

**RESEARCH ON 6833 FOREST ECOSYSTEM TYPE *COMMON OAK-TURKEY OAK* MIXED STAND WITH *AGROSTIS-CAREX BRIZOIDES* (REGIONAL VERSION OF A NEW TYPE OF ECOSYSTEM) WITHIN THE SEGMENT OF LANDSCAPE SITUATED ON HIGHT WESTERN PLAIN OF TINCA FOREST DISTRICT**

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**Abstract**

*The identification and description of types of forest ecosystems on smaller geographical units, from the level of landscapes (landschaft), in order to establish the ecological specificity within a certain territorial unit and the establishment of some sustainable management measures, gives the forest typology a strong regional feature (Doniță, 2004). Forest typology evolved from the necessity of differentiating management measures of the forests according to composition, structure, productivity, features of the stands, i.e. after their eco-systemic features (Doniță et al., 1990). In this type of forest ecosystem the nucleus of constant species consists of: *Quercus cerris*, *Q. robur*, *Crataegus monogyna*, *Agrostis stolonifera*, *Veronica officinalis*.*

**Key words:** forest ecosystems, geographical segment landscape, ecological landscape environment, sustainable forestry.

**INTRODUCTION**

High piedmontal 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 is 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-Carex brizoides*, *Genista-Festuca heterophylla* on the plateaus, *Glechoma-Geum* and *Arum-Brachypodium* along the brooks.

## MATERIAL AND METHOD

The locations of the research are the forests administrated by Tinca Forest District; the study has started in 2020 and continued in 2021.

The establishment of typological units (types of ecosystems) was made using the method of synthetic systemic indicators evaluating phytocoenosis, climate indicator forest plants and edaphic conditions: acidity, humidity, humus content, compactness. The use of phyto indicators is based on the principles of modern ecology according to which the plants, as primary producers and the phytocoenosis which they make up, exactly reflects not only the complex abiotic ecological factors, decisive for forest biocoenosis but also the nature and the functionality of these biocoenosis which finally represents the productivity of the forest ecosystem.

The forest ecosystems were analyzed according to **location** within the study area; **the features of the ecosystem type**: surface area, geographical parameters (average altitude, altitude range); relief forms: types, inclination of the slopes, slope exposition, lithology, soil types and subtypes, ecological limitative factors); the description of the stands, the description of the herbaceous layer; the **correspondence with**: types of forests, types of stations, plant associations, types of habitat, **present state of the stands and management measures (particularities)**: main features, distribution according to age classes, the source of main elements, natural regeneration, productivity classes, management measures, variability and succession tendency (forms of type, successional tendencies and forest facies).

The description of the forest ecosystem was made based on collected field data. In order to analyse the collected data were used different softwares, such as Excel, ArcGis.

After determining the types, they were mapped by researching all the planning units and classifying them into types, taking into account the composition of the trees, the type of grass-subshrub layer, the type of humus. (Moțiu and co., 2011; Moțiu and co., 2012). The delimitation method of the forest ecosystems had as base some typological schemes made for the study area (for ex forest corps) (Moțiu and co., 2011; Moțiu and co., 2012). The landscaping units with non-native species cultures were classified into types based on the type of resort.

## RESULTS AND DISCUSSION

**TYPE OF ECOSYSTEM:** 6833 Medium and poorly productive oak, with moder, on stagnant luvisols and stagnant albic and luvic, oligobasic, quasi-balanced hydric soils and alternating on the surface, cu *Agrostis-Carex brizoides* (the regional variant of a new type of ecosystem)

**Subtypes:** 68332 highly productive subtype;  
68333 poorly productive subtype.

**Spreading:** this type of ecosystem is widespread on the Piedmont plain and a little on the low hills. It is widespread in U.P.IV - Trup Tinca - Topile.

### **Characteristics of the type of ecosystem within the researched area:**

**a. Occupied area:** 700.2 ha.

**b. Resorts:**

- average altitude 181 m (variation difference 131-210 m);
- relief: by shape - plateau, rarely sloping; after inclination - no inclination or moderate slopes; after the exhibition - ground plan;
- rock: red clays;
- types and subtypes of soil: stagnic luvisols, white stagnic, luvic stagnosols;
- ecological limiting factors: vernal excess moisture on the surface and in profile, and moisture deficit in dry summers, reduced trophicity.

**c. The composition of the stands:** in the dominant floor *Quercus cerris* (in high proportions), accompanied in all cases by *Quercus robur* with coverage of 5% -30% of the surface; disseminated, *Quercus petraea* ssp. *polycarpa* can be found; in the dominant floor sometimes a few specimens of *Carpinus betulus*, *Pyrus pyraster* și *Acer tataricum* may appear.

**d. The composition of the shrubs:** *Crataegus monogyna*, *Rubus caesius*, *R. sulcatus*, *Ligustrum vulgare*, *Rosa canina*; rarely maybe found also: *Evonymus europaeus*, *Frangula alnus*, *R. hirtus*.

*Acer tataricum* and *Pyrus pyraster* may also be present in the sub-tree floor, with a maximum coverage of 5%.

The shrub is generally poorly developed, with a cover of 5% - 10% of the surface.

**e. The composition of the herbaceous layer:** *Agrostis stolonifera*, *Carex brizoides*, *Lysimachia nummularia*, *Veronica officinalis*, *Festuca heterophylla*, *Polygonum hydropiper*, *Juncus effusus*, *Brachypodium sylvaticum*, *Galium palustre*, *Dactylis glomerata*, *Lychnis flos-cuculi*, *Campanula patula*, *Galeopsis tetrahit*, *Lamium galeobdolon*, *Euphorbia amygdaloides*, *Hypericum perforatum*, *Fragaria vesca*; in some situations

they may still be encountered: *Geranium robertianum*, *Polygonatum latifolium*, *Galium aparine*, *Stellaria holostea*.

The layer of shrubs is well developed, with a coverage of 30% - 70% of the surface, depending on the degree of illumination. *Agrostis stolonifera*, *Carex brizoides* and *Festuca heterophylla* can become abundant, especially in parquet, but also in the case of stronger thinning of the stand

**Correspondence with:**

- **forest types:** - ;
- **resort types:** **6.4.1.1.** – Hilly beech (oak, sky, garnish) Pm, luvisols, including whitish luvisols, epihypostagnic-mesohypostagnic, medium edaphic;
- **plant associations:** - ;
- **habitat type:** - .

**The current state of the stands and management measures (particularities):**

**f. The structure of the trees:** is missing - no inventory has been made.



Foto 1: *Common oak-turkey oak mixed stand with Agrostis-Carex brizoides, in u.a. 36, U.P.IV Topile area, (photo - P.T. Moşiu)*

**g. Distribution by age range:** 6-10 years - 2%; 11-20 years 18%; 21-40 years - 17%; 41-80 years - 53%; over 80 years - 11%.

**h. The origin of the main elements of the tree:** Turkey oak - natural sowing 33%, sprout 55%, plantation and artificial seeding 12%, common oak - natural sowing 17%, sprout 55%, plantation 28%.

**i. Production class of the main tree elements:** Turkey oak cl III/IV; Common oak cl IV/III; Sessile oak cl III/IV.

**j. Natural regeneration through seeding:** turkey oak regenerates well, oak regenerates harder and only in more favorable microstations, on elevations (Doniță and co., 1990); the cause is poor fruiting and soil

understanding by *Agrostis stolonifera*;

**k. The indicated target composition:** 4Ce 2St 2Go 2Ju,Ar,Pă,Mă.

**l. Management measures on age intervals:** 0-5 years - decomposition of natural regenerations and/or plantations; 6-10 years - preferential promotion of oak and sessile oak by applying clearings and quercus cerris only where appropriate. It is mandatory to maintain the mixed species (Tartarian maple and wild pear) to create a subfloor; 11-20 years - proportioning the mixture in favor of oak and sessile oak by clearing; 21-40 years - the application of thinning combined with the promotion of sessile oak and valuable cerris quercus specimens; 41-80 years - continuing to promote the oak through combined thinning, keeping the rest of the massif closed; over 80 years - application of hygiene cuts.

**m. Other management measures:** introduction in the composition of the arboretum of some species of aid - common maple, Tartarian maple and wild pear. Increasing the proportion of oak and sessile oak up to 40-50% in the composition of stands, in more favorable resorts (on slopes). Shrubs from shoots will be converted gradually, as much as possible by natural regeneration (if the tree is at the age of fruiting), or by restoration. In the case of crops with non-native species, ecologically not indicated (acacia), it is recommended to replace them with native species adapted to local seasonal conditions.

Hydrotechnical works, execution of drainage ditches and unclogging of existing ditches, works to improve the conditions of biological drainage are indicated.

**n. Variability and successional trends (forms of type, successional tendencies and silvofacies):** in the researched territory we describe the geographical variant with oak (sometimes sessile oak). Type of forest ecosystem **7133** presents a form with slightly common oak, up to 10% in the composition of the stand, with *Agrostis stolonifera* and *Festuca heterophylla* dominant within the grass layer (Turkey oak realizes the third class of production and common oak fourth class of production, quality being IV for both species) and a form with more peduncled oak - up to 30% in the composition of the tree, in some cases the oak being even dominant as a proportion of participation (it may appear sessile oak also, disseminated or with a proportion of 10% in the composition of the tree), with mosaic of the grassy-subshrub layer: in the lower places (wetter) with *Agrostis stolonifera* and *Festuca heterophylla* and in higher places (with better edaphic conditions in the upper soil horizon) with *Lamium galeobdolon*, *Geranium robertianum*, *Melica uniflora*, *Mycelis muralis*, *Euphorbia amygdaloides*, *Carex sylvatica*, *uneori Polygonatum latifolium*, *Galium aparine*; productivity and quality is higher than in the previous form, both in the *Quercus cerris* and in the oak (second or third production class for Turkey

oak and third or fourth class for common oak, and third class quality for *Quercus cerris*, and fourth class for oak). This form represents a transition to the type of ecosystem **7833** - Mixed oak stand with *Agrostis-Carex brizoides*.

In conditions of plateau edges, on soils with better drainage, the transition is made to ecosystem **7135** - Turkey oak stand with *Genista-Festuca heterophylla* (terrace shape) or to type **5724** - Turkey oak-Sessil oak with common hornbeam mixed stand with *Glechoma-Geum* (terrace shape); these forms of transition are characterized by mosaicizing the subshrub grassy layer. On the sunny slopes, exposed to stronger insolation and implicitly to stronger drying, the transition is made to type **7135** - Turkey oak stand with *Genista-Festuca heterophylla* (slope shape). **Silvo Facies:** with Hungarian oak (mixture in bouquets or groups with coverage of up to 30-40% in the composition of the stand);

**o. Observations:** we find in this type of forest ecosystem stands of medium productivity; the cause lies in the average creditworthiness of the resorts (soils with medium edaphic volume and in some places with a more favorable aero-hydric regime). The type of ecosystem has variability on micro resorts: in micro resorts where hydrophilic species dominate in the grassy layer (*Agrostis stolonifera*, *Carex brizoides* and so on), the productivity of the stands is lower, and on micro-elevations, with species from the mull flora, the productivity is higher.

It is the regional version of a new type of ecosystem.

## CONCLUSIONS

This priority of this period is to establish types of forests on small geographic units, at the level of landscapes, the typology having thus a strong regional feature.

We tried, within this research, to establish ecosystem-based forest type existing in a territory smaller but representative for the high plain units within Tinca Forest District, to state the current status of types and propose appropriate management measures to bring forest types as close as possible to the natural state.

### Regarding the regional particularities of ecosystem type

The existence of oligo loamy and oligo mezo basic soils on plains, on large surfaces, strongly alternating humidity both on the surface and on the soil, which develops edified biocenosis of some species from the *Quercus* genus, with a few mixed species, having in the herbaceous layer many species of swamp (Beldie and Chiriță, 1967; Ciocârlan, 2000).

Under these conditions, the competitiveness of species from *Quercus* genus, being reduced, may form mixtures, in which participate three or more four species from this genus, present in the region: *Quercus robur*, *Quercus petraea*, *Quercus cerris*, *Quercus frainetto*, thus making the transition to the type of 7833 Mixed oak stand with *Agrostis stolonifera*-*Carex brizoides* forest ecosystem.

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