

Article

Ophioglossum lusitanicum L.: New Records of Plant Community and 92/43/EEC Habitat in Italy

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Citation: Perrino, E.V.; Tomaselli, V.; Wagensommer, R.P.; Silletti, G.N.; Esposito, A.; Stinca, A. *Ophioglossum lusitanicum* L.: New Records of Plant Community and 92/43/EEC Habitat in Italy. *Agronomy* **2022**, *12*, 3188. <https://doi.org/10.3390/agronomy12123188>

Academic Editors: Alessio Papini, Mushtaq Ahmad, Fazal Ullah and Wajid Zaman

Received: 9 November 2022

Accepted: 10 December 2022

Published: 15 December 2022

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Abstract: In this paper, integrating field surveys and literature data, an analysis of *Ophioglossum lusitanicum* plant communities and related 92/43/EEC habitats are reported for Italy. Two new syntaxa, *Euphorbio exiguae-Ophioglossetum lusitanici* ass. nova hoc loco and *trifolietosum scabri* subass. nova hoc loco of the *Rumici bucephalophori-Ophioglossetum lusitanici* were described in the Apulia and Campania regions. Both types of vegetation identified in Apulia, Campania, and Sicily regions represent two different aspects of the same priority habitat: “pseudo-steppe with grasses and annuals of the *Thero-Brachypodietea*” (habitat code 6220*). A phytosociological and ecological dataset of the literature and new field surveys highlighting the soil type as parameters affecting the vegetation cover of this small fernlike plant, with the *Trachynion distachyae* Rivas–Martínez, 1978 alliance on calcareous soils and *Helianthemion guttati* Br.-Bl. in Br.-Bl. et al., 1940 alliance on volcanic soils. Many species of other types of annual meadows have been identified within *Ophioglossum* communities due to the very small patches of land, where they have been found, and ecological conditions that facilitate this phenomenon of the transgression of other therophytes species.

Keywords: fernlike plant; new syntaxa; Ophioglossaceae; phytosociological study

1. Introduction

Ophioglossum L. is a cosmopolitan monophyletic genus, belonging to the oldest existing evolutionary line of the vascular cryptogams megaphylls [1,2], and includes about 25–30 species [1–3]. The number of chromosomes in the genus ranges from $2n = 240$ (*O. lusitanicum* L.) to $2n = 1440$ (*O. reticulatum* L.), the latter being the highest chromosomal number known in plants [4]. *Ophioglossum lusitanicum* is a small fernlike plant a few centimeters high (from 2 to 7 cm) (Figure 1), difficult to observe in the field due to its size and ecology, it is generally found mixed and undercover with the biggest plants [5]. Its distribution is very fragmented and includes the temperate zones of the Atlantic coast and extends from the Macaronesian region eastwards up to India, including the Mediterranean basin [6] and Iran [7]. Three species of the genus *Ophioglossum* have been reported in Italy: *O. azoricum* C. Presl is only present in Latium and Veneto, while it is doubtful in Tuscany; *O. vulgatum* L. is present in all Italian regions, except for Valle d’Aosta and Apulia; and *O. lusitanicum* L. is present in all Tyrrhenian regions, Apulia, Sicily, and Sardinia [8]. In Italy, all the species of *Ophioglossum* are of conservation interest, as reported in the Regional Red Lists [9]. Indeed, *O. lusitanicum* (Figure 1) was evaluated

as lower risk (LR) in Tuscany, Latium, and Apulia, and endangered (EN) in Calabria [9]. Regarding the Apulia region, it has been found in some sites of Salento [10], and only one in Polignano a Mare [11,12] and on Gargano promontory [13]. This small fernlike plant was assessed as a characteristic species of several syntaxa: in the Mediterranean Basin with the alliance of *Cicendio-Solenopsis laurentiae* Brullo and Minissale 1998 [14–16], in Spain with the *Ophioglosso-Cicendietum filiformis* Rivas Goday, 1970 [17], in western France with the *Ophioglosso lusitanici-Isoëtium histricis* de Foucault 1988 [18], and all aspects referable to the class of *Isoëto-Nanojuncetea* Br.-Bl. et Tx. in Br.-Bl. et al., 1952. In addition, the *Scillo-Ophioglossetum lusitanici* Ballesteros and Sagarra, 1984 association was described in Spain [19], which differ from the previous vegetation, as it falls under the *Helianthemion guttati* Br.-Bl. in Br.-Bl. et al., 1940 alliance. Both types of vegetation fall within the priority habitat of Directive 92/43 EEC [20]. *Helianthemion guttati* belongs to the habitat “pseudosteppe with grasses and annuals of the *Thero-Brachypodietea*” (code 6220*), while the aspects of *Isoëto-Nanojuncetea* belongs to “Mediterranean temporary ponds” (code 3170*). In Croatia, unlike other countries, it grows mainly in disturbed habitats (e.g., paths and edges of paths) in garrigue vegetation [3]. Given the considerable conservation interest of this species and, in some cases, in the habitat in which it grows, a more in-depth research can provide an important contribution to the knowledge of its distribution and ecology. In this study, through the integration of new field data with literature data, a phytosociological analysis of *O. lusitanicum* plant communities occurs in some Italian regions. The field investigations were carried out both on volcanic and calcareous soils, in order to assess whether the hypothesis of different types of a geological substrate can determine a difference in the floristic composition between plant communities.



(a)



(b)

Figure 1. (a) Small patches of soil with *O. lusitanicum* community; (b) Individuals of *O. lusitanicum* in late winter. Locality: Polignano a Mare (Bari). Date: 4 March 2012. Photos by Enrico Vito Perrino.

2. Materials and Methods

Study sites are located in Italy and are representative of soils whose parent material is volcanic (Elba Island in Tuscany: T1-T2; Mt. Vesuvius in Campania: CV1-CV8; Vulcano Island in Sicily: S1-S5;) and calcareous (Tifatini Mts. in Campania: CT1-CT3; Santeramo in Colle in loc. Alessandrelli in Apulia: P1-P5) in origin (Figure 2).

The investigated sites of Tuscany, Apulia, and Sicily are part of the Special Area of Conservation (SAC) of the Natura 2000 network; that is, SAC “Elba orientale” (code IT5160102), SAC “Murgia Alta” (code 9120007), and SAC “Isola di Vulcano” (code ITA030027). In Campania, Mt. Vesuvius study site falls into SAC “Vesuvio e M. Somma” (code IT8030037), SAC “Vesuvio” (code IT8030036), and Vesuvius National Park.

Field surveys, performed by applying the Braun–Blanquet method [21], were carried out in Campania and Apulia in 2016 and 2021, between the late winter and spring periods.

Plant species cover was visually assessed based on the following abundance scores: (r) <1% and rare; (+) <1%; (1) 1–5%; (2) 6–25%; (3) 26–50%; (5) 51–75%; and (5) 76–100%. The collected plant material is preserved in the *Herbarium Austroitalicum* of the University of Campania Luigi Vanvitelli (19 March 2016, *Stinca A.*, IT 3702) and *Herbarium Horti Botanici Barenensis* of the University of Bari (3 March 2012, *Perrino E.V. et Signorile G.*, BI 35965) (IT and BI, acronyms follow Thiers 2022) [22]. As far as Tuscany and Sicily sites, vegetation data were taken from specialistic literature [23,24]. In total, 21 relevés were selected and analyzed. For the taxa identification, Flora Europaea [25] and Flora d'Italia [26] were used, while for the nomenclature we followed Bartolucci et al. [8] and Galasso et al. [27].



Figure 2. The sampling sites evaluated for the phytosociological classification.

A multivariate analysis using XLSTAT software [28] was applied to the data matrix to test the degree of floristic similarity between vegetation relevés. To this aim, the plant sampling cover scale was transformed into the ordinal scale according to Van der Maarel [29] and the obtained matrix was processed by agglomerative hierarchical clustering (AHC), using Spearman's correlation coefficient. In addition, the principal component analysis (PCA) was performed with the application of the Euclidean biplot, using Spearman's correlation coefficient, to the graphical exploration of the distances among relevés.

3. Results and Discussion

Many communities of *O. lusitanicum* usually have early spring phenology and a typically Mediterranean character, with an Atlantic–Mediterranean climate, moist acid soils submerged or waterlogged in winter and dry in late spring [14], and the presence of higher microstationary humidity compared to the surrounding soil, as observed in Tuscany [30]. These ecological features are confirmed with new data in the present study and in other non-Mediterranean countries, such as Iran, where a dense population of this species has been identified in the forest clearings of the submontane belt, inside small sandy patches [7], and in Algeria in the clearing of cork oaks, in small areas of moist sandy soil [31].

In Italy, the vegetation with this interesting fern is characterized by small pools ranging from a few centimeters to a few square meters, often within other vegetation types, such as shrublands. As a result, these plant communities are rich in transgressive taxa of other grassland syntaxa.

The classification and ordination analysis of the vegetation relevés (a data matrix of 145 taxa × 21 phytosociological relevés) are depicted in Figures 3 and 4, respectively. The dendrogram (Figure 3) shows two clearly distinct groups: cluster I includes all the plant communities of volcanic soils divided in turn into three subgroups (IA: Tuscany, IB: Sicily, IC: Campania–Mt. Vesuvius) while cluster II includes all the relevés carried out on limestone soils and grouping two subclusters (IIA: Campania–Tifatini Mts., IIB: Apulia). These results are consistent with those of the biplot showing the separation of the same groups and subgroups according to the first and second principal components. In detail, the clusters of relevés are highlighted along the first axis (F1), which accounted for 20.74% of the variation (to improve readability, species names are not reported) and clearly reflect the separation of the soil types. However, the phytosociological relevés showed a separation according to the second axis (F2), which accounted for 14.28% of the remaining variation and clearly reflected mainly their geographical location and the characteristics of the plant communities (Figure 4).

These results highlight significant differences between calciphilous (*Brachypodietalia distachyae* Rivas–Martínez, 1978) and acidophilous communities (*Helianthemetalia guttati* Br.-Bl. in Br.-Bl. et al., 1940) and fully confirm our initial hypothesis regarding the effect of soil type on the floristic composition of the studied plant cenoses.

3.1. Calciphilous Communities (*Brachypodietalia distachyae*)

For the surveys carried out in loc. Alessandrelli (Apulia) and on the Tifatini Mts. (Campania) on calcareous substrates, at relatively low altitudes (i.e., 325 to 460 m.a.s.l.) in the hinterland, *O. lusitanicum* and *Euphorbia exigua* can be considered characteristic taxa of a new phytosociological association: *Euphorbio exiguae-Ophioglossetum lusitanici* ass. nova hoc loco (*holotypus*: relevé P4 in Table 1, Figure 5). In Apulia, the high coverage of *Brachypodium distachyon* suggests that this plant community in the annual meadows of *Trachynion distachyae*, the alliance of *Brachypodietalia distachyae* and *Stipo-Trachynietea distachyae* (habitat 6220*), is identified by the presence of *Hypochaeris achyrophorus*, *Ononis reclinata*, *Linum strictum*, *Trifolium scabrum*, *Romulea bulbocodium*, *Hippocrepis biflora*, and other species (Table 1). Due to the small extension of this community, we find many transgressive species of other grassland communities well represented in the surrounding territory, especially those of *Helianthemetea guttati* (habitat 6220*) and *Festuco valesiacae-Brometea erecti*

(habitat 62A0). The plant cenoses found in Campania and Apulia are very similar, even if slightly different in some aspects of their floristic composition. It is interesting to note that the Apulian sites are slightly richer in characteristic species of the order *Brachypodietalia distachyae* and *Stipo-Trachynietea distachyae*, though it is above all the presence and high coverage of *Brachypodium distachyon*, a species characteristic of the *Trachynion distachyae* which differentiates, from the vegetational point of view, Campania (subgroup IIA, CT1-CT3) from Apulia (subgroup IIB, P1-P5) (Figure 3), even spatially (Figure 4).

3.2. Acidophilous Communities (*Helianthemetalia guttati*)

On the volcanic soils of Vulcano Island and Mt. Vesuvius, where this species has recently been rediscovered [32], a peculiar aspect of *Helianthemetalia guttati* communities has been attributed to this fern, the *Rumici bucephalophori-Ophioglossetum lusitanici* Médail, Pavon, Lo Cascio and Pasta 2016 association [24], due to the presence of *Rumex bucephalophorus*, *Ornithopus compressus*, *Trifolium arvense* subsp. *arvense*, *Lagurus ovatus*, *Silene mutabilis*, *Aira caryophyllea*, *Tolpis virgata* subsp. *virgata*, *Silene gallica*, and other species. This consideration is not statistically supported, because the Campania and Sicilian sites belong to different subgroups (IB, IC) (Figure 3) spatially distant (Figure 4). It seems there are good relationships between communities and environments at Mt. Vesuvius (Table 2), in which the main environmental aspect, compared to other communities, is the higher altitude while, from the vegetational point of view, a crucial role is played by the high coverage of *Trifolium scabrum* and the presence of some transgressive species of the *Festuco valesiacae-Brometea erecti*. For these reasons, the communities occurring at Mt. Vesuvius have been described as a new endemic subassociation of the *Rumici bucephalophori-Ophioglossetum lusitanici: trifolietosum scabri* subass. nova hoc loco (holotypus: relevé CV4, Table 2, Figure 6). The vegetation of Mt. Vesuvius could be referred to as the priority habitat 6220*; however, the characteristics of the volcanic soil do not exclude in the future, through further studies, its attribution to the habitat 8320 “Fields of lava and natural excavations”, which is very complex with little known and characterized by pioneer vegetation with few species, often endemics.

In Elba Island (Tuscany), *O. lusitanicum* identifies microcoenoses on a small riparian plateau along a stream near Vallone di Madonna del Monserrato, consisting of sandy sediments where it grows with other species of different ecological contingents, such as *Petrosedum rupestre*, *Centranthus calcitrapa*, *Senecio vulgaris*, and *Geranium purpureum*, testifying that we are dealing with transitional aspects in a progressive release from the wet temporary ponds. For this reason, it was not possible to assign the Elba Island plant community with *O. lusitanicum* to its own syntaxon (Table 2), even if the authors in the taxonomic scheme report *Isoëtium durieui* Br.-Bl., 1935 [23], confirming the vegetational versatility of this species. This variability is confirmed in other sites of Elba Island by other authors [30] who highlight, even if without phytosociological relevés, the presence of hygrophilous stations of *Isoëtium durieui* due to the presence of *Isoëtes durieui* Bory with *Juncus bufonius* L. and *J. capitatus* Weigel. In the same locality, at higher altitudes between 250 and 750 m a.s.l., were reported the ephemeral meadows of late spring on granitic soils, referable to the *Helianthemetalia guttati* class, the latter interpreted as a secondary series with respect to the communities of the *Isoëtium*, which would be of primary role. Statistically, although falling within the same group (I) of the Sicilian and Campania–Mt. Vesuvius sites, it must refer to another subgroup (IA) (Figure 3) and, spatially, it has a distinct position (Figure 4). Therefore, further field studies are necessary to clarify the syntaxonomic position of the plant populations of Tuscany.

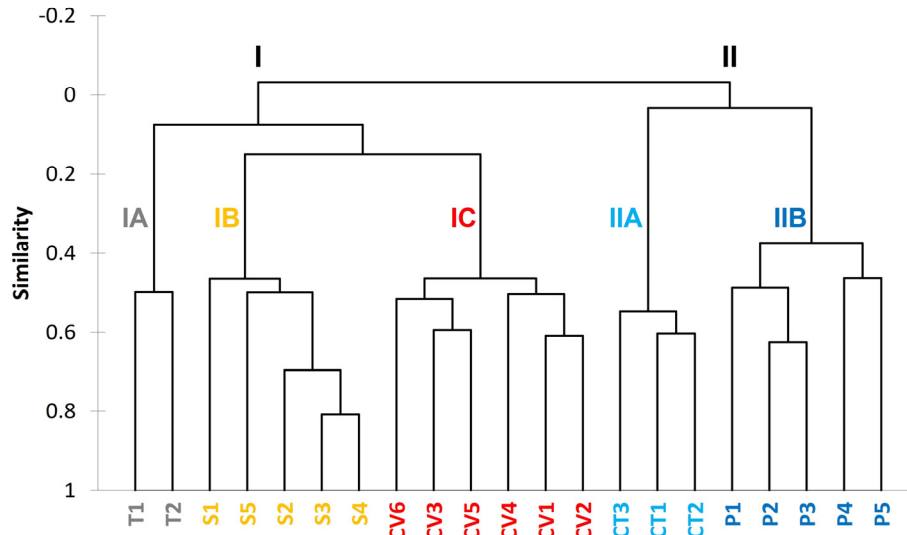


Figure 3. Dendrogram of the agglomerative hierarchical clustering of the vegetation relevés (T1–T2: Tuscany; S1–S5: Sicily; CV1–CV6: Campania–Mt. Vesuvius; CT1–CT3: Campania–Tifatini Mts.; P1–P5: Apulia).

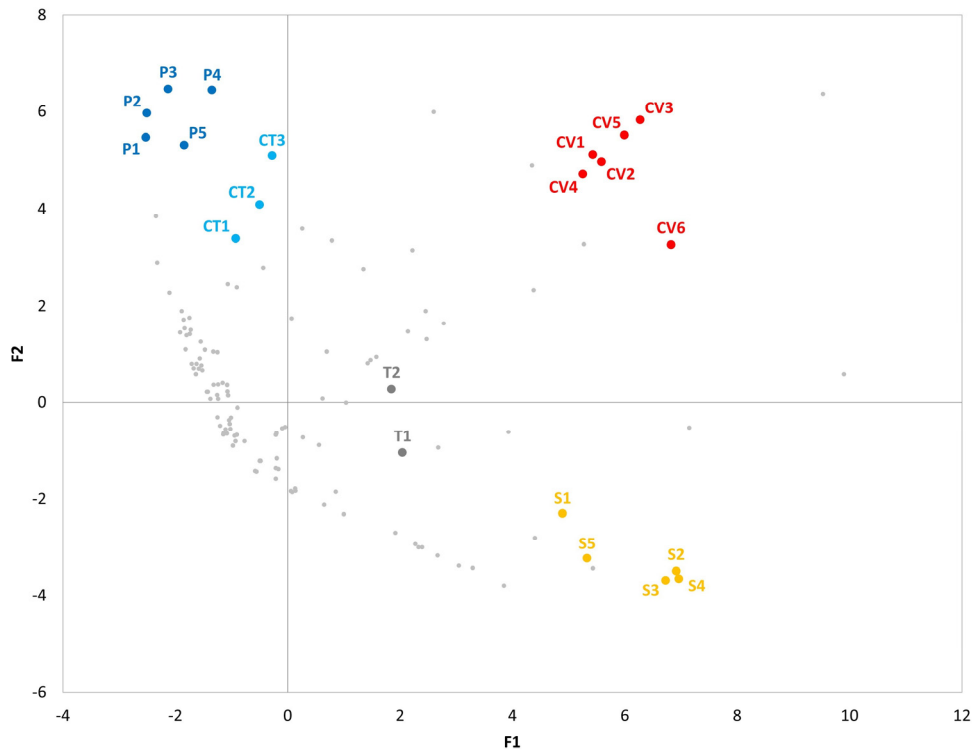


Figure 4. Biplot of the principal component analysis in the first two principal components space of the vegetation relevés (T1–T2: Tuscany; S1–S5: Sicily; CV1–CV6: Campania–Mt. Vesuvius; CT1–CT3: Campania–Tifatini Mts.; P1–P5: Apulia); light gray circles indicate taxon whose names are not reported to improve the readability of the figure).



Figure 5. *Euphorbio exiguae-Ophioglossetum lusitanici* ass. nova hoc loco. Date: 3 May 2021, Santeramo in Colle, in loc. Alessandrelli (Bari). Photo by Enrico Vito Perrino.



Figure 6. *Rumici bucephalophori-Ophioglossetum lusitanici* subass. *trifolietosum scabri* subass. nova hoc loco. Date: 19 March 2016, Mt. Vesuvius, Ercolano, between Casa Cantoniera and Osservatorio Vesuviano (Naples). Photo by Adriano Stinca.

Table 1. *Euphorbio exiguae-Ophioglossetum lusitanici* ass. nova hoc loco. Further details of relevés and sporadic species are reported in Appendices A and B, respectively.

Sampling Number	1	2	3	4	5	6	7	8
Identification Relevé Code	P1	P2	P3	P4	P5	CT1	CT2	CT3
Altitude (m a.s.l.)	460	458	457	450	450	325	325	325
Aspect	W	W	W	W	W	W	WSW	SW
Slope (°)	10	7	7	8	8	2	3	3
Area of relevé (m ²)	1	1	1	1	1	1	1	1
Stoniness (%)	20	15	10	10	10	20	5	5
Rockiness (%)	2	5	2	5	5	-	-	-
Total cover (%)	90	90	85	85	80	-	-	-
Vascular plant layer cover (%)	80	80	75	75	70	50	80	60
Moss layer cover (%)	45	40	45	40	40	70	60	90
Number of taxa	29	33	28	29	28	34	29	28
Holotypus (≠)				≠				
Charact. <i>Euphorbio exiguae-Ophioglossetum lusitanici</i> ass. nova hoc loco								
<i>Ophioglossum lusitanicum</i> L.	2	1	1	1	+	2	3	3
<i>Euphorbia exigua</i> L. subsp. <i>exigua</i>	1	1	+	1	+	+	+	+
Charact. <i>Trachynion distachyae</i> Rivas–Martínez, 1978								
<i>Brachypodium distachyon</i> (L.) P.Beauv.	2	3	3	3	1	-	-	-
<i>Bupleurum baldense</i> Turra	-	-	-	-	-	-	+	-
Charact. <i>Brachypodietalia distachyae</i> Rivas–Martínez, 1978 and <i>Stipo-Trachynietea distachyae</i> Brullo in Brullo et al., 2001								
<i>Hypochaeris achyrophorus</i> L.	1	+	+	1	+	-	-	-
<i>Ononis reclinata</i> L.	1	+	1	-	-	+	-	+
<i>Linum strictum</i> L.	-	1	-	+	+	1	+	-
<i>Trifolium scabrum</i> L.	-	+	2	1	2	-	-	-
<i>Romulea bulbocodium</i> (L.) Sebast. & Mauri	-	-	+	-	-	1	+	1
<i>Polygala monspeliaca</i> L.	1	+	-	+	-	-	-	-
<i>Valantia muralis</i> L.	+	-	+	+	-	-	-	-
<i>Hippocrepis biflora</i> Spreng.	-	-	-	-	-	+	1	2

<i>Stipellula capensis</i> (Thunb.) Röser & H.R.Hamasha	-	-	-	2	1	-	-	-
Transg. <i>Helianthemetea guttati</i> Rivas Goday & Rivas-Martínez 1963								
<i>Briza maxima</i> L.	-	+	+	+	+	-	+	-
<i>Medicago minima</i> (L.) L.	+	+	+	1	-	-	-	-
<i>Trifolium stellatum</i> L.	+	+	1	-	+	-	-	-
<i>Helianthemum salicifolium</i> (L.) Mill.	-	1	1	+	+	-	-	-
<i>Trifolium campestre</i> Schreb.	1	+	+	-	-	-	-	-
<i>Aira elegans</i> Willd. subsp. <i>elegans</i>	+	-	-	-	-	-	+	+
<i>Lysimachia linum-stellatum</i> L.	-	-	-	+	-	+	-	+
<i>Cerastium brachypetalum</i> Desp. ex Pers. subsp. <i>tenoreanum</i> (Ser.) Soó	-	-	-	-	-	+	+	+
<i>Tuberaria guttata</i> (L.) Fourr.	-	-	-	-	-	+	1	+
<i>Onobrychis caput-galli</i> (L.) Lam.	-	+	1	-	-	-	-	-
<i>Hedypnois rhagadioloides</i> (L.) F.W.Schmidt	-	-	-	+	+	-	-	-
<i>Trifolium cherleri</i> L.	-	-	-	+	+	-	-	-
<i>Filago pygmaea</i> L.	-	-	+	-	-	-	-	-
<i>Alkanna tinctoria</i> Tausch subsp. <i>tinctoria</i>	-	-	-	+	-	-	-	-
<i>Trifolium arvense</i> L. subsp. <i>arvense</i>	-	-	-	+	-	-	-	-
<i>Cynosurus echinatus</i> L.	-	-	-	-	+	-	-	-
<i>Hippocrepis ciliata</i> Willd.	-	-	-	-	+	-	-	-
Transg. <i>Festuco valesiaca</i> - <i>Brometea erecti</i> Br.-Bl. & Tüxen ex Br.-Bl. 1949								
<i>Anthyllis vulneraria</i> L. subsp. <i>rubriflora</i> (DC.) Arcang.	+	+	-	+	-	+	+	-
<i>Bellardia trixago</i> (L.) All.	+	-	-	+	+	-	-	+
<i>Anacamptis morio</i> (L.) R.M.Bateman, Pridgeon & M.W.Chase	-	+	+	+	+	-	-	-
<i>Poterium sanguisorba</i> L. s.l.	-	-	-	+	-	2	1	+
<i>Colchicum cupanii</i> Guss. subsp. <i>cupanii</i>	1	1	1	-	-	-	-	-
<i>Scorzonera villosa</i> Scop. subsp. <i>columnae</i> (Guss.) Nyman	+	+	-	-	+	-	-	-
<i>Stipa austroitalica</i> Martinovský s.l.	+	+	-	-	+	-	-	-
<i>Thymus spinulosus</i> Ten.	+	-	-	+	+	-	-	-
<i>Petrorhagia saxifraga</i> (L.) Link subsp. <i>gasparrinii</i> (Guss.) Pignatti ex Greuter & Burdet	-	-	-	-	-	+	+	+
<i>Teucrium chamaedrys</i> L. subsp. <i>chamaedrys</i>	-	-	-	-	-	+	1	-
<i>Muscari comosum</i> (L.) Mill.	-	+	-	-	-	-	-	-

<i>Ophrys bertolonii</i> Moretti	-	+	-	-	-	-	-	-
<i>Eryngium campestre</i> L.	-	-	-	-	+	-	-	-
<i>Helianthemum nummularium</i> (L.) Mill. s.l.	-	-	-	-	-	+	-	-
<i>Centaureum erythraea</i> Rafn subsp. <i>erythraea</i>	-	-	-	-	-	-	+	-
<i>Brachypodium rupestre</i> (Host) Roem. Schult.	-	-	-	-	-	-	-	+
Transg. <i>Chenopodieta</i> Br.-Bl. in Br.-Bl. et al., 1952								
<i>Sherardia arvensis</i> L.	1	+	+	+	-	+	+	+
<i>Lysimachia arvensis</i> (L.) U.Manns & Anderb. subsp. <i>arvensis</i>	1	-	+	+	+	-	+	+
<i>Triticum vagans</i> (Jord. & Fourr.) Greuter	+	-	+	1	-	-	-	-
<i>Hypericum triquetrifolium</i> Turra	-	-	-	+	-	-	-	-
<i>Erodium cicutarium</i> (L.) L'Hér.	-	-	-	-	-	-	+	-
Transg. <i>Lygeo sparti-Stipetea tenacissimae</i> Rivas–Martínez, 1978								
<i>Reichardia picroides</i> (L.) Roth	+	-	+	-	+	+	-	+
<i>Anacamptis papilionacea</i> (L.) R.M.Bateman, Pridgeon & M.W.Chase	+	-	+	-	-	-	+	+
<i>Daucus carota</i> L. subsp. <i>carota</i>	-	+	-	-	+	+	-	-
<i>Carlina corymbosa</i> L.	+	-	-	-	-	+	-	-
<i>Convolvulus elegantissimus</i> Mill.	+	-	-	-	-	-	-	-
<i>Thapsia asclepium</i> L.	-	1	-	-	-	-	-	-
Transg. <i>Ononido-Rosmarinetea</i> Br.-Bl. in A.Bolos y Vayreda, 1950								
<i>Micromeria graeca</i> (L.) Benth. ex Rchb. s.l.	2	+	+	-	-	-	-	2
<i>Osyris alba</i> L.	-	1	+	-	-	-	-	-
<i>Teucrium capitatum</i> L. subsp. <i>capitatum</i>	-	-	-	-	-	+	-	-

Table 2. *Rumici bucephalophori-Ophioglossetum lusitanici* and *trifolietosum scabri* subass. nova hoc loco. Further details of relevés and sporadic species are reported in Appendices A and B, respectively.

Sampling number	9	10	11	12	13	14	15	16	17	18	19	20	21
Identification relevé code	S1 *	S2 *	S3 *	S4 *	S5 *	CV1	CV2	CV3	CV4	CV5	CV6	T1 **	T2 **
Altitude (m a.s.l.)	25	35	35	35	35	479	479	479	479	479	479	84	140
Aspect	-	NW	NW	NW	NW	-	WNW	N	-	-	-	-	-
Slope (°)	-	20	20	20	25	-	1	2	-	-	-	-	-
Area of relevé (m ²)	1	1	1	1	1	1.2	0.05	0.06	0.5	0.2	0.06	0.3	0.25
Stoniness (%)	-	-	-	-	-	-	-	-	-	-	-	-	-
Rockiness (%)	-	-	-	-	-	10	10	-	5	10	10	-	-
Total cover (%)	-	-	-	-	-	-	-	-	-	-	-	40	30
Vascular plant layer cover (%)	-	-	-	-	-	70	70	70	95	70	90	-	-
Moss layer cover (%)	-	-	-	-	-	90	90	100	10	90	70	-	-
Number of taxa	19	16	14	13	13	23	15	10	23	19	14	15	8
Holotypus (≠)									≠				
Charact. <i>trifolietosum scabri</i> subass. nova hoc loco													
<i>Trifolium scabrum</i> L.	-	-	-	-	-	1	1	1	+	1	-	-	-
Charact. <i>Rumici bucephalophori-Ophioglossetum lusitanici</i> Médail, Pavon, Lo Cascio & Pasta, 2016													
<i>Ophioglossum lusitanicum</i> L.	3	2	3	3	2	4	3	4	5	4	4	3	3
<i>Rumex bucephalophorus</i> L. s.l.	1	2	2	3	2	1	+	1	1	1	+	-	-
Charact. <i>Helianthemion guttati</i> Br.-Bl. in Br.-Bl. et al., 1940, <i>Helianthemetalia guttati</i> Br.-Bl. in Br.-Bl. et al., 1940 <i>Helianthemetea guttati</i> Rivas Goday & Rivas-Martínez 1963													
<i>Ornithopus compressus</i> L.	-	1	2	+	+	+	-	1	-	+	1	-	-
<i>Trifolium arvense</i> L. subsp. <i>arvense</i>	-	+	-	-	-	+	+	+	+	+	2	-	-
<i>Lagurus ovatus</i> L.	+	2	3	+	-	-	+	-	-	-	-	+	-
<i>Silene mutabilis</i> L.	+	+	1	+	+	-	-	-	-	-	-	-	-
<i>Aira caryophyllea</i> L.	+	1	-	-	-	-	-	-	+	+	-	+	-
<i>Tolpis virgata</i> (Desf.) Bertol. subsp. <i>virgata</i>	+	+	+	-	+	-	-	-	-	-	-	-	-
<i>Silene gallica</i> L.	-	-	-	-	-	+	2	-	+	-	+	-	-

<i>Cerastium semidecandrum</i> L.	-	-	-	-	-	+	-	+	-	+	+	-	-
<i>Briza maxima</i> L.	+	-	-	-	-	-	-	+	-	+	-	-	-
<i>Ornithopus pinnatus</i> (Mill.) Druce	-	+	2	+	-	-	-	-	-	-	-	-	-
<i>Galium parisiense</i> L.	-	+	+	+	-	-	-	-	-	-	-	-	-
<i>Phedimus stellatus</i> (L.) Raf.	-	-	-	-	-	1	+	-	+	-	-	-	-
<i>Lupinus angustifolius</i> L.	-	-	-	-	-	-	+	-	+	1	-	-	-
<i>Logfia gallica</i> (L.) Cosson & Germ.	-	+	-	-	-	-	-	-	-	-	-	-	-
<i>Sedum rubens</i> L.	-	-	-	-	1	-	-	-	-	-	-	-	-
<i>Trifolium cherleri</i> L.	-	-	-	-	-	-	-	-	-	-	-	1	-
<i>Cynosurus echinatus</i> L.	-	-	-	-	-	-	-	-	-	-	-	+	-
<i>Festuca lachenalii</i> (C.C.Gmel.) Spenn.	-	-	-	-	-	-	-	-	-	-	-	-	+
Transg. <i>Echio-Galactition tomentosae</i> O.De Bolòs et Molinier, 1969													
<i>Echium plantagineum</i> L.	2	3	2	1	+	-	-	-	-	-	2	-	-
<i>Galactites tomentosus</i> Moench	2	-	1	-	-	-	-	-	-	-	-	-	-
Transg. <i>Festuco valesiacae-Brometea erecti</i> Br.-Bl. & Tüxen ex Br.-Bl., 1949													
<i>Petrorhagia saxifraga</i> (L.) Link subsp. <i>gasparrinii</i> (Guss.) Pignatti ex Greuter & Burdet	-	-	-	-	-	+	+	+	+	-	-	-	-
<i>Allium vineale</i> L.	-	-	-	-	-	+	+	-	-	+	-	-	-
<i>Sixalix atropurpurea</i> (L.) Greuter & Burdet	-	-	-	-	-	-	+	-	-	-	+	-	-
<i>Muscari comosum</i> (L.) Mill.	-	-	-	-	-	-	-	1	+	-	-	-	-
Transg. <i>Lygeo sparti-Stipetea tenacissimae</i> Rivas-Mart, 1978													
<i>Hyparrhenia hirta</i> (L.) Stapf subsp. <i>hirta</i>	2	-	1	2	+	-	-	-	-	-	-	-	-
<i>Daucus carota</i> L. subsp. <i>carota</i>	-	-	-	-	-	+	+	-	-	-	-	-	-
<i>Lathyrus clymenum</i> L.	-	-	-	-	-	-	-	-	+	-	-	-	-
<i>Reichardia picroides</i> (L.) Roth	-	-	-	-	-	-	-	-	-	+	-	-	-

* from [24], ** from [23].

3.3. Syntaxonomical Scheme of Surveyed Vegetation

Stipo-Trachynietea distachyae Brullo in Brullo et al., 2001

Brachypodietalia distachyae Rivas–Martínez, 1978

Trachynion distachyae Rivas–Martínez, 1978

Euphorbio exiguae-Ophioglossetum lusitanici Perrino, Stinca & Tomaselli, 2022 ass.
nova hoc loco

Helianthemetea guttati Rivas Goday and Rivas–Martínez, 1963

Helianthemetalia guttati Br.-Bl. in Br.-Bl. et al., 1940

Helianthemion guttati Br.-Bl. in Br.-Bl. et al., 1940

Rumici bucephalophori-Ophioglossetum lusitanici Médail, Pavon, Lo Cascio &
Pasta, 2016

trifolietosum scabri Stinca, Perrino & Tomaselli, 2022 subass. nova hoc loco

4. Conclusions

The *Ophioglossum* L. species, such as *O. azoricum* and *O. vulgatum*, although reported in the Italian Regional Red Lists [9], as stated by other authors [33], have become increasingly rare due to: (1) their particular biological cycle; and (2) human impact on their growth environments. The new *O. lusitanicum* communities identified in Apulia, Campania, and Sicily regions represent two different aspects of the same priority habitat (i.e., “pseudo-steppe with grasses and annuals of the *Thero-Brachypodietea*” (habitat code 6220*), as well as described in Spain (*Scillo-Ophioglossetum lusitanici* Ballesteros & Sagarra, 1984), even if doubts persist for the plant populations of Mt. Vesuvius. This phytosociological framework differs from the vegetation described for this species in other European territories, often attributed to *Isoëto-Nanojuncetea* Br.-Bl. et Tx. in Br.-Bl. et al., 1952 (e.g., *Ophioglossum lusitanici-Isoëtium histricis* de Foucault, 1988) [14], which constitute a different habitat (habitat code 3170*).

The type of soil, together with the altimetric parameter, with some exceptions, is confirmed to be the key that discriminates the different types of vegetation and habitat detected. *Isoëtium durieui* (habitat 3170*) at low altitudes, often near the coast, prefers calcareous soils, while the annual meadows of *Brachypodietalia distachyae* (habitat 6220*) are found at relatively higher altitudes and inland. Nevertheless, given the limited number of investigated sites, the matter deserves further investigation. Finally, the aspects of *Helianthemetalia guttati* (habitat 6220*) have been reported on soils of a different nature, volcanic in Sicily and Campania, and granitic in Tuscany (Elba Island). These environmental and ecological assessments deserve to be deepened with further investigations in other Mediterranean territories to verify their reliability on a wide scale, including the primary and secondary roles. In any case, we emphasize that the description of new syntaxa, such as the description of new taxa, is the first step towards local and worldwide biodiversity conservation.

Author Contributions: Conceptualization, E.V.P. and V.T.; methodology, E.V.P., V.T., and A.S.; software, E.V.P., V.T., and A.S.; validation, E.V.P., V.T., G.N.S., R.P.W., A.E., and A.S.; formal analysis, E.V.P., V.T., and A.S.; investigation, E.V.P., V.T., A.E., and A.S.; data curation, E.V.P., V.T., G.N.S.; and A.S.; writing—original draft preparation, E.V.P.; writing—review and editing, E.V.P., V.T., G.N.S., R.P.W., A.E., and A.S.; visualization, E.V.P., V.T., G.N.S., R.P.W., A.E., and A.S.; supervision, E.V.P., V.T., A.S., and R.P.W.; pictures, E.V.P. and A.S. All authors have read and agreed to the published version of the manuscript.

Funding: This research did not receive funding.

Data Availability Statement: The data that support the findings of this study are available from the corresponding authors upon reasonable request.

Conflicts of Interest: The authors declare no conflicts of interest.

Appendix A. Locality, municipality, region, date, identification relevé code, and geographic coordinates (UTM-WGS84) of the surveys analyzed (if available).

Table 1: **Rel. 1:** Santeramo in Colle in loc. Alessandrelli (Bari), Apulia, 3 May 2021, P1, 33T 644123 E—4514234 N; **Rel. 2:** Santeramo in Colle in loc. Alessandrelli (Bari), Apulia, 3 May 2021, P2, 33T 644091 E—4514226 N; **Rel. 3:** Santeramo in Colle in loc. Alessandrelli (Bari), Apulia, 3 May 2021, P3, 33T 644053 E—4514228 N; **Rel. 4:** Santeramo in Colle in loc. Alessandrelli (Bari), Apulia, 3 May 2021, P4, 33T 644012 E—4514227 N; **Rel. 5:** Santeramo in Colle in loc. Alessandrelli (Bari), Apulia, 3 May 2021, P5, 33T 643832 E—4514539 N; **Rel. 6:** Tifatini Mts., Caserta, Campania, 2 April 2016, CT1, 33T 444068 E—4550816 N; **Rel. 7:** Tifatini Mts., Caserta, Campania, 2 April 2016, CT2, 33T 444085 E—4550830 N; **Rel. 8:** Tifatini Mts., Caserta, Campania, 2 April 2016, CT3, 33T 444108 E—4550818 N.

Table 2: **Rel. 9:** Vulcano Island, Lipari (Messina), Sicily, 5 November 2016, S1* (from [24]), no geographic coordinates; **Rel. 10:** Vulcano Island, Lipari (Messina), Sicily, 5 November 2016, S2*, no geographic coordinates; **Rel. 11:** Vulcano Island, Lipari (Messina), Sicily, 5 November 2016, S3*, no geographic coordinates; **Rel. 12:** Vulcano Island, Lipari (Messina), Sicily, 5 November 2016, S4*, no geographic coordinates; **Rel. 13:** Vulcano Island, Lipari (Messina), Sicily, 5 November 2016, S5*, no geographic coordinates; **Rel. 14:** Mt. Vesuvius, Ercolano (between locality Casa Cantoniera and Osservatorio Vesuviano) (Naples), Campania, 19 March 2016, CV1, 33T 448579 E—4519275 N; **Rel. 15:** Mt. Vesuvius, Ercolano (between Casa Cantoniera and Osservatorio Vesuviano) (Naples), Campania, 19 March 2016, CV2, 33T 448574 E—4519281 N; **Rel. 16:** Mt. Vesuvius, Ercolano (between Casa Cantoniera and Osservatorio Vesuviano) (Naples), Campania, 19 March 2016, CV3, 33T 448573 E—4519291 N; **Rel. 17:** Mt. Vesuvius, Ercolano (between Casa Cantoniera and Osservatorio Vesuviano) (Naples), Campania, 19 March 2016, CV4, 33T 448558 E—4519301 N; **Rel. 18:** Mt. Vesuvius, Ercolano (between Casa Cantoniera and Osservatorio Vesuviano) (Naples), Campania, 19 March 2016, CV5, 33T 448549 E—4519307 N; **Rel. 19:** Mt. Vesuvius, Ercolano (between Casa Cantoniera and Osservatorio Vesuviano) (Naples), Campania, 19 March 2016, CV6, 33T 448531 E—4519312 N; **Rel. 20:** Madonna di Monserrato (Elba Island) (Livorno), Tuscany, in the period 1999–2005, T1** (from [23]), 32T 613859 E—4737753 N; **Rel. 21:** Madonna di Monserrato (Elba Island) (Livorno), Tuscany, in the period 1999–2005, T2**, 32T 613878—E 4737806 N.

Appendix B. Other sporadic species found in the vegetation relevés.

Table 1: **Rel. 1:** *Avena barbata* Pott ex Link (+), *Dasypyrum villosum* (L.) P.Candargy (+), *Linum usitatissimum* L. subsp. *angustifolium* (Huds.) Thell. (+), *Neotinea lactea* (Poir.) R.M.Bateman, Pridgeon & M.W.Chase (+). **Rel. 2:** *Avena barbata* Pott ex Link (+), *Dasypyrum villosum* (L.) P.Candargy (+), *Festuca danthonii* Asch. & Graebn. (+), *Lathyrus cicera* L. (+), *Linum usitatissimum* L. subsp. *angustifolium* (Huds.) Thell. (+), *Neotinea lactea* (Poir.) R.M.Bateman, Pridgeon & M.W.Chase (+), *Tordylium apulum* L. (+), *Valerianella* sp. (+), *Vicia* sp. (+). **Rel. 3:** *Bromus* sp. (+), *Dasypyrum villosum* (L.) P.Candargy (+), *Festuca danthonii* Asch. & Graebn. (1), *Lathyrus cicera* L. (+), *Tordylium apulum* L. (+), *Valerianella* sp. (+). **Rel. 4:** *Bromus* sp. (+), *Crepis* sp. (+), *Dasypyrum villosum* (L.) P.Candargy (+), *Lathyrus cicera* L. (+). **Rel. 5:** *Avena barbata* Pott ex Link (+), *Echium vulgare* L. subsp. *pustulatum* (Sm.) Bonnier & Layens (+), *Galactites tomentosus* Moench (+), *Lathyrus cicera* L. (+), *Linum usitatissimum* L. subsp. *angustifolium* (Huds.) Thell. (+), *Plantago afra* L. (+), *Tordylium apulum* L. (+). **Rel. 6:** *Allium* sp. (+), *Anemone hortensis* L. subsp. *hortensis* (+), *Biscutella didyma* L. (+), *Crepis* sp. (+), *Euphorbia helioscopia* L. subsp. *helioscopia* (+), *Hypochaeris radicata* L. (+), *Lotus edulis* L. (+), *Parentucellia latifolia* (L.) Caruel (+), *Picris hieracioides* L. subsp. *hieracioides* (+), *Plantago lanceolata* L. (+), *Poa bulbosa* L. subsp. *bulbosa* (1), *Sonchus bulbosus* (L.) N.Kilian & Greuter subsp. *bulbosus* (+), *Trifolium* sp. (+). **Rel. 7:** *Anemone hortensis* L. subsp. *hortensis* (+), *Biscutella didyma* L. (+), *Crepis* sp. (+), *Euphorbia helioscopia* L. subsp. *helioscopia* (+), *Lotus edulis* L. (+), *Parentucellia latifolia* (L.) Caruel (1), *Poa bulbosa* L. subsp. *bulbosa* (1), *Ranunculus* sp. (2), *Trifolium* sp. (2). **Rel. 8:** *Allium* sp. (+), *Carex flacca* Schreb.

subsp. *erythrostachys* (Hoppe) Holub (+), *Coronilla scorpioides* (L.) W.D.J.Koch (+), *Crepis* sp. (+), *Euphorbia helioscopia* L. subsp. *helioscopia* (+), *Lotus edulis* L. (+), *Parentucellia latifolia* (L.) Caruel (+), *Poa bulbosa* L. subsp. *bulbosa* (1), *Trigonella* sp. (+), *Trifolium* sp. (1).

Table 2: **Rel. 1:** *Erodium cicutarium* (L.) L'Hér. (1), *Geranium molle* L. (1), *Heliotropium europaeum* L. (+), *Lobularia maritima* (L.) Desv. (+), *Lysimachia arvensis* (L.) U. Manns and Anderb. subsp. *arvensis* (+), *Medicago* sp. (+), *Orobancha minor* Sm. (+), *Plantago coronopus* L. (+), *Sherardia arvensis* L. (+). **Rel. 2:** *Erodium botrys* (Cav.) Bertol. (2), *Fumaria capreolata* L. subsp. *capreolata* (+), *Geranium molle* L. (+), *Medicago* sp. (+). **Rel. 3:** *Galium aparine* L. (+), *Geranium molle* L. (+), *Serapias* sp. (2). **Rel. 4:** *Erodium botrys* (Cav.) Bertol. (1), *Geranium molle* L. (+), *Medicago* sp. (+), *Serapias* sp. (+). **Rel. 5:** *Anisantha madritensis* (L.) Nevski subsp. *madritensis* (2), *Citrullus colocynthis* (L.) Schrad. (1), *Erodium botrys* (Cav.) Bertol. (+), *Fumaria capreolata* L. subsp. *capreolata* (+), *Plantago coronopus* L. (+). **Rel. 6:** *Calendula arvensis* (Vaill.) L. (1), *Carduus pycnocephalus* L. subsp. *pycnocephalus* (+), *Crepis* sp. (+), *Euphorbia peplus* L. (+), *Medicago arabica* (L.) Huds. (+), *Micromeria graeca* (L.) Benth. ex Rchb. s.l. (+), *Petrosedum rupestre* (L.) P.V.Heath (1), *Poa bulbosa* L. subsp. *bulbosa* (1), *Raphanus raphanistrum* L. subsp. *landra* (Moretti ex DC.) Bonnier & Layens (1), *Silene vulgaris* (Moench) Garcke subsp. *tenoreana* (Colla) Soldano & F.Conti (+), *Trigonella* sp. (+), *Veronica cymbalaria* Bodard subsp. *cymbalaria* (+). **Rel. 7:** *Euphorbia peplus* L. (+), *Poa bulbosa* L. subsp. *bulbosa* (1), *Trigonella* sp. (+). **Rel. 8:** *Petrosedum rupestre* (L.) P.V.Heath (+), *Poa bulbosa* L. subsp. *bulbosa* (+). **Rel. 9:** *Campanula erinus* L. (+), *Catapodium rigidum* (L.) C.E.Hubb. subsp. *rigidum* (+), *Euphorbia peplus* L. (+), *Holcus lanatus* L. subsp. *lanatus* (+), *Lobularia maritima* (L.) Desv. (1), *Lysimachia arvensis* (L.) U.Manns and Anderb. subsp. *arvensis* (+), *Micromeria graeca* (L.) Benth. ex Rchb. s.l. (+), *Petrosedum rupestre* (L.) P.V.Heath (1), *Poa bulbosa* L. subsp. *bulbosa* (+), *Serapias* sp. (+), *Sonchus asper* (L.) Hill subsp. *asper*, *Trigonella* sp. (1). **Rel. 10:** *Crepis* sp. (+), *Euphorbia peplus* L. (+), *Lysimachia arvensis* (L.) U.Manns & Anderb. subsp. *arvensis* (+), *Petrosedum rupestre* (L.) P.V.Heath (+), *Poa bulbosa* L. subsp. *bulbosa* (+), *Serapias* sp. (+), *Sonchus asper* (L.) Hill subsp. *asper* (+), *Spartium junceum* L. (+). **Rel. 11:** *Crepis* sp. (+), *Petrosedum rupestre* (L.) P.V.Heath (+), *Poa bulbosa* L. subsp. *bulbosa* (1), *Serapias* sp. (+), *Trigonella* sp. (+), *Vicia pseudocracca* Bertol. (1). **Rel. 12:** *Allium triquetrum* L. (+), *Centranthus calcitrapae* (L.) Dufur. subsp. *calcitrapae* (+), *Cerastium glomeratum* Thuill. (+), *Dactylis glomerata* L. s.l. (+), *Geranium molle* L. (+), *Geranium purpureum* Vill. (+), *Petrosedum rupestre* (L.) P.V.Heath (+), *Polycarpon tetraphyllum* L. (+), *Senecio vulgaris* L. (+), *Sherardia arvensis* L. (+), *Vicia disperma* DC. (+). **Rel. 13:** *Centranthus calcitrapae* (L.) Dufur. subsp. *calcitrapae* (+), *Geranium purpureum* Vill. (+), *Petrosedum rupestre* (L.) P.V.Heath (1), *Senecio vulgaris* L. (+), *Veronica arvensis* L. (+), *Vicia disperma* DC. (+).

References

- Hauk, W.D.; Park, C.R.; Chase, M.W. Phylogenetic studies of Ophioglossaceae: Evidence from *rbcL* and *trnL-F* plastid DNA sequences and morphology. *Mol. Phylogenet. Evol.* **2003**, *28*, 131–151. [https://doi.org/10.1016/S1055-7903\(03\)00032-0](https://doi.org/10.1016/S1055-7903(03)00032-0).
- Smith, A.R.; Pryer, K.M.; Schuettpelz, E.; Korall, P.; Schneider, H.; Wolf, P.G. A classification for extant ferns. *Taxon* **2006**, *55*, 705–731. <https://doi.org/10.2307/25065646>.
- Brana, S.; Vuković, N.; Kaligarič, M. Least adder's-tongue (*Ophioglossum lusitanicum* L.) in Croatia—Distribution, ecology and conservation. *Acta Bot. Croat.* **2014**, *73*, 471–480. <https://doi.org/10.2478/botcro-2014-0015>.
- Khandelwal, S. Chromosome evolution in the genus *Ophioglossum* L. *Bot. J. Linn. Soc.* **1990**, *102*, 205–217. <https://doi.org/10.1111/j.1095-8339.1990.tb01876.x>.
- Medjahdi, B.; Letreuch-Belarouci, A.; Prelly, R. Actualisation du catalogue des pteridophytes du Nord-ouest algerien (Region de Tlemcen). *Acta Bot. Malacitana.* **2013**, *38*, 33–39.
- Prelli, R. *Les Fougères et plantes alliées de France et d'Europe occidentale*; Belin, Paris, 2001.
- Naqinezhad, A.R.; Kavousi, K. The easternmost distribution of *Ophioglossum lusitanicum* L. (Ophioglossaceae), new to flora of Iran. *Iran J. Bot.* **2004**, *10*, 167–171.
- Bartolucci, F.; Peruzzi, L.; Galasso, G.; Albano, A.; Alessandrini, A.; Ardenghi, N.M.G.; Astuti, G.; Bacchetta, G.; Ballelli, S.; Banfi, E.; et al. An updated checklist of the vascular flora native to Italy. *Plant Biosyst.* **2018**, *152*, 179–303. <https://doi.org/10.1080/11263504.2017.1419996>.
- Conti, F.; Manzi, A.; Pedrotti, F. *Liste Rosse Regionali delle Piante d'Italia*; WWF Italia, Società Botanica Italiana, CIAS, Univ.: Camerino, Italy, 1997; p. 139.

10. Beccarisi, L.; Chiriaco, L.; Marchiori, S.; Medagli, P. Felci (Filicopsida) spontanee del Salento (Puglia, Italia). *Inform. Bot. Ital.* **2001**, *33*, 341–349.
11. Perrino, E.V.; Signorile, G.; Marvulli, M. A first checklist of the vascular flora of the Polignano a Mare coast (Apulia, southern Italy). *Nat. Croat.* **2013**, *22*, 295–318.
12. Perrino, E.V.; Wagensommer, R.P.; Silletti, G.N.; Signorile, G.; Angiulli, F. Nuovi dati distributivi e relazione con la Direttiva 92/43/CEE di taxa critici pugliesi dalla Provincia di Bari. *Inform. Bot. Ital.* **2013**, *45*, 53–62.
13. Licht, W.; Wagensommer, R.P. *Flora Vascolare del Gargano e delle Isole Tremiti. Chiavi Analitiche per la Determinazione*; Biblioteca Verde del Parco Nazionale del Gargano, G., Ed.; Parco Nazionale del Gargano, Foggia, Italy, 2020; pp. 955+LXIV.
14. Brullo, S.; Minissale, P. Considerazioni sintassonomiche sulla classe *Isoeto-Nanojuncetea*. *Itinera Geobot.* **1998**, *11*, 263–290.
15. Tomaselli, V.; Beccarisi, L.; Brullo, S.; Cambria, S.; Forte, L.; Minissale, P.; Veronico, G. Phytosociological research on temporary ponds in Apulia (southern Italy). *Mediterr. Bot.* **2020**, *41*, 15–41. <https://doi.org/10.5209/mbot.63617>.
16. Brullo, S.; Brullo, C.; Sciandrello, S.; Tavilla, G.; Cambria, S.; Tomaselli, V.; Ilardi, V.; Giusso del Galdo, G.; Minissale, P. The Plant Communities of the Class *Isoeto-Nanojuncetea* in Sicily. *Plants* **2022**, *11*, 1214. <https://doi.org/10.3390/plants11091214>.
17. Rivas Goday, S. Revision de las comunidades hispanas de la clase *Isoeto-Nanojuncetea* Br.-Bl. et Tx. 1943. *Anal. Inst. Bot. Cavanilles* **1970**, *27*, 225–276.
18. De Foucault, B. Les végétations herbacées basses amphibies: Systématique, structuralisme, synsystème. *Dissert. Bot.* **1988**, *121*, 1–150.
19. Ballesteros, I.; Sagarra, E. Sobre l'estructura i la dinàmica de les comunitats terofítiques humides (classe *Isoeto-Nanojuncetea*) i els pradells amb *Ophioglossum lusitanicum* L. del Massís de Cadiretes (la Selva). *Collect. Bot.* **1984**, *15*, 39–57.
20. European Commission. Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora, 1995–2007. Available online: <http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31992L0043:EN:HTML> (accessed on 9 October 2022).
21. Braun-Blanquet, J. *Plant Sociology*; McGraw-Hill: New York, NY, USA, 1932; p. 439.
22. Thiers, B. *Index Herbariorum: A Global Directory of Public Herbaria and Associated Staff* [Continuously Updated]. Available online: <http://sweetgum.nybg.org/ih/> (accessed on 3 November 2022).
23. Foggi, B.; Cartei, L.; Pignotti, L.; Signorini, M.A.; Viciani, D.; Dell'Olmo, L.; Menicagli, E. Il paesaggio vegetale dell'Isola d'Elba (Arcipelago Toscano). Studio fitosociologico e cartografico. *Fitosociologia* **2006**, *43*, 3–95.
24. Médail, F.; Pavon, D.; Lo Cascio, P.; Pasta, S. Sulla presenza di *Ophioglossum lusitanicum* L. (Psilotopsida) nell'isola di Vulcano e aggiunte alla flora vascolare delle Isole Eolie (Sicilia nord-orientale). *Nat. Sicil.* **2016**, *S. IV, XL*, 51–66.
25. Tutin, T.G.; Heywood, V.H.; Burges, N.A.; Moore, D.M.; Valentine, D.H.; Walters, S.M.; Webb, D.A. *Flora Europaea 1-5*, 1st ed.; Cambridge University Press: Cambridge, UK, 1968–1980.
26. Pignatti, S.; Guarino, R.; La Rosa, M. *Flora d'Italia 1-4*; Edagricole: Bologna, Italy, 2017–2019.
27. Galasso, G.; Conti, F.; Peruzzi, L.; Ardenghi, N.M.G.; Banfi, E.; Celesti-Grappow, L.; Albano, A.; Alessandrini, A.; Bacchetta, G.; Ballelli, S.; et al. An updated checklist of the vascular flora alien to Italy. *Plant Biosyst.* **2018**, *152*, 556–592. <https://doi.org/10.1080/11263504.2018.1441197>.
28. Addinsoft. *XLSTAT Statistical and Data Analysis Solution*; Version 2022.4.1. Available online: <https://www.xlstat.com/en/> (accessed on 3 November 2022).
29. Van der Maarel, E. Transformation of cover-abundance values in phytosociology and its effects on community similarity. *Veg-etatio* **1979**, *39*, 97–114.
30. Carta, A.; Pierini, B.; Peruzzi, L. Distribuzione di *Ophioglossum lusitanicum* L. (Psilotopsida) in Toscana. *Inform. Bot. Ital.* **2008**, *40*, 135–141.
31. Medjahdi, B.; Letreuch-Belrouci, A.; Babali, I. Une Nouvelle station d'*Ophioglossum lusitanicum* L. en Oranie (Algérie Occidentale). *Acta Bot. Malacit.* **2018**, *42*, 177–179. <https://doi.org/10.24310/abm.v42i1.3297>.
32. Stinca, A. Rediscovery of two presumably extinct plant vascular species in Mt. Vesuvius, Italy. *Plant Sociol.* (in press).
33. Giovannini, A.; Pierini, B. *Ophioglossum* (Ophioglossaceae, Polypodiophyta) sul Monte Pisano. Due nuove stazioni di *O. azoricum* e di *O. vulgatum*. *Atti. Soc. Tosc. Sci. Nat. Mem. Serie B* **2006**, *113*, 67–68.