

CORNELIAN CHERRY (*Cornus mas* L.) COMMUNITIES IN THE UPPER BASIN OF OLT RIVER

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Abstract: The paper describes the vegetation communities dominated by *Cornus mas* identified in the south-eastern Transylvania. For ten relevés within the studied area, floristic composition and site conditions are presented. The physiognomy and the mixture of xerophilous and mesophilous species are characteristic. Using the cluster analysis method the author outlined the floristic similarity with some woody vegetation units on limestone gorges described from Romania. *Tilio-Fraxinetum* is the most suitable syntaxon.

Key words: *Cornus mas*, phytosociology, saxicolous vegetation.

1. Introduction

Cornus mas is a species with pontic-mediterranean distribution, sub-thermophile, calcophile. This species is highly related with the xero-thermophilous vegetation units of *Quercetalia pubescenti-petraeae*. Although it has mainly a subordinate coenotic position, in some cases could become dominant, like in several vegetation communities developed in limestone gorges [1], [8], [6]. The importance of woody saxicolous vegetation derives from its relict status, with phytogeographical and nature conservation connections. Consequently, a detailed investigation of such communities is desirable.

2. Objectives

The study objectives are: (1) description of the shrubs dominated by *Cornus mas*

and (2) analysis of relations among saxicolous vegetation communities described in Romania in order to establish the syntaxonomical position of *Cornus mas* shrubs.

3. Material and Methods

Phytocoenoses dominated by cornelian cherry (*Cornus mas*) were observed in two different sites: (1) Tipia Racoşului Hill, located in Perşani Mountains, in the gorge of Olt River at Racoş; (2) Râşnoavei Gorges, located on the southern part of Postăvaru Mountains.

Vegetation data were collected through the Braun-Blanquet method, using 10 plots of 100 m². The species scientific names are according to the Romanian Flora [2]. In order to establish the syntaxonomical position of the studied phytocoenoses, the following published data were used: 10

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relevées assigned to *Corno-Fraxinetum orni* Pop et Hodişan 1964 from Miniş Gorges [8] and Godineşti-Zam Cliffs [9], 8 relevées assigned to *Tilio-Fraxinetum Zolyomy* 1934 from Crişul Repede Gorges [1] and Trascău Mountains [6], 8 relevées assigned to *Cotoneastro-Rhamnetum tinctorii* Danciu 1979 from Perşani Mountains [5] and Postăvaru Mountains [4]. Cluster analysis of the 36 relevées was performed within the PC-ORD software [7], using the presence-absence values, Sørensen distance and flexible beta linkage method ($\beta = -0.25$). As a measure of species fidelity the Dufrene-Legendre indicator value was calculated in the JUICE software [11].

4. Results and Discussions

The phytocoenoses dominated by *Cornus mas*, observed on Perşani and Postăvaru Mountains are developed on a peculiar habitat: gorges or related cliffs, on limestone, sunny steep slopes (25-50°), with bare rock at the surface (20-80%) and very shallow soils, rich in humus. The altitude ranges between 650-950 m.

The physiognomy of vegetation is imposed by *Cornus mas*, with multi-stemmed trunk and arched branches that make these bushes almost impenetrable. Sometimes it is distinguished an upper layer with sparse and dwarfed individuals of tree species, like European ash (*Fraxinus excelsior*), pedunculate oak (*Quercus robur*), sessile oak (*Quercus petraea*) or hornbeam (*Carpinus betulus*); however, its cover didn't exceed 40%. The shrub layer is well developed, reaching 2-4 m height. Beside *Cornus mas* are present xero- and xeromesophilous shrubs like *Euonymus verrucosus*, *Rhamnus saxatilis* ssp. *tinctorius*, *Viburnum lantana*, *Crataegus monogyna*, *Berberis vulgaris*.

In the herb layer grow species with different ecological affinities: neutrophile/nitrophile (*Mercurialis perennis*,

Geranium robertianum, *Alliaria petiolata*, *Torilis japonica*, *Glechoma hirsuta*), xerophile (*Carex humilis*, *Teucrium chamaedrys*, *Galium glaucum*, *Sedum maximum*, *Bupleurum falcatum*, *Polygonatum odoratum*, *Vincetoxicum hirundinaria*, *Viola hirta*, *Arabis turrata*, *Laserpitium latifolium*, *Lithospermum purpureo-ceruleum*), mesophile (*Melica uniflora*, *Stellaria holostea*, *Poa nemoralis*). Another feature is the presence of saxicolous species (*Sesleria rigida*, *Polypodium vulgare*, *Asplenium trichomanes*, *Asplenium ruta-muraria*, *Cardaminopsis arenosa*). The overall number of vascular taxa is relatively high, between 36 and 62 (Table 1).

The presence of species of mesophilous forests outlines the spatial connection with such communities. Thus, the syntaxonomic position of *Cornus mas* phytocoenoses became difficult to establish: should they be considered as shrub communities or a type of the scree forests?

It can be considered that in the case of these limestone cliffs the shrub vegetation represent a primary vegetation, as an edaphic climax. The harsh habitat conditions severely affect the capacities of climax trees species for establishing, growing and competition [3], so the forest communities are improbable to develop. However, isolated trees appear where the water soil capacity is improved through a larger volume of fine earth, shadowing or water flow incoming. For this reason, it wasn't considered in the further analysis the secondary shrub vegetation, like *Pruno-Crataegetum*.

The cluster analysis of several vegetation units outlines the similarities of the *Cornus mas* shrubs with phytocoenoses of both *Tilio-Fraxinetum* and *Cotoneastro-Rhamnetum tinctorii*. *Corno-Fraxinetum* differs from our phytocoenoses by some thermophilous species (*Quercus cerris*, *Scutellaria altissima*, *Lychnis coronaria*,

Fraxinus ornus, *Tilia platyphyllos*, shrubs are *Bupleurum falcatum*, *Carex Lathyrus venetus*, *Ceterach officinarum*). *digitata*, *Laserpitium latifolium*, *Aster amellus*, *Melica picta*, *Acer platanoides*, *Lilium martagon*.

Table 1

Cornus mas communities on limestone cliffs from upper basin of Olt River

Relevee code:	81	82	83	84	91	92	93	94	95	96	K
Place	Perșani Mountains					Postăvaru Mountains					
Altitude	650	660	660	690	850	880	920	880	910	940	
Aspect	SE	SE	SE	E	SV	S	S	S	S	S	
Slope	40	25	40	40	25	20	40	40	50	40	
Bare rock (%)	50	30	40	70	50	20	50	60	80	60	
Cover (%) - trees		20		40	40				3	10	
- shrubs	80	80	70	30	85	30	90	80	80	60	
- herbs	30	60	45	50	40	80	30	50	50	40	
Tree and shrub layer											
<i>Cornus mas</i>	3	4	4	2	4	4	5	4	4	3	V
<i>Euonymus verrucosus</i>	1	+	1	1	1	+	1	2	1	2	V
<i>Crataegus monogyna</i>	+	+	+	1	+	+	+	1	+	1	V
<i>Rhamnus tinctorius</i>	+	.	1	1	+	+	+	+	1	+	V
<i>Fraxinus excelsior</i>	.	+	+	+	1	2	+	1	+	2	V
<i>Quercus petraea</i>	1	2	+	2	2	1	.	+	.	.	IV
<i>Lonicera xylosteum</i>	.	.	.	.	+	+	+	+	+	.	III
<i>Rosa canina</i>	+	+	+	+	.	.	.	.	.	+	III
<i>Viburnum lantana</i>	.	.	.	.	+	+	.	+	1	+	III
<i>Acer platanoides</i>	.	.	+	+	.	.	+	.	+	+	III
<i>Acer pseudoplatanus</i>	+	.	.	+	+	+	.	.	1	.	III
<i>Carpinus betulus</i>	.	+	.	1	+	+	.	.	.	.	II
<i>Acer campestre</i>	.	+	+	+	.	.	.	.	.	.	II
<i>Ulmus minor</i>	1	1	+	.	.	.	.	.	.	.	II
<i>Populus tremula</i>	.	.	.	.	.	.	+	.	+	1	II
<i>Corylus avellana</i>	1	.	1	.	.	+	.	.	.	.	II
Herb layer											
<i>Sedum maximum</i>	1	1	1	+	1	1	1	1	1	1	V
<i>Bupleurum falcatum</i>	+	+	1	+	+	1	+	+	1	+	V
<i>Dactylis glomerata</i> agg.	+	1	+	1	1	1	1	+	+	+	V
<i>Asplenium trichomanes</i>	+	.	+	+	+	+	+	+	1	+	V
<i>Campanula persicifolia</i>	+	+	+	+	+	1	+	.	+	+	V
<i>Hedera helix</i>	+	1	1	1	+	.	1	1	1	1	V
<i>Polygonatum odoratum</i>	1	1	2	1	.	+	+	+	1	1	V
<i>Geranium robertianum</i>	+	.	+	+	+	+	+	.	+	+	IV
<i>Poa nemoralis</i>	+	.	+	.	2	2	3	2	2	3	IV
<i>Stellaria holostea</i>	+	1	+	+	.	.	+	+	1	+	IV
<i>Veronica chamaedrys</i>	+	+	1	.	.	+	1	+	+	1	IV
<i>Vincetoxicum hirsutinaria</i>	+	+	+	1	+	.	.	+	+	+	IV
<i>Melica uniflora</i>	1	3	2	1	.	.	+	.	+	1	IV
<i>Potentilla thuringiaca</i> agg.	.	.	.	+	+	+	+	+	1	1	IV
<i>Valeriana sambucifolia</i>	.	+	+	+	.	+	+	.	+	+	IV
<i>Glechoma hirsuta</i>	+	+	+	+	.	.	+	.	+	+	IV
<i>Carex muricata</i> agg.	+	+	+	.	.	+	.	.	+	1	III
<i>Coronilla varia</i>	.	.	+	+	+	+	+	.	.	+	III

Relevee code:	81	82	83	84	91	92	93	94	95	96	K
<i>Galium schultesii</i>	+	+	+	1	+	+	.	.	.	.	III
<i>Laserpitium latifolium</i>	.	.	.	1	+	.	+	2	2	2	III
<i>Lilium martagon</i>	.	.	.	+	.	.	+	+	1	+	III
<i>Campanula rapunculoides</i>	.	.	1	.	.	+	+	.	+	+	III
<i>Primula veris</i>	.	.	.	1	.	.	+	+	1	1	III
<i>Chamaecytisus hirsutus</i>	+	+	+	.	.	.	.	+	.	+	III
<i>Origanum vulgare</i>	.	.	.	.	+	+	+	+	.	+	III
<i>Teucrium chamaedrys</i>	.	.	.	+	+	+	.	+	.	.	II
<i>Euphorbia amygdaloides</i>	.	.	.	+	.	.	+	.	+	+	II
<i>Brachypodium sylvaticum</i>	+	.	.	.	+	2	.	1	.	.	II
<i>Alliaria petiolata</i>	.	.	+	.	.	.	+	.	+	+	II
<i>Iris aphylla</i>	+	.	.	.	.	.	+	1	.	+	II
<i>Cardaminopsis arenosa</i>	+	+	+	+	.	.	.	.	.	.	II
<i>Carex digitata</i>	.	+	.	1	1	1	.	.	.	.	II
<i>Cnidium silaiifolium</i>	.	.	.	.	.	+	.	+	+	+	II
<i>Mycelis muralis</i>	.	.	+	+	+	.	+	.	.	.	II
<i>Melica picta</i>	+	+	+	+	.	.	.	.	.	.	II
<i>Mercurialis perennis</i>	.	.	.	+	+	+	.	.	.	+	II
<i>Silene italica</i>	+	+	+	+	.	.	.	.	.	.	II
<i>Polypodium vulgare</i>	.	+	.	.	1	+	.	.	.	+	II
<i>Waldsteinia geoides</i>	2	2	2	2	.	.	.	.	.	.	II
<i>Clinopodium vulgare</i>	.	.	.	.	+	1	.	.	+	.	II
<i>Arabis turrata</i>	.	.	.	.	.	+	+	.	.	+	II
<i>Aster amellus</i>	.	.	.	.	+	+	.	.	.	.	II
<i>Helleborus purpurascens</i>	.	.	.	.	.	.	+	+	+	.	II
<i>Silene alba</i>	.	.	+	.	.	.	.	.	+	+	II
<i>Allium sp.</i>	+	.	.	.	.	.	.	.	+	+	II
<i>Piptatherum virescens</i>	1	.	1	1	.	.	.	.	.	.	II
<i>Lamium maculatum</i>	.	.	.	.	.	+	.	.	+	+	II
<i>Bromus ramosus</i>	.	+	.	.	.	.	+	.	+	.	II
<i>Solidago virgaurea</i>	.	.	.	.	+	+	.	+	.	.	II
<i>Peltaria alliacea</i>	.	.	.	.	.	.	+	.	+	+	II
<i>Carex humilis</i>	.	.	.	.	.	.	+	+	.	+	II
<i>Viola hirta</i>	.	+	.	+	.	.	+	.	.	.	II
<i>Torilis japonica</i>	+	.	.	.	.	.	+	+	.	.	II
<i>Verbascum lychnitis</i>	+	.	.	.	.	.	+	.	.	+	II
<i>Fragaria vesca</i>	.	.	.	+	1	1	.	.	.	.	II

Species in 1 or 2 relevees: shrub layer - *Staphylea pinnata* 83: +, 84: +; *Cornus sanguinea* 82: +, 92: +; *Tilia cordata* 82: +, 84: +; *Sorbus torminalis* 81: +, 84: 2; *Euonymus europaeus* 93: +, 95: +; *Pyrus pyraster* 82: +, 84: +; *Malus sylvestris* 83: +, 96: +; *Berberis vulgaris* 82: +; *Fagus sylvatica* 81: +; *Cotoneaster integerimus* 92: +; *Rosa pendulina* 93: +; *Rhamnus catharticus* 83: +; *Quercus robur* 82: +; **herb layer** - *Lamium galeobdolon* 84: +, 93: +; *Galium glaucum* 81: +, 82: +; *Trifolium medium* 82: +, 84: +; *Sesleria rigida* 93: +, 96: +; *Allium oleraceum* 82: +, 83: +; *Asplenium ruta-muraria* 83: +, 91: +; *Peucedanum oreoselinum* 84: +, 93: +; *Melampyrum bihariense* 82: +, 84: 1; *Ornithogalum umbellatum* 95: +, 96: +; *Digitalis grandiflora* 84: +, 92: +; *Stachys recta* 81: +, 83: +; *Seseli libanotis* 84: +, 96: +; *Lithospermum purpureocaeruleum* 82: 2, 84: +; *Carex michelii* 83: +, 84: 1; *Clematis vitalba* 92: +, 94: +; *Dentaria bulbifera* 95: +, 96: 1; *Silene dubia* 94: +, 96: +; *Polygonum convolvulus* 83: +; *Galium album* 93: +; *Lathyrus vernus* 84: +; *Geum urbanum* 82: +; *Geranium sanguineum* 84: +; *Epipactis helleborine* 94: +; *Lotus corniculatus* 81: +; *Acinos arvensis* 94: +; *Euphorbia cyparissias* 96: +; *Lapsana communis* 82: +; *Fragaria viridis* 83: +; *Poa angustifolia* 82: +; *Festuca drymeja* 92: 1; *Erysimum odoratum* 96: +; *Thlaspi kovatsii* 95: 1; *Cephalanthera damasonium* 95: +; *Campanula sibirica* 96: +; *Convallaria majalis* 84: 1; *Cystopteris fragilis* 95: +; *Cruciata glabra* 84: +; *Veronica prostrata* 96: +; *Thalictrum foetidum* 96: +; *Veronica teucrium* 92: +; *Stachys alpina* 92: +; *Stachys officinalis* 92: +; *Scabiosa sp.* 93: +; *Moehringia trinervia* 95: +; *Hordelymus europaeus* 83: +; *Lamium album* 96: +; *Hepatica transsilvanica* 84: 1; *Iris pseudocyperus* 84: +; *Moehringia muscosa* 91: +; *Linaria genistifolia* 93: +; *Ajuga reptans* 84: +; *Orobanche sp.* 82: +; *Brachypodium pinnatum* 84: +; *Thymus comosus* 94: +; *Calamagrostis epigeios* 92: +.

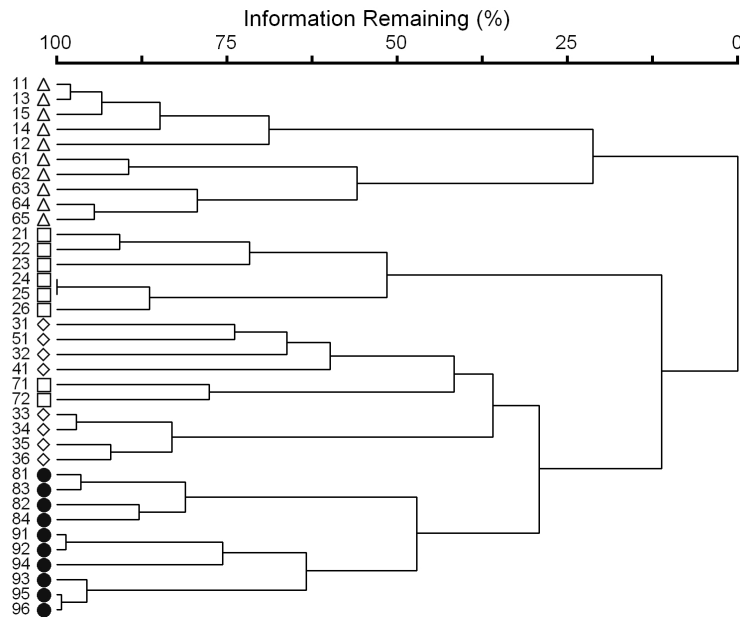


Fig. 1. Similarities between saxicolous shrub vegetation on limestone.

11-15, 61-65 = *Corno-Fraxinetum orni*, 21-26 = *Tilio-Fraxinetum*,
31-36, 41, 51 = *Cotoneastro-Rhamnetum tinctorii*, 81-84, 91-96 = *Cornus mas* shrubs
on Perșani and respectively Postăvaru Mountains

Shared species with *Tilio-Fraxinetum*, but not common in the other two units are: *Fraxinus excelsior*, *Quercus petraea*, *Veronica chamaedrys*, *Dactylis glomerata*, *Helleborus purpurascens*, *Galium schultesii*, *Lamium maculatum*. A high similarity is between *Tilio-Fraxinetum* from Trascău and *Cotoneastro-Rhamnetum* (relevés 71-72 and respectively 31-36, 41, 51 in Figure 1), since they uniquely share *Spiraea chamaedryfolia*, *Cotoneaster integerrimus*, *Helictotrichon decorum*.

Analysing the relevés where *Cornus mas* exhibit different degrees of cover, it can't be outlined relevant changes in the composition of phytocoenoses with or without tree layer. No differential species show up.

It was also checked the relation between cornelian cherry phytocoenoses from Romania and those belonging to the association *Violo hirtae-Cornetum maris*

Hilib et Klotz 1990, described from Germany [10]. The values of Sørensen similarity index are lower than 0.3. This is the consequence of reduced number of species in *Violo-Cornetum* phytocoenoses, because of dense canopy. Even if Romanian communities with *Cornus mas* have most of the *Violo-Cornetum* species, they are differentiated by more than 30 species.

Studied shrubs came in contact with forests of *Carpinus betulus* and *Fraxinus excelsior*, on sunny but relatively gentle slopes, and *Acer pseudoplatanus* (co-) dominated forests on shaded ravine. On steeper slopes there are patches of herbaceous vegetation with *Sesleria rigida*, *Festuca pallens* or *Phleum montanum*. *Carex brevicollis* and *Sorbus graeca* are some examples of thermophilous species preserved here, that along with *Piptatherum virescens* and *Carex humilis*, denote the relic status of the vegetation.

5. Conclusions

Vegetation communities of *Cornus mas* on rocky slopes exhibit a peculiar physiognomy and assemblage of species. The resemblances at floristic, dynamic and ecological level, determine us to consider them a variant of *Tilio-Fraxinetum* forests.

References

1. Boşcaiu, N., Gergely, I., et al.: *Flora și vegetația rezervației naturale Defileul Crișului Repede (Flora and Vegetation of the Natural Reserve Defileul Crișului Repede)*. In: *Contribuții Botanice* (1966), p. 167-258.
2. Ciocârlan, V.: *Flora ilustrată a României (Illustrated Flora of Romania)*. Ceres Publishing House, 2000.
3. Clot, F.: *Les érablaies européennes: essai de synthèse (The Scree Forests: an Synthetic Approach)*. In: *Phytocoenologia* **18** (1990) No. 4, p. 409-564.
4. Danciu, M., Parascan, D.: *Die Strauchvegetation mit *Cotoneaster integerrimus* Med. und *Rhamnus saxatilis* Jacq. im Burzenland (The Shrub Vegetation with *Cotoneaster integerrimus* and *Rhamnus saxatilis* in Bârsa Land)*. In: *Naturwissenschaftliche Forschungen über Siebenbürgen* **6** (2000), p. 195-203.
5. Danciu, M., Parascan, D., Gurean, D., Ularu, P., Abrudan, I.V.: *Characteristics of Vegetation from Tipeiul Racoşului (Perşanii Nordici)*. In: *Bulletin of the Transilvania University of Braşov* (1994) Vol. 1 (36), Series A, p. 211-218.
6. Gergely, I.: *Contribuții la studiul fitocenologic al pădurilor din partea nordică a Munților Trascăului (Contributions to the Phytosociological Study of the Forests in the Northern Part of Trascău Mountains)*. In: *Contribuții Botanice* (1962), p. 263-298.
7. McCune, B., Mefford, M. J.: *PC-ORD. Multivariate Analysis of Ecological Data, Version 5.10*. MjM Software Design, Gleneden Beach, Oregon, 2006.
8. Peia, P.: *Aspecte de vegetație din Cheile Minişului (Vegetation aspects from Miniş Gorges)*. In: *Contribuții Botanice* (1978), p. 235-250.
9. Pop, I., Hodişan, I.: *Contribuții la cunoaşterea vegetației calcarelor de la Godineşti-Zam (Contributions to the knowledge of limestone vegetation at Godineşti-Zam)*. In: *Contribuții Botanice* (1964), p. 229-239.
10. Rauschert, S., Hilbig, W., Klotz, S.: *Übersicht über der gesellschaften des sudlichen teiles der DDR. XV Die xerothermen Gebuschgesellschaften (Berberidion Br.-Bl. 52 und Prunion fruticosae Tx. 52)*. In: *Hercynia* **27** (1990) No. 3, p. 195-258.
11. Tichý, L.: *JUICE, software for vegetation classification*. In: *Journal of Vegetation Science* **13** (2002), p. 451-453.