

FORESTS WITH PINE TREES (*TAXUS BACCATA*) AND YEW (*PINUS SYLVESTRIS*) FROM OITUZ PRIVATE FOREST DISTRICT

Milian Gurău

Key words: *Taxus baccata*, *Pinus sylvestris*, forests with high level of protection

INTRODUCTION

The area under study was submitted to extensive floristic and phyto-sociological research from 1996-2003 (Gurău M., 2004). The current study was commissioned in 2018 by Tornator company, specialised in forest exploitation as the administrator of the forests belonging to the heirs of general Eremia Grigorescu, who was granted ownership of these lands after the Romanians' victory in the battles from Mărști, Mărășești and Oituz in 1918.

MATERIAL AND METHOD

After an interval of 15 years, all types of forest from the 9000 Ha area of Oituz Private Forest District where re-evaluated. The phytosociological method was supplemented with recommendations from the methods of analysis of forests with high value of habitat conservation and protection. The surface of the entire river basin covers over 300 Km², which is much larger than the one investigated for this study.

RESULTS AND DISCUSSIONS

This analysis completes the notions of *Taxus baccata* species distribution with 3 new geographical locations and provides a new evaluation of forest plots covered with *Pinus sylvestris*.

New locations of yew trees (*Taxus baccata*) from Oituz Basin were identified in the following areas:

1. Slatina Cabin from UP – I- Leșunț from Oituz Private Forest District (UA 77); 567 m altitude; N 46°08'312"/E 026°33'444"; two 30 cm-thick specimens are located by the forest road in a semi-natural forest of fir-beech type. Their state of conservation is favourable. The evolution trend of the habitat is unknown, but there are no present of future threats (Photo 1).

2. Pârâul lui Martin (Martin's Brook) from UP- II-Oituz Private Forest District, in plot 28B, at 660 m altitude; N 46°08'2455"/E 026°30'1182"; there is semi-natural forest by the forest road, ranging in Ass. *Pulmonario rubrae- Abieti- Fagetum* subass. *Taxetosum baccatae*, sheltered, with western

exposure, very strong inclination (31-40°), without dead wood, with a canopy of 90%, with felled tree specimens.



Photo 1. *Taxus baccata* in Leșunțul Mare Basin, next to Sărărie

The state of conservation is unfavourable, the evolution trend of the habitat is unknown. The current pressures are exerted by the presence of a forest road for wood exploitation and windfalls. Several specimens of yew were peeled at the base of the trunk during the pulling of the logs from the upstream exploitation. It is an area of 1-2 Ha of beech-fir with young specimens of yew, of which 0.5 Ha represent perennial forest. 7 specimens 16-30 cm thick were identified near the road and 3 equally large specimens injured by dragged logs. In the list of species were identified: *Fagus sylvatica*, *Abies alba*,

Pinus sylvestris, *Acer pseudoplatanus*, *Hedera helix*, *Cornus sanguinea*, *Sorbus aucuparia*, *Daphne mezereum*, *Prunus avium*, *Rubus hirtus*, *Cephalanthera longifolia*, *Athyrium filix-femina*, *Dryopteris filix-mas*, *Betula pendula*, *Festuca drymeja*, *Lathyrus vernus*, *Hieracium transsilvanicum*, *Senecio nemorensis*, *Actaea spicata*.

3. On Pârîul Feșca de Sus (Feșca de Sus brook), upstream of the church from Hârja village (technical right), 3 specimens of yew were identified, with a diameter of approximately 10 cm, which are on the border between Oituz State Forest District and Oituz Private Forest District.

Ass. *Leucobryo glauci*– *Pinetum* Matusz. 1962

Distribution: Bazinul Leșunțul Mare (Lesuntul Mare Basin), on Dealul Borșica (Borsica Hill), Vf. Dinga (Dinga Peak), upstream Pârâul Adânc (Adanc Brook), Pârâul Popii (Popii Brook), Bazinul Rotăriei (Rotariei Basin), Plaiul Pinului (Pinului Peak), Virful Arșița (Arsita Peak) .

The association belongs to class VACCINIO-PICCETEA Br.-Bl in Br.-Bl 1939; Order PICEETALIA ABIETIS Pawlowski in Pawlowski et al. 1939; Alliance DICRANO-PINION (Libbert 1932) Matusz. 1962.

Mapping place and date: 1 - Cernica, Plot 52 A; (12.07.2018); 2 - upstream Popii Brook, Plot 59 B; N 46°10'14.12" / E 026°27'31.16"; (12.07.2018); 3 - Borșica Hill on Leșunțul Mare Basin; N 46°08'27.9" / E 026°32'28.2"; (12.07.2018); 4 - Dinga Peak, upstream Adânc brook N 46°09'09.8" / E 026°34'58.8"; (12.07.2018); 5 - Pinului Hill/Brook; N 46°10'28.53" / E 026°29'13.75" ; (12.07.2018); 6 - Plaiului Peak; N 46°09'10.54" / E 026°29'32.31"; (12.07.2018); 7 - Rotăriei Basin- Pârâul lui Martin (Martin's Brook); Plot 44 of UP II Oituz, N 46°08'59.10" / E 026°48'07.7"; (12.07.2018); 8- Rotăriei Hill - Plot 46 of UP II Oituz, N 46°08'44.16" / E 026°29'19.75"; (12.07.2018); 9- Rotăriei Peak - Plot 47A of UP II Oituz, N 46°08'33.08" / E 026°29'40.25"; (12.07.2018).

The exposure of these forests is predominantly southern or southwestern. Slopes have a steep inclination, generally 30° or more. Vegetation coverage is generally 70-90%. Age is variable, in most plots it exceeds 100 years.

Floristic composition is poor because the degree of canopy completion is high and the soils are covered with fallen needle leaves (Table 1).

Bioforms are grouped into the following categories: 13 species of phanerophytes, 4 species of hemicryptophytes and 2 species of geophytes.

Table 1. Ass. *Leucobryo glauci*– *Pinetum* Matusz. 1962

Mapping number	1	2	3	4	5	6	7	8	9	K
Surface (square meters)	400	400	400	400	400	400	400	400	400	
Altitude (m.s.m.)	793	675	459	459	504	752	687	939	1003	
Inclination (°)	30	30	30	40	35	35	30	40	30	
Exposure	SV	E	S	V	S	SV	S	SV	V	
Tree coverage (%)	70	70	65	90	90	90	80	90	70	
Shrub coverage (%)	10	10	10	1	-	-	20	-	20	
Grass coverage(%)	-	1	-	1	-	-	1	2	2	
Car. Ass.										
<i>Leucobrium glaucum</i>	.	+	.	+	.	.	+	.	.	II
<i>Pinus sylvestris</i>	4	4	4	4	4	5	4	4	4	V
Abieti - Piceion										
<i>Abies alba</i>	.	+	+	1	.	+	.	+	+	III
<i>Picea abies</i>	.	+	+	.	.	.	.	+	+	II
Piceetalia										
<i>Calluna vulgaris</i>	.	.	.	+	+	+	+	.	+	III
<i>Luzula luzuloides</i>	.	.	.	.	.	.	.	.	+	I
<i>Calamagrostis arundinacea</i>	.	.	.	.	.	.	.	+	+	I
Vaccino - Picetea										
<i>Vaccinium myrtillus</i>	1	1	1	+	1	+	+	+	+	V
<i>Sorbus aucuparia</i>	.	.	.	+	+	+	+	+	+	IV
Fagetalia										
<i>Fagus sylvatica</i>	+	+	.	2	2	1	2	+	+	V
<i>Hieracium transsilvanicum</i>	.	.	.	.	+	+	.	.	+	II
<i>Athyrium filix-femina</i>	.	.	.	.	+	.	.	.	.	I
Quercu-Fagetea										
<i>Betula pendula</i>	+	.	+	+	+	1	+	2	1	V
<i>Populus tremula</i>	.	.	.	.	+	.	+	.	1	II
<i>Quercus petraea</i> (juv.)	+	+	.	.	.	.	.	.	.	I
<i>Platanthera bifolia</i>	.	.	.	.	.	.	+	.	.	I
<i>Rubus hirtus</i>	.	.	.	.	.	.	+	.	+	I
Sambuco-Salicion										
<i>Rubus idaeus</i>	.	.	.	.	.	.	.	+	.	I
Quercetaliapetreae										
<i>Pteridium aquilinum</i>	.	.	.	+	+	+	+	.	+	III
Geranionsanguinei										
<i>Cytisus nigricans</i>	.	.	.	.	+	+	.	.	.	I

The geographical elements are grouped into the following categories: 8 European species, 1 Central European species, 1 Central European and Atlantic species (*Fagus sylvatica*), 5 Eurasian species, 2 circumpolar species (common is *Vaccinium myrtillus*) and 2 cosmopolitan species (one common is *Athyrium filix-femina*).

Among the native coniferous species, there is the Scots pine which has the highest ecological plasticity, it displays a crown transparent for light, which allows the installation of subshrub species under natural conditions. In these forest plots, the following groups of indicator species are found: shade-loving plants (L3) = 1 species; plants with preferences between stages 3 and 5 (L4) = 4 species; semi-shade plants that withstand moderate shading (L5) = 1 species; plants with preferences between stages 5 and 7 (L6) = 8 species; light-loving plants that withstand weak shading (L7) = 3 species; light-loving plants that tolerate exceptional shading (L8) = 2 species.

Pine tree has very high tolerance for temperature, so at high altitudes, it is very resistant to frost, and are satisfied with 3 months of vegetation per year. At low altitudes, it can withstand high temperatures, prolonged heat and strong insolation (situation encountered in the analysed area). It also has very high adaptability to humidity, withstands humid climates on shady or dry slopes on sunny slopes. For this factor, there are the following groups of mountain climate plants: 7 species present with preferences between subalpine and hilly temperatures (T4), 4 species are hilly and sub-mountain climate plants (T5), 1 species is of plain (T8) and 8 species belong to the category of eurytherms (Tx).

Pine and birch are species resistant to dry and shallow soil. For humidity, there are the following groups of indicator plants: plants that withstand variations in humidity from dry soil to moderately moist soil (U4) are represented by 1 species; moderately moist soil plants (U5) are 15 species; it is only one species of wet soil (U7) and 2 species of euryhydric (Ux).

They have good tolerance to soil reaction. In the arboretum, there are the following groups of plants: plants with distribution only on very acid soils

(R1) = 1 species; plants with preferences between acidic and slightly low acidic soils (R4) = 5 species; low acid-loving plants (R6) = 6; neutral soil plants (R7) = 1 species; euryionic plants (Rx) = 6 species.

Pine tree is unpretentious to soil trophicity, it withstands very well oligotrophic or extremely oligotrophic soils, it can grow on heavy, compact soils, with deficiencies for aeration, with water in excess or variable water regime. The most favourable soils are siliceous, deep, resilient, refined, rich in humus. Soils with excess humus, with high trophicity, cause better growth, but the wood remains porous and fragile. There are the following groups of plants: plants of soil which is very low in mineral nitrogen (N1) = 1 species; plants of soil with preference between steps 1 and 3 (N2) = 1 species; plants of soil poor in mineral nitrogen (N3) = 2; plants with preferences between stages 3 and 5 (N4) = 2 species; plants of soil with moderate mineral nitrogen content (N5) = 1 species; plants of soil with sufficient mineral nitrogen (N6) = 1; plants of soil rich in mineral nitrogen (N8) = 1 species; eurytrophile plants (Nx) are the majority = 10 species. (Table 2)

In conclusion, it is not pretentious to edapho-climatic conditions, it represents a typical pioneer species (there are natural pine plots in the area) but has a low capacity of spreading seeds and does not present the competitive ability of birch and aspen that are found among the pines. The fires affected some trees between the two world wars, and after 2010 there were fires behind the forest district building. At the age of 70, the pine allows the installation of some acidophilic subshrub species such as black grass (*Calluna vulgaris*) and blueberry (*Vaccinium myrtillus*). Due to this aspect, it ensures a succession of vegetation.

The biodiversity of these forests is low. The state of preservation is good. The evolution trend of the habitat is stable. Disruptive factors are abiotic and biotic in nature.

From the first category, windfalls were found on Pinului Peak in very small proportion, and erosions on Cernica; on Dinga Peak, there are stronger winds but there were no downfalls.

Table 2. Number of indicator species reported to some values of ecological factors from Ass. *Leucobryo* – *Pinetum* end Ass. *Pino* – *Quercetum* Kozłowska 1925

Value Fact. Ecol	Light (no. sp.)		Temperature (no. sp.)		Humidity (no. sp.)		p-H (no. sp.)		Trophicity (no sp.)	
	Leuc-Pin.	Pin- Que	Leuc-Pin.	Pin- Que	Leuc-Pin.	Pin- Que	Leuc-Pin.	Pin- Que	Leuc-Pin.	Pin- Que
	-	-	8	10	2	2	6	11	10	10
1	1	-	-	-	-	1	1	1	1	4
2	-	-	-	-	-	1	-	1	1	3
3	-	2	-	-	-	1	-	1	2	8
4	4	5	7	5	1	7	5	4	1	2
5	1	3	5	8	15	15	-	9	1	1
6	8	7	-	4	-	1	6	2	1	-
7	3	-	-	1	1	1	1	1	-	1
8	2	7	-	-	-	-	-	-	1	-

The disturbing factors of biotic origin are rare: weak drying phenomena were observed on Culmea Rotăriei Hill and rotten wood on Dinga Peak. We cannot appreciate future threats. The protection measures recommended involve corresponding forestry works.

Ass. *Pino – Quercetum* Kozłowska 1925

Distribution: Pârâul Cernica (Cernica Brook), canton Hățman (Hatman forest ranger's house), Pârâul Puturos (Puturos Brook), Pârâul Mănașca-Ferăstrău (Manasca-Ferestrau Brook)

The association belongs to class QUERCETEA ROBORI-PETREAE Br.Bl. et R.Tx. 1943; Order QUERCETALIA ROBORIS R.Tx. 1931; Alliance PINO-QUERCION Medweka-Kornas et Pawłowsky 1959

The slopes have a high degree of inclination, sometimes reaching 40°, with a predominantly southern exposure, with a higher amount of heat.

The age of the trees is more than 70 years, the diameters are between 20-40 cm, the soil has a small volume, the vegetation cover is about 70% because there were strong anthropogenic influences, and, in some places, there are rocks (Table 3).

Mapping date and place: 1- Cernica (Plot 52A ;12.07.2018); 2- UP II Oituz (Plot 6C; N 46° 11'5534"/ E 026° 34'5442"); 3- UP II Oituz (Plot 131 A, N 46° 13'3010"/ E 026° 39'3840"); 4- UP II Oituz (Plot 121 B, N 46° 12'3609"/ E 026° 35'4499")

Bioforms are grouped into the following categories: phanerophytes – 11 species; chamaephytes– 3 species, geophytes – 3 species, hemicryptophytes – 12 species.

The geographical elements are grouped into the following categories: 9 European species; 7 Eurasian species; 4 Central European species; 3 circumpolar species (*Polypodium vulgare*, *Poa nemoralis*, etc.), 2 cosmopolitan species (*Asplenium trichomanis*, etc.), 1 alpine-European species, 1 Mediterranean species. Low altitudes are favourable to greater biodiversity.

According to light factor, the following indicator species are present: shade-loving plants (L3) = 2 species; plants with preferences between stages 3 and 5 (L4) = 5 species; semi-shade plants that withstand moderate shading (L5) = 3 species; plants with preferences between stages 5 and 7 (L6) = 7 species; light-loving plants that withstand weak shading (L7) = 6 species; light-loving plants that tolerate exceptional shading (L8) = 7 species. Most species are adapted to different degrees of shading but the strong anthropization near the localities has led to the emergence of enclaves and light-loving species.

In relation to temperature, there are the following groups of indicator plant species: subalpine climate species (T3) – 1 species, mountain climate species (T4) – 5 species; hilly and sub-mountain

climate plants (T5) – 8 species, hilly plants (T6) – 4 species; eurytherms (TX) – 11 species.

Table 3. Ass. *Pino – Quercetum* Kozłowska 1925

Mapping number	1	2	3	4
Surface (square meters)	400	400	400	400
Altitude (m.s.m.)	-	394	528	515
Inclination (°)	45	40	30	30
Exposure	SE	NE	S	SE
Tree coverage (%)	90	70	70	80
Shrub coverage (%)	10	-	20	-
Grass coverage (%)	1	1	1	1
Carr. Ass.				
<i>Quercus petraea</i>	1	+	3	3
<i>Pinus silvestris</i>	4	4	2	2
Abieti - Piceion				
<i>Abies alba</i>	+	+	.	.
<i>Picea abies</i>	+	.	.	.
Piceetalia				
<i>Calluna vulgaris</i>	+	.	2	.
<i>Luzula luzuloides</i>	.	+	.	.
<i>Calamagrostis arundinacea</i>	.	.	+	.
Vaccino - Piceetea				
<i>Vaccinium myrtillus</i>	2	+	+	.
<i>Sorbus aucuparia</i>	+	.	.	.
Fagetalia				
<i>Fagus sylvatica</i>	+	+	+	+
<i>Hieracium transsylvanicum</i>	.	.	+	.
<i>Salvia glutinosa</i>	.	.	+	.
Quercio-Fagetea				
<i>Betula pendula</i>	1	.	+	.
<i>Poa nemoralis</i>	.	+	+	+
<i>Cephalanthera longifolia</i>	.	.	+	.
Androsacetalia vandellii				
<i>Asplenium trichomanis</i>	.	.	.	+
<i>Sempervivum montanum</i>	.	.	.	+
Asplenietea trichomanis				
<i>Polypodium vulgare</i>	.	+	+	+
<i>Sedum telephium ssp. maximum</i>	.	.	+	.
Quercetalia petraeae				
<i>Pteridium aquilinum</i>	+	.	.	+
Fraxino- Cotinetalia				
<i>Silene italica</i>	.	+	+	+
Lathyro- Carpinion				
<i>Carpinus betulus</i>	.	+	.	.
<i>Festuca drymeja</i>	.	+	.	.
Geranion sanguinei				
<i>Cytisus nigricans</i>	.	.	+	.
<i>Teucrium chamaedrys</i>	.	.	+	.
<i>Trifolium alpestre</i>	.	.	+	.
Molinietalia				
<i>Genista tinctoria</i>	.	+	.	.
Molinio- Arrhenatheretea				
<i>Plantago media</i>	.	+	.	.
Festuco - Brometea				
<i>Sedum acre</i>	.	.	+	.
Trifolio - Geranietea				
<i>Coronilla varia</i>	.	.	+	.
Briofita				
<i>Leucobryum glaucum</i>	+	.	.	.

For humidity/moisture, there were identified the following groups of indicator species: very dry soil plants (U1)=1; plants with preferences between levels 1 and 3 (U2)=1 species; dry soil plants (U3)=1; plants with preferences between levels 3 and 5 (U4)=7 species; moderately moist soil plants (U5)=15 species; plants with preferences between

levels 5 and 7 (U6)=1; wet soil plants (U7)=1 species; euryhydric plants (Ux)=3 species.

Soil reaction accounts for the following plant groups: plants adapted to very acid soils (R1)=1 species; plants with preferences between 1 and 3 (R2) = 1 species; acid soil plants (R3)=1 species; plants with preferences between 3 and 5 (R4) =4 species; slightly low acidic soils (R5) = 9 species; plants with preferences between 5 and 7 (R6) = 2 species; neutral pH soil plants, from low acidic to low alkaline (R7)=1 species; euryionic plants (Rx) =11 species.

Mineral nitrogen is a factor that characterizes the following plant groups: plants preferring soils very poor in mineral nitrogen content (N1)=4 species; plants with preferences between 1 and 3 (N2) =3 species; plants preferring soil poor in mineral nitrogen content (N3) =8 species; plants with preferences between 3 and 5(N4) = 2 species; plants of soil slightly low in mineral N (N5)=1 species; plants of soil rich in mineral N (N7) =1 species; eurytrophile plants (NX)=11 species (Table 2).

The biodiversity value is higher than in other pine forests because they are spread at lower altitudes.

Jovibarba globifera is a succulent xerophytic herbaceous plant, found on calcareous rocks, full of light and alkaline pH, with fleshy leaves, arranged in a basal rosette; when flowering, it reaches 10-20 cm, with yellow flowers, with 6 ciliated petals; it is spread in Plot 121 B from UP II Oituz. It is a Dacian element with Carpatho-Balkan spread. There are numerous specimens on the rocks behind the Oituz district building, they can be monitored occasionally in the period-V-IX. The state of preservation is bad. The evolution trend of the habitat is stable. On the Mănașca Stream there are paths, a forest road, gutters produced by rains and a small windfall. In Piatra Șoimului, tourism is practiced at low intensity, but there was a fire in 2007. These forests are near Oituz village and are subject to anthropogenic pressure.

CONCLUSIONS

On Pârâul lui Mărtin (Martin's Brook), in Plot 28B, of U.P. II Oituz, there are many specimens of *Taxus baccata*, 5-15 cm thick which need to be protected for biodiversity purposes. The specimens identified on the entire surface managed by Oituz Private Forest District can be monitored either annually in the plots with works and roads circulated in the period IV-V or X-XI or at intervals of 5-10 years in the sheltered plots and without works.

The *Pinus silvestris* forest plots are located on the steepest slopes and have a very good coverage; for this reason, many of them are protected by the norms of forestry administration. In addition, some of them shelter forest animals, while bear dens, birds of prey, woodpeckers, etc. have been identified.

ABSTRACT

Taxus baccata is sporadically present in some forest plots covered with a mixture of softwood and beech trees and is protected as a natural monument. *Pinus silvestris* continues to form semi-natural forests of relatively restrained areas. These forests require special attention given that they are located on very steep slopes and the soil is reduced and stony.

ACKNOWLEDGMENTS

This monitoring was performed after a period of 15 years since the completion of another flora and vegetation in Oituz River Basin. It was conducted as a biodiversity study to the purpose of identifying forests with high conservation potential, commissioned by Tornator company, the administrator of Oituz Private Forest District. In this hydrographic basin, we also find upstream Oituz State Forest District and part of Bretcu State Forest District.

On this occasion, I express my special thanks to PhD biologist Irimia Romeo Vasile and engineer Negoiță Adrian who supported me with collecting field information.

REFERENCES

1. CHIFU T., 2014 – Diversitatea fitosociologică a vegetației României, III – Vegetația pădurilor și tufărișurilor [Phytosociological Diversity of Romanian Vegetation III – Forest and Shrub Vegetation], Institutul European, Iași.
2. GURĂU M., 2014 – Flora și vegetația cormofitelor din Depresiunea Cașin-Onești și Bazinul Oituz [Cormophyte Flora and Vegetation from Casin-Onesti Depression and Oituz River Basin], Ed. Alma Mater, Bacău.
3. SÎRBU I., ȘTEFAN N., OPREA AD., 2011 – Plante vasculare din România. Determinator ilustrat de teren [Vascular Plants in Romania. An Illustrated Field Guide], Victor B. Victor, București.
4. VLAD R. G., BUCUR C., TURTIĂ M. (coord.), 2013 – Ghid practice pentru identificarea și managementul pădurilor cu valoare ridicată de conservare [Practical guide for the identification and management of forests with high conservation value], Green Steps, Brașov.

AUTHOR'S ADDRESS

GURĂU MILIAN - „Vasile Alecsandri” University of Bacău, Faculty of Sciences, Department of Biology and Environmental Protection, Mărășești Street no. 157, Bacău, Romania, e-mail: milian_gurau@yahoo.com.