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CHOROLOGY, ECOLOGY AND PHYTOSOCIOLOGY OF THE *Ruscus aculeatus* L. IN FOREST HABITATS FROM THE SOUTH OF OLTENIA, ROMANIA

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Abstract

Ruscus aculeatus L. (Ruscaceae), is a shrub with strong, erect stems bearing numerous phylloclades widespread in western, southern and southeastern Europe, in Anatolia and northern Africa. This species is cited from few places in Oltenia. Following field research in the forest habitats of southern Oltenia, important populations of this species were identified. Such populations were identified in the lower Jiului basin, in the forest base of the Segarcea, Perişor and Craiova Forestry Districts. The most important populations with a large number of individuals, increased vitality and good conservation status are found in the Dâlga and Ţuglui arboretums. The species is found especially in the forests of the Quercus cerris and Q. frainetto, in the natural habitat - 91M0 Pannonian-Balkan oak - Oak forests (CLAS. PAL.: 41.76). Thirty populations of Ruscus aculeatus were identified and monitored in the Dâlga and Ţuglui arbotretums.

Key words*: Ruscus aculeatus, populations, corology, ecology, plant communities, forest habitats.*

INTRODUCTION

Ruscus aculeatus popularly called "thorn" is a plant known from Antiquity. It is part of the Liliaceae family and is a thorny subshrub, with rigid phyllocladia 1-4 cm long, with a thorn at the top. The plant is richly branched. The flowers of the thorn are yellow-white in color and are found in the shape of a star. The fruits are small red berries. It is found in forests or rare forests being a mesotrophic to eutrophic, xeromesophilic and thermophilic species. In Romania, the species is protected and considered a monument of nature (Ciocârlan, 2009).

In Europe, *Ruscus aculeatus* is most widespread around the mediterranean, native from North Africa (Morocco, Algeria, Tunisia and Libya) to Eastern Europe and Central Hungary (Tutin et al., 1964-1980, 1993).

In Romania, the species was cited from several places, for example: Vamanu Mountains, Bilbor village (Topliţa region); Şimleu hill, Băile 1 Mai, Hidişelul de Sus (Oradea region); on the hills in between the Şuncuiuş large valley and the Urman valley (Beiuş region); in Moneasa, along the Megieş valley, and also in Piatra Mică, Sebiş on the Pilişca hill, Dezna on the Corbului hill, Musteşti under the Drocea hill (Gurahonţ region); Cerna valley, Băile Herculane, Mehadia on the Străjuţ mountain, Danube valley in the Cazane place (Orşova region); Hinova on the Stârmina hill, Valea Hoţului (Turnu Severin region); Bucovăţ forest, Leamna de Jos, Palilula, Podari (Craiova region); Gâncioava (Segarcea region); Bechet (Corabia region); Rast (Băileşti area); Ponoare, Cloşani (Baia de Aramă zone); Vlădaia - inside the Bungetului forest (Vânju Mare region); Comana, located in Padina lui Vasile, and at the Fântâna cu Nuc, Călugăreni (in the Crucea de Piatră forest and also the Mihai Bravu forest) (Giurgiu region); Niculiţel - inside the forest (Tulcea region); Mangalia, above the thermal spa; Grozeşti, Slănic (Tg. Ocna region) (Maftei & Maftei, 2016).

In Oltenia, the species was also cited from Valea Motrului, Culmea Motrului, Dealurile Cerăngarilor, Trunchiul Cârceni (Costache, 2005).

This species is found in calcareous forests, thickets, shady rocky places and also wetlands. It needs mild temperatures in winter. *Ruscus aculeatus* can be found in a wide range of habitats listed in the Habitats Directive (Commission of the European Communities, 2009). This species is classified as having stable populations, but because in some areas of Romania the conditions of protection and maintenance of favorable conservation

conditions for existing populations are not respected, it is likely that existing and future threats will cause the decline of several species in the near future.

MATERIALS AND METHODS

Study area

The field research regarding the species *Ruscus aculeatus* was carried out in the forest habitats around the towns: Dâlga, Leamna de Sus, Obedin, Mihăita, Tîmburești, Bratovoiești, Țuglui, Bucovăț, Bîzdâna, Almaj, Gogoșu, Ștefănel (Dolj County), Rogova, Ogradena, Dubova, Svinita, Eibenthal (Mehedinți County), Negomir, Urdari, Artanu, Capul Dealului (Gorj).

Methods

To identify the species we looked into: *Romanian Flora*, vols. I-XII (1952-1976) and *Flora Europaea*, vols. I-V (1964-1980), *Illustrierte Flora von Mitteleuropa* (Hegi, 1987), *Atlas of North vascular plants: North of the Tropic of Cancer* (Hultén & Fries, 1986), *Red list of extinct, endangered, vulnerable vascular plants and rare from Romania's flora* (Boșcaiu et al., 1994).

For the analysis of the plant community in the study area was used the methoology of phyto-sociologic research of the Central European Phyto-Sociologic School, which is based on the principles and methods elaborated by Braun-Blanquet (1939). The plant communities were identified according to the characteristic, edifyng, dominant and differential species.

For the classification and phytosociology study were used synthesis papers on the Romanian (Coldea, 1991; 1997; Sanda et al., 1997) and Europeen vegetation (Géhu & Rivas-Martinez, 1981; Mucuna, 1997; Mucina et al., 2016; Rodwell et al., 2002; Raus et al., 2016). The name of the vegetal association was given taking into account the regulations stated by the Phytosociologic Nomenclature Code (Weber et al., 2000). The environmental analysis included altitude, slope, aspect, and soil properties.

RESULTS AND DISCUSSIONS

Ruscus aculeatus L. is known as a medicinal plant since antiquity, from a morphological point of view it is a sempervirescent shrub, with a horizontal rhizome on which metamorphosed stems with an assimilative role, called phyllocladia, are found. The leaves are reduced to membranous bracts. The white-green flowers are solitary and are inserted on the lower part of the phyllocladia. The fruits are red berries with 1-2 spherical seeds (Flora României, Vol. XI, 1976).

In our country, this species has been studied a lot from a phytopharmaceutical point of view, being an important plant for treating diseases of the circulatory system. *Ruscus aculeatus* has a protection regime in our country, the species being included on the red list of endangered vascular plants, in danger of extinction and, as a result. The branches of the plant are often collected by peasants and sold by the piece for decorative purposes. The plant is also used for medicinal purposes, thus not respecting the status of a protected plant.

Most populations were found in the Dâlga Forest and Lemna de Sus. In the Dâlga forest, 47 populations were inventoried and monitored. The number of individuals within these populations varies from 2 to 30 individuals. The state of conservation of the populations is very good, the individuals are well developed, they fruit very well and form large vigorous bushes (Figure 1).

Figure 1. *Ruscus aculeatus* in Dâlga Forest (Photo: Mariana Niculescu)

Ecological and cenological characterization of the species Ruscus aculeatus L. *in the investigated territory*

Research carried out by us in habitats foresters highlighted the presence of some well-structured forest phytocoenoses floristically and cenotic, which belong to the plant communities: *Quercetum cerris* (Georgescu, 1941); *Quercetum frainetto-cerris* (Georgescu,

1945; (Rudski, 1949); *Carpino-Quercetum cerris* (Klika, 1934); *Quercetum frainetto* (Păun, 1966). Within the phytocoenoses analyzed, the species *Ruscus aculeatus* L. achieves a coverage between 5 and 60%. The greatest coverage is found in the phytocenoses on the sloping lands, with inclination between 15 and 25% and eastern exposure.

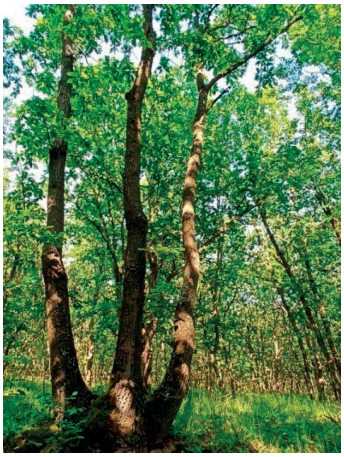

Figure 2. Aspect with the habitat of the *Ruscus aculeatus* species - Dâlga Forest

The populations of the Dâlga Forest belong to the plant community - *Carpino-Quercetum cerris* (Klika, 1934) (Table 1). The compaction of the canopy of the analyzed phytocoenoses in this forest is between 0.6-0.8. *Ligustrum vulgare, Euonymus europaeus, E. verucosa, Sambucus nigra, Rosa canina, Crataegus monogyna, Viburnum lantana* and *Cornus sanguinea* are frequently found in the shrub layer (Niculescu et al., 2009). The following species participate with high constancy in the composition of the floristic composition of the grass cover: *Festuca heterophylla, Potentilla micrantha, Tanacetum corymbosum, Vincetoxicum hirundinaria, Melica uniflora, Silene nutans, Hieracium sabaudum, Lathyrus vernus, Helleborus odorus, Asperula taurina, Lithospermum purpureo-coeruleum, Teucrium chamaedrys*.

From a conservative point of view, it was observed that the highest abundance-dominance of the species is within the Natura 2000 habitat - 91M0 Pannonian-Balkanic turkey oak - sessile oak forests; CLASS. PAL.: 41.76 (Gafta & Mountford, 2008) (Figure 2). In the forest habitats of the Leamna de Sus Forest, 16 populations with equally vigorous individuals, with very good fruiting, were found.

Ecological, phytosociological and population studies were done during the entire growing season to cover all morphological and phenological aspects.

Ruscus aculeatus populations show large numbers of individuals. In the Leamna de Sus Forest, the species was identified in the same type of habitat (Figure 3).

Figure 3. *Ruscus aculeatus* - Leamna de Sus Forest

Within this forest body, the species was identified in the plant community *Quercetum frainetto-cerris* (Georgescu, 1945; Rudski, 1949). The compaction of the canopy of the analyzed phytocenoses in this forest is between 0.6-0.7. *Euonymus europaeus, E. verucosa, Sambucus nigra, Crataegus monogyna, Viburnum lantana* are frequently found in the shrub layer. The following species participate with high constancy in making up the floristic composition of the grass blanket: *Helleborus odorus, Anemone nemorosa, Asparagus offcinalis, Asperula taurina, Lithospermum purpureo-coeruleum, Viola odorata* etc.

The species was inventoried and monitored without conducting population studies in these locations as well: Obedin, Mihăița, Tîmburești, Bratovoiești, Țuglui, Bucovăț, Bîzdâna, Almaj, Gogoșu, Ștefănel (Dolj County), Rogova, Ogradena, Dubova, Svinita, Eibenthal (Mehedinți County), Negomir, Urdari, Artanu, Capul Dealului (Gorj).

From a phytosociological point of view, within these locations the species was also identified in other Natura 2000 habitats: 40A0* Subcontinental peri-Pannonic scrub; CLASS. PAL.: 31.8B12p, 31.8B13, 31.8B14, 31.8B3p and Habitat 91I0* Euro-Siberian steppic woods with *Quercus* spp.

Table 1. *Carpino-Quercetum cerris* plant community (Klika, 1934)

No. of relevée	1	2	3	4	5	6	7	8	9	10	K
Altitude m.o.s. (x 10 m)	142	140	140	140	138	140	140	142	142	142	
Exposure	E	SV	E	SE	S	S	E	SE	E	SE	
Inclination (in grades)	10	10	15	10	15	20	25	20	10	25	
Canopy (%)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.7	0.7	
Coverage of herbacaeous layer (%)	60	70	70	70	70	60	60	65	65	60	
Area (m^2)	400	400	400	400	400	400	400	400	400	400	
Char. ass.											
Quercus cerris	3-4	4	4	4	4	4	4	4	4	4	V
Carpinus betulus	1	+	1	1	1	+	+	+	+	+	V
Quercetea pubescenti-petraeae* et *Qurcetalia petraeae-pubescentis											
Quercus frainetto	1	1	1	1	+-1	1	+	+	1	1	V
Rosa canina	+	+	+	+	+	+	+	+	+	+	V
Tanacetum corymbosum	-	+	-	+	-	-	+	-	+	-	II
Astragalus glycyphyllos	+	+	+	+	+	+	+	+	+	+	V
Ruscus aculeatus	**2**	**2**	**3**	**3-4**	**3-4**	**2**	**2**	**2**	**2-3**	**3**	**V**
Fragaria viridis	+	+	-	-	-	+	-	-	+	+	III
Vincetoxicum hirundinaria	+	+	+	+	+	+	+	+	+	+	V
Dianthus armeria	+	+	+	-	+	+	+	-	+	+	IV
Hypericum perforatum	+	+	-	-	+	+	-	-	-	-	II
Coronilla varia	+	-	+	-	+	-	+	-	-	+	II
Arabis turrita	+	+	-	-	-	+	-	-	+	+	III
Viola hirta	+	-	-	-	-	-	-	-	-	+	I
Poa angustifolia	+	-	-	+	-	-	-	-	-	-	I
Lithospermum purpureo- coeruleum	1	1	+-1	+	1-2	2	+	2	+-1	1	V
Festuca heterophylla	+	+	+	+	+	+	+	+	+	+	V
Teucrium chamaedrys	+	+	+	-	+	+	+	-	+	+	IV
Carex montana	+	+	-	-	+	+	-	-	-	-	II
Potentilla micrantha	+	-	+	-	+	-	+	+	-	+	III
Oryzopsis virescens	+	+	-	-	-	+	-	-	+	-	II
Potentilla alba	+	+	-	-	+	+	-	-	-	-	II
Lychnis coronaria	+	-	-	+	-	-	-	-	-	-	I
Fraxinus ornus	+	-	+	+	+	-	-	-	-	-	I
Helleborus odorus	+	+-1	1	1	+-1	+	+	+-1	+	+	V
Scutellaria altissima	-	+	+	+	-	-	-	+	+	+	III
Tilia tomentosa	+	+	+	+	+	+	+	-	-	+	IV
Acer tataricum	+	-	+	-	+	-	+	+	-	+	III
Querco Fagetea											
Cornus sanguinea	+	+	+	+	+	+	+	+	+	+	V
Crataegus monogyna	+	+	+	+	+	+	+	+	+	+	V
Viburnum lantana	+	+	+	+	+	+	+	+	+	+	V
Prunus spinosa	+	+	+	+	+	+	+	+	+	+	V
Cerasus avium	+	-	-	-	+	+	+	-	-	-	II
Ligustrum vulgare	+	+	+	+	+	+	+	+	+	+	V
Euonymus europaeus	-	+	+	+	-	-	-	+	+	+	III
Poa nemoralis	+-1	1	1	1	1	+-1	1	1-2	1	+-1	V
Smyrnium perfoliatum	1	1	+	-	+	-	1	1	+	-	IV
Veronica officinalis	+	+	+	+	+	+	+	+	+	+	V
Anemone nemorosa	+	1	1	1	1	+-1	1	1	1	+-1	V
Viola odorata	+	+	+	+	+	+	+	+	+	+	V
Viola alba	-	+	+	+	-	-	-	+	+	+	III
Melica nutans	+	+	+	+	+	+	+	+	+	+	V
Melica uniflora	+	+	+	+	+	+	+	+	+	+	V
Euphorbia amygdaloides	+	+	+	+	+	+	+	+	+	+	V

Veronica chamaedrys	+	+	+	+	+	+	+	+	+	+	V
Brachypodium sylvaticum	+	1	1	1	+-1	1	+-1	1	-	+	V
Viola odotata	+	+	+	+	+	+	+	+	+	+	V
Ranunculus auricomus	+	+	+	-	-	-	+	+	-	+	III
Lathyrus vernus	+	+	+	+	+	+	+	+	+	+	V
Hedera helix	+-1	1	1	1	+	+-1	+-1	+	+	+	V
Geum urbanum	+	+	+	+	+	+	+	-	-	+	IV
Asperula taurina	+	+	+	+	+	+	+	+	+	+	V
Hieracium sabaudum	+	+	+	+	+	+	+	+	+	+	V
Variae Syntaxa											
Lathyrus venetus	+	+	+	+	+	+	+	+	+	+	V
Ornithogalum umbellatum	-	-	-	+	+	+	-	-	-	-	II
Ornithogalum flavescens	+	-	-	+	-	+	-	-	-	-	II
Muscari comosum	-	+-1	-	+-1	+	-	1	-	-	+	III
Inula hirta	+	+	+	+	+	+	+	+	+	+	V
Orchis purpurea	-	-	-	+	-	+	-	-	-	+	II
Mycelis muralis	-	+	+	+	-	+	-	+	+	+	IV
Rubus caesius	-	-	-	+	+	+	-	-	-	-	II
Larthyrius hallersteinii	+	-	+	+	-	+	-	-	-	-	II
Euphorbia cyparissias	+	-	-	-	+	+	+	-	-	-	II
Betonica officinalis	+	-	-	-	+	-	-	-	-	-	I
Galium aparine	-	-	+	+	+	+	-	-	-	+	III
Viscaria vulgaris	+	+	-	-	-	+	-	-	-	-	II
Scrophularia nodosa	-	-	-	+	-	+	-	-	-	+	II

Place and data of the relevés: 1-10, Forest Dâlga, 28.IV.2020, 15.VI.2021, 12.V. 2022

CONCLUSIONS

Ruscus aculeatus is a protected species found on the IUCN Red List status of threatened species. In Romania it also has protection status. The species is found in forest habitats in a few places in the country. In the southern part of Oltenia, the species was identified in several forest habitats.

Following field studies, it was found that it is in a good state of preservation. The species was analyzed from a chorological, ecological and phytosociological point of view from several areas in Gorj and Dolj counties. Population studies were carried out in two locations: Dâlga Forests and Leamna de Sus (Dolj County), in these areas numerous populations with vigorous individuals and very good fruiting were found. Several pressures and threats to the conservation status of the species have also been observed, so sustainable, long-term measures are needed for this species.

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