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UNPROTECTED GRASSLAND AREAS FROM DOBROGEA, OF HIGH BOTANICAL VALUE

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Abstract: This study presents high botanical value dry grasslands (vegetation type and richness of rare plants) in Dobrogea, Romania. Two sites (Coroana and Vânători) in the south-east of Dobrogea, which have been identified, evaluated and proposed for inclusion in the European network of IPAs (Important Plant Areas), hold hill limestone steppe grasslands (Habitats Directive – 62CO) and 35 taxa rare in the Romanian Flora. The 'tie breaking' of the diagnostic grass species at the alliance level (*Festuca valesiaca* and *Festuca callieri*) relied on the use of structural analyses of the leaf.

Keywords: dry grasslands, rare plants, conservation hotspots, grass-leaf structure

Introduction

This study impacts upon the requirements of Objective 1 (understanding and documenting plant diversity) of the European Strategy for Plant Diversity Conservation (2008–2014) [5]. It presents high botanical value dry grassland vegetation, significant for the conservation of the diversity of the bio-geographical Steppe zone in Romania and the assistance of migration of species in terms of climate change.

Dry grasslands have a limited extent today in Dobrogea and are split up by zones with an agricultural use. Well-preserved representative samples can only be found on small, isolated land surfaces, mostly inside protected areas.

During 2000–2003, in c.70% of Dobrogea, the grassland vegetation was classified and an inventory made at the alliance level, using a standardized methodology, based on the criterion of vegetation/polygon homogeneity [1]. The GIS database developed allowed the geo-botanical characterization of grassland habitats and the construction of digital maps [6].

Starting from 2007, this work was continued, within the framework of the national project "Inventory of Romanian semi-natural grasslands with high biodiversity, in order to scientific support their management and conservation". A part of this work has taken place in continental Dobrogea, where two samples of hill limestone steppe grasslands with a concentration of significant rare species were identified and assessed.

Material and Methods

Research was carried out in 2008, in Dobrogea, and directed at two sites: Coroana (N 43° 45'947" / E 028° 24'618", 85 m altitude, 215 ha area) and Vânători (N 43° 53'112" / E 028° 32'007", 190 m altitude, 80 ha area), situated in the low hill zone (70–120 m altitude) in the south-east of the province (Photo 1, Photo 2, Photo 3, Photo 4).

The identification methodology for these two potential dry grassland zones relied on the processing of satellite images, the utilization of Corine Land Cover images and topographical maps.

For every site/polygon an evaluation was made of taxa abundance (3-step ladder; 5–7 transects of N-S/polygon evaluation), of the sociological category [3, 4] and of vegetation type respectively, at an alliance level [2].

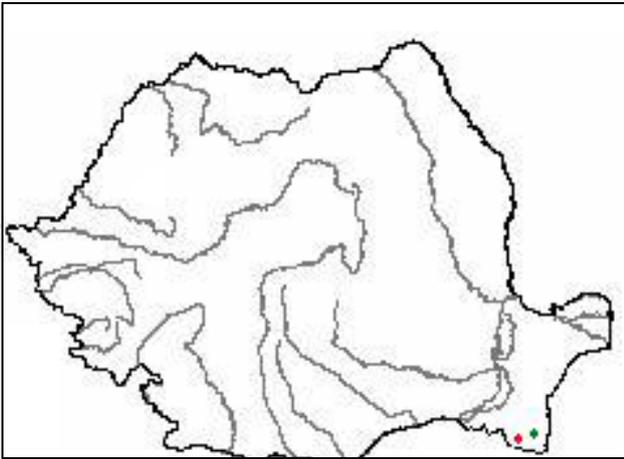


Photo 1: Location of Coroana (●) and Vânători (●) sites in the map of Romania



Photo 3: *Thymus zygioides* (Vânători site, 2008)



Photo 2: Coroana site, general view (June 2008)



Photo 4: Coroana site (June 2008)

For two diagnostic species, *Festuca valesiaca* Schleicher ex Gaudin and *Festuca callieri* (Hackel ex St. Yves) Markgraf, which are very difficult to distinguish morphologically, 'tie breaking' structural analyses were carried out, in line with the existing criteria for the anatomy of the leaf [7]. These were performed on transverse sections of the conduplicate leaf, processed by means of double stain technique (iodine green and carmine alaunate) and analyzed by optical microscopy.

Results

The two areas evaluated are situated outside the agricultural zones, hardly accessible (steep slopes and high plateau) and with considerable land areas, and they do not benefit from a special management, the anthropogenic impact being reduced.

The Coroana site holds 116 taxa, 34 of which are rare plants, and the Vânători site, 82 taxa, 15 of which are rare (Table 1). Of the total of rare taxa, 50% occur only in Dobrogea, and 30% are only in 3–10 localities.

Table 1: Coroana and Vânători sites: species composition, abundance, zoological category and spread in Romania

Species composition	Abundance/polygon (3 steps scale)		Zoological category	
	Coroana site	Vanatori site	Romanian Red List (Oltean, 1994)	Number of localities in Romania
<i>Achillea clypeolata</i> Sibth. & Sm.	1	-	R	10 (Dobrogea)
<i>Achillea setacea</i> Waldst. & Kit.	1	1		
<i>Adonis flammea</i> Jacq.	1	1		
<i>Adonis vernalis</i> L.	1	1		
<i>Aegilops cylindrica</i> Host	-	1		
<i>Agropyron cristatum</i> (L.) Gaertner subsp. <i>pectinatum</i> (M.Bieb.) Tzvelev	-	1		
<i>Ajuga chamaeptytis</i> (L.) Schreber	1	1		
<i>Ajuga laxmannii</i> (L.) Benth	1	1		
<i>Allium rotundum</i> L.	1	-		
<i>Althaea hirsuta</i> L.	1	1		
<i>Alyssum alyssoides</i> (L.) L.	1	1		
<i>Alyssum hirsutum</i> M.Bieb.	1	1		
<i>Anchusa azurea</i> Miller	1	1		
<i>Artemisia austriaca</i> Jacq.	-	1		
<i>Asparagus verticillatus</i> L.	1	1		
<i>Asperula arvensis</i> L.	2	1		
<i>Aster oleifolius</i> (Lam.) Wagenitz	1	1		
<i>Astragalus hamosus</i> L.	1	1		
<i>Astragalus onobrychis</i> L.	1	1		
<i>Astragalus spruneri</i> Boiss.	1	-	R	6 (Dobrogea)
<i>Asyneuma anthericoides</i> (Lam.) Bornm.	-	1	R	5 (Dobrogea)
<i>Bombycilaena erecta</i> (L.) Smolj.	1	1		
<i>Bromus commutatus</i> Schrader	1	-		
<i>Bromus hordeaceus</i> L.	-	1		
<i>Bromus tectorum</i> L.	-	1		
<i>Campanula sibirica</i> L.	1	-		
<i>Centaurea salnitana</i> Vis.	1	-		
<i>Centaurea solstitialis</i> L.	-	1		
<i>Chamaecytisus jankae</i> (Velen.) Rothm.	2	2	R	7 (Dobrogea, Tohani)

<i>Chondrilla juncea</i> L.	1	-		
<i>Chrysopogon gryllus</i> (L.) Trin.	2	-		
<i>Convolvulus arvensis</i> L.	-	1		
<i>Convolvulus cantabrica</i> L.	2	1		
<i>Coronilla scorpioides</i> (L.) Koch	1	-	R	15 (Dobrogea)
<i>Coronilla varia</i> L.	1	1		
<i>Crepis foetida</i> L. subsp. <i>rheadifolia</i> (M.Bieb.) Čelak.	1	-		
<i>Crepis pulchra</i> L.	1	-		
<i>Crepis sancta</i> (L.) Bornm	1	1		
<i>Crupina vulgaris</i> Cass.	1	-		
<i>Cynodon dactylon</i> (L.) Pers.	-	1		
<i>Dactylis glomerata</i> L.	1	-		
<i>Dianthus giganteus</i> D'Urv.	1	-		
<i>Dianthus membranaceus</i> Borbás	1	-		
<i>Dichanthium ischaemum</i> (L.) Roberty	2	2		
<i>Echinops ritro</i> L. subsp. <i>ruthenicus</i> (M.Bieb.) Nyman	1	-	R	~35
<i>Elymus hispidus</i> (Opiz) Melderis	1	-	R	~50
<i>Elymys repens</i> (L.) Gould	-	1		
<i>Erodium cicutarium</i> (L.) L' Hérit	-	1		
<i>Erodium hoefftianum</i> C.A.Meyer	1	1	R	~15
<i>Erysimum diffusum</i> Ehrh.	-	1		
<i>Euphorbia dobrogensis</i> Prod.	1	1	b, R	20 (Dobrogea)
<i>Euphorbia glareosa</i> Pallas ex M.Bieb.	1	1		
<i>Ferulago confusa</i> Velen.	1	-	V/R	16 (Dobrogea)
<i>Festuca callieri</i> (Hackel ex St. Yves) Markgraf	2	2	R	14 (Dobrogea)
<i>Filipendula vulgaris</i> Moench	-	1		
<i>Galium octonarium</i> (Klokov) Poped.	1	1		
<i>Galium verticillatum</i> Danth.	1	1	R	8 (Dobrogea)
<i>Galium verum</i> L.	1	-		
<i>Genista sessilifolia</i> DC	1	-	R	5 (Dobrogea)
<i>Gypsophila pallasii</i> Ikonn.	-	1		
<i>Haplophyllum suaveolens</i> (DC.) G.Don fil.	1	-		
<i>Helianthemum salicifolium</i> (L.) Miller	2	2	R	7 (Dobrogea)
<i>Herniaria incana</i> Lam.	1	-	R	~38
<i>Hieracium echioides</i> Lumn.	1	1		
<i>Hordeum murinum</i> L.	-	1		
<i>Hypericum elegans</i> Stephan	1	-		
<i>Hypericum perforatum</i> L.	1	-		
<i>Inula britannica</i> L.	1	-		
<i>Inula hirta</i> L.	1	-		
<i>Inula oculus-christi</i> L.	1	1		
<i>Iris pumila</i> L.	1	-		
<i>Jasminum fruticans</i> L.	1	-	R	17 (Dobrogea)
<i>Jurinea arachnoidea</i> Bunge	1	-		
<i>Koeleria lobata</i> (M.Bieb.) Rhoemer & Schultes	1	-	R	31 (Dobrogea)
<i>Koeleria macrantha</i> (Ledeb.) Schultes	1	-		
<i>Lappula squarrosa</i> (Retz.) Dumort.	1	-		
<i>Lathyrus tuberosus</i> L.	1	-		
<i>Legousia speculum-veneris</i> (L.) Chaix	1	-	R	~29
<i>Leontodon crispus</i> Vill.	1	-		
<i>Linaria genistifolia</i> (L.) Miller	1	-		

<i>Linum austriacum</i> L.	-	1		
<i>Lolium perenne</i> L.	-	1		
<i>Marrubium peregrinum</i> L.	-	1		
<i>Medicago falcata</i> L.	2	1		
<i>Medicago minima</i> (L.) L.	1	1		
<i>Medicago rigidula</i> (L.) All.	-	1		
<i>Melica ciliata</i> L.	1	-		
<i>Nepeta parviflora</i> M. Bieb.	1	1	V/R	~18
<i>Nonea pulla</i> DC.	1	-		
<i>Onobrychis gracilis</i> Besser	1	-	R	~26
<i>Onobrychis viciifolia</i> Scop.	1	-		
<i>Ononis pusilla</i> L.	1	1	V/R	14 (Dobrogea)
<i>Onosma taurica</i> Pallas	1	-	R	7 (Dobrogea)
<i>Onosma visianii</i> G.C.Clementi	1	-		
<i>Orlaya grandiflora</i> (L.) Hoffm.	1	-		
<i>Ornithogalum orthophyllum</i> Ten. subsp. <i>kochii</i> (Parl.) Zahar.	1	-		
<i>Paeonia tenuifolia</i> L.	1	-	V/R	~22
<i>Paliurus spina-christi</i> Miller	1	1	V/R	~32
<i>Papaver rhoeas</i> L.	1	-		
<i>Plantago lanceolata</i> L.	1	1		
<i>Plumbago europaea</i> L.	1	-	R	3 (Dobrogea)
<i>Poa angustifolia</i> L.	1	1		
<i>Poa bulbosa</i> L.	-	1		
<i>Polygala major</i> Jacq.	1	-		
<i>Potentilla argentea</i> L.	-	1		
<i>Potentilla pedata</i> Willd.	1	1		
<i>Reseda lutea</i> L.	-	1		
<i>Rumex tuberosus</i> L.	1	-	R	~63
<i>Salvia aethiopsis</i> L.	1	1	E/R	~42
<i>Salvia austriaca</i> Jacq.	1	1		
<i>Salvia nemorosa</i> L.	1	1		
<i>Salvia nutans</i> L.	1	1		
<i>Salvia ringens</i> Sibth. & Sm.	1	-	R	4 (Dobrogea)
<i>Sanguisorba minor</i> Scop.	1	1		
<i>Satureja caerulea</i> Janka	1	1	R	16 (Dobrogea)
<i>Scabiosa argentea</i> L.	-	1		
<i>Scabiosa ochroleuca</i> L.	1	-		
<i>Seseli pallasii</i> Besser	-	1		
<i>Sideritis montana</i> L.	-	1		
<i>Stachys atherocalyx</i> C.Koch	1	-		
<i>Stipa capillata</i> L.	1	1		
<i>Stipa lessingiana</i> Trin. Et Rupr.	-	1		
<i>Stipa pulcherrima</i> C.Koch	1	-		
<i>Stipa tirsia</i> Steven	1	-		
<i>Tanacetum corymbosum</i> (L.) Schultz Bip.	1	1		
<i>Tanacetum millefolium</i> (L.) Tzvelev	1	1	R	~70
<i>Taraxacum serotinum</i> (Waldst. & Kit.) Tzvelev	1	1		
<i>Teucrium chamaedrys</i> L.	1	2		
<i>Teucrium polium</i> L. subsp. <i>capitatum</i> (L.) Arcangeli	1	1		
<i>Thalictrum minus</i> L.	1	-		
<i>Thymus pannonicus</i> All.	1	1		
<i>Thymus zygoides</i> Griseb.	2	2	R	~30
<i>Trigonella gladiata</i> Steven ex M. Bieb.	1	-	R	~15
<i>Trigonella monspeliaca</i> L.	1	-		

Valerianella lasiocarpa (Steven) Betcke	1	1		
Ventenata dubia (Leers) Cosson & Durieu	-	1		
Verbascum banaticum Rochel	1	1		
Veronica austriaca L.	1	-		
Vicia narbonensis L.	1	-	R	~19
Vicia peregrina L.	1	-	R	~13
Vicia tenuifolia Roth	1	-		
Vicia villosa Roth	1	-		
Viola hirta L.	-	1		
Ziziphora capitata L.	2	1	R	6 (4 in Dobrogea)

The vegetation type is represented for both the sites by hill limestone steppe grasslands, of the alliance *Pimpinello-Thymion* Dihoru 1970.

Hill limestone steppe grasslands – *Pimpinello - Thymion*

Diagnostic taxa: *Agropyron brandzae*, *Agropyron ponticum*, *Koeleria lobata*, *Festuca callieri*, *Thymus zygioides*, *Pimpinella tragium* subsp. *lithophila*, *Euphorbia nicaeensis* s.l., *Dianthus nardiformis*, *Artemisia pedemontana* (*A. caucasica* auct. roman.), *Goniolimon besserianum*, *Allium saxatile*, *Scorzonera mollis*, *Potentilla bornmuelleri*, *Satureja caerulea*, *Teucrium polium* subsp. *capitatum*.

Ecology: located on the top and the upper storey part of the slope (average 30–45°) of the hills of Dobrogea (70–120 m altitude), on limestone rocks, moderately and light soil, in a dry, warm and very warm climate

Syncorology: spread sporadically in Dobrogea.

Syntaxonomy: order *Festucetalia valesiaca* Br.-Bl. 1949,
class *Festuco-Brometea* Br.-Bl. et R. Tx. ex Br.-Bl. 1949.

Natura 2000: 62CO – Ponto-Sarmatic steppe

Management: 20% grazing, 80% no management

Structural analyses carried out on the conduplicate leaf, of all *Festuca* samples gathered from both sites, Coroana and Vânători, confirmed that the species present is *Festuca callieri* (Photo 5).

In transverse section, the leaf of *Festuca callieri* is ovate or almost circular with convex sides and presents a continuous ring of sclerenchyma, situated beneath the lower epidermis (Photo 6, Photo 8). The leaf of *Festuca valesiaca* in transverse section is elongate, presenting a concave form to the sides, and the sclerenchyma from beneath the lower epidermis is divided into 3 distinct fascicles, one median and two marginal (Photo 7).

An additional criterion with which to separate the two species was identified during these investigations. It refers to the sclerenchyma cells of the ring surrounding the conducting fascicles of the leaf: they are thickened in a horseshoe shape in *Festuca callieri* (like the endodermis cells of *Iris*) and uniformly thickened in *Festuca valesiaca*.

Discussion

Both sites (Coroana and Vânători) support a type of vegetation (hill limestone steppe grasslands) that is significant for the bio-geographical Steppe zone in Romania. Nowadays, we can find it sporadically in Dobrogea and it is listed in the Habitats Directive (62CO).

Identifying with accuracy the presence of the species *Festuca callieri* in the two sites evaluated as a diagnostic species for the alliance *Pimpinello-Thymion* eliminates any confusion with the alliance *Festucion valesiaca*, which is characteristic of hill and plateau xeric grasslands.



Photo 5: *Festuca callieri* in situ (Coroana site)

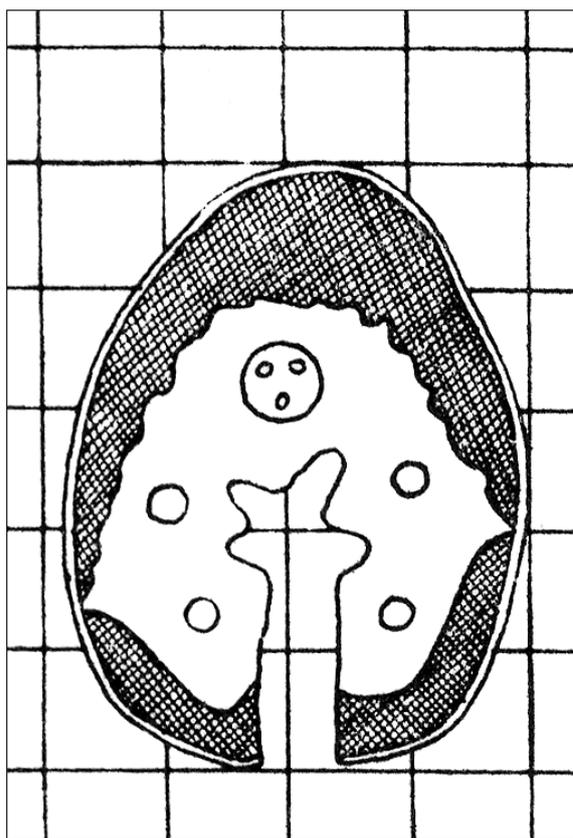


Photo 6: *Festuca callieri* life cross-section, sclerenchyma tissue in grey (reference from Romanian Flora, vol. 12)

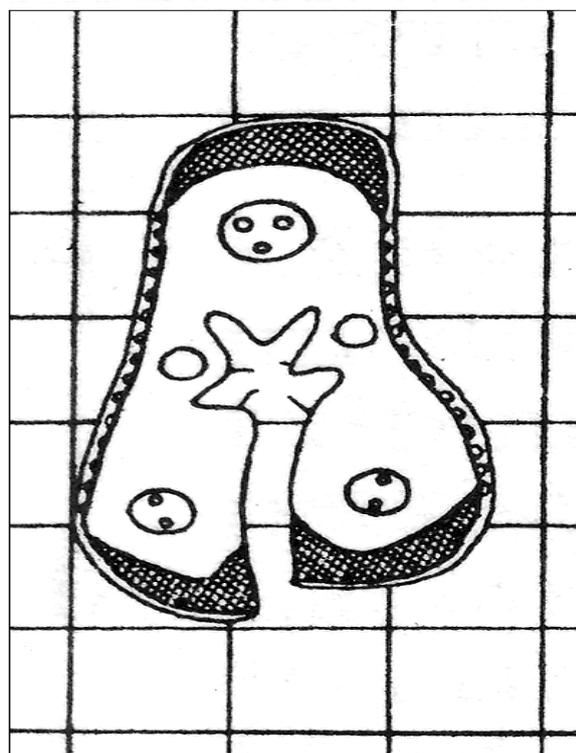


Photo 7: *Festuca valesiaca*, life cross-section, sclerenchyma tissue in grey (reference from Romanian Flora, vol. 12)



Photo 8: *Festuca callieri* (Coroana site), life cross-section, original

The great concentration of rare plants inside the two areas (Coroana – 34 rare taxa, Vânători – 15 rare taxa) and the diversity of their chorological spectrum (Balkan, Ponto-Balkan, Ponto-

Mediterranean, Mediterranean, Sub-Mediterranean, Alpine-Carpathian-Balkan, Euro-Asian, Ponto-Caucasian elements, etc.) raise their botanical and the conservative value.

The sites identified represent new locations for 35 rare plants, many of which have a very restricted distribution (Table 1).

One can particularly notice *Astragalus spruneri*, *Asyneuma anthericoides*, *Genista sessilifolia*, *Onosma taurica*, *Plumbago europaea* and *Salvia ringens*, which are species to be found in only a few protected areas in Dobrogea.

Coroana and Vânători are also significant conservation areas for *Chamaecytisus jankae*, *Festuca callieri*, *Helianthemum salicifolium*, *Thymus zygoides* and *Ziziphora capitata*, species which display significant populations within the analyzed sites (abundance 2).

Conclusions

This study demonstrates, with documentary and scientific evidence, the high botanical value of two unprotected areas situated in the south-east of Dobrogea: Coroana and Vânători. They are new sites for hill limestone steppe grasslands (alliance *Pimpinello-Thymion*) and for 35 rare plants of the Romanian Flora, of which five represent significant populations. Hardly accessible, large enough and significant for conservation, Coroana and Vânători were proposed in 2009 as candidate sites for the European network of IPAs (Important Plant Areas). This study also shows the importance and usefulness of anatomical research for ‘tie breaking’ some diagnostic species, which are difficult to identify with just standard morphological criteria.

REFERENCES

1. Coldea, Gh., Negrean, G., Sârbu, I., Sârbu, A., 2001, *Guide book for identification and inventory of semi-natural grasslands from Romania*, Ed. alo, București, Bucharest.
2. Gafta, D., Mountford, I.O., 2008, *The manual for evaluation of Natura 2000 habitats in Romania*, Publication UE nr. Europe Aid/121260/D/SV/RO.
3. Oltean, M., Negrean, G., Popescu, A., Roman, N., Dihoru, G., Sanda, V., Mihăilescu S., 1994, The Red List of vascular plants from Romania. In: Oltean M (coord.), *Studies, sintesis and ecological documentation* Nr. 1, pp:1-52. Academia Română, România.
4. Oprea, A., 2005, *Critical List of vascular plants from Romania*, Ed. Univ. A. I. Cuza, Iași.
5. Planta Europa, 2008, *A Sustainable Future for Europe: the European Strategy for Plant Conservation 2008 – 2014*, Ed. Plantlife International (Salisbury, UK) and the Council of Europe (Strasbourg, France).
6. Sârbu, A., Coldea, Gh., Negrean, G., Cristea, V., Hanganu, J., 2004, *Grasslands of Romania*, Ed. University of Bucharest, Bucharest.
7. Săvulescu, T., (ed), 1952-1976, *Flora României* vol. 12, Ed. Academiei Române, București.

PAJIȘTI DIN DOBROGEA, CU VALOARE BOTANICĂ RIDICATĂ ȘI NEPROTEJATE

(Rezumat)

Prezenta lucrare se adresează pajiștilor pietroase dobrogene din alianța *Pimpinello – Thymion*, Dihoru 1970. Două situri, Corona și Vânători, situate în partea de sud-est a Dobrogei, adăpostesc pajiști pietroase dobrogene cu valoare botanică ridicată (tip de vegetație și bogăția de plante rare), nominalizate pentru protecție și conservare în Directiva Habitate (62CO).

Acest studiu este conform cerințelor Strategiei Europene pentru Conservarea Diversității Plantelor și răspunde obiectivului 1, care se referă la necesitatea cunoașterii și documentării științifice a diversității vegetale, la toate cele 3 nivele de abordare.

Cele două zone dobrogene analizate (Corona și Vânători) nu beneficiază de un management special și nici de protecție la nivel național. Ele sunt importante atât prin tipul de vegetație cât și prin cei 35 de taxoni rari din Flora României, pe care îi adăpostesc, dintre care 5 dezvoltă populații semnificative (*Chamaecytisus jankae*, *Festuca callieri*, *Helianthemum salicifolium*, *Thymus zygioides* și *Ziziphora capitata*).

În contextul acestei lucrări, prin utilizarea analizelor structurale s-a eliminat orice confuzie între speciile *Festuca valesiaca* și *Festuca callieri*. Ultima, specie de diagnostic pentru alianța *Pimpinello-Thymion* a fost identificată cu acuratețe atât prin pajiștile de la Corona, cât și de la Vânători.

Greu accesibile, cu suprafață seminificativă și reprezentativă pentru conservare, Corona și Vânători au fost propuse în anul 2009 ca situri candidate pentru Rețeaua Europeană de Arie Importante pentru Protecția și Conservarea diversității plantelor.

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