AL-method (Džamić *et al*., 1996).

3. RESULTS

Forest management unit Mala Ukrina is situated within forest management area Usorsko-ukrinsko, which is situated in North-western part of the Republic of Srpska (Figure 1). According to the ecological-vegetational zoning of Bosnia and Herzegovina (Stefanović *et al*., 1983) the area of research belongs to the region of inner Dinarides, Zavidovićko-Teslićki district. This area is characterized by very heterogeneous orographic situations, and it belongs to Srednjebosanska ophiolitic zone.

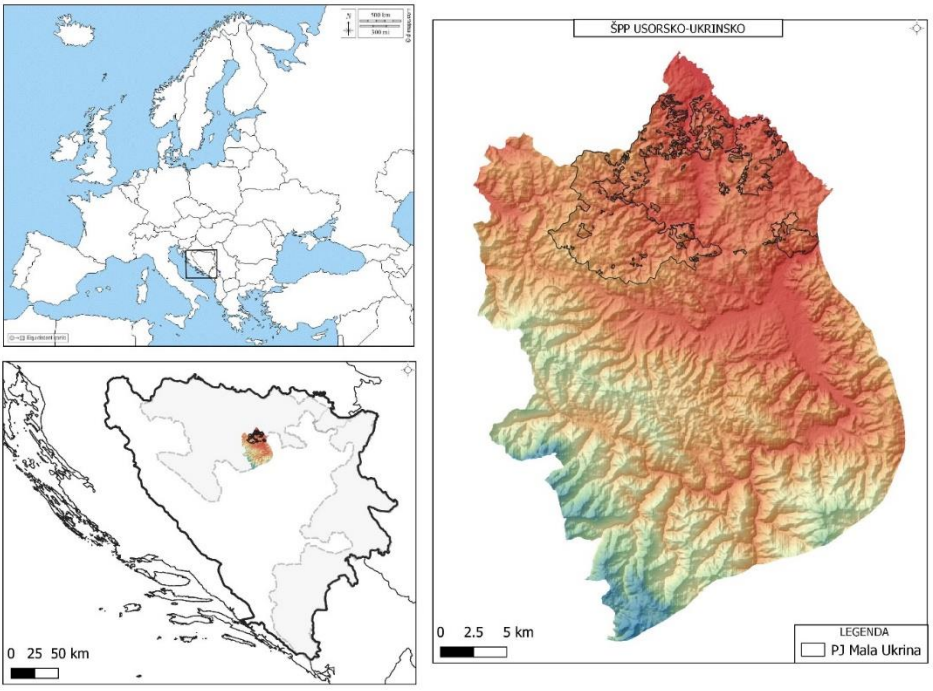

Figure 1. *Geographical location of the research area (Čigoja, 2024)*

The research was carried out in the compartments: 37, 44, 136, 142 and 143. The height range of the object of research is from 152 to 591 m above sea level. According to Kapović Solomun *et al*. (2015) Usorsko-ukrinsko forest management area is characterized by typical moderate continental climate, with mean annual air temperature of 9.8°C and mean amount of precipitation of 1026 mm (period from 1961 to 1990). The same authors state that according to the amount of annual climate index in this area moderate humid climate – B2 is dominant. Geological properties of the researched area show the presence of silicate rocks (cherts and sandstones) in the compartments 44 and 143, while peridotite and serpentinized peridotite, out of the group of ultrabasic rocks, are represented in the compartments: 37, 136 and 142. Vegetation properties in the researched compartments are characterized by the presence of artificially raised plantations of Austrian pine and Scots pine. According to the classification of soils of Yugoslavia (Škorić *et al*., 1985) three types of soils are singled out:

1. Ranker – compartment 136;
2. Dystric brown soil – compartment 44;
3. Ilimerized soil – compartments 37, 142 and 143.

Ranker (Profile structure: O-A-R)

Figure 2. *Appearance of pedological profile and vegetation (© Kapović Solomun, 2021)*

Pedological profile is opened on southern exposure on the terrain with a pronounced slope, without surface rockiness and visible erosion processes. Total depth of the pedological profile is 24 cm. Organogenic horizon is less developed and has a thickness of only 3 cm. Gradually and relatively irregularly it transitions into humus-accumulative horizon with thickness of 21 cm. The horizon is water-permeable, drained, with coarse grained structural aggregates, which are relatively stable to the touch. It is very loose and airy. Novaković-Vuković (2015) for humus silicate soils states that they are mostly of shallow solum, with a high content of skeleton, and a low capacity for water. Soil has a small depth, on sunny exposure which additionally increases its xerothermophilic character. The presence of skeletons is medium. Blagojević & Govedar (2009) state that rankers have from 20 to 40% of skeletons. The content of total sand in the profile is 15.50%, total clay 9.25%, while the content of dust is 75.25%. Textural class is silty loam. The research of Kapović Solomun *et al*. (2015) show that rankers in the territory of FMU Donja Velika Usora have sandy loamy textural composition, which corresponds to the research of Košanin & Knežević (2005), while Blagojević (2016) states that mechanical composition of rankers can be sandy loamy, silty loamy to sandy clay loamy. Knežević & Košanin (2009) state that rankers have silty loamy texture. This textural composition is more typical for silicate substrates, than for ultrabasic rocks, at which they are characterised by higher content of clay and clay loamy texture (Kapović Solomun & Marković, 2022). Silty loamy textural composition indicates certain hazard of this type of soil from soil erosion. The pH reaction in H_2O and KCl is very acidic (Table 1), which was contributed by the unfavourable composition of forest litterfall of coniferous origin. Sizes that characterize adsorption complex of

the soil indicate that it is poorly saturated and poor. Total capacity of adsorption has the value of 17.07 mLNaOH/50g, while the degree of saturation by bases is lower than 50%. Košanin & Knežević (2005) for rankers state that the degree of saturation by bases ranges from 27.04 to 45.89% and that is why it is singled out as a dystric subtype. According to the content of humus (5.19%) the soil is very rich in humus, while the supply of nitrogen (0.20%) is on the limit between well provided and rich in nitrogen, which is in direct correlation with the content of humus. The ratio of carbon and nitrogen is 15.35, which indicates a good decomposition of organic residues and is in direct correlation with good supply with humus and nitrogen. The soil is poor in readily available phosphorus (<1 mg/100g) and potassium (Table 2). Although it is a soil formed on ultrabasic substrate, which is rich in bases (mainly magnesium), the values of pH reaction and adsorption complex of the soil are such that this profile of rankers is classified as dystric subtype. The shallowness of the profile, content of skeletons, pronounced acidophility, but also poor adsorption complex indicate that humus silicate soils in this area have low ecological and productive potential. Due to the pronounced relief and susceptibility to erosion of this type of soil, the management of forest plantations in this compartment should be adapted also to edaphic factor, in order not to destroy the pedolayer, as this would degrade the entire ecosystem. Rankers have low efficiency, low biological activity, high content of skeletons and weak ability to retain water, which influences their low ecological and productive potential (Blagojević *et al.*, 2016; Kapović Solomun *et al.*, 2015).

According to the Classification of soils of Yugoslavia (Škorić *et al.,* 1985) the analysed profile belongs to the **class of humus-accumulative soils, to the type of ranker, subtype dystric, variety lithic, form silty loam.**

Dystric brown soil (Profile structure: O-A-AE-(B)v-C)

Figure 3. *Appearance of pedological profile and vegetation (©Kapović Solomun, 2021)*

Pedological profile of dystric brown soil is opened in one compartment, on the terrain with a gentle slope, where the geological substrate consists of sandstones and cherts. Total depth of the pedological profile is 51 cm. The organogenic horizon reaches thickness of 5 cm, it is characterized by the presence of less decomposed litterfall. Gradually and relatively irregularly it transitions into faded A horizon 8 cm thick, with weakly expressed structural aggregates, which are fine-grained and spheroidal in shape. They are unstable to touch. Košanin & Knežević (2003) state for dystric brown soils the existence of powdery up to fine-grained structural aggregates. This horizon texturally belongs to the class powdery loam, with dominant participation of powder fraction (79.40%). The pH reaction in H_2O is very strongly acidic (4.93), while in KCl is strongly acidic (3.80). Richness in humus (7.27%) causes that this horizon is richer in bases, than it is typical of dystric brown soils, and it is directly connected with the fact that the soil in this part is rich in nitrogen. Ratio C/N is lower than 20 (Table 2) which indicates that the conditions for decomposition of organic residues are favourable, which is visible also from the content of humus. According to the content of readily available phosphorus and potassium in this horizon, the soil is poor. It transitions irregularly into eluvial AE horizon, 14 cm thick, of granular to pea-sized structural aggregates, also unstable to touch, of silty loamy texture. The pH reaction in this part of the profile, determined in H_2O, is very strongly acidic, while the value in KCl is strongly acidic. The content of humus, nitrogen, the degree of base saturation (Table 2) are lower than in the horizon above. Below is a cambic horizon 24 cm thick, of polyhedral structure. The pH reaction in H_2O (4.62) and KCl (3.48) shows that this horizon has also very strongly acidic, i.e. strongly acidic reaction of soil solution. The reaction of soil solution of dystric brown soils ranges from extremely acidic to acidic (Košanin & Knežević, 2003, 2004; Kapović & Keren, 2012; Čigoja *et al.*, 2024). Cambic horizon is compressed and poorly permeable, compact and with increased content of clay, but the relation of textural fractions indicates that the texture of this horizon is silty loam. Textural evenness of the profile of dystric brown soil is one of the typical characteristics of dystric brown soil (Kapović & Keren, 2012). The structure in this part of the profile is polyhedral, which has a positive effect on water and air properties in this part, since it enables forming of macro and micro pores. The content of humus in this horizon is 1.11%, which indicates the existence of the ilimerization process, i.e. movement of humus particles from higher to lower parts of the profile. The water permeability and aeration of the soil gradually decreases with depth, due to the greater participation of the clay fraction in deeper parts of the profile. By analysing the properties of dystric brown soil on the said territory we can conclude that physical properties are more favourable compared to chemical. The depth and structure of this soil affect somewhat more favourable environment for the development of plants, which is certainly contributed also by abundance of humus and bases in humus-accumulative horizon, in contrast to more pronounced acidity and weaker supply of phosphorus and potassium. For the above reasons, dystric brown soil of the said area has a low to medium ecological productive potential.

According to the Classification of the soils of Yugoslavia (Škorić *et al.*, 1985) the analysed profile belongs to **the class of cambic soils, the type dystric brown soil, subtype ilimerized, variety on sandstones-cherts, form medium deep.**

Ilimerized soil – (Profile structure: O-Aoh-E-Bt-C)

Figure 4. *Appearance of pedological profiles of ilimerized soil (©Kapović Solomun, 2021)*

Pedological profiles of ilimerized soil are opened in three compartments, out of which one profile in compartment 143 on sandstone, while profiles in compartments 37 and 142 were on peridotite. All profiles were opened under the cultures of Austrian pine and Scots pine. Total depth of pedological profiles ranges from 52 to 68 cm. According to the depth of solum analysed profiles can be classified as medium deep to deep (Knežević & Košanin, 2007). Organogenic horizon is developed up to 2 to 6 cm, with the presence of less decomposed organic residues. In all profiles O horizon gradually and irregularly transitions into humus-accumulative horizon, of lighter color, from 8 to 17 cm thick (Figure 4). A horizon is relatively water permeable, drained, with spheroid structural aggregates, fine- to coarse-grained, mostly unstable, moderately pronounced. Textural class of A horizon is silty loam. The pH reaction determined in H_2O is very strongly, i.e. strongly acidic, while in KCl it is strongly acidic (Table 4). According to the humus content the soils are quite to very rich in humus (4.09 - 6.70%). The ratio C/N is lower than 20. The soils are poorly supplied with readily available phosphorus in A horizon, while the supply of potassium ranges from poor (8.9 mg/100g) to good (21.8 mg/100g). It transitions gradually into eluvial horizon, from 20 to 22 cm thick. Basic morphological property of ilimerized soil is the presence of eluvial horizon of light-brown color, which is morphologically very pronounced, from 2 to 25 cm thick (Knežević *et al*., 2011). E horizon is washed with polyhedral structural aggregates, except in profile in compartment 37, where it is structureless, unsaturated. Texturally it belongs to class silty loam, of very acidic reaction of soil solution. It is poorly supplied with readily available forms of phosphorus and potassium. Diffusely it transitions into illuvial horizon 22 to 28 cm thick, which is characterised by increased content of clay, density and compactness. Kapović & Keren (2012) state that clay in the deeper parts of the profile is not desirable for the development of the root system of plants, since in addition to anaerobic conditions it also provides mechanical resistance. It has the smallest water permeability in the profile, and presence of

concretions, which indicates the presence of the process of gleying in the period with increased amount of precipitation (Figure 4). The structural aggregates are well pronounced, polyhedral. Texturally it is differentiated, with silty clay loamy texture (compartments 37 and 143), while soil rich in clay is at the profile in compartment 142. Content of clay in Bt horizon is 1.5 to 2.9 times higher than in E horizon. Kapović Solomun & Marković (2022) state that ilimerized soils in illuvial horizon have from 1.5 to 2.5 times more clay than in eluvial horizon. The values of hydrolytic acidity are the highest in the A horizon and they decrease with the increase of depth, due to lower content of humus matters. The degree of soil saturation with bases increases with depth and it is the highest in the illuvial horizon (59.98-81.04%). Bt horizon is poor in readily available phosphorus, while in terms of K_2O supply it is poorly to moderately supplied. The largest amount of nitrogen is in the humus-accumulative horizon. Out of all analysed profiles in the territory of FMU Mala Ukrina, pedological profiles of ilimerized soil have the deepest solum. The condition of physical and chemical properties indicates that this type is the most favourable for the development of forest cultures of the researched area, so compared to other types of soil of this site, it stands out as the soil of high ecological and productive potential. Kapović Solomun & Eremija (2017) state that ecological and productive properties of ilimerized soil are conditioned by the depth, supply of nutrients and water and physical properties.

According to the Classification of soils of Yugoslavia (Škorić *et al.*, 1985) analysed profile belongs to the **class of eluvial-illuvial soils, type ilimerized soil, subtype on silicates-ultrabasites, varieties pseudogley and typical, form silty loamy.**

Table 1. *Physical properties of soil*

Tip zemljišta / Soil type	Odjeljenje / Compartment	Dubina / Depth (cm)	Granulometrijski sastav zemljišta / Granulometric composition of soil (%)								Teksturna klasa/ Soil texture class
			2.0-0 . 2 (mm)	0.2 - 0.06 (mm)	0.06 – 0.02 (mm)	0.02 – 0.002 (mm)	<0.002 (mm)	Pijesak / Sand	Prah / Silt	Glina / Clay	
Humusno-silikatno zemljište / Ranker	136	3-24	6.34	13.97	25.98	39.33	14.38	20.31	65.31	14.38	Praškasta ilovača / Silty loam
Kiselo smeđe zemljište / Dystric brown soil	44	5-13	3.18	0.16	31.96	47.44	17.25	3.34	79.40	17.25	Praškasta ilovača / Silty loam
		13-27	1.76	0.37	26.65	52.09	19.13	2.13	78.74	19.13	Praškasta ilovača / Silty loam
		27-51	1.58	1.92	25.10	45.50	25.90	3.50	70.60	25.90	Praškasta ilovača / Silty loam
Ilimerizovano zemljište / Ilimerized soil	37	2-10	3.06	8.22	25.26	46.52	16.94	11.28	71.78	16.94	Praškasta ilovača / Silty loam
		10-32	2.80	0.65	24.55	48.22	23.78	3.45	72.77	23.78	Praškasta ilovača / Silty
		32-52	1.97	9.12	19.80	33.95	35.17	11.09	53.75	35.17	Praškasto-glinovita ilovača / Silty clay loam
Ilimerizovano zemljište / Ilimerized soil	142	2-19	8.62	11.27	25.04	42.75	12.32	19.90	67.79	12.32	Praškasta ilovača / Silty loam
		19-40	4.64	10.03	22.03	42.20	21.10	14.67	64.23	21.10	Praškasta ilovača / Silty loam
		40-68	2.60	10.40	10.29	15.28	61.43	13.01	25.57	61.43	Glinuša / Clay
Ilimerizovano zemljište / Ilimerized soil	143	6-17	2.12	11.97	28.19	44.99	12.72	14.09	73.18	12.72	Praškasta ilovača / Silty loam
		17-37	1.53	8.39	24.94	44.38	20.76	9.92	69.31	20.76	Praškasta ilovača / Silty loam
		37-65	2.05	11.44	18.93	35.73	31.86	13.48	54.66	31.86	Praškasto-glinovita ilovača / Silty clay loam

Table 2. *Chemical properties of soil*

Tip zemljišta / Soil type	Odjeljenje / Compartment	Dubina / Depth (cm)	pH		Adsorptivni kompleks / Adsorption complex					Humus / Humus	N	C	C/N	Pristupačn / Available	
					T	S	T-S	V	Y1					P_2O_5	K_2O
			H_2O	KCl	cmol/kg			%	mLNaOH/50g	%				mg/100g	
Humusno-silikatno zemljište / Ranker	136	3-24	5.29	4.06	33.70	16.63	17.07	49.34	26.26	5.19	0.20	3.01	15.35	<1	8.1
Kiselo smeđe zemljište / Dystric brown soil	44	5-13	4.93	3.80	34.02	14.28	19.74	41.97	30.37	7.27	0.26	4.22	16.32	<1	5.6
		13-27	4.63	3.57	28.51	9.66	18.85	33.88	29.00	3.36	0.14	1.95	14.38	<1	16
		27-51	4.62	3.48	27.73	10.61	17.11	38.28	26.33	1.11	0.04	0.64	14.56	<1	9.3
Ilimerizovano zemljište / Ilimerized soil	37	2-10	5.20	4.03	47.91	31.37	16.55	65.47	25.45	6.70	0.28	3.89	13.73	<1	21.8
		10-32	5.17	3.55	42.26	28.10	14.16	66.50	21.78	1.98	0.13	1.15	8.52	<1	14.8
		32-52	5.42	3.64	53.81	42.12	11.69	78.27	17.99	1.04	0.09	0.60	6.99	<1	3.8
Ilimerizovano zemljište / Ilimerized soil	142	2-19	5.04	3.76	28.95	12.89	16.06	44.52	24.71	4.09	0.13	2.37	18.48	<1	16.4
		19-40	5.06	3.55	25.88	12.29	13.59	47.48	20.91	1.07	0.04	0.62	16.23	<1	4
		40-68	5.93	4.04	48.64	39.41	9.22	81.04	14.19	0.82	0.01	0.47	31.75	<1	13
Ilimerizovano zemljište / Ilimerized soil	143	6-17	5.09	3.67	33.54	13.80	19.74	41.15	30.37	5.28	0.18	3.06	17.46	<1	8.9
		17-37	5.31	3.51	23.60	10.65	12.94	45.15	19.92	2.29	0.05	1.33	28.09	<1	4.4
		37-65	5.51	3.77	27.19	16.31	10.88	59.98	16.74	1.13	0.02	0.66	33.65	<1	5

4. CONCLUSION

- FMU Usorsko-ukrinsko is located in the North-western part of the Republic of Srpska, and is composed of five economic units: Mala Usora, Mala Ukrina, Velika Ukrina, Donja Velika Usora and Gornja Velika Usora.
- Climate properties of the said area are characterized by moderate continental climate. The geological substrate of the object of research was represented by silicate substrates, sandstones and cherts and ultrabasic rocks, peridotite and serpentinized peridotite. The vegetation in the researched compartments consists of forest cultures of Austrian pine and Scots pine, established in the belt of forests of sessile oak and hornbeam (*Querco-Carpinetum*).
- Edaphic component is represented by three types of soil: humus silicate soil, dystric brown soil and ilimerized soil.
- Ranker is represented by one pedological profile in the compartment 136. This is at the same time the only representative of soil from the class of humus-accumulative soils. Physical and chemical properties of the researched profile in the area of research indicate that it is the type of the soil that has limited capability for supply of plants with sufficient amounts of nutrients, which affects low ecological and productive capability of the above-mentioned soil.
- Dystric brown soil belongs to class of cambic soils. The analysis included one pedological profile opened in the compartment 44, on sandstones and cherts. Physical and chemical properties of this type of soil indicate there is an initial phase of the process of ilimerization, sufficient quantities of humus and depth provide the existing vegetation with more favourable conditions for growth and development of the root system, but small amounts of phosphorus and insufficient supply of potassium in all profiles, along with lighter textural composition, as well as strong acidity are the crucial factors that in the sense of ecological and productive potential this type of soil is characterized as low or medium.
- Ilimerized soil belongs to class of eluvial illuvial soils, as the deepest of all the researched profiles in this forest economic unit it is represented by three pedological profiles, in three different compartments (37, 142 and 143). The geological substrate of the researched profiles consists of sandstone and peridotite. Out of all the researched soils of this area, ilimerized soil has the best properties and provides the best conditions for growth and development of vegetation, which in combination with other physical and chemical properties certainly has a decisive influence on the fact that this type stands out as the soil that has high ecological and productive potential.

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CHARACTERISTICS OF SOILS IN FOREST MANAGEMENT UNIT „MALA UKRINA“

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Summary

Soil research is of great importance in the forestry profession and science. Understanding soil types, their spatial distribution, and their physical-chemical properties certainly contributes to better foundational frameworks for creating basic planning documents in forestry. The soil research in the forest management unit (FMU) "Mala Ukrina" aimed to enhance knowledge of the physical-chemical properties of the most common soil types and to ensure that future management plans for forest cultures in this area are closely correlated with edaphic characteristics. Field research identified three types of soil from three different soil classes. Investigations were conducted in five different compartments, with one basic pedological profile opened in each compartment from which soil samples were taken for laboratory studies according to genetic horizons. The class of humus-accumulative soils was represented by one type – humus-silicate soil; from the class of cambic soils, dystric brown soil was represented, while illimerized soil was a representative of the class of eluviated-illuviated soils. Among the mentioned soil types, illimerized soil provides the best conditions for the growth and development of forest vegetation in this area, while humus-silicate soil is the most limiting.

KARAKTERISTIKE ZEMLJIŠTA U PRIVREDNOJ JEDINICI „MALA UKRINA“

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Rezime

Istraživanje zemljišta ima veliki značaj u šumarskoj struci i nauci. Poznavanje tipova zemljišta, njihove prostorne distribucije, kao i fizičko-hemijskih osobina doprinosi svakako boljim polaznim osovama za izradu osnovnih planskih dokumenata u šumarstvu. Istraživanja zemljišta u privrednoj jedinici (PJ) „Mala Ukrina“ imala su za cilj da doprinesu poznavanju fizičko-hemijskih osobina najzastupljenijih tipova zemljišta, kao i da budući planovi gazdovanja šumskim kulturama na ovom području budu u uskoj korelaciji sa edafskim karakteristikama. Terenskim istraživanjem identifikovana su tri tipa zemljišta, iz tri različite klase zemljišta. Istraživanja su sprovedena u pet različitih odjeljenja, u svakom odjeljenju otvoren je po jedan osnovni pedološki profil iz koga su uzimani uzorci zemljišta za laboratorijska proučavanja po genetičkim horizontima. Klasa humusno-akumulativnih

zemljišta zastupljena je sa jednim tipom – humusno-silikatno zemljište, iz klase kambičnih zemljišta zastupljeno je kiselo smeđe zemljište, dok je ilimerizovano zemljište predstavnik klase eluvijalno-iluvijalnih zemljišta. Od navedenih tipova zemljišta najbolje uslove za rast i razvoj šumske vegetacije na ovom području ima ilimerizovano zemljište, dok je najviše limitarno humusno-silikatno zemljište.