

## RESEARCH OF THE MAIN TYPES OF FOREST ECOSYSTEMS ON THE WEST CRISANA PIEDMONT PLAIN

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### Abstract

Forestry typology, founded over a century ago, has evolved differently according to concepts and criteria, based on which the types were established. It was outlined a typology of forests and a typology of resorts. In the last half of the 20<sup>th</sup> century it was created a complex typology of ecosystems, promoted in Romania too. Currently, drawing up the typology of regional ecosystems is topical. The way of typology determination within this typology has been used in the research too, undertaken by the author.

**Key words:** forest typology, forest ecosystems, management measures, sustainable forestry, ecological ambience of landscape.

### INTRODUCTION

Forests from this territory were managed by the Forest District from Tinca, part of Forestry Directorate Oradea.

Piedmont plain situated in the center of the study area, with average altitudes of 100-200 m, with increasing values eastward, is a Pleistocene plain unit, largely folded, resulted from the connection of the alluvial cones of the river flowing from the mountains and hills situated eastward.

The connection between the plain and the hills is marked by a morphological threshold of about 40-60 m.

The proluvial deposits from the plain are consisted of clay and silt deposits. On these materials heavy and alternant hydric soils forms.

The relief in dominantly a plateau, slightly folded and fragmented by some shallow, temporary brooks. The clays (red clays) are the base of stagnic luvisols on the slopes, planic and whitish soils on the plateau, with a well-balanced hydric regime.

The climate is warm, less humid as in the low hill unit (mean average temperatures of 10°C, average rainfall quantities of 614.7 mm).

Within these natural conditions the plateau ecosystem is consisted of turkey oak, pedunculate oak, sessile oak, Hungarian oak, usually the mix of two even three species, with the presence of the common hornbeam along the small brooks. The soil indicators herbaceous and shrub layer is consisted of *Agrostis-Carexbrizoides*, *Genista-Festucaheterophylla* on the plateaus, *Glechoma-Geum* and *Arum-Brachypodium* along the brooks.

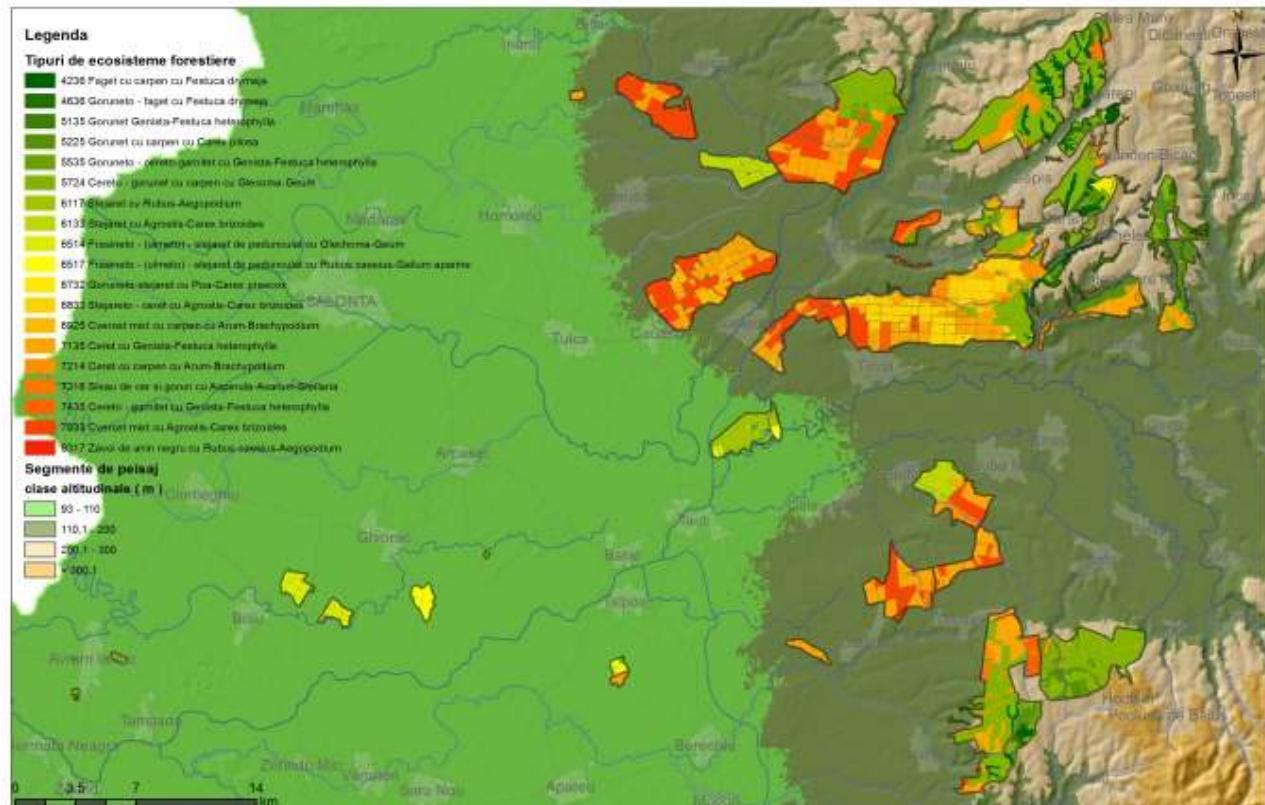


Fig. 1. The map of geographical landscape segments  
(source: ArcGis, with modifications)

## MATERIAL AND METHODS

First of all, it was made an ample documentation regarding the principles and methods of forest typification. We insisted on the method of determination of forest ecosystems types, proposed and used in our country (Doniță N. et al., 1990), based on the following criteria:

- The composition of stand, the main producer of biomass, which determines through its quality the most populations of users and decomposers, and which through the component tree species, represents a general and local climate indicator, as well as other stationary features;
- The types of living blanket (herbaceous layer), as indicators of humus nature, of acidity, trophicity and soil's humidity;
- The main characteristics of soils, determined by analyzing the samples collected from the profiles;
- The humus type, as indicator of nature and the intensity of decomposition process of necromass.

By processing the digitized data, from the parcelling descriptions, there were determined the landscape planner units with the same natural composition as in stands, evidenced by natural regeneration from seeds or sprouts. Through the further research of these landscape planner units on the field, there were determined the types of living blanket and the corresponding humus types, there were set the soil sampling points too. Using these materials and soil characteristics, there were outlined the types of ecosystems, which include all ecosystems with the same species or combination of woody species, the same type of humus, ionic regime and soil moisture regime.

The types outlined in this way were compared to those described in the monograph „Types of forest ecosystems in Romania” (Doniță N. et al., 1990), in order to determine which types are already described and which may be considered new. These were presented as the model in the cited monograph, determining their regional characteristics too.

## RESULTS AND DISCUSSION

Based on field and laboratory research on soils, phytocoenoses, as well as based on stands inventory, there were identified in the segment of low hills 8 types of forest ecosystems:

Types of ecosystems on the piedmont plain:

6133 Weak productive pedunculate oak stand, with moder, on pseudogley-luvic soils, oligomesobasic, hydric alternating on the surface with *Agrostis-Carexbrizoides* (regional variant with Turkey oak, Hungarian oak and sessile oak)

- 6833 Middle – and low productive common oak-Turkey-oak mixed stand, with moder, on stagnic luvisoils and albic-stagnic and luvic stagnosoils, oligobasic, hydric quasi-balanced and alternating on surface with *Agrostis-Carexbrizoides* (regional variant of a new type of ecosystem)
- 6925 Mixed oak with common hornbeam, high- and middle productive, with mull-moder, on typical luvisoils and stagnic oligomesobasic, hydric quasi-balanced, alternating on profile with *Arum-Brachypodium* (regional variant on luvisoils of a new type of ecosystem with stands edified by four species from *Quercus* and common hornbeam genus).
- 7135 Middle productive Turkey-oak stand, with moder, on brown luvic soils and luvisoils, pseudogley, oligomesobasic, hydric quasi-balanced, alternating on profile with *Genista-Festucaheterophylla* (regional variant with mixed oak, Hungarian oak, sessile oak)
- 7214 Turkey-oak with common hornbeam stand, high- and middle productive, with mull, on brown- and reddish brownluvic soils, pseudogley, eu- and mesobasic, hydric quasi-balanced with *Arum-Brachypodium* (regional variant on stagnic luvisoils)
- 7435 Middle productive Turkey oak – Hungarian oak mixed stand, with moder, on brown- and reddish brown luvic soils and pseudogley luvisoils, oligomesobasic, hydric quasi-balanced and alternating on profile with *Genista-Festucaheterophylla* (regional variant of mixed common oak and sessile oak)
- 7833 Mixed oak, middle – and low productive, with moder, on stagnic luvisolis, albic-and planicstagnic, oligomesobasic, hydric strongly alternating, with *Agrostis-Carexbrizoides* (regional variant of a new type of ecosystem, with 4 species from *Quercus* genus)

Table 1

Types and surfaces of ecosystems within the study area

Code	Type of ecosystem	Surface in ha	Observations
<b>West – Crisana Piedmont plain</b>			
6133	<i>Pedunculate oak stand with Agrostis-Carexbrizoides</i>	414	
6833	<i>Common oak-turkey oak mixed stand with Carexbrizoides</i>	700	New type
6925	<i>Mixed oak with common hornbeam with Arum-Brachypodium</i>	323	New type
7135	<i>Turkey oak stand with Genista-Festucaheterophylla</i>	2631	
7214	<i>Turkey oak with common hornbeam stand with Arum-Brachypodium</i>	655	
7435	<i>Turkey oak-Hungarian oak mixed stand with Genista-Festucaheterophylla</i>	339	
7833	<i>Mixed oak with Agrostis stolonifera-Carex brizoides</i>	1887	New type

Table 2

The core of species with high presence (classes V, IV) on different ecosystem types

<b>Code</b>	<b>Type of ecosystem</b>	<b>The core of constant species</b>
	<b>West – Crisana Piedmont plain</b>	
6133	<i>Ppedunculate oak stand with Agrostis-Carexbrizoides</i>	<i>Quercusrobur, Rubuscaesius, Crataegusmonogyna, C. laevigata, Rosa canina, Prunusspinosa, Frangulaalnus, Carexbrizoides, Agrostisstolonifera, Polygonumhydropiper, Calamagrostisepigeios, Campanula patula, Myosotisscorpioides, Hieraciumumbellatum, Lychnisflos-cuculi, Galiumpalustre</i>
6833	<i>Common oak-turkey oak mixed stand with Carexbrizoides</i>	<i>Quercuscerris, Q. robur, Crataegusmonogyna, Agrostisstolonifera, Veronica officinalis</i>
6925	<i>Mixed oak with common hornbeam with Arum-Brachypodium</i>	<i>Quercusrobur, Q. cerris, Carpinusbetulus, Crataegusmonogyna, Fragariavesca</i>
7135	<i>Turkey oak stand with Genista-Festucaheterophylla</i>	<i>Quercuscerris, Crataegusmonogyna, Ligustrumvulgare, Genistinctoria, Fragariavesca, Lysimachianummularia, Geumurbanum, Veronica officinalis, Agrostisstolonifera, Festucaheterophylla, Calamagrostisepigeios, Lapsanacommunis</i>
7214	<i>Turkey oak with common hornbeam stand with Arum-Brachypodium</i>	<i>Quercuscerris, Q. polycarpa, Carpinusbetulus, Acer tataricum, Crataegusmonogyna, Ligustrumvulgare, Rubushirtus, Genistinctoria, Lysimachianummularia, Fragariavesca, Geumurbanum, Dactylispolypagma, Brachypodiumsylvaticum, Melicauniflora, Viola reichenbachiana, Carexpilosa, Scrophularianodosa, Polygonatumlatifolium, Galiummollugo, Vincetoxicumhirundinaria</i>
7435	<i>Turkey oak-Hungarian oak mixed stand with Genista-Festucaheterophylla</i>	<i>Quercuscerris, Q. frainetto, Q. polycarpa, Crataegusmonogyna, Rubussulcatus, Lysimachianummularia, Dactylispolypagma, Veronica officinalis, Festucaheterophylla, Lychniscoronaria, Carex praecox, C. divisa, Hieraciumumbellatum, Genistaovata, Poaangustifolia</i>
7833	<i>Mixed oak with Agrostis stolonifera-Carex brizoides</i>	<i>Quercus cerris, Q. robur, Ligustrum vulgare, Crataegus monogyna, Rubus caesius, Fragaria vesca, Geum urbanum, Agrostis stolonifera, Dactylis polypagma, Veronica officinalis, Geranium robertianum, Calamagrostis epigeios, Lapsana communis, Ajuga reptans, Lychnis coronaria</i>

## CONCLUSIONS

Amid a temperate climate with Mediterranean shades, on the territory in which research was made (Forest District from Tinca), there are distinguished three types of geographical landscape segments, which differ

in different climatic variables as pluviosity, relief, pedogenetical substrates, soils and biocenoses:

- West Crisana low hills;
- Piedmont Crisana plains;
- Alluvial Crisana Plain.

Each of this segment has a certain environmental ambiance, decisive for the formation of biocenoses and constitution of ecosystems.

It was defined the notion of ecological ambiance, and it is expected that the regional typological studies to be performed on landscapes or landscape segments, thus explaining the causes of ecosystem nature and the presence of certain ecosystem types in the landscape.

On the piedmont plain landscape segment there were identified and described, in a complex way, 4 regional variants of ecosystem types, which are already known (Doniță N. et al., 1990) and there were determined and described 3 regional variants of new types. The predominant types are: **7135** –Turkey oak stand with *Genista-Festuca heterophylla* and **7833** –Mixed oak with *Agrostis-Carex brizoides*.

## REFERENCES

1. Beldie Al., Chiriță C., 1967, *Flora indicatoare din pădurile noastre*, Ed. Agrosilvică, București
2. Bica A.M., Curilă M., Curilă S., 2006, *Optimal Piecewise Smooth Interpolation of Experimental Data*, ICCCC 2006, International Journal of Computers, Communications & Control, ISSN 1841-9836, pp. 74-79
3. Chiriță C., Tufescu V., Beldie Al., Ceucă G., Haring P., Stănescu V., Toma G., Tomescu Aurora, Vlad I., 1964, *Fundamentele naturalistice și metodologice ale tipologiei și cartării staționale forestiere*, Editura Academiei, București
4. Chiriță C., Vlad I., Păunescu C., Pătrășcoiu N., Roșu C., Iancu I., 1977, *Stațiuni forestiere*, Editura Academiei R.S.R., București, p. 518
5. Ciocârlan V., 2000, *Flora ilustrată a României*, Editura Ceres, București
6. Cristea V., Gaftă D., Pedrotti F., 2004, *Fitosociologie*, Editura Universitară Clujeană, Cluj Napoca
7. Dănescu F., Costăchescu C., Drăgan Dorina, 2010, *Corelarea Sistemului român de clasificare a solurilor cu (SRCS, 1980) cu Sistemul român de taxonomie a solurilor (SRTS, 2003)*, Editura Silvică, București, p. 80
8. Dănescu F., Costăchescu C., Mihăilă Elena, 2010, *Sistematica stațiunilor forestiere*, Editura Silvică, București, p. 253
9. Doniță N., 2004, *Tipologia forestieră integrată și sarcini de viitor ale tipologiei forestiere în România*, Revista Pădurilor, no. 2/2004
10. Doniță N., Chiriță C., Stănescu V. et al., 1990, *Tipuri de ecosisteme forestiere din România*, C.M.D.P.A., I.C.A.S., București
11. Doniță N., Popescu A., Păucă-Comănescu Mihaela, Mihăilescu Simona, Biriș I., 2005, *Habitatele din România*, Editura Tehnică Silvică, București
12. Doniță N., Borlea F., Turcu D., 2006, *Cultura pădurilor*, Editura Eurobit, Timișoara, p. 367

13. Florea N., Munteanu I., 2003, *Sistemul român de taxonomie a solurilor (SRTS)*, Editura Esfalia, Bucureşti
14. Florescu I., Nicolescu N., 1996, *Silvicultura, Vol. I, Studiul pădurii*, Editura Lux Libris, Braşov, p. 210
15. Florescu I., Nicolescu N., 1998, *Silvicultura, Vol. II, Silvotehnica*, Editura Universităţii Transilvania din Braşov, p. 194
16. Giurgiu V., 2004, *Probleme actuale ale tipologiei forestiere Româneşti*, Revista Pădurilor, no. 2/2004
17. Mc.Gaughey, Robert J., 1999, *Stand Vizualisation System (SVS vers. 3.36)*, USDA Forest Service, Pacific Northwest Research Station
18. Moțiu P.T., 2004, *Caracteri sticidendrometrice ale unor specii alohtone cultivate în O.S. Tinca, Jud. Bihor*, Analele Universităţii din Oradea, Fascicula Silvicultură, pp. 135-144
19. Moțiu P.T., 2011, *Contributions to sustainable management measures, based on the type of forests from Crișul Negru Plain and Hills of Tășad*, „Risk Factors for Environment and Food Safety”, Editura Universităţii din Oradea, pp. 589-598
20. Moțiu P.T., 2011, *Typological research of forest ecosystems from Crișul Negru Plain and Hills of Tășad*, „Risk Factors for Environment and Food Safety”, Editura Universităţii din Oradea, pp. 580-588
21. Moțiu P.T., 2014, *Research of the Main Types of Forest Ecosystems on the West Crișana Low Hills*, „Risk Factors for Environment and Food Safety”. Editura Universităţii din Oradea, pp. 503-508
22. Moțiu P.T., Bartha Sz., 2006, *Progresive clear-strip felling simplified in total regeneration stand*, The 4<sup>th</sup> Internatinal Symposium „Natural resources and sustainable development”, Annals of the University of Oradea, Forestry Fascicula, University of Oradea Printing House, pp. 407-410
23. Moțiu P.T., Bucur L., Nistor S., 2011, *Contribution to the typological substantiation of the forestry using gis tools in Crișul Negru plain and Tășadului Hills*, „Risk Factors for Environment and Food Safety”, Annals of the University of Oradea, Forestry Fascicula, University of Oradea Printing House, pp. 572-579
24. Moțiu P.T., Bucur L., Nistor S., 2012, *Researches on types of forest ecosystems in the Crisul Negru Low Plain*, „Risk Factors for Environment and Food Safety”, Annals of the University of Oradea, Forestry Fascicula, University of Oradea Printing House, pp. 516-529
25. Moțiu P.T., Bucur L., Nistor S., 2012, *The methodology of elaboration researches regarding typology studies and typological mapping of forest ecosystems in Crisul Negru Plain and Tasadului Hills*, „Risk Factors for Environment and Food Safety”, Annals of the University of Oradea, Forestry Fascicula, University of Oradea Printing House, pp. 507-516
26. Moțiu P.T., Bucur L., Nistor S., 2013, *Research on 5225 forest ecosystem type sessil oak with common hornbeam with Carex pilosa within the segment of landscape situated on low hills of Tinca forest district*, „Risk Factors for Environment and Food Safety”, Editura Universităţii din Oradea, p. 453-462
27. Moțiu P.T., Bucur L., Nistor S., 2013, *Research on 7214 forest ecosystem type turkey oak with common hornbeam with arum-brachypodium within the segment of landscape situated on high plain of Tinca forest district*, „Risk Factors for Environment and Food Safety”, Editura Universităţii din Oradea, pp. 463-472
28. Pașcovschi S., Leandru V., 1958, *Tipuri de pădure din R.P.R.*, Ed. Agro-Silvică, Bucureşti

29. Pașcovschi S., Avram C., Constantinescu N., Petrescu L., Popa G., 1964, *Complexe de măsuri silvotehnice pentru tipuri de pădure din Republica Populară Română*, Editura Agro-Silvică, București
30. Târziu D.R., 2006, *Pedologie și stațiuniforestiere*, Editura Silvodel, Brașov
31. Târziu D., Spârchez G., Dincă L., 2004, *Solurile României*, Editura „Pentru viață”
32. \* \* \*, 1999, *Amenajamentul O. S. Tinca - Studiul general*, București
33. \* \* \*, 2004, *La typologie des stations forestières. InventaireForstier National*
34. \* \* \*, 2007, *Amenajamentul O. S. Tinca - Studiul general*, București