SOILS FROM THE LIPOVA FOREST DISTRICT, ROMANIA

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***Abstract**: This paper describes all soil types and subtypes within the Lipova Forest District. Geographically, the Lipova Forest District is located in the western part of Romania, in the Lipova Hills, with the Mureş River as limits to the north, the hills within the Bega River basin to the south, and the boundary between the western plain and the Lipova hills (UP I and UP IX) to the west. The average altitude is between 120 m, in the meadow of the Mureş River, and 340 m. Most forests are found at altitudes between 200 and 400 m. Slope is the predominant geomorphological unit, followed by plateau, meadow and mane. The terrain configuration is usually flat and wavy, less often bumpy. Slope is a physical-geographical character with an ecological determinant role for soil and vegetation, bringing important changes in surface leakage. A number of arboreta suffer from the stationary conditions in which they vegetate, the soil being exposed to excess water – short-lived (0.67 ha) or seasonal (0.83 ha) – while others have stems damaged by game or rot at the base as a result of the origin of the shoots. These destabilising factors affect a total area of 2,687.18 ha as follows: 1.50 ha of low-to-medium intensity; unhealthy stems on 2,685.68 ha of which 10-20% (2,677.41 ha) and 30-50% (8.27 ha). These destabilising factors act either singularly or cumulatively (most often) with a different degree of intensity and, depending on it, they affect the normal development of the respective arboreta. Within the Lipova Forest District, the soils of the luvisol class predominate by 95%: luvosol, by 77%, preluvosol by 16%, and allosol by 2%. Next are the protisol class soils that participate with 3% of the area of forests and land for afforestation or reforestation while the smallest area is occupied by the cambisol class, which participate with only 2% of the area of forests and land for afforestation or reforestation.*

***Keywords**: soil, forest district, luvosol, preluvosol, eutricambosol*

INTRODUCTION

From a lithological point of view, the territory of the Lipova Forest District belongs to the following more important formations: diorite sand clays and compact sands, which occupy most of the surface. (EL ALFY Z., et al, 2010; BADEA A.C., 2014; CIOLAC VALERIA et al, 2013; POPESCU, C.A. et al, 2020) On these substrates, were formed stagnic or typical luvosols and preluvosols. (IANOȘ GH., et al, 1997; (IANOȘ GH., et al, 1992; CASIANA MIHUȚ, et al, 2018; MIRCOV V.D., et al, 2016) All soils are deep, rich in nutrients, devoid of skeleton, with a large compactness that causes the spread of oak species (Turkey oak and especially Hungarian oak are best adapted to soils with high compactness); sands mixed with gravels, on which rich and very rich soils of the type aluviosol (aluvial soil) have formed. (OKROS ADALBERT 2015; OKROS ADALBERT 2015 et al, 2018)

The presence of calcium and ferro-magnesium minerals in certain rock complexes has led to the formation of richer (basic) soils of medium or higher creditworthiness and on which medium or higher productivity arboreta grow; the lack of the above-mentioned minerals has led to the formation of poorer (more acidic) soils of medium and lower creditworthiness on which middle and lower productivity arboreta grow. (NIȚĂ L., et al, 2018)

MATERIAL AND METHOD

For the knowledge of the spatial distribution of soil types and subtypes within the Lipova Forest District, the determination of their intrinsic properties and the identification of the types of the resort, 226 main soil profiles (1 profile per 66 ha) were carried out and from 30 profiles, 85 soil samples were collected which were analysed at the *Laboratory of Pedology and Soil Analysis of OSPA Arad, Romania*.

The results of these analyses are presented in the *Analysis Bulletin*.

RESULTS AND DISCUSSION

The distribution of areas by altitude category is as follows:

- altitudes between 100 and 200 m: 3,577.04 ha (23%);
- altitudes between 200 and 400 m: 11,655.43 ha (77%).

Total district – 15,232.47 ha (100%).

The distribution of areas by tilt category is as follows:

- tilt less than 16 degrees: 13,089.98 ha (86%);
- tilt between 16 and 30 degrees: 2,084.04 ha (14%);
- tilt between 31 and 40 degrees: 58.45 ha (-%);

Total district – 15,232.47 ha (100%).

For a better knowledge of the spatial distribution of soil types and subtypes within the district (table 1), the determination of their intrinsic properties and the identification of the types of the resort, 226 main soil profiles (1 profile per 66 ha) were carried out and from 30 profiles, 85 soil samples were collected which were analysed at the *Laboratory of Forest Pedology and Soil Analysis of OSPA Arad, Romania*. The results of these analyses are presented in the *Analysis Bulletin*.

Table 1.

The soil types identified are the result of soil genesis factors (geological substrate, geomorphological, microrelief, and climate factors).

Class of soil	Types of soli	Subtypes of soil - *cod*	Supraface				ca pe U.P. - ha					Total ha	%
			I	II	III	IV	V	VI	VII	VIII	IX		
Protisoil	Aluvisol	dystric - 0401	97.98		1236	88.65	-	-	13258	-	8275	41452	3
	Total Aluvisoil		97.8		1236	8865		-	13258	-	823	41432	3
	Total Protisols		97.8		1236	8865	-	-	13238	-	8275	41432	3
Luvisoil	Preluvosol	typic-2101	51.44		-	-	9,06	173,08	58.77	-	-	29235	2
		stagnyc - 2108	-		91,85	161,01	-	-	293.60	-	157807	2125.43	14
	Total Preluvosols		5144		9135	16101	906	17308	35237	-	157897	2417.78	16
	Luvosol	typic-2201	85.6	47225	128,66	-	614.44	61270	3825	1501.48	87,81	3541.19	24
		stagnyc -2212	1199.68	41427	172337	2090.82	-	-	246240	31.41	-	792215	53
		lytic - 2214	-	53.85	-	-	-	-	-	-	-	53.85	0
	Total Luvosols		128528	94037	185223	209032	61444	61270	250065	153289	8731	11517.19	77
	Alosol	typic-2301	-	-	-	-	-	-	177.12	-	-	177.12	1
		stagnyc -2305	-	-	-	14432	-	-	-	-	-	14432	1
	Total Alosoils		-	-	-	14432	-	-	177.12	-	-	321.44	2
	Total Luvisols		1336,72	94037	194408	2396,15	6233	785.78	3030.14	153289	1666.78	1425641	95
Cambosoil	Eutricambosoil typic — 3101		-	4,6	-	63.47	15329	2727	8.74	-	-	25737	2
	Total Eutricambosols		-	46	-	63.47	15329	2727	8.74	-	-	25737	2
	Total Cambisols		-	46	-	6347	153,29	2727	8.74	-	-	25737	2
Total O.S.			1434.71	94497	195664	254827	77679	81305	317106	153289	174933	1492830	100

Table 1 shows that the soils of the luvisol class predominate (95%), namely luvisol (77%), preluvosoil (16%), and allosol (2%). Next are the protisol class soils that share 3% of the area of forests and land for afforestation or reforestation, while the smallest area is occupied by the cambisol class, which shares only 2% of the area of forests and land for afforestation or reforestation.

Dystric aluviosol, formed on watersides, with a moderate humus content of 2-3%, is moderate to weak acid, and the degree of base saturation is less than 53%. It is a soil well supplied in water and nutrients, with a medium trophicity, favourable to common oak, Turkey oak, and Hungarian oak.

Typical preluvosol, with Ao-Bt-C profile, is formed on clays and diorite sands, on low-tilted slopes with various exhibitions, hight to low acidic, with a pH=4.5-6.3, rich to intense humiferous with a humus content of 5.1-21.5% over 15 cm, mesobasic to eubasic, with a degree of base saturation V=62-86%, well supplied in nitrogen at surface (0.25-1.10 g %) sandy-clayey to clayey-clay, of superior creditworthiness for oak species, at a high edaphic volume.

Stagnic preluvosol, with Ao-Btw-C profile, is formed on clays and diorite sands, on slightly inclined slopes, terraces, weak to intense humiferous with a humus content of 1.5-10.2%, is low alkaline to high acidic, with a pH=4.1-7.6 and a degree of base saturation greater than 53% in the Btw horizon reaching even 97% (ua 35B of UP VII on clay). It is a soil well supplied in nutrients, with a medium to superior trophicity, favourable to sessile oak, Turkey oak, common oak, and Hungarian oak. It is spread over 14% of the forest surface.

Typical luvosol, with Ao-El-Bt-C profile, is formed on rocks poor in calcium and ferro-magnesium minerals, grit stone, etc., on slopes with various exhibitions, but predominantly shaded slopes and slopes not too inclined, strongly acidic to neutral with a pH=4.5 (in El)-6.9, very humiferous to intense humiferous, with a humus content of 5.6-19.5% over 1-15 cm, with a degree of base saturation V>53% in Bt or El; well to very well supplied in total nitrogen (0.288-1.000 g%), sandy-clayey to clay, light texture in El and heavy in Bt, of medium or low creditworthiness for Turkey oak, sessile oak, Hungarian oak, or mixtures of them.

Stagnic luvosol, with Ao-El-Btw-C profile, formed on clays, on light slopes, or terraces, even high plains, very strongly acidic to neutral with a pH=4.3(in El)-6.0, weak humiferous to intense humiferous with a humus content of 2.6-19.2% over 1-15 cm, degree of base saturation V>53% in Btw or in El. It is a medium trophic soil, favourable to sessile oak, Turkey oak, common oak, Hungarian oak, and a mixture, which form middle and upper productivity arboreta. It is spread over 53% of the forest surface.

Lytic luvosol, with Ao-El-Bt-Rli profile, is formed on moderately inclined slopes, on a small surface in UP II, similar to the typical one but superficial, with a massive rock that lies over 20-50 cm deep, strongly acidic, very humiferous, oligobasic with a lower degree of base saturation in the horizon podzolite El, very well supplied in total nitrogen, clayey-sandy, low creditworthiness for beech, sessile oak, European hornbeam, and Turkey oak. The lower creditworthiness is determined by the small edaphic volume due to the superficiality of the soil in thickness and of the skeleton on the profile. On this soil, it is recommended, in addition to the species mentioned above, to plant Austrian pine and Scots pine and spruce which make much better use of the edaphic conditions of superficial and skeletal soil.

Typical allosol, with Ao-Bt-C profile, formed on clays, light slopes, or terraces, even high plains, with a pH=4.5-5.6, humus content larger over 10 cm and decreasing in depth, degree of base saturation less than 53%. It is a soil of medium trophicity, being on almost flat land, favourable to the sessile oak, Turkey oak, Hungarian oak, and a mixture, which form arboreta of lower or middle productivity.

Stagnic allosol, with Ao-Elw-Btw-C profile, formed on clays, light slopes, or terraces, even high plains, is acidic to strong acid, with pH=4.4-5.4, humus content is intense (15.5%) over 10 cm and decreasing in depth, the degree of base saturation 35-79%. It is a soil of medium trophicity, being on almost flat land, favourable to sessile oak, Turkey oak, common oak, Hungarian oak, and a mixture, which form arboreta of medium and superior productivity. It is spread over 1% of the forest surface.

Typical eutricambosol, with Ao-Bv-C profile. This soil is defined by the horizon B cambic (Bv) having a degree of base saturation (V>53%) in both Ao and Bt. It is formed on rocks rich in calcium and ferro-magnesium minerals, tectonic limestone, dolomites, conglomerates, limestone grit stone, diorite sands, and chlorite shales. It is found on moderately fast-inclined slopes with shadowed and semi-shadowed exhibitions, with medium productivity hill formations sometimes superior with mull-like floor represented by Asperula-Asarum. It is very acidic on the surface and less acidic in profuse with a pH=5.3-5.5, very humiferous with a humus content of 6.0% over 17 cm, mesobasic with a degree of base saturation V=70%, very well supplied in total nitrogen (0.3l g%), clayey-sandy to clayey, of medium creditworthiness (in the field studied) for beech, spruce, and European hornbeam. The middle creditworthiness is determined by the medium useful end-volume due to the presence of the skeleton on the profile in the proportion of 25-50% (semi-skeletal).

Table 2.

Physico-chemical characterization of soils within the Lipova Forest District

Nr crt	U.P. and u.a. / Types, subtypes of soil / Arboret: compoz-prod.	Horizont	Depth cm	Humidity	pH	Humus	Exchange bases	Exchange	Total exchange capacity	Degree of turation in bases	Total nitrogen %
1	**UPI u.a.43B**	Ao	0-10	1,017	4,972	2,650	17,670	11,104	28,774	61,410	0,136
2	Luvosoil stagnyc	El	10-30	0,905	4,877	1,900	14,780	11,183	25,963	56,928	0,097
3	8CE2GI, D.	Btw	30-90	1,516	5,511	0,400	2872C	6721	34,441	81,937	0,021
4	**UPI u.a.53F**	Ao	0-11	0,762	5,481	5,000	20,610	7,875	28,485	72,354	0756
5	Luvosoil stagnic 8CE1ST1GÎ, H.	El	11-27	0,655	4,930	1,650	13,260	9793	22,553	58,796	0,085
6		Btw	27-97	1,283	5,254	1,000	21,870	8,584	30,454	71,814	0,051
7	**UPI u.a. 56**	Ao	0-12	0,876	5,223	5,000	20740	9,056	29796	69,087	0756
8	Preluvosoil typic 7TE3CA.II.	Bt	12-98	1,414	5,338	2,000	21790	9,135	30,425	69,975	0,103
9	**UPH u.a.36B**	Ao	0-5	1,100	5,457	5,625	20730	6721	26,451	76,480	0788
10	Luvosoil typic	El	5-20	1,434	5760	1,071	22,120	7,481	29,601	74,727	0,055
11	7CE3GÎ, H.	Bt	20-70	1,565	5,485	0,670	17,500	4,174	21,674	80,743	0,034
12	**UPH u.a.2A**	Ao	0-5	1,570	6,020	19786	35,770	6,615	42,385	84,393	0,989
13	Luvosoil stagnyc 7CE3GÎ,n.	El	5-15	1,811	4.843	8.50	23,590	12,915	36,505	64,621	0,423
14		Btw	15-60	1,920	5,367	2,304	27,370	7,639	35,009	78,180	0,118

Table 3.

Physico-chemical characterization of soils within the Lipova Forest District

U.P. și u.a. **Typ, subtyp of soil** **Arboret: compoz-prod.**	**Horizont**	**Depth cm**	**Humidit**	**pH**	**Humus**	**Exchange bases**	**H Exchang e**	**Total exchange capacity**	**Degree of saturation in bases**	**Total nitrogen %**	**% texture**
UP III u.a. 15A Luvosol stagnic 6CA2CE2GO, sământă, 80 ani,Ps	Ao	04	1,090	6,075	13286	30,166	5,871	36,037	83,708	0,681	n-l
	El	4-20	1,070	5,091	4,635	10,596	11279	21,875	48,440	0238	n
	Btw	20-90	1,033	5,328	2,391	13,480	8,343	21,823	61,770	0,123	a-1
UP III u.a. 17B Luvosol tipic 6CE1GÎ1GO2CA, sământă, 15ani, Ps	Ao	0-6	1,007	5,380	10,720	31,404	8,729	40,131	78248	0,550	n-1
	El	6-16	0,995	4,653	6,607	12,862	16,145	29,007	44,341	0,339	n
	Bt	18-20	2,054	5,044	3,108	18218	16,454	34,672	52,543	0,159	a-1
UP III u.a. 59B Luvosol stagnic 8CE1GO1CA, sământă, 130 ani,Ps	Ao	0-4	1,994	4,580	13,000	35,552	17,768	53,320	66,677	0,667	n-1
	El	4-20	1,501	4,344	5,811	6,094	14,446	20,540	29,669	0,298	n
	Btw	20-90	1,531	5,220	2,676	10,420	6,644	17,064	61,066	0,137	a
UPin u.a. 36A Preluvosol stagnic 5CA3CE2TE, sământă, 60 ani, Ps	Ao	0-6	2209	6,494	10297	29,784	3,554	33,338	89,341	0,528	n-4
	Btwl	6-10	1,485	5,494	6,027	12,686	5,408	18,094	70,114	0,309	n
	Btw2	10-55	1,509	4,920	2,027	10,008	10,043	20,051	49,914	0,104	a
UP IV u.a 117B Alosol stagnic 7CE1GÎ2ST, D.	Ao	3-5	2,060	4,464	15,514	10420	18,695	29,115	35,790	0,796	-
	BtWi	5-50	1,467	4,631	4297	8,978	11,974	20,952	42,851	0220	-
	Btw_2	-	3,180	5,499	1,865	21,750	5,871	27,621	78,744	0,096	-
UP IV u.a. 20A Eutricambosol tipic 9FA1DTJI.	Ao	0-20	0,781	5,330	6,027	18,012	7,571	25,583	70,408	0,309	-
	Bv	20-75	1,029	5,490	1,560	14,716	6257	6257	70,166	0,080	-
	-	-	-	-		-	-	-	-	-	-
UP IV u.a. 94B Luvosol stagnic 6CE1GÎ2ST1DT,II.	Ao	0-15	0,921	4,895	8,000	11,626	12,824	24,450	47,551	0,410	-
	El	15-25	0,782	4,841	2223	7,300	9,965	17265	42281	0,114	-
	Btw	25-60	1,764	5,387	0,658	18,424	5,794	24218	76,076	0,034	-
UP IV u.a. 88 Preluvosol stagnic 6CE4GI,II.	Ao	0-15	0,724	4,383	7,974	7,300	14,678	21,978	33216	0,409	-
	BtW]	15-20	1,027	5,090	0,984	9,360	7262	16,622	56,313	0,050	-
	Btw_2	20-70	0,716	5,536	0,196	9,566	2,472	12,038	79,465	0,010	-
UP IV u.a. 32A Luvosol stagnic 5CE3CElGÎlCA,n.	Ao	0-10	0,962	5,203	12,011	18,424	12206	30,630	60,151	0,616	-
	El	10-15	0,723	4,736	1,679	7,506	9,502	17,008	44,133	0,086	-
	Btw	15-50	1226	5,220	0,635	16,158	4,481	20,639	78291	0,033	-
U.P.V u.a. 64 B Preluvosol tipic 6FA3CA1DT Sământă, 120 ani, Ps	Ao	0-5	1,077	4,703	21,505	14,922	7,339	22261	67,033	1,103	n-1
	Bt	5-85	0,706	4,838	1,820	6,888	7,571	14,459	47,640	0,093	l-a
	-	-	-	-	-	-	-	-	-	-	-
U.P.V u.a. 16A Luvosol tipic 6CA2CE1GI1FA sământă, 80 ani, Pm	Ao	0-5	1,794	5,918	18,068	37,376	8,729	46,105	81,067	0,927	n-1
	El	5-25	1,306	4,780	4242	16,364	12,360	28,724	56,970	0218	n
	Btl	15-85	2,394	6,418	1,034	28,008	7,394	35,402	79,115	0,053	l-a
	Bt2	50-105	2,026	6,973	0,045	30,784	1,545	32,329	95221	0,002	l-a
UPVI u.a. 17 Preluvosol tipic 6GO2GI2CE, sământă, 100 ani,Pm	Ao	04	2,567	5,220	14,622	25252	13,673	38,925	64,873	0,750	n-1
	Bt	4-84	1,951	4,488	3,501	10,008	17,304	27,312	56,643	0,180	La
	-	-	-	-	-	-	-	-	-	-	-
UP VI u.a. 25B Preluvosol tipic 6CE 4GI, sământă, 80 ani, Ps	Ao	0-5	1,989	5,614	8,307	21,338	6,412	27,750	76,894	0,426	n-1
	Bt	5-75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	-	-	-	-	-	-	-	-	-	-	-

Table 4.

Physico-chemical characterization of soils within the Lipova Forest District

U.P. și u.a. Tip, subtip de sol Arboret: compoz-prod.	Horizont	Depth cm	Humidit	pH	Humus	Ca CO_3 %	Exchange bases	H Exchange	TTotal exchange capacity	Degree of saturation in bases	TTotal nitrogen %	% texture
U.P.VU, u.a. 78A Luvosol stagnic	Ao	0-10	0.784	5.007	8.170	-	13.300	10.789	24.089	55.212	0.419	l-n
	El	11-20	0.558	4.687	2.352	-	8.760	10.868	19.628	44.631	0.121	l-a
	Btw	21-95	1.078	4.857	0.523		18.420	6.694	25.114	73.346	0.027	a
U.P.VH, u.a. 76G Preluvosol stagnic	Ao	0-10	0.983	5.062	2.404		13.170	9.529	22.699	58.021	0.123	l-n
	BtWi	11-30	1.338	5.075	2.064	-	16.740	9.686	26.426	63.346	0.106	l-a
	Btw_2	31-90	1.584	5.488	1.411		22.830	6.300	29.130	78.373	0.072	a
U.P.VU, u.a. 51A Preluvosol tipic	Ao	0-10	1.436	6.357	11.183		35.904	5.485	41.389	86.748	0.573	n-l
	Bt	11-70	1.740	5.312	4.086		27.664	11201	38.865	71.179	0.210	l-a
	-	-	-	-	-		-	-	-	-	-	-
U.P.VH, u.a. 50C Preluvosol tipic	Ao	0-15	0.888	5.470	5.188		20.248	7.571	27.819	72.786	0.266	n-1
	Bt	16-55	1.559	5276	0.860		14.480	8.575	23.055	62.807	0.044	l-n
	-	-	-	-	-		-	-	-	-	-	-
U.P.VH, u.a. 38A Preluvosol stagnic	Ao	0-10	0.919	5.024	5250		15.830	10.553	26.383	60.002	0.269	n-l
	Btw_I	11-30	1209	5.128	2.750		14.780	9.608	24.388	60.605	0.141	l-a
	Btw_2	31-90	2223	5.472	1.700		23.810	7.403	31.213	76.284	0.087	l-a
U.P.VJH, u.a. 35B Preluvosol stagnic	Ao	0-10	2.301	7.612	1.500	1.822	43.968	3.090	47.058	93.434	0.077	n-1
	BtWi	11-30	2.072	7.740	3.500	3.653	46.028	1.700	47.728	96.439	0.179	l-a
	Btw_2	31-90	2274	7.620	0.200	0.504	34.872	1.004	35.876	97.201	0.010	l-a
UP VIU u.a. 52A Luvosol tipic 3CE5GÎ1ST1TE, sămânță, 150 ani, Pm	Ao	0-10	1288	5,740	6,625	-	22,750	6,721	29,471	77,195	0,340	l-n
	El	10-20	1214	5,142	1,372	-	13,892	8,575	22,467	61,834	0,070	l-a
	Bt	20-50	2297	5208	0,441	-	18,424	7,107	25,531	72,163	0,023	l-a
UP VIII u.a. 28D Luvosol tipic 6GÎ4CE, sămânță,70 ani,	Ao	0-10	1,427	6246	8281	-	35,728	5,794	41,522	86,046	0,425	l-n
	El	10-20	1,499	5,025	3,429	-	15,540	12,360	27,900	55,699	0,176	l-a
	Bt	20-50	1,536	5233	2,816	-	20,072	10274	30,346	66,143	0,144	l-a
UP VIU u.a. 50C Luvosol tipic 5CE5GÎ,	Ao	0-5	1,571	5,796	19,506	-	35,728	9270	44,998	79,399	1,000	l-n
	El	5-15	1,746	4,502	3,078	-	14,922	16,300	31222	47,794	0,158	l-a
	Bt	20-45	2240	5,570	0,318		22,956	5,408	28,364	80,935	0,016	l-a
UP IX u.a. 56 A Preluvosol stagnic 5CE4GÎ1TE sămânță, 120 ani,Ps	Ao	0-5	1,379	4,187	5215		9,536	17,381	26,917	35,427	0^267	-
	Bw!	5-15	2,426	4,976	0,538		21,072	5253	26,352	80,046	0,028	-
	Bw_2	15-45	2,781	6,450	0215		24,780	2,781	27,561	89,910	0,011	-
	-	-	-	-	-		-	-	-	-	-	
U.P.IX u.a.21 Luvosol tipic 10GO, sămânță, 85ani, Pm,	Ao	0-5	2,372	4,517	12,581		21278	14,446	35,724	59,563	0,645	-
	Ao/El	5-15	1,786	5,688	1,720		26222	7262	33,484	78,313	0,088	-
	El	15-30	2,954	5,108	0,699		25,810	26,497	52,307	49,344	0,036	-
	Bt	30-60	2,518	6,419	0,484		21,072	4,481	25,553	82,466	0,025	-
	-	-	-	-	-	-	-	-	-	-	-	
U.P.IX u.a. 63E Preluvosol stagnic 8FA2CA, sămânță. 95 ani,Pm	Ao	0-5	2,194	5,702	7,849		25,810	6,953	32,763	78,779	0,403	-
	BtW!	5-15	2,899	5,618	0,930	-	25,192	4,635	29,827	84,460	0,048	
	Btw_2	15-45	3,029	6,736	1,392	-	26,840	2,086	28,926	92,789	0,071	-
	-	-		-	" 1	-	-	-	-	-	-	-

The other forest types occupy areas representing not more than 2% of the forest area and land for afforestation and reforestation.

CONCLUSIONS

Analysing the data presented in the paper, it is found that within the radius of the Lipova Forest District there are certain factors which, by their action, lead to the destabilization of some arboreta (or certain species, elements within the arboreta) affecting normal development.

Within the Lipova Forest District, the soils of the luvisol class predominate by 95%: luvosol, by 77%, preluvosol by 16%, and allosol by 2%. Next are the protisol class soils that participate with 3% of the area of forests and land for afforestation or reforestation while the smallest area is occupied by the cambisol class, which participate with only 2% of the area of forests and land for afforestation or reforestation.

BIBLIOGRAPHY

BADEA A.C., BADEA G., 2014 - „Cadastre, Databanks and GIS Applications in Urban Aeas”, Conspress Publishing House, ISBN 978-973-100-310-8;

CIOLAC VALERIA, NISTOR ELEONORA, POPESCU C., BĂBUCĂ N., DIRLEA AURUȚA, BÂRLIBA LIVIA, 2013 - Study of flora and birds habitat in the Danube Delta: GIS approach. International Multidisciplinary 13th Scientific GeoConference SGEM 2013, 16-22 june, ALBENA-BULGARIA, Conference Proceedings, Vol.I., 935-942, ISSN 1314-2704, ISBN 978-954-91818-9-0;

EL ALFY Z., ELHARDY R., ELASHRY A., 2010 - Integrating GIS and MCDM TO Deal with Landfill Site Selection, International Journal of Engineering & Techhology IJET – Ijens Vol: 10 No: 06, December 2010, p.p. 33-40;

GHIBEDEA V., GRIGERESIK E., LUCIA BĂCANU, 1970 - Precipitaţii atmosferice în Câmpia Banatului şi în dealurile piemontane vecine. Studii de geografie a Banatului, vol.II, Universitatea Timişoara;

IANOȘ GH., BORZA I., ŢĂRĂU D., STERN P., 1992, Contribuţia OSPA Timişoara la cercetarea solurilor şi sporirea fertilităţii terenurilor agricole din Banat, Ştiinţa Solului nr. 4, Bucureşti;

IANOȘ GH., GOIAN M., 1992, – Influenţa sistemelor de agricultură asupra calităţii solurilor din Banat. Probleme de agrofit. teor. şi aplic., vol. 14, nr. 3-4, ICCPT Fundulea;

IANOȘ GH., PUȘCĂ I., GOIAN M., 1997 – Solurile Banatului-condiţii naturale şi fertilitate, Editura Mirton, Timişoara;

MIHUȚ CASIANA, NIȚĂ L. – 2018 Atmospheric Factors used to characterize soil resources https://www.rjas.ro/issue_detail/44, Timișoara, pag. 114-120

MIHUŢ CASIANA, OKROS A., IORDĂNESCU OLIMPIA, 2012 - Research on the soils of Western Romania. XI Wellmann International Scientific Conference, Review on Agriculture and Rural Development, Scientific Journal of University of Szeged, (Hungary) Faculty of Agriculture, vol.1(1) Supplement, 2012, ISSN 2063-4803;

MIRCOV V.D., S. VUXANOVICI, COSMA ANTOANELA, OKROS A., PINTILIE SOFIA, NICHITA ANCA IULIANA, MOISESCU CARMEN IRINA, 2016 - Climate records registered in western Romania, European Biotechnology Conference, vol. 231, ISSN 0168-1656, factor 3,34;

NIȚĂ L., D ŢĂRĂU, GH ROGOBETE, GH DAVID, D DICU, SIMONA NIȚĂ - Using pedologic information in defining the quality and sustainable use of land in western Romania, 2018/1/1; Jurnal Research Journal of Agricultural Science; Volumul 50; Numărul 1

OKROS ADALBERT 2015, Fertility status of soils in western part of Romania Journal of Biotechnology, Volume 208, Supplement, 20 August 2015, -09.05.2015 Bucuresti Romania 3,14 Page S63;

OKROS ADALBERT, POP GEORGETA, NITA SIMONA, RADULOV ISIDORA, MICU LAVINIA MADALINA, MIRCOV VLAD, DICU DANIEL DORIN 2016 Agricultural systems in the western part of Romania Journal of Biotechnology, Volume 231, Supplement, 10, Riga Letonia 3,14, Page S58

POPESCU, C.A., HERBEI, M.V., SALA, F., 2020 - Remote sensing in the analysis and characterization of spatial variability of the territory. A study case in Timis County, Romania. Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development, 20(1): 505-514.

* * * 2003, Ghidul excursiilor celei de-a XVII-a conferinţe naţionale pentru știinţa solului, „Utilizarea solurilor, protecţia mediului ameliorat şi dezvoltarea rurală din partea de vest a României”, Editura Estfalia, Bucureşti;

* * * – Implementarea Sistemului Român de Taxonomie a solurilor pentru partea de vest a României, Material elaborat de Gh. Rogobete şi Gh. Ianoş.