SUSTAINABLE USE OF SOIL COVER IN THE LIGHED - LUNCA TIMIȘULUI FOREST ADMINISTRATION

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Abstract*. This paper presents a brief description of the soil cover in the Lighed, Lunca Timişului Forest Administration (Romania), and of the woody vegetation within the studied perimeter for sustainable use.(11) Together with the other elements of the environment (water, air, vegetation, and fauna), soil is the essential element that ensures food for both plants and humans and animals, participating in the different vital cycles of ecosystems; it is the cradle and source of existence for humankind. Hence the necessity of deeply knowing nature and soil features, its functions, its complex relationships with other components of the environment for sustainable use and soil reserve management, so that soil cover be free of damage that could impact the environment.(9)Studies were carried out within the production unit VII Lighed, part of the Lunca Timişului Forest Administration, Forest Office Timişoara – National Regie of Forests, where it covers 1657.3 ha in north-west. (4)This paper presents climate and edaphic ecological indicators differentiating forest stations from the perspective of their economic value. The permanent hydrographic network is made up of the Timiş River and Pogonici Rivulet. (6,10)The goal of the paper was to identify soils within this forest administration for proper, effective, and sustainable use. (7)Research was carried out in the field, laboratory, and office. The goals of the study were knowing the physical geographical landscape, determining ecologic and climatic indicators based on local Weather Stations, identifying natural vegetation depending on their yielding level (high, medium, and low), describing soils and station types, and making recommendations after establishing the economic value of each forest station. (3)Research in the field and in the laboratory allowed us to identify the following soil types and sub-types: chernic gleysol, gleysol, alluvial gley soil, and mollic alluvial gley soil.(2,5)*

Keywords: *soil cover, sustainable use, forest administration, chernic gleysol, gleysol, alluvial gley soil, mollic alluvial gley soil.*

INTRODUCTION

Studies were carried out within the production unit VII Lighed, part of the Lunca Timişului Forest Administration, Forest Office Timişoara – National Regie of Forests, where it covers 1,657.3 ha in north-west.(12)

Geographically, this area is located in the Western Plain, on the left bank of the Timiş River, and is limited by the localities Șag – Timișeni, Pădureni, and Peciu Nou. (6)

The studied area has for lithologic substratum, loamy and clayey-loamy silts, sometimes intertwined with loamy-sandy and sandy substrata. Marshy loamy deposits predominate. The alternance of these substrata point to an irregular alluvial deposit regime. On these parental rocks appeared very varied, generally deep soils. (8)

This area belongs to the plain area (91%), at an altitude ranging within 90 and 100 m; 8% is depression and 1% is deserted river bed. (1)

The hydrographic network has medium density: it influences positively the forest vegetation in the area.

Statistics show that, in general, climate is favourable to forest vegetation development.

MATERIAL AND METHOD

To reach our goals, we conducted research in parallel in the field, laboratory, and office, aiming at the following:

- Identifying and studying soil types and sub-types and their features;
- Studying relief, hydrography, and hydrology, as well as flora and fauna elements;
- Collecting data regarding the sustainable management of soil resources.

The material studied was represented by the lands belonging to the Lighed – Lunca Timișului Forest Administration, i.e. the soils identified within the perimeter. These soils are studied in relation to the environmental factors conditioning their existence.

The research methods used were bibliographical documenting, observation, and laboratory analyses.

RESULTS AND DISCUSSION

During field work, we dug soil profiles and sampled soil; soil samples were taken to the laboratory and prepared for analysis. We thus identified the following soil types and sub-types: chernic gleysol, typical gleysol, alluvial gley soil, and mollic alluvial gley soil (Table 1).

Table 1.

Soil types within the Lighed – Lunca Timișului Forest Administration

Class	**Soil type and sub-type**	**Area**	
		ha	**%**
PROTISOLS	Typical alluvial soil	81.6	5
	Gleyey argic alluvial soil	59.4	4
	Gleyey mollic cambic alluvial soil	1180.9	74
	Gleyey alluvial soil	30.3	2
HYDRISOLS	Chernic cambic gleysol	59.8	4
	Stagnic gleysol	72.8	5
	Typical gleysol	87.1	6
TOTAL		1571.9	100
Other lands		85.4 ha	
TOTAL U.P.		**1657.3 ha**	

The **typical alluvial soil** covers 81.6 ha, i.e. 5% of the total perimeter. It is a soil formed in the meadow area mainly from heterogeneous alluvia and it has a medium texture (loamy to loamy-clayey). Its humus content over the depth 0-20 cm is 2.9%; its reaction is acid

with a pH ranging within 5.1-5.2; and base saturation is 74-82%. The soil is medium supplied with total nitrogen (0.15%). As for its economic value, typical alluvial soil was classified medium for **oak** (*Quercus* spp.), **ash** (*Fraxinus* spp.), and **elm** (*Ulmus* spp.), and low for **acacia** (*Acacia* spp.). The soil has a high water-retention capacity due to its loamy to loamy-clayey texture. This is why acacia yields low amounts of wood. It is recommended to grow on this soil *oak*, *ash*, *elm*, and *sycamore* (*Platanus* spp.), together with *white poplar* (*Populus alba*) and *black poplar* (*Populus nigra*).

The **contractile swelling mollic alluvial soil** was formed in the meadow area, on fine alluvia. Therefore, its texture is medium to fine. It has a medium humus content (3-4%) over 0-20 cm, and a reaction acid to low acid with pH values of 5.0-6.2. Base saturation has values ranging within 51% on the surface and 82% in depth. The soil is medium supplied with total nitrogen (0.17%). The economic value of this soil is medium for **oak** and **hornbeam** (*Carpinus* spp.). It is also recommendable to promote **Turkey oak** (*Quercus cerris*) and **American walnut** (*Juglans nigra*) that can valorise better the edaphic conditions of thus loamy soil.

The **gleyey alluvial soil** developed in the meadow where ground water is 100-125 m deep in the soil. Its texture is medium (loamy-sandy to loamy). It contains 1.9-4.8% humus over 20-30 cm, and it has an acid to neuter reaction with a pH 5.0-7.0. base saturation level is 51-90%. The soil is medium to well supplied with total nitrogen (0.12-0.25%). The economic value of this soil is medium to high for **oak**, **Turkey oak**, **hornbeam**, **field maple** (*Acer campestre*) and **ash**, depending on soil trophicity and moisture during vegetation, which depends on the level of ground water and capillary fringe that is in close relationship with soil texture.

The **gleyey mollic alluvial soil** was formed in the meadow on finer alluvia. Therefore, its texture is finer, loamy-dusty to loamy-clayey and even clayey. Humus content is very high (4.3-9.4%) over 25-50 cm. Soil reaction is acid to neuter with a pH 5.5-7.1. Base saturation level ranges within 67 and 96%. The soil is very well supplied with total nitrogen (0.22-0.49%). The economic value of this soil is medium for **oak**, **ash**, **Turkey oak**, and **American walnut**. It is recommended to grow *oak*, *Turkey oak*, and *ash*.

The **cambic chernic gleysol** formed in the plain area, with groundwater at 50-60 cm, oscillating during the vegetation season. The texture is medium (loamy-dusty to loamy-clayey). Humus content is 3-4.1% over 30-40 cm, soil reaction is moderate acid to low alkaline with pH values of 6.5-7.3. Carbonate content differs depending on depth since it is a very low deep carbonated soil (0.09-1.18%), eubasic at the surface with a base saturation level of 88-95%. Nutrient content is medium to good, and total nitrogen supply is medium to well (0.15-0.21%). The economic value of this soil is medium for **oak**, **ash**, **elm**, and **field maple**. On this soil, it is recommended to grow *oak* and *ash* and, possibly, *Turkey oak*.

CONCLUSIONS

Studies conducted within the Lighed – Lunca Timișului Forest Administration pointed out that the studied forests are part of the forestry formation "wood shrugs" (65%). Within this U.P., medium productivity dominates (77%), in correlation with station types.

We identified the following soil types and sub-types: chernic gleysol, typical gleysol, alluvial gley soil, and mollic alluvial gley soil.

The economic value of soils identified within U.P. VII Lighed ranges within medium (77%), low (14%) and high (9%).

Since most soils within the studied area are medium and high (88%), we can say that there are favourable conditions for the development of forest vegetation.

The forest types less met are high-yielding ones (9%).

The soil analysed have a fertility level varying depending on depth, skeleton content, reaction, nutrient content, texture, depth of ground water, therefore the strong correlation between soil edaphic volume, its trophicity, and yielding level of arboreta.

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