

## RESEARCH REGARDING TWO VEGETAL ASSOCIATIONS SPECIFIC TO THE HILLS AREA IN THE NORTH-WEST OF ROMANIA

Carol KARACSONYI

"Vasile Goldiș" Western University, Arad, Romania

**ABSTRACT.** The latest scientific research accomplished on the fieldwork (activities occurred in the hills area of the North-West region of the country in the last years), emphasized that there are series of vegetal associations, requiring identification and analysis. Among them, we take into account the associations *Danthonio alpinae-Stipetum stenophyllae* Ghișa, 1941 and *Prunetum fruticosae* Dziubałowski 1926, both of them signalized in the South-East of Satu Mare County, in the bounds of Cehăluț (Tășnadului Hills). The outcome of the scientific researches illustrates the appearance of series of remarkable floristic elements in their structure. With regard to the origin of the plants, a notable fact is that some of them are of Mediterranean, Pontic or Balkan origins.

**Keywords:** rare plant associations specific for the North-West of Romania, remarkable plant species

### INTRODUCTION

The identified and analyzed vegetal associations are included in the territory belonging to Tășnadului Hills. Geomorphologic unity, this particular area occupies the south-east side of Satu-Mare County, lying partially on the neighboring territories of Sălaj and Bihor Counties. In the geological time history, a sealed off maritime lagoon (which rose because of the subsidence's motion) was extended in this particular area. Consequently, nowadays, it reaches higher points comparing to those reached by the limitrophe plains' territory. Thus, in places, the absolute altitudes go above 350 meters. For the time being, the surface is clothed by yellow Pleistocene clay, but once, the territory had been covered by woods and forests.

Therefore, a remarkable floristic station, consisting in an herbaceous vegetal layer, has been identified in the particular drifting scientific reservation southwards to the village Cehăluț, towards Orbău, in the area of Salomon Hills (266 metres) and Szárhegy.

### MATERIALS AND METHODS

The preclude investigation upon the scientific research stations has been accomplished by means of performing some phyto-geographic relevé sampling methods (annotation of plants) and by taking into account the floristic standpoint. Among numerous remarkable floristic elements, the greatest forces of them are compressed in the two vegetal associations submitted to enquiry in what follows. In addition to the analysis of their floristic composition, we achieved results regarding the percentage analysis of ecological values: humidity and moisture content, temperature and soil reaction.

### RESULTS AND DISCUSSIONS

It seems that the research stations come to prove their thermophilic featured status, aright exemplified through specific examinations of the southern and western slopes of Salomon Hills. This area is

dominated by different herbaceous vegetal associations, but the following are notable and pointed out:

- FESTUCO – BROMETEA Br.- Bl. et Tüxen in Br.- Bl. 1949
- BRACHYPODIO-CHRYSOPOGONETALIA (Horvatič 1958) Boșcaiu 1972
- DANTHONIO-BRACHYPODION Boșcaiu 1972.
- As. DANTONIO ALPINAE-STIPETUM STENOPHYLLAE Ghișa 1941



**Fig. 1** *Danthonio-Stipetum stenophyllae* (The Salomon Hills, near Cehăluț)

A noticeable fact is the presence of this association at the peripheral hilly region in the North-West of the country. Moreover, in addition to those associations edifying species *Stipa tirsa* and *Danthonia alpina*, there are some other interesting species signalized in its' structure: *Aster amellus*, *Echium russicum*, *Ornithogalum pyramidale*, *Trinia ramosissima* and *Linum hirsutum*. Because of detailed research based upon its scattering, these species' distribution appears to be compressed at the peripheral areas, missing in what concerns the limitrophe plains. The vegetal

association is mainly dominated by Hemicryptophytes (68,3%), followed by Therophytes (13,6%), emphasizing, therefore, the station's herbaceous status. From the standpoint of its' geographical origin, besides Eurasian elements (45,7%), some species of Ponitic origin are distinguishing themselves in a considerable percentage (10,5%), respectively, Mediterranean origin (10,5%). As a consequence, the result is evincing the analyzed stations' thermophilic character. With regard to the ecological values, the most species are making part of the Xeromesophytes (47,0%, humidity) of the Mesotherms (30,3%, temperature), respectively, of species indicating a poorly acid-neutrophyle soil (57,6%, soil reaction).

A notable fact is that this specific vegetal association has already been succinctly illustrated, by

means of one certain relevé sampling method (annotation of plants) (Karacsonyi, 2002).

The spectrum regarding the bioform: H - 68,3%/H (G) -1,5%; H (Ch) -1,5 %; H-G-1,5%; G-6%/G-H-3%; Ch 3%/Ch-H-1,5%; T-13,6%/Th-9,1%; Th-3%; TH-H-1,5%; Ph-9,1%/Phm-3,0%; Phn-6,1%.

The spectrum regarding the floristic elements: Eua-45,7%/Eua(C)-16,8% ; Eua(M)-7,5% ;E-16,7%/E(C)-3,0% ; Ec-9,1%/Ec(M)-1,5% ; Ec-M-1,5% ; Cp-1,5% ; M-10,5%/M-Ec-3,0% ; Atl-M-1,5% ; P-10,5% ; P-M-4,5% ; P-Pan-3,0% ; P-Pan-Ba-1,5% ; Ba-Pan-3,0% ; Cosm-1,5%.

The relevé sampling method's place and date: Cehăluț, sampling 1 – Szárhegy 16-VI-1986: sampling -5 The Salomon Hill, 16 V 2009. (registered in VII 2009).

#### As. *Danthonia alpinae-Stipetum stenophyllae* Ghișa, 1941

Bioform	Floristic element	Species	Number of relevé method	1	2	3	4	5	K
			Surfa e (m <sup>2</sup> )	25	25	25	20	20	
			Plant dispersal(%)	95	100	95	95	90	
			Slope	S	S-V	S-V	S-V	S-V	
			Inclination (degree)	15	15	8	10	8	
<b>DANTHONIO-STIPION TIRSAE</b>									
H	Eua (C)	<i>Stipa tirsae</i>		4	4	4	5	4	V
H	M	<i>Danthonia alpina</i>		+	+	1	1	+	V
<b>DANTHONIO-BRACHYPODION</b>									
H	Ec	<i>Veronica austriaca ssp. bihariensis</i>		-	+	+	-	+	III
H	Eua (M)	<i>Brachypodium pinnatum</i>		-	+	+	+	-	III
H	Ba-pan	<i>Trinia ramosissima</i>		-	+	-	-	-	I
<b>FESTUCO-BROMETEA</b>									
H	Eua (C)	<i>Festuca rupicola</i>		2	1	+	-	+	IV
H	Eua (C)	<i>Festuca valesiaca</i>		1	-	+	+	-	III
H	P-pan	<i>Inula ensifolia</i>		+	+	-	-	1	III
Ch	Eua (C)	<i>Thymus pannonicus</i>		+	-	+	+	+	IV
TH-H	Eua	<i>Verbascum chaixii ssp. austriacum</i>		+	-	-	-	-	I
H	E(M)	<i>Salvia pratensis</i>		+	+	-	-	+	III
H	Eua (C)	<i>Trifolium montanum</i>		+	+	+	+	+	V
H	E	<i>Dianthus carthusianorum</i>		+	-	-	-	-	I
H	E	<i>Dianthus pontederiae</i>		-	-	+	-	+	II
H	P-M	<i>Veronica spicata ssp. orchidea</i>		+	-	-	-	-	I
Th	P-M	<i>Odontites lutea</i>		1	+	-	-	-	II
TH	Ec	<i>Seseli annuum</i>		+	-	-	-	-	I
H	Eua	<i>Agrimonia eupatoria</i>		+	-	-	+	+	III
H	Eua	<i>Filipendula vulgaris</i>		+	+	+	+	+	V
H	Eua	<i>Plantago media</i>		+	-	-	-	-	I
H	Eua(C)	<i>Aster amellus</i>		+	-	-	-	-	I
H	Eua(C)	<i>Euphorbia virgata</i>		+	-	-	-	-	I
H	Eua	<i>Euphorbia esula</i>		-	-	+	+	-	II
H	P-Pan	<i>Echium russicum</i>		+	-	-	-	-	I
H	P-M	<i>Asperula cynanchica</i>		+	+	-	-	+	III
H	Ec	<i>Galium eruptivum</i>		-	+	+	-	-	II
Th	Eua	<i>Bromus hordeaceus</i>		-	+	-	-	-	I
H(Ch)	Eua	<i>Polygala comosa</i>		-	+	+	+	-	III
H	P-Pan-Ba	<i>Linum hirtum</i>		-	+	-	-	-	I
H	Eua(C)	<i>Hieracium bauginii</i>		-	-	+	+	-	II
H	Eua(C)	<i>Euphorbia cyparissias</i>		-	-	+	+	+	III
H	Cp	<i>Koeleria macrantha</i>		-	-	+	+	+	III
Th	M-Ec	<i>Valerianella locusta</i>		-	-	-	-	+	I
Th	E(C)	<i>Melampyrum arvense</i>		-	-	+	+	-	II
G-H	Eua(C)	<i>Poa bulbosa</i>		-	-	+	-	-	I

H	E	<i>Potentilla cinerea</i>	-	-	+	-	-	I
H	P	<i>Eryngium campestre</i>	-	-	-	+	+	II
Th	P-M	<i>Xeranthemum cylindraceum</i>	-	-	-	-	+	I
G-H	Ec	<i>Thesium linophyllum</i>	+	+	+	+	+	V
GERANION SANGUINEI								
H	E	<i>Geranium sanguineum</i>	-	-	-	+	+	II
H	E(M)	<i>Peucedanum cervaria</i>	+	+	+	-	+	IV
H	Eua	<i>Inula salicina</i>	+	-	+	-	-	II
Ch-H	Ec(M)	<i>Dorycnium pentaphyllum ssp. herbaceum</i>	+	-	+	+	-	III
H	E(C)	<i>Fragaria viridis</i>	+	-	+	+	-	III
H	Eua(C)	<i>Thalictrum minus</i>	+	-	-	-	-	I
H	Ec-M	<i>Trifolium rubens</i>	+	-	+	-	-	II
H	Eua(M)	<i>Vicia tenuifolia</i>	+	+	-	-	-	II
H	M-Ec	<i>Prunella laciniata</i>	+	-	-	-	-	I
Phn	M	<i>Rosa gallica</i>	+	+	+	-	-	III
H	Eua(M)	<i>Centaurea scabiosa</i>	+	-	-	-	+	II
ORIGANETALIA								
H	Eua	<i>Galium verum</i>	+	-	-	-	+	II
H	M	<i>Lathyrus latifolius</i>	+	-	+	-	-	II
H	E	<i>Hieracium sabaudum</i>	+	-	-	-	-	I
VARIAESYNTAXA								
G	M	<i>Ornithogalum pyramidale</i>	+	-	-	-	-	I
H	Eua	<i>Silene nutans</i>	-	-	+	-	-	I
G	Eua(M)	<i>Carex tomentosa</i>	-	+	-	-	-	I
H	Eua	<i>Leucanthemum vulgare</i>	-	-	+	-	-	I
H	Eua	<i>Lotus corniculatus</i>	-	-	+	-	-	I
Th	Atl-M	<i>Lathyrus nissolia</i>	-	-	-	-	+	I
H(G)	Eua	<i>Calamagrostis epigeios</i>	+	-	+	+	+	IV
H-G	Cosm	<i>Convolvulus arvensis</i>	+	-	-	-	-	I
Phn	M	<i>Rubus canescens</i>	-	-	+	-	-	I
Phn	Eua(C)	<i>Prunus fruticosa</i>	-	-	1	-	-	I
Phm	Eua	<i>Prunus spinosa</i>	-	+	+	-	-	II
Phn	E	<i>Rosa canina</i>	-	+	+	-	-	II
Phm	E	<i>Crataegus monogyna</i>	-	-	+	-	+	II

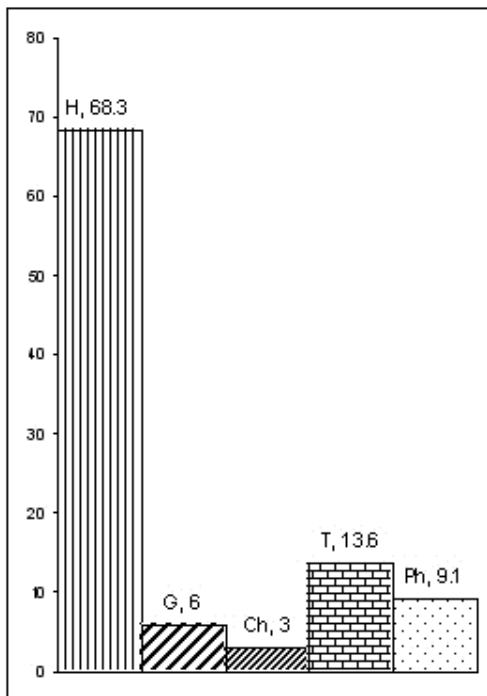


Fig. 2 The spectrum regarding the bioforms of the association *Danthonio alpinae-Stipetum stenophyllae*

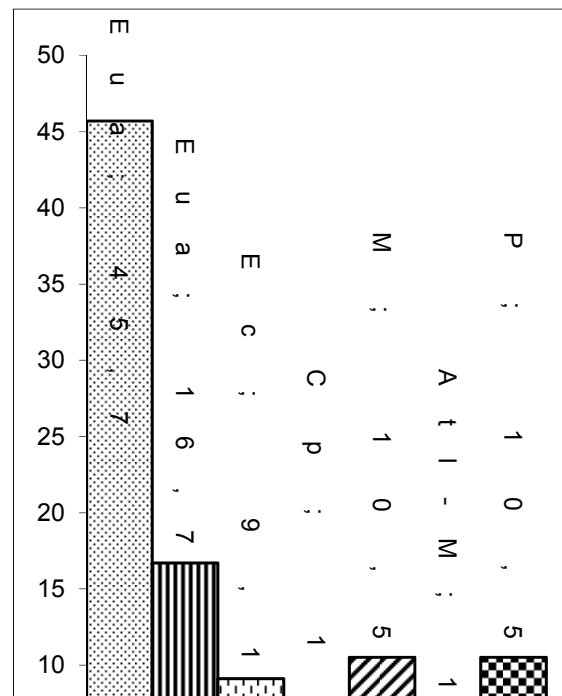


Fig. 3 The spectrum regarding the floristic elements of the association *Danthonio alpinae-Stipetum stenophyllae*

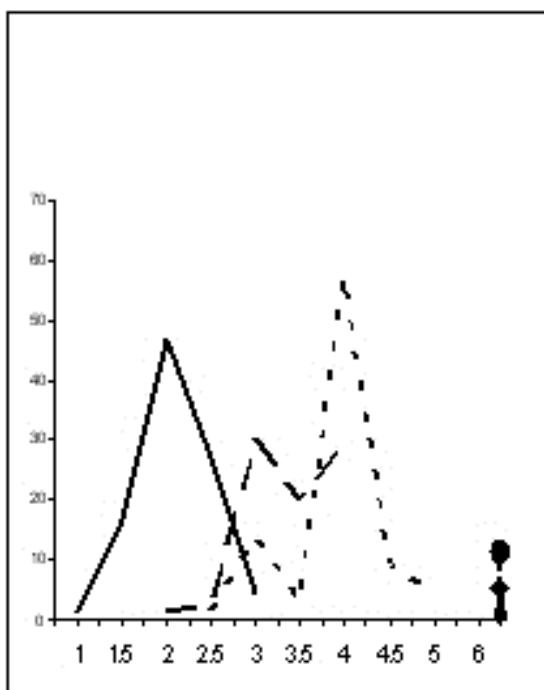


Fig. 4 The ecological values' diagram of the species from the association *Danthonio alpinae-Stipetum stenophyllae*



Fig. 5 *Prunus fruticosa* on The Salomon Hill (near Cehăluț).

**RHAMNO – PRUNETALIA** Rivas Goday et Borja Carbonell, 1961

**PRUNETALIA SPINOSAE** R. Tüxen, 1952

*Prunion fruticosae* R. Tüxen, 1952

As. *Prunetum fruticosae* Dziubałtowski, 1926. This remarkable vegetal association is dominated by a low shrub species, named *Prunus fruticosa*, which forms a cluster of bushes and shrubs on the south-west slopes of Salomon Hills, near Cehăluț (Satu Mare County). Besides the presence of the before mentioned shrub species, some herbaceous plants (particular for more worm and drier research stations) have appeared in this region (*Cl. Festuco – Brometea*). We also notice the existence of species characteristic for the extremity edge of the forest (*Geranion sanguinei*). Particularly for the scientific station, this is a sign with regard to the formerly vegetation's mosaic composition. The herbaceous species characterized by high constancy

values of spreading and dispersal distribution are *Danthonia alpina*, *Filipendula vulgaris*, *Thymus pannonicus*, *Fragaria viridis* and the invasive element *Calamagrostis epigeios*. For the time being, in the spectrum regarding the bioform, the largest amount of percentage is registered by *Hemicryptophytes* (H – 62.7%) in spite of the fact that the association's edifying and dominating species are the *Phanerophytes*. From the standpoint of the constitutive species' origin, the Mediterranean ones are distinguishing between them, because of its relatively high percentage (12.5%), in addition the dominating ones, the Eurasians (50%). The outcome of the scientific researches illustrates that according to the ecologic values, the most edifying and clear percentage is registered by: humidity - Xeromesophytes (57.5%), temperature – Mesotherms (37.5%), soil reaction – species poorly acid-neutrophyle (47.5%).

As. *Prunetum fruticosae* Dziubałtowski, 1929

Bioform	Floristic element	Species	Number of relevé method	1	2	3	4	5	K
			Surface (m <sup>2</sup> )	20	20	25	25	25	
			Plant dispersal(%)	90	95	100	95	95	
			Slope	S-V	S-V	S-V	S-V	S-V	
			Inclination (degree)	10	10	10	15	15	
		CHAR. ASS.							
Phn	Eua(C)	<i>Prunus fruticosa</i>		4	4	5	4	4	V
Phn	E	<i>Crataegus monogyna</i>		+	1	+	-	-	III
		PRUNION SPINOSAE							
Phm	Eua	<i>Prunus spinosa</i>		2	+	-	-	+	III

Phn	E	<i>Rosa canina</i>	-	+	+	+	-	III
Phn	M	<i>Rubus canescens</i>	-	-	-	+	+	II
GERANION SANGUINEI								
H	E(M)	<i>Geranium sanguineum</i>	+	-	-	-	+	II
H	E(C)	<i>Fragaria viridis</i>	+	-	-	+	+	III
H	Eua(M)	<i>Peucedanum cervaria</i>	+	-	-	+	+	III
Ch-H	Ec-M	<i>Dorycnium pentaphyllum ssp. herbaceum</i>	-	+	-	-	-	I
H	E(M)	<i>Trifolium alpestre</i>	-	+	-	-	-	I
H	Eua(M)	<i>Vicia tenuifolia</i>	+	+	-	-	-	II
Phn	M	<i>Rosa gallica</i>	1	-	-	-	+	II
ORIGANETALIA								
H	Eua	<i>Galium verum</i>	-	+	+	-	+	III
H	Eua	<i>Hypericum perforatum</i>	-	+	-	-	+	II
H	M	<i>Lathyrus latifolius</i>	-	-	-	-	+	I
FESTUCETALIA VALESIIACAE								
H	Eua(C)	<i>Festuca valesiaca</i>	-	-	+	-	-	I
H	Eua(C)	<i>Festuca rupicola</i>	-	+	-	-	+	II
Ch	Eua(C)	<i>Thymus pannonicus</i>	+	+	+	+	-	IV
Th	E(C)	<i>Melampyrum arvense</i>	-	+	-	-	+	II
G-H	Ec	<i>Thesium linophylon</i>	-	+	+	-	-	II
H	Ba-Pan	<i>Dianthus pontederae</i>	-	-	+	+	-	II
H	Eua	<i>Sanguisorba minor</i>	-	-	+	-	-	I
Th	Atl-M-Ec	<i>Vicia lathyroides</i>	-	-	+	-	-	I
Th	M-Ec	<i>Valerianella locusta</i>	-	-	-	-	+	I
Phn	Eua(C)	<i>Chamaecytisus ratisbonensis</i>	+	-	-	-	-	I
H	Eua(C)	<i>Hieracium bauhinii</i>	+	-	-	-	-	I
FESTUCO-BROMETEA								
H	Cp	<i>Koeleria macrantha</i>	1	+	+	+	+	V
H	Eua	<i>Filipendula vulgaris</i>	+	-	+	+	+	IV
H(Ch)	Eua	<i>Polygala comosa</i>	+	+	-	-	-	II
H	Eua(C)	<i>Trifolium montanum</i>	+	-	+	-	+	III
Th-TH	E	<i>Trifolium campestre</i>	-	-	-	-	+	I
H-G	Eua	<i>Euphorbia cyparissias</i>	+	-	-	-	-	I
H	P	<i>Eryngium campestre</i>	-	-	-	+	+	II
H	Eua(C)	<i>Stipa tirsia</i>	-	+	+	-	-	II
H	M	<i>Danthonia aplanata</i>	+	+	-	+	+	IV
VARIASYNTAXA								
H	E	<i>Silene nutans</i>	-	-	-	+	+	II
H	Eua	<i>Euphorbia esula</i>	+	+	-	-	+	III
G	Eua(M)	<i>Carex tomentosa</i>	+	+	-	-	-	II
H	E	<i>Leucanthemum vulgare</i>	+	-	+	-	-	II
H(G)	Eua(M)	<i>Calamagrostis epigeios</i>	+	+	+	+	+	V

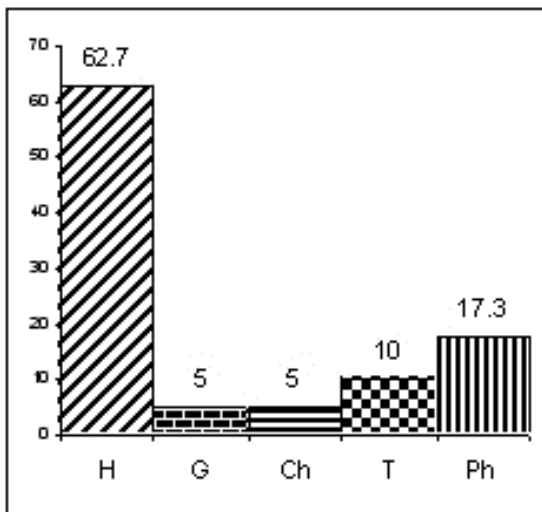


Fig. 6 The spectrum regarding the bioforms of the association *Prunetum fruticosae*

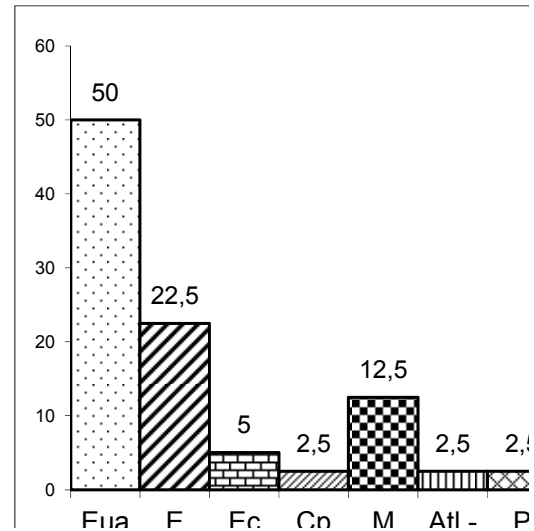


Fig. 7 The spectrum regarding the floristic elements of the association *Prunetum fruticosae*

The spectrum regarding the bioform: H – 62.7%/ H (Ch) -2.5%; H-G-2.5%; Ch-5%; / Ch-H-2.5%; T-10% / Th-7.5%; Th-TH-2.5%; Ph-17.5% / Phm-5.4%; Phn-12.5%.

The spectrum regarding the floristic elements: Eua-50%/Eua(C)-20% ; Eua(M)-7.5% ;E-22.5%/E(C)-5.0%; E(M)-7.54% ; Ec-5%/Ec(M)-2.5% ; Cp-2.5% ; M-12.5%/M-Ec-2.5% ; Atl-M-Ec-2.5% ; P-2.5% ; Ba-Pan-2.5% .

The relevé sampling method's place and date: Cehăluț, The Salomon Hills, 16 V 2009. This rare association has been analysed especially in The East and The South of Romania (Sanda et al., 2088).

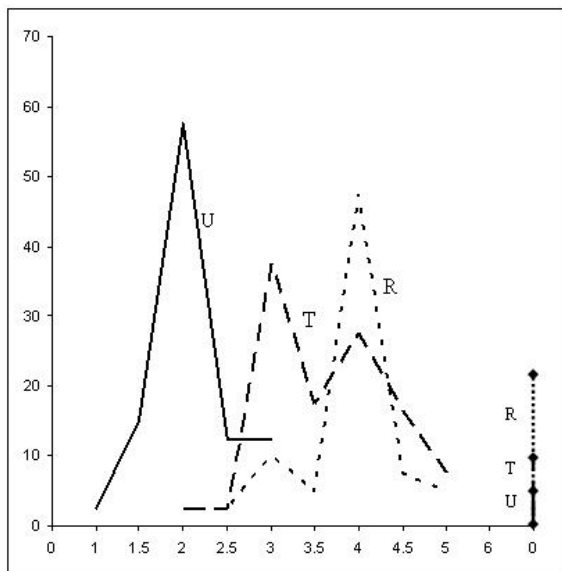


Fig. 8 The ecological values' diagram of the species from the association *Prunetum fruticosae*

## CONCLUSIONS

The outcome of the scientific flora and vegetation researches accomplished in the perimeter of Tășnadului Hills illustrates that the station from Cehăluț is unique in the area, on account of it's preservation in a increasing number of remarkable thermophile species of plants. In times to come, these species' persistency may endanger the clusters of shrubs' extension and the invasion of first-rate species, as *Calamagrostis epigeios*, in addition to the negative influence considering the human activities. To conclude, in order to maintain the area's genuine specificity, we propose its inclusion on the list of natural reservations in Romania.

## REFERENCES

- Borhidi A., Magyarország növénytársulásai, Akadémiai Kiadó, Budapest, 2003.
- Coldea G., Sanda V., Popescu A., Ștefan N., Les associations végétales de Roumanie, Tom 1, Les associations herbacées naturelles, Presses Universitarie de Cluj, Cluj-Napoca, 1997.

- Doniță N., Popescu A., Paucă Comănescu Mihaela, Mihăilescu Simona, Biriș I. – A., Habitatele din România, Editura Tehnică, București, 2005.
- Ghișa E., Cercetări asupra As. Stipetum stenophyllae – Danthoniteum calycinae în Transilvania, Bul. Grăd. Bot. Muz. Bot. Cluj, 21, 1941, 1-2, 56-67.
- Karacsonyi C., Flora și vegetația județului Satu Mare, Edit. Muzeului Sătmărean, Satu Mare, 1995.
- Karacsonyi C., Die Trockenrasen an der kollinen Stufe im Nordwesten Siebenbürgens, Siebenbürgisches Archiv, 36, Naturwiss. Forschungen über Siebenbürgen, VI, Köln-Wien-Weimar, 2000. 177-193.
- Sanda V., Öllerer Kinga, Burescu P., Fitocenozele din România, Sintaxonomie, structură, dinamică și evoluție, Edit. Ars Docendi, București, 2008.
- Schneider-Binder Erika, Pajiști xeromezofile din Depresiunea Sibiului și colinele ei marginale, Șt. Com., Ști. Nat., Muz Brukenthal, Sibiu, 16, 1971, 135-172.
- Schneider-Binder Erika, Gebüsch und Hecken (*Prunion fruticosae* Tx. 1952 und *Prunion spinosae* Soó (1930 n.n. 1940) im Hügellgebiet und die Zibinsenke in Siebenbürgen, St. Com.Ști. Nat., Muz. Brukenthal, Sibiu, 17, 1972, 183-207.