

PROPOSAL FOR ESTABLISHING THE *FRITILLARIA ORIENTALIS* BOTANICAL RESERVE IN BERCHIEȘU, FRATA COMMUNE, CLUJ COUNTY

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Abstract: *Fritillaria orientalis* Adams is an endangered central Balkan and Illyrian species with a sporadic presence in Romania, that has been declared a "Natural Monument". A new protected area of 22.18 ha located southwards to the village Berchieșu (Frata commune) is proposed for conserving the most important and abundant population of *F. orientalis* in Cluj county, the assessment based on available literature and personal observations in the field. For this reason, the area has special botanical value and needs to be legally protected in order to preserve this isolated population. This paper presents floristic data and vegetation characteristics along with relevant illustration of the proposed protected area. In order to easily distinguish *F. orientalis* from *F. meleagris* L., reported as well in the Cluj county, morphological, biometric and ecological differentiation characters are presented. Individual plants of *F. orientalis* from Berchieșu are characterized by a pronounced diversity regarding the height of flower stems and colour of perianth. Collection of flowers or whole plants, extension of cultivated land, improvised fireplaces near the forest edge, logging, fertilization of agricultural fields and motorized access threatens this population. Therefore, we propose a set of measures to assure its sustainable conservation and monitoring of the phytocoenoses to assess the effectiveness of protective actions.

Key words: botanical reserve, conservation, Cluj county, *Fritillaria orientalis*, protected area.

Introduction

The genus *Fritillaria* L. (Liliaceae) includes between 100 and 160 species (depending on the author), distributed in the temperate zone of Europe, Asia and North America. Three species have been identified in the spontaneous flora of Romania, namely: *F. meleagris* L., *F. orientalis* Adams (syn. *F. montana* Hoppe; *F. tenella* M. Bieb) and *F. meleagroides* Patrin ex Schult. & Schult. fil. [5, 18, 29]. Since *Fritillaria* populations are endangered in Romania due to collection of flowers or whole plants during the blooming period and the impact caused by human activities on their habitats, both *F. meleagris* and *F. orientalis* have been declared "Natural Monument" species [29]. Consequently, the two species benefit from a protection regime, prohibiting the collection of plant individuals or flowers. Their status as protected plants was strengthened by their inclusion in the Red List of higher plants in Romania, as Vulnerable/Rare species [5, 17], *F. orientalis* also being included in the European List of threatened species [24].

F. orientalis is a mesophilic perennial bulbous (geophyte) plant with a height of 20-40 (80) cm. It has 5-8 (12) leaves, the lower ones alternate, (40) 70-140 mm long and 2-12 mm

wide, with acute tips, sometimes mucronate, rarely linearly acuminate, filiform, with an apex 3-5 mm long, straight or spiral, like a tendril. The floral leaves (bracts) are usually longer than the flowers, sometimes equal or shorter, nearly opposite or whorled. The flowers are nodding, 18-35 mm long, generally solitary or 2 (6). The perianth has a variable shape, conical at first, then campanulate, more or less open when mature. The perianth segments are oblong or narrowly elliptical, variable in colour from dark purple-brown to yellowish-cream and more or less spotted. The nectariferous foveola is elongate, ovate and weakly prominent [29].

The species is considered a western and Illyrian Pontic, even Mediterranean element [5, 28, 29]. Its area of distribution includes the southern and south-eastern part of the European continent (Albania, Bulgaria, Greece, Italy, former Yugoslavia, Romania and Western Russia) reaching as far as south-eastern France [26]. In Romania the species has been reported from the following 73 sites listed by counties (county abbreviation in brackets): Blaj, Cheile Vălişoarei, Ciuguzel, Colţeşti/Bedelevu Mt., Sebeş, Tiur, Trascău Mts., Ardaşcheia peak (AB), Arad, Şiria, Mocrea (Arad), Braşov/Tâmpa Hill (BV), Buzău/Spătaru forest (BZ), Apahida, Cheia, Cheile Copandului, Cheile Turzii, Copăceni, Fânaţele Clujului and Valea Caldă, Geaca, Iclod/Iclozel, Lacu, Sucutard, Hăşdate Valley (CJ), Băile Herculane, Bozovici, Brădişor, Ciclova, Oraviţa, Sasca Română/Beuşniţa Valley, Beuşniţa Valley, Vârciorova (CS), Craiova/Mofleni, Craiova/Jiu floodplain, Murta/Glavacioc forest (DJ), Ghidigeni, Drăgăneşti/Tecuci (GL), Mermezeu-Văleni (HD), Remetea (HG), Brăneşti, Bucureşti/Pasărea and Cernica (IF), Nanov forest, Slobozia/Moş Toma forest (IL), Bârnova, Breazu, Cârlig, Coada Stâncii, Copou, Cristeşti, Repedea Hill, Iaşi/Galata, Mârzeşti, Miroslava, Şorogari, Stânca (IS), Domogled Mt., Plavişevişa, Danube Valley at Cazane (MH), Band, Grebeniş forest/Grebenişu de Câmpie, Sighişoara, Zau de Câmpie (MS), Romula forest (OT), Mediaş, Roşia, Sibiu/Guşteriţa, Slimnic (SB), Babadag, Ciucurova (TL), Bârlad, Vaslui/Paiu forest (VS) [21, 29, Coldea, unpublished data, Ciobanu, unpublished data]. The plant is found sporadically from the sessile oak up to the beech vegetation belt, in forests (*Quercus*, *Acer*, *Ulmus*, *Fraxinus* etc.) and at their edges, as well as in areas with thickets and meadows [5, 8, 29]. The presence of *F. orientalis* was mentioned in the floristic composition of some forest associations of the order *Quercetalia pubescentis* Br.-Bl. (1931) and the alliance *Lathyro hallersteinii-Carpinion* Boşcaiu 1979 [4].

In Cluj county the presence of *F. orientalis* was reported from 12 sites (see above) [20, 21, 29, Coldea, unpublished data], but most of these records are very old and therefore further investigation is needed to reveal the actual distribution of the species. *F. orientalis* populations in Cheile Turzii and Cheile Turenilor are legally protected in these natural areas [30-32, 34], whereas for some locations (e.g. Fânaţele Clujului, Cheia, Sucutard and Lacu) there is no recent information to confirm the presence of this species.

The occurrence of a fritillary second species (*F. meleagris*) in Cluj county (Fig. 3 B) was reported more recently in the upper part of the Şardu Valley [9], currently under a protection regime [32, 34, 36]. This species bears a striking resemblance to *F. orientalis*; therefore, this study will delve deeper into these potentially confusing situations.

In this paper we aim to present information about a newly discovered population of *F. orientalis* in Cluj county, near the village of Berchieşu, belonging to the Frata commune (Fig 1), considered to be the most important and abundant in the Cluj county, on the basis of available literature and personal observations in the field. We also provide morphological, biometric and ecological differentiation characters from *F. meleagris*, floristic data and vegetation

characteristics. Finally, we propose the creation of a botanical reserve to legally preserve this isolated population, along with a set of protective measures.

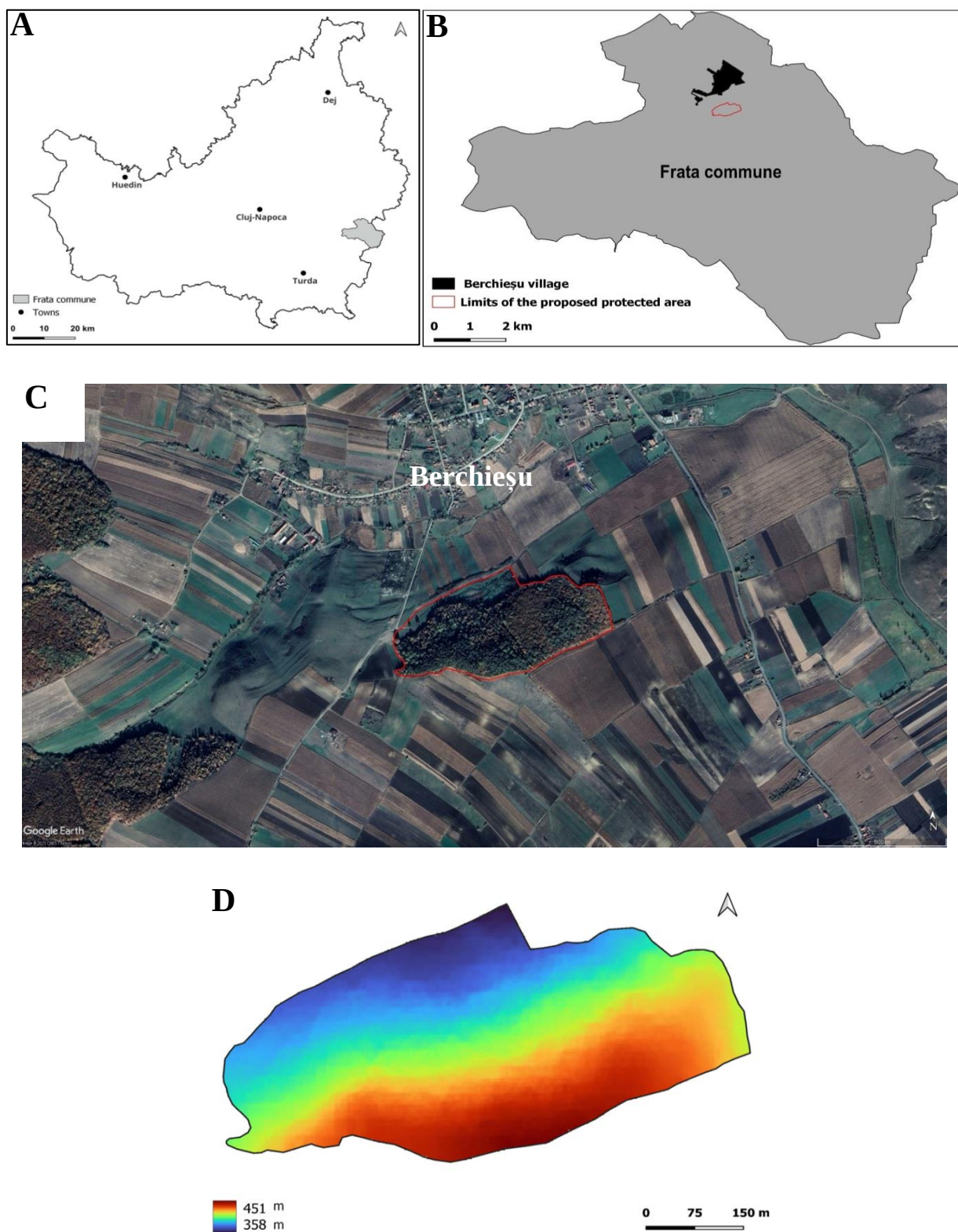


Fig. 1: A-Location of Frata commune within Cluj county; B-Detailed location of the proposed protected area; C-Aerial image; D-Digital elevation model of the the proposed protected area

Material and Methods

The area where *F. orientalis* was found occupies 22.18 ha and is situated at an altitude between 358 and 451 m a.s.l., southwards to the village Berchieşu, Frata commune, at the eastern border of the Cluj county - Lat.: 46.720192° Long.: 24.03875° (Figs. 2 and 3). It is situated in the Sârmaşului Plain, a subunit of the Transylvanian Plain, rich in sedimentary deposits (marls, clays and sandstones) [16, 19]. This subunit includes the largest part of the hydrographic basin of the Luduşului Valley (Pârâul de Câmpie), with hills reaching 450 - 500 m a.s.l., gentle slopes and rounded ridges and relatively wide, swampy valleys [19]. The local landscape is typical for the Transylvanian Plain, relatively monotonous, with alternating hills, valleys, settlements and agricultural fields. The climate is characterized by annual average temperature around 9°C and annual average precipitation about 500-600 mm [19]. The dominant soils are brown-clay loam luvisols, classified as faeozioms [10].

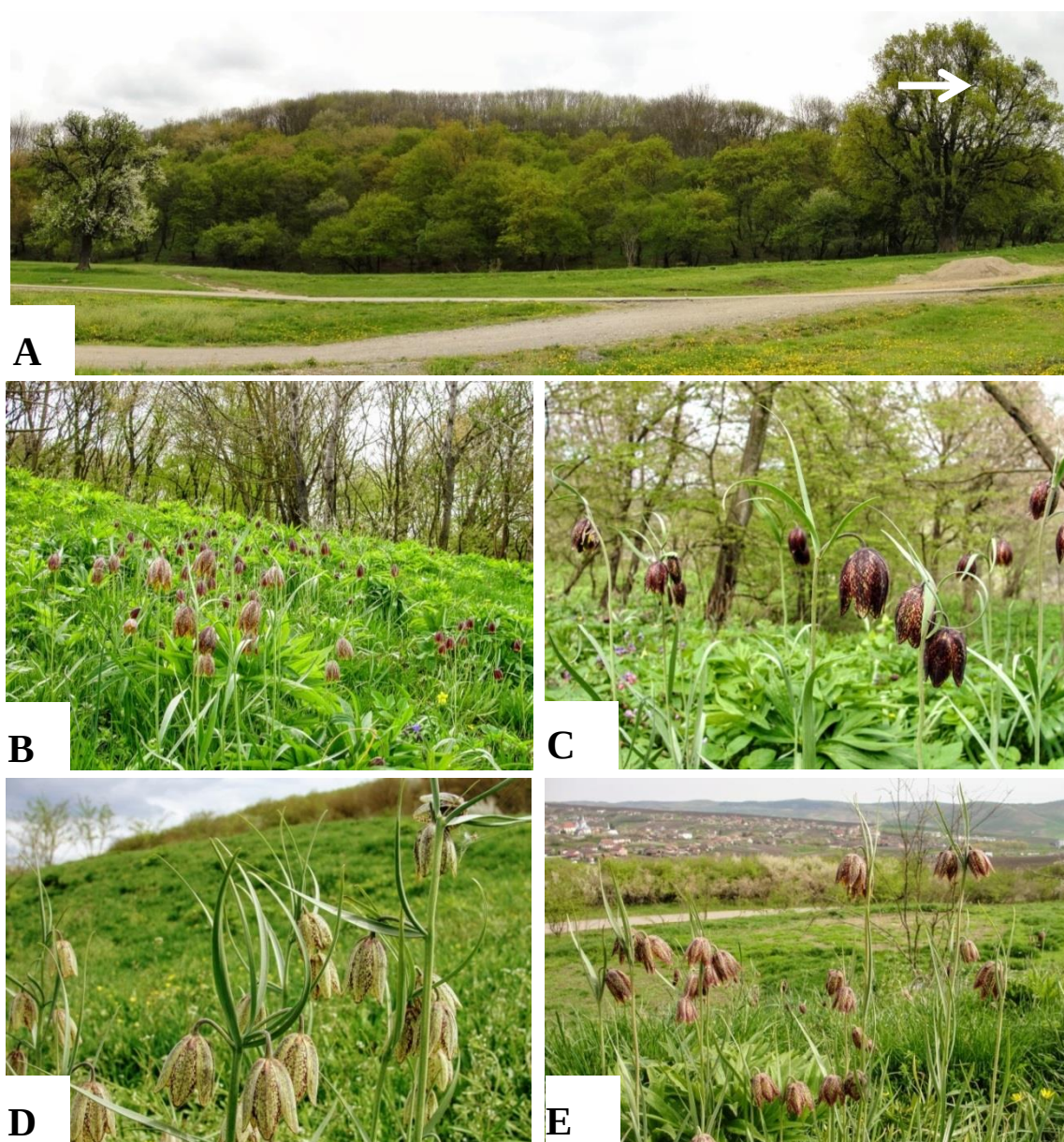


Fig. 2: A-Perspective of the forest and pasture; the arrow indicates a remarkable oak, about 400 year old; B, D and E-Pasture; C-Forest (note the remarkable variation in perianth color) (Photographs: Marcel Ciobanu)



Fig. 3: A-*Fritillaria orientalis* from Berchieșu; B-*Fritillaria meleagris* from Șardu.
Note the habitat discrepancy (Photographs: Marcel Ciobanu)

Two field surveys were conducted to investigate this population: the first on April 20, 2023, when the plant was reaching its optimal anthesis phase, and the second on May 25, 2023, to conduct phytocoenotic surveys. A handheld GPS device was used to record coordinates of plant individuals. Maps were generated with QGIS v.3.22 programme [11, 12, 23]. The phytocoenological survey method [3] was used for floristic and vegetation investigation in both the forest (400 m²) and the pasture (25 m²) where the species was found. Along with this information, geomorphological parameters such as altitude, slope and orientation were also recorded. A systematic survey was used for assessing the spatial distribution of plant individuals, by covering the entire surface where they grow. A grid of 25 × 25 m (625 m²) was then created using QGIS, superimposed over the area surveyed. The presence/absence as well as the number of *F. orientalis* individuals occurring in each grid was recorded. The field data were geo-referenced and then integrated into the GIS environment to achieve the spatial distribution of individual density. Morphometrics of flowering stems and perianth were also obtained randomly for 100 specimens distributed in the pasture, forest and ecotonal zone.

Results and Discussion

The *F. orientalis* individuals at Berchieșu grow in an uneven-aged deciduous forest (Forva forest) located on a hillside with a general NNW orientation and slope of 0 - 46°, and a pasture (apparently abandoned) at the hill's base (Fig. 2 A, E, Fig. 6 and Fig. 7 B, C). Thickets consisting mostly of hawthorn (*Crataegus monogyna* Jacq.) occur towards the NNE extremity of the pasture. The forest is mainly composed of hornbeam (*Carpinus betulus* L.), sessile oak

(*Quercus petraea* Liebl.), ash (*Fraxinus excelsior* L.) and wild cherry (*Cerasus avium* (L.) Moench), hazel (*Corylus avellana* L.), elder (*Sambucus nigra* L.), maple (*Acer campestre* L.) etc. There is a remarkable pedunculate oak (*Quercus robur* L.) around 400 years old [22] at the south-western margin of the pasture, at an altitude of 394 m, near the forest edge - Lat.: 46.719719° Long.: 24.033375° (Fig. 2 A).

In order to accurately identify/discriminate *F. orientalis* and *F. meleagris*, both occurring in Cluj county, the following differential characters were summarized in Table 1 and shown in Figs. 4 and 5.

The description of the two predominant vegetation assemblages accommodating *F. orientalis* in Berchieşu is as follows.

(i) Forest primary vegetation - *Waldsteinio geoidis-Carpinetum* (Jakucs et Jurkó 1967) Soó 1971 [25] (Fig. 6 and Table 2). Here, *Fritillaria orientalis* grows in the hilly, meso-thermophilic Forva forest, with a diversified floristic composition in relation to some orographic factors, such as hillside aspect and slope (Fig. 7 B and C). Two tree layers and one herbaceous are well individualized in the vertical structure of this forest. *Quercus petraea*, *Carpinus betulus* and *Fraxinus excelsior* are present in the higher (18-22 m) layer, sometimes dominating the community. *Acer campestre*, *Prunus avium*, *Acer tataricum*, *A. platanoides* and *Ulmus glabra* occur in the second, lower (7-12 m) layer. Tree canopy cover ranges between 0.7 and 0.9 and tree diameters between 25 and 40 cm. The predominance of trees with smaller diameters indicates the fact that older trees have been cut down in the last three decades. The shrub layer is sparsely present here-and-there and consists of *Crataegus monogyna*, *Cornus mas*, *Corylus avellana* and young specimens of *Acer campestre* and *Ulmus glabra*. The herbaceous layer is well-developed and has an average cover of 25%, even up to 60-75% where the tree canopy is less developed and forest floor receives more light. The synusial layer is built-up by both meso-thermophilic species such as *Stellaria holostea*, *Viola mirabilis*, *Dactylis polygama*, *Campanula rapunculoides*, *Corydalis solida*, *Carex pilosa*, *Galium schultesii* and *Primula veris*, characteristic for the alliance *Carpinion betuli*, as well as nemoral, mesophilic species, typical for the order *Fagetalia* [1, 14, 27]. The western Euxinic species *Waldsteinia geoides* (Stojanov, 1970) also has high presence in these sessile oak-hornbeam coenoses. This species was identified as well in sessile oak-hornbeam forests of southern Slovakia and north-eastern Hungary. The phytogeographical specificity of this taxon led Jakucs and Jurkó [13] to identify it in the subassociation - *waldsteinietosum*, within the association *Querco petraeae-Carpinetum*, later on raised to the rank of association *Waldsteinio geoidis-Carpinetum* Soó 1971 [24]. Since *Waldsteinia geoides* has high presence in the sessile oak and hornbeam phytocoenoses surveyed in the Forva forest from Berchieşu and because it is accompanied by central-Balkan and Illyrian thermophilic geo-elements, such as *Fritillaria orientalis* and *Helleborus purpurascens* [28], we consider it is appropriate to include them in the association *Waldsteinio geoidis-Carpinetum* and the alliance *Lathyro hallersteinii-Carpinion betuli* [7]. The distribution area of this association includes southern Slovakia, north-eastern Hungary and north-western Romania [2]. *Fritillaria orientalis* phytocoenoses have been described from several regions in Romania and have been equally assigned to thermophilic thickets of the alliance *Syringo-Carpinion orientalis* or thermophilic forests of the alliance *Quercion frainetto* [4, 7].

(ii) Grassland secondary vegetation - *Agrosteto-Festucetum sulcatae* Csűrös-Káptalan, 1971 (Fig. 6 and Table 2). The grassland at the northern part of the Forva forest, where

Fritillaria orientalis plant individuals also occur, was used for sheep grazing (now prohibited by the Frata commune administration). It represents a secondary successive stage of vegetation evolution [6], whose floristic structure is strictly conditioned by the type of agro-pastoral management and which is maintained as long as anthropic influence is exerted on it through its use, as pasture (Fig. 2 D-E and Fig. 6). The floristic structure is mainly built-up by *Agrostis tenuis* and *Festuca rupicola*. The two species cover together more than 35%, whereas individuals of *Fritillaria orientalis* participate in the structure of the grassland in a proportion of 10-15%.

Table 1 Differential characters between *Fritillaria orientalis* and *F. meleagris*

Nr. crt.	Character	Species		Reference
		<i>F. orientalis</i>	<i>F. meleagris</i>	
1	Biotope preferences	Thickets, forests, hillsides in hilly and plateau-like areas	Wet, boggy places	[29]
2	Reproductive stem height	20-40 (80) cm (see also Fig. 5)	20-30 (50) cm (see also Fig. 6 in Csergő and Frink (2003) [9])	
3	Leaves	Tip straight or spiral, acute, sometimes with mucron	Linear-lanceolate or broadly linear, flat or concave	[29]
4	Leave arrangement	Almost opposed or 3 (4), apparently whorled	All alternate, even the bracteate ones	[29]
		Some opposed or whorled	All alternate, including the bracteate ones	[5]
		Some opposed or whorled	Alternate	[26]
5	Number of leaves	5-8 (12)	3-5 (6)	[29]
		(6-)8-10(-11)	(3-)4-6(-8)	[26]
6	Flowers	Often solitary or 2 (6)	Solitary, rarely 2	[29]
7	Perianth length	3.1 (2-4) cm (see also Fig. 5)	3.28 cm (Csergő and Frink (2003) [9])	
8	Shape of nectariferous foveola	Elongated ovate	Linear	[29]
9	Location of nectariferous foveola	5 mm above base of tepals	10 mm above base of tepals	[5]
10	Stamen's filament length	8 mm	10-13 mm	[26]
11	Style length	8-10 mm	13-16 mm	
12	Phytocoenological assignement	<i>Quercetalia pubescentis-petreae</i> <i>Quercion frainetto</i> <i>Fraxino orni-Cotinetalia</i> <i>Syringo-Carpinion orientalis</i> <i>Aceri tataricum-Quercion</i> <i>Fagetalia</i> <i>Lathyro-Carpinion betuli</i>	<i>Potentillion anserinae</i> <i>Molinion</i> <i>Calthion</i> <i>Magnocaricion</i> <i>Alnion incanae</i> <i>Salicion cinerea</i> <i>Quercio (robori)-Carpinetum</i> <i>Robureto-Ulmetum</i> <i>Agrostion stoloniferae</i>	[4,7,8, 9, 18]

In addition to the characteristic species of the alliance *Cynosurion*, grouping mesophilic grasslands rich in bases and nutrients, such as *Trifolium pratense*, *Ranunculus acris*, *Trifolium repens*, *Carum carvi*, the floristic composition of the grassland includes also transgressive nemoral species, such as *Helleborus purpurascens*, *Pulmonaria mollis*, *Galanthus nivalis*. Along with these, characteristic species of ecotonal areas such as *Salvia nemorosa*, *Centaurea jacea*, *Ornithogalum umbellatum*, *Veronica hederifolia*, *Veronica chamaedrys*, *Cruciata laevipes* and *Primula veris* are present as well. Some nitrophilous species like *Capsella bursa pastoris*, *Cirsium vulgare*, *Lolium perenne*, *Elymus repens*, *Arctium nemorosum* are well represented

along with the two dominant and codominant species in terms of abundance-dominance (*sensu* Braun-Blanquet, 1964) [3], favoured by the relatively long use as pasture. The presence of agricultural areas in the immediate vicinity of the grassland provided conditions for some segetal species, such as *Vicia sepium* and *Stellaria media*.

Table 2: Floristic structure of the vegetation types in the proposed protected area

Nr. of relevé	4	5	6	7	8	2	3
Orientation	NW	NW	E	-	NW	NE	NW
Slope (degrees)	10	5	5	-	15	5	3-4
Tree height (m)	18	22	20	20	22	18	-
Canopy coverage	0.7	0.8	0.7	0.9	0.8	0.7	-
Herbaceous coverage (%)	75	40	60	25	25	25	100
Relevé's area (m ²)	400	400	400	400	400	400	25
<i>Fraxinus excelsior</i>	4.5	-	1.3	-	1.1	3.4	-
<i>Carpinus betulus</i>	-	4.5	1.3	-	1.2	2.3	-
<i>Prunus avium</i>	-	+2	-	+	1.1	-	-
<i>Acer campestre</i>	1.3	1.2	2.4	3.5	2.4	+	-
<i>Quercus petraea</i>	-	+	2.5	3.5	1.2	-	-
<i>Acer tataricum</i>	-	-	+2	+3	-	-	-
<i>Acer platanoides</i>	-	-	-	1.3	1.2	-	-
<i>Ulmus glabra</i>	2.5	+2	-	-	-	-	-
<i>Corylus avellana</i>	+	-	-	-	-	-	-
<i>Cornus mas</i>	-	-	+	-	-	-	-
<i>Crataegus monogyna</i>	+3	+	-	+	-	+	-
<i>Waldsteinia geoides</i>	2.3	+	+3	-	+2	+	-
<i>Fritillaria orientalis</i>	+2	+3	+2	-	+4	2.5	2.5
<i>Helleborus purpurascens</i>	1.4	1.3	1.3	+2	+	1.4	1.2
<i>Dactylis polygama</i>	1.5	-	+2	+	-	+	-
<i>Brachypodium sylvaticum</i>	+4	-	+	+	-	-	-
<i>Poa nemoralis</i>	1.5	1.3	-	+	+	-	-
<i>Polygonatum odoratum</i>	+	1.3	1.4	2.5	+	+	-
<i>Stellaria holostea</i>	2.5	+4	3.5	+	2.5	+	-
<i>Stachys sylvatica</i>	1.4	-	-	-	+	-	-
<i>Galium schultesii</i>	+3	-	-	-	-	+	-
<i>Primula veris</i>	-	-	-	-	+	+	+
<i>Campanula rapunculoides</i>	+	-	+	1.4	+	+	-
<i>Geranium robertianum</i>	2.5	+	1.4	-	-	+	-
<i>Silene latifolia</i> ssp. <i>alba</i>	+	+	+	+	-	-	-
<i>Lamium maculatum</i>	+	-	-	-	+4	+	-
<i>Viola mirabilis</i>	+	+	-	+	+	-	-
<i>Veronica chamaedrys</i>	+	-	-	-	-	-	+
<i>Hypericum hirsutum</i>	+	+	-	-	+	-	-
<i>Agropyron caninum</i>	+3	+	-	-	-	-	-
<i>Aconitum anthora</i>	+	-	-	-	-	-	-
<i>Viola reichenbachiana</i>	+	+	+	-	-	-	-
<i>Falopia dumetorum</i>	+	+	-	+	+	+	-
<i>Hesperis matronalis</i>	+	-	-	-	-	-	-
<i>Geum urbanum</i>	+	+	1+3	+	+	-	-
<i>Euphorbia amygdaloides</i>	+	+	-	-	+2	+	-
<i>Scrophularia nodosa</i>	+	-	-	-	+	-	-
<i>Asarum europaeum</i>	+	2.5	-	+	1.3	-	-
<i>Carex muricata</i>	+	+	-	-	+	-	-
<i>Milium effusum</i>	+	+	1.5	+	+	-	-
<i>Galium aparine</i>	+	+	+	+	+	-	-
<i>Corydalis solida</i>	-	+3	+	-	-	+	-
<i>Veronica hederifolia</i>	-	+2	-	+3	-	-	+

Table 2 continued

Nr. of relevé	4	5	6	7	8	2	3
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Tree height (m)	18	22	20	20	22	18	-
Canopy coverage	0.7	0.8	0.7	0.9	0.8	0.7	-
Herbaceous coverage (%)	75	40	60	25	25	25	100
Relevé's area (m ²)	400	400	400	400	400	400	25
<i>Pulmonaria officinalis</i>	-	+3	-	-	-	-	-
<i>Alliaria officinalis</i>	-	+	-	-	1.2	+	-
<i>Lapsana communis</i>	+	+	-	-	-	-	-
<i>Galeobdolon luteum</i>	-	+	-	-	+	-	-
<i>Anemone ranunculoides</i>	-	+	+3	+	-	1.4	-
<i>Moehringia trinervia</i>	-	+3	-	-	+	-	-
<i>Aegopodium podagraria</i>	-	+	-	-	-	-	-
<i>Carex pilosa</i>	-	+	+	-	-	-	-
<i>Melica nutans</i>	-	+	-	-	+	-	-
<i>Isopyrum thalictroides</i>	-	+	-	+	+	+	-
<i>Lilium martagon</i>	-	+	-	-	-	-	-
<i>Tanacetum corymbosum</i>	-	+	-	-	-	-	-
<i>Dentaria bulbifera</i>	-	-	+	-	-	-	-
<i>Symphytum tuberosum</i>	-	-	+	-	-	-	-
<i>Hepatica nobilis</i>	-	-	+	+	-	-	-
<i>Pulmonaria mollis</i>	-	-	+	-	+	-	+
<i>Hedera helix</i>	-	-	-	-	+	-	-
<i>Anthriscus sylvestris</i>	-	-	-	-	+	-	-
<i>Aposeris foetida</i>	-	-	-	-	-	+	-
<i>Leucojum vernum</i>	-	-	-	-	-	+	+
<i>Achillea millefolium</i>	-	-	-	-	-	-	1.5
<i>Agrostis tenuis</i>	-	-	-	-	-	-	2.5
<i>Arctium nemorosum</i>	-	-	-	-	-	-	+
<i>Capsella bursa pastoris</i>	-	-	-	-	-	-	1.5
<i>Carum carvi</i>	-	-	-	-	-	-	+
<i>Centaurea jacea</i>	-	-	-	-	-	-	+
<i>Cerastium holosteoides</i>	-	-	-	-	-	-	+
<i>Cirsium vulgare</i>	-	-	-	-	-	-	+
<i>Cruciata laevipes</i>	-	-	-	-	-	-	+
<i>Daucus carota</i>	-	-	-	-	-	-	+
<i>Festuca rupicola</i>	-	-	-	-	-	-	2.5
<i>Filipendula hexapetala</i>	-	-	-	-	-	-	+
<i>Galanthus nivalis</i>	-	-	-	-	-	-	+
<i>Luzula campestris</i>	-	-	-	-	-	-	+
<i>Ornithogalum umbellatum</i>	-	-	-	-	-	-	1.4
<i>Ranunculus acris</i>	-	-	-	-	-	-	+
<i>Ranunculus ficaria</i>	-	-	-	-	-	-	+
<i>Salvia nemorosa</i>	-	-	-	-	-	-	+
<i>Stellaria media</i>	-	-	-	-	-	-	1.5
<i>Taraxacum officinale</i>	-	-	-	-	-	-	+
<i>Trifolium pratense</i>	-	-	-	-	-	-	1.3
<i>Trifolium repens</i>	-	-	-	-	-	-	1.5
<i>Vicia sepium</i>	-	-	-	-	-	-	+

Note: Relevés nr. 4, 5, 6, 7, 8, 2 - forest, 3 - grassland

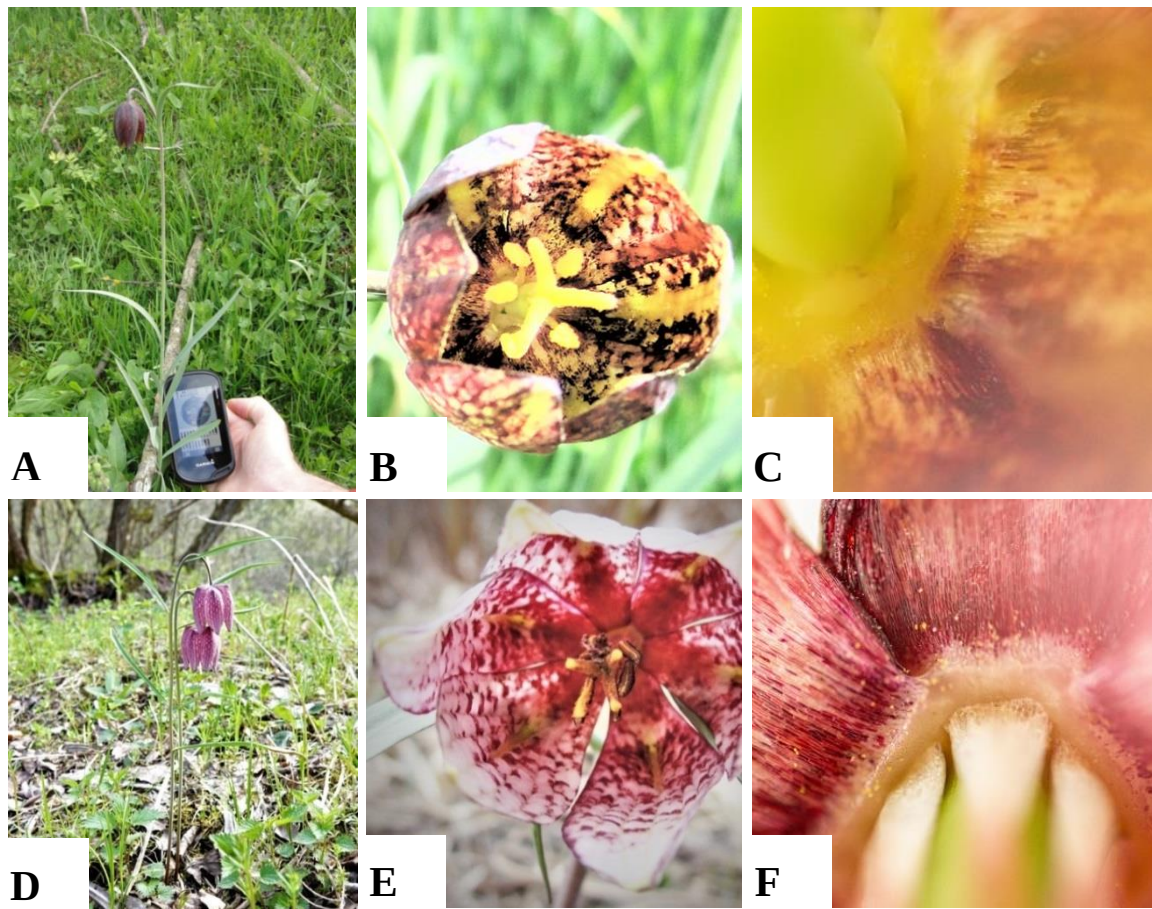


Fig. 4: Differential characters between *Fritillaria orientalis* (Berchieşu) (A-C) and *F. meleagris* (Şardu) (D-F) (Photographs: A, B, D, E-Marcel Ciobanu; C, F-Adrian Ruicănescu)

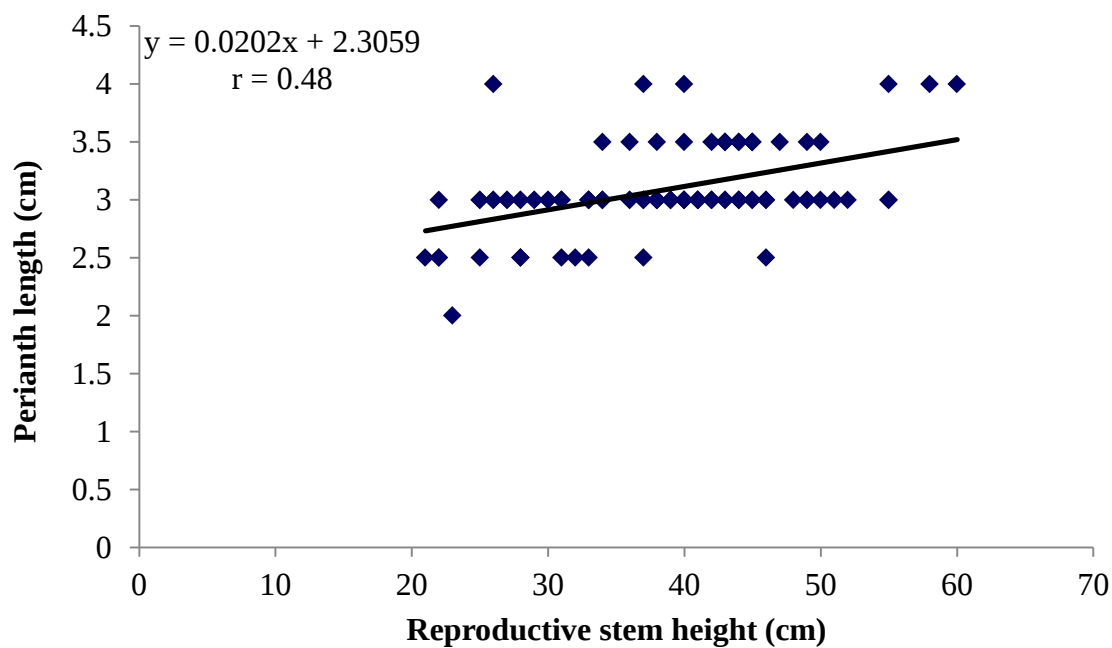


Fig. 5: Variation of the perianth length in the population of *Fritillaria orientalis* from Berchieşu, according to the reproductive stem height (n=100) (r=Pearson's coefficient; $p < 0.05$); average, standard deviation, minimum and maximum values for the two variables are 3.1 ± 0.4 (2-4), respectively 38.3 ± 8.7 (21-58)

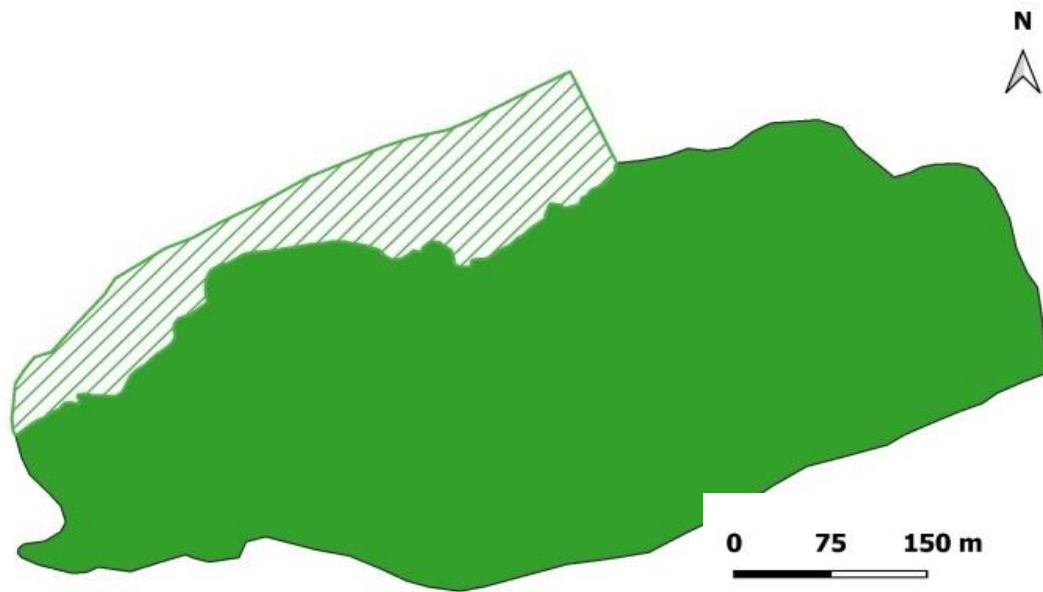


Fig. 6: Proposed protected area: land use and plant associations (green area-forest, Ass. *Waldsteinio geoidis-Carpinetum*, diagonal line area-pasture, Ass. *Agrosteto-Festucetum sulcatae*)

Conclusions

The area where *F. orientalis* grows at Berchieșu which consists of a deciduous forest and an abandoned pasture, has special botanical value because it shelters the most important and most abundant population of the species in Cluj county, a strong reason to legally preserve this isolated population. Moreover, *F. orientalis* individuals of the Forva forest occur in a mesophilous, meso-thermophilous habitat specific for the alliance *Lathyro hallersteinii-Carpinion betuli*, complementing the forest formations in which this species is present in Romania and providing additional justification at landscape-level for conserving this population. The site is surrounded by agricultural fields and bordered by a secondary road at its northern limit, and therefore there is no need to establish a buffer zone. Plant individuals are more numerous on gentle slopes and in near-flat areas (Fig. 1 D and 7 A, B) and are characterized by a pronounced morphological diversity regarding the colour of the perianth, from dark red to cream-yellow (Fig. 2 B-E). Individuals with a cream-yellow coloured perianth are mostly found in the pasture, but also in the forest-pasture ecotonal zone (Fig. 2 D-E). Collection of flowers or whole plants, extension of cultivated land, improvised fireplaces near the forest edge, logging, fertilization of agricultural land and motorized access threatens this population. Therefore, the following measures are necessary to be legally implemented to ensure its sustainable conservation: prohibition of collecting plants; preservation of current environment and habitats where plants grow by prohibiting constructions, drainage, application of fertilizers, car access, fire and waste storage of any kind; waste removal; monitoring in the future to assess how efficient the protective measures are.

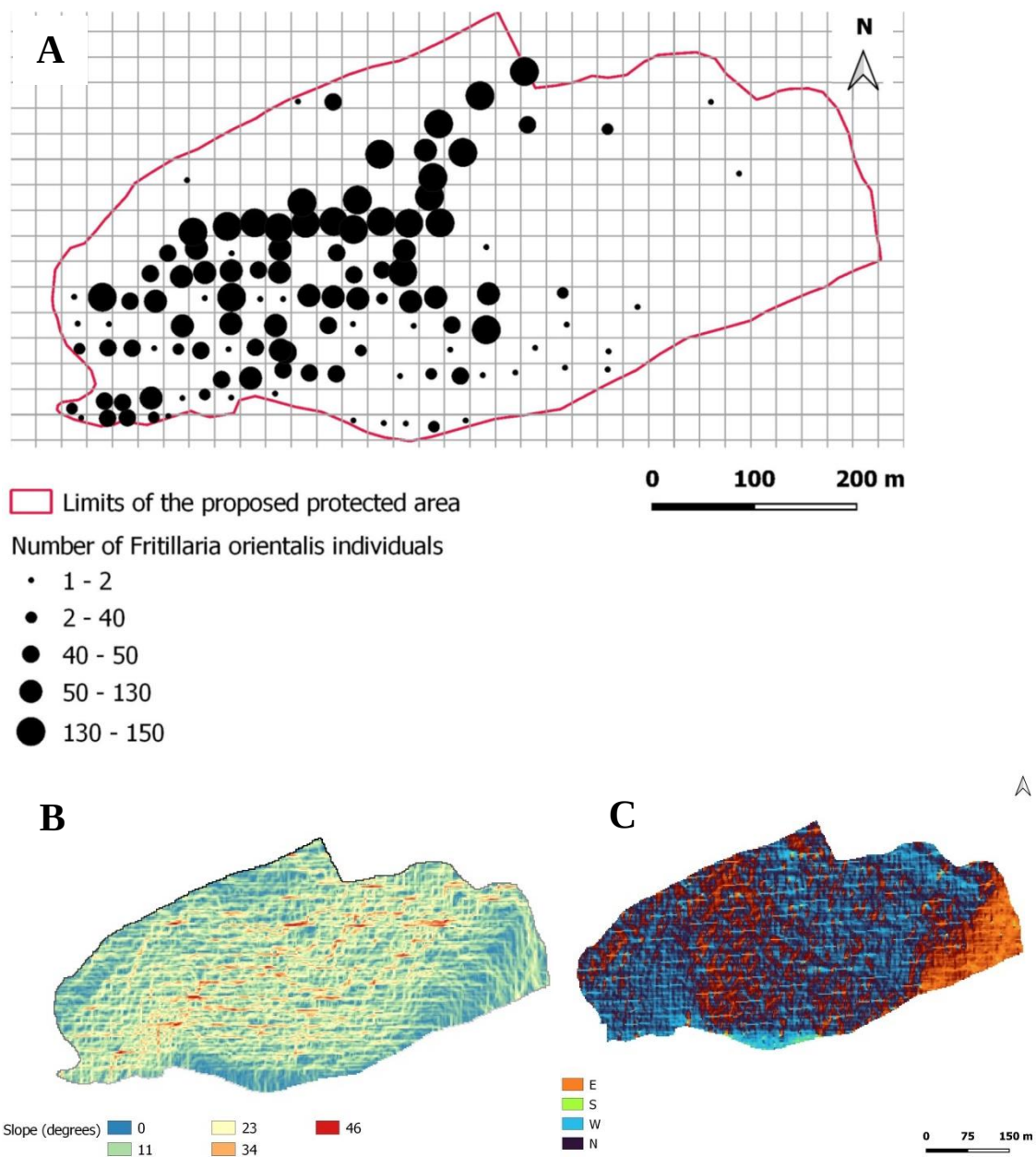


Fig. 7: A-Distribution of *F. orientalis* individuals in the proposed protected area; B and C-Digital models of slope and aspect

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PROPUNERE PENTRU O NOUĂ ARIE PROTEJATĂ ÎN JUDEȚUL CLUJ – REZERVAȚIA BOTANICĂ DE LALEA PESTRIȚĂ (*FRITILLARIA ORIENTALIS*) DE LA BERCHIEȘU, COMUNA FRATA

(Rezumat)

Laleaua pestriță (*Fritillaria orientalis* Adams) este o specie central balcanică și ilirică, cu prezență sporadică în România, vulnerabilă și protejată (monument al naturii). Se propune înființarea unei noi arii protejate cu o suprafață de 22,18 ha la sud de satul Berchieșu (comuna Frata), pentru conservarea celei mai importante și abundente populații de lalea pestriță din județul Cluj, apreciere bazată pe date din literatură și observații în teren. Din acest motiv zona respectivă are o valoare botanică deosebită și trebuie protejată legal pentru a conserva această populație izolată din Câmpia Transilvaniei. Datele floristice și caracteristicile vegetației sunt prezentate alături de ilustrații relevante ale ariei protejate propuse. Pentru a deosebi facil specia *F. orientalis* de *F. meleagris*, și ea semnalată în județul Cluj, sunt prezentate caractere de diferențiere morfologică, biometrică și ecologică. Plantele de *F. orientalis* de lângă Berchieșu se caracterizează printr-o diversitate pronunțată în ceea ce privește înălțimea tulpinilor florifere și culoarea perigonului. Colectarea florilor sau a plantelor întregi, extinderea terenurilor cultivate, vetrele de foc improvizate de lângă marginea pădurii, exploatarea forestieră, fertilizarea terenurilor agricole și accesul motorizat reprezintă amenințări pentru această populație. În scopul asigurării conservării durabile a lalelei pestrițe de lângă Berchieșu se propune un set de măsuri specifice, precum și monitorizarea fitocenozelor pentru a surprinde dinamica comunităților vegetale și a evalua eficacitatea măsurilor de protecție.

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