

An annotated key to the species of *Gastridium* (Poaceae) with distributional novelties to the Italian territory

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Abstract - *Gastridium* is a Mediterranean-paleotropical genus of the Poaceae family, native to Italy. Species number and diversity were imperfectly known until recent taxonomic updates on morphological and molecular basis that enhanced our knowledge of this *taxon*. The present contribution provides a complete key of the genus, encompassing the four currently known closely related species, *G. lainzii*, *G. phleoides*, *G. scabrum*, and *G. ventricosum*. The essential features of panicle, spikelets, and florets are specified and briefly discussed. Revisions of ancient and recent herbarium specimens provided three Italian distributional novelties for *G. phleoides* concerning Liguria, Campania, and Puglia and two for *G. scabrum* concerning Liguria and Basilicata. In contrast, the distributional ranges of *G. scabrum* and *G. lainzii* in the W Mediterranean region remain poorly known and await further investigations.

Key words: *Gastridium*, identification key, Italy, new records, Spain, taxonomic characters.

Riassunto - Una chiave annotata per le specie di *Gastridium* (Poaceae) con novità circa la sua distribuzione nel territorio italiano.

Gastridium è un genere mediterraneo-paleotropico della famiglia delle Poaceae, autoctono in Italia. Il numero e la diversità di specie erano conosciuti in modo imperfetto fino ai recenti aggiornamenti tassonomici su base morfologica e molecolare che hanno migliorato le nostre conoscenze su questo *taxon*. Il presente contributo fornisce una chiave completa del genere, che comprende le quattro specie attualmente conosciute, strettamente correlate, *G. lainzii*, *G. phleoides*, *G. scabrum* e *G. ventricosum*. Vengono indicate e brevemente discusse le caratteristiche essenziali di pannocchia, spighe e fiori. La revisione di antichi e recenti esemplari di erbario ha fornito per il territorio italiano tre novità distributive relative a *G. phleoides* riguardanti Liguria, Campania e Puglia e due relative a *G. scabrum* riguardanti Liguria e Basilicata. Al contrario, gli areali di *G. scabrum* e *G. lainzii* nella regione mediterranea occidentale rimangono poco conosciuti e richiedono ulteriori indagini.

Parole chiave: caratteri tassonomici, chiave di identificazione, *Gastridium*, Italia, nuove segnalazioni, Spagna.

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INTRODUCTION

Gastridium P.Beauv. is a Mediterranean-paleotropical genus (Pignatti, 1982; Bolòs & Vigo, 2001) of the Poaceae family (subfamily Pooideae Benth., tribe Poeae R.Br., subtribe Agrostidinae Fr.), sister of the monotypic, Mediterranean and Irano-Turanian genus *Triplachne* Link (Clayton & Renvoize, 1986; Quintanar *et al.*, 2007; Saarela & Graham, 2010; Soreng *et al.* 2015). It is represented by few, somewhat similar, annual species inhabiting ephemeral grasslands, shrubby pastures, garrigues, forest clearings, hedges, path sides (Scoppola & Cancellieri, 2019). According to Kellogg (2015), the genus comprises two traditionally well-known species from Europe, North Africa, and the Middle East: the Circum-Mediterranean-Paleotropical *G. ventricosum* (Gouan) Schinz & Thell. (\equiv *Agrostis ventricosa* Gouan), and the (Steno)-Mediterranean *G. phleoides* (Nees & Meyen) C.E.Hubb (\equiv *Lachnagrostis phleoides* Nees & Meyen) (cf. Doğan, 1985; Scholz, 1986, 1998; Scoppola *et al.*, 2017; Romero García, 2019). Nevertheless, literature on Mediterranean flora consistently shows evidence of additional morpho-ecological variation within the genus, suggesting the occurrence of further taxa, generally overlooked in taxonomic authorities such as IPNI (www.ipni.org), The Plant List (www.theplantlist.org), and Tropicos (www.tropicos.org), all accessed on March 2019, and in some major treatments (Scholz, 1986; Valdés & Scholz, 2009; Le Floch *et al.*, 2010). An improved taxonomic framework of the genus was recently derived from the patterns of DNA diversity existing at two plastid (trnH-psbA, trnL-F) and one nuclear (ITS) DNA markers (Cardoni & Simeone *in litt.*, 2019). Notably, this study demonstrated that morphological diversity has consistent molecular grounds in both genomes, and likely subtend the existence of more objective species than currently acknowledged. Authors of some traditional and recent Mediterranean floras regarded as distinct species of the genus *Gastridium* three entities (*e.g.*, Doğan, 1985; Feinbrun-Dothan, 1986; Dimopoulos *et al.*, 2013; Tison & De Foucault, 2014; Tison *et al.*, 2014; Pignatti, 2017). This additional entity is the N Steno-Mediterranean *G. scabrum* C.Presl, whose name was either treated as a heterotypic synonym of *G. ventricosum* or even included in it as an illegitimate or an invalid name (cf. Tutin, 1980; Valdés & Scholz, 2009;

WCSP, 2018; Romero García, 2019). It was validly and effectively published in 1818 by C. Presl, as highlighted by Scoppola & Cancellieri (2019) who also confirmed a taxonomically satisfying circumscription of *G. scabrum* at the species level and provided useful morphological characters discriminating the three species. A fourth species, *G. lainzii* (Romero García) Romero Zarco (\equiv *Gastridium phleoides* subsp. *lainzii* Romero García), has the most restricted distribution area within the genus and is still treated as a subspecies of *G. phleoides* in the quoted taxonomic authorities. It is known to occur on SW Iberian Peninsula, in Badajoz, Cordoba, Huelva, Malaga, Seville and Cadiz Provinces and on N Morocco (Romero García, 1996, 2019; Romero Zarco, 2013; López Tirado & Scoppola, 2017), although Pike (2007) has proposed to extend its distribution also to Portugal. In the Iberian Peninsula *G. phleoides* and *G. ventricosum* are also known and regarded as distinct species (Romero García, 2019), while *G. scabrum* is treated as a synonym of *G. ventricosum*. All three species have been reported within the Italian territory (Giardina *et al.*, 2007; Arrigoni, 2015; Pignatti, 2017; Bartolucci *et al.*, 2018), where the occurrence of *G. scabrum* in Tuscany and *G. phleoides* in Campania remains somewhat unclear (Bartolucci *et al.*, 2018). No author has ever questioned the specific autonomy or given doubtful occurrences, of *G. ventricosum*. The close relationships highlighted between *Triplachne nitens* (Guss.) Link and *Gastridium*, particularly *G. lainzii* (Quintanar *et al.*, 2007; Saarela & Graham, 2010; Saarela *et al.*, 2017; Cardoni & Simeone *in litt.*, 2019) reflect previous ideas and current observations about their morpho-ecological similarity (Clayton & Renvoize, 1986; Romero García, 1996; Pyke, 2008; Scoppola & Cancellieri, 2019) that even led Romero Zarco (2015) to include *Triplachne* within *Gastridium* (*G. nitens* (Guss.) Coss. & Durieu). Their precise affinities and the possible role of *T. nitens* in the origin of *G. lainzii* still remain unclear.

The main obstacles to an unambiguous solution of current knowledge gaps can be tracked both in the considerable, sometimes overlapping variation exhibited by some diagnostic characters traditionally reported in literature (*e.g.*, panicle shape, ligule length; cf. Scholz, 1986; Jauzein, 2003) and in the incomplete keys that have complicated the task of identifying old and new material, thus increasing confusion. Even the recent revision by Scoppola & Cancellieri (2019) did not include a full key of the genus. Accordingly, the present contribution aims to provide an updated identification key to the species of the genus *Gastridium* at a European scale, including *Triplachne*, and to refine its Italian distribution through a critical examination of selected specimens from some main herbaria, and recent plant collections from central Italy.

MATERIALS AND METHODS

Specimens belonging to the Mediterranean *Gastridium* taxa were selected among the revised exsiccata in CLU, FI, GE, HLUC, MSNM, PAL, PI, RO, SIENA, SS, UTV herbaria (acronyms according to Thiers, 2018). The specimens of *G. lainzii*, recently collected for our mole-

cular taxonomic studies, were also selected from UTV. Caryopses of *G. scabrum* from central Italy and Turkey were germinated in the greenhouse for subsequent observations. High-definition images of glumes and dispersal units of *G. lainzii* were obtained using a Leica IC80 HD digital camera under a Leica M60 stereo-microscope and processed using the application LAS V-3.8. Images of the other species were selected from our archives. Species delimitation was performed based on Scoppola & Cancellieri (2019) and by means of a critical examination of relevant and type material available in the herbaria B, CAS, HAL, PRC, SE, and W (online). Unfortunately, the type of *G. ventricosum* (lectotype indicated by Doğan 1985: 359: A. Gouan in K) could not be checked. Overall, more than 200 specimens were revised. The most significant are reported in the ‘Selected specimens examined’ section.

IDENTIFICATION KEY TO THE SPECIES OF THE GENUS *GASTRIDIMUM*, INCLUDING THE GENUS *TRIPLACHNE*

The present key refers to a comprehensive combination of reliable features allowing a consistent circumscription of the four species. It can be useful for a quick recognition of *Gastridium* variability at a larger scale. It mostly results from the check of fresh and dried material (see ‘Selected specimens examined’) and of several digital images used in previous studies, as well as from the essential features published by Scoppola & Cancellieri (2019), and by previous partial keys. More specifically, all species have dense (or lobed) spiciform panicles (Fig. 1) with 1-flowered awned and unawned spikelets, with a different rate of heterodiaspory (Tzvelev, 1976; Scholz, 1986) in any given panicle. Surprisingly, in the recent *Flora d’Italia* (Pignatti, 2017, 2019) the heterodiaspory has not been properly interpreted: the key first splits the species based on the presence, in the same panicle, of only awned (*G. ventricosum*, *G. phleoides*) or unawned lemmas (*G. scabrum*, “resta mancante”), as also reported by Tison *et al.* (2014), thus indicating *G. scabrum* as having only unawned florets. Our observations provide for this species 2-5% of awned spikelets in agreement with Tzvelev (1976).

The main diagnostic characters (to be observed on spikelets with mature caryopses) are summarized as follows: 1) The dorsal awn position: in *Gastridium* just below the apex of the lemma (subterminal), in *Triplachne* from near the base. 2) Glumes shape and length (Fig. 1): half the width of glumes measured at 1 mm from the apex was significantly different among species (even more if associated to the glume length), and determinant in distinguishing *G. phleoides* from *G. scabrum*. 3) The awn length and consequently the awn portion protruding from panicle: it is determinant in distinguishing *G. phleoides* and *G. lainzii* from *G. ventricosum*; note that the measures reported for the various species could be affected by underestimates derived from measurements of not entirely mature florets. 4) The dense roughness on the lemma surface: it can be used to distinguish *G. ventricosum* from the other species (Fig. 2). 5) The hairiness (hairs or bristles) pattern on the lemma surface in both awned and unawned florets (Fig. 2); note that data on the hairiness of unawned



Fig. 1 - Comparison of the panicle details in the studied species. From left to right, above: *G. scabrum*, *G. ventricosum* (dense), *G. ventricosum* (lobed); *G. phleoides*; below: *G. scabrum*; *G. ventricosum*, *G. lainzii*, *G. phleoides*. The images were obtained using a high-resolution flatbed digital scanner (scale bar = 1 cm).

lemmas in *G. lainzii* are based only on observations of the material in UTV as no information is reported in the literature. 6) The awned lemmas with four evident *setae* at the apex of which the laterals are larger, in addition to the dorsal subterminal awn: this character is determinant to distinguish *G. lainzii* from the other congeners and from *Triplachne*.

Identification key

- 1 - Panicles narrow, cylindrical, dense to lobed; glumes clearly swollen below; lemma with a geniculate dorsal awn rising (when present) just below the apex 2
- 2 - Glumes lanceolate, narrow (half the width of the upper glume 0.20-0.27 mm by mean), scabrid mostly on the keel, unequal in both spikelet types; lower glume acuminate-subulate. Most florets with awned and hairy/bristly lemmas. Spiciform panicles usually well-spaced, lax and lobed during anthesis, with spikelets shortly (or not) pedicellate 3
- 3 - Lower glume (3.0) 3.5-5.5 mm, acuminate; upper glume 2.5-3.5 (4.0) mm. Lemma surface always densely, minutely rough upwards (slightly tuberculate at magnification $\times 40$); hairiness (when present) distributed only on the upper third of lemma, margins or callus, never on the whole surface. Awn (2.0) 2.5-4.5 (5.0) mm, scarcely

- protruding from panicle. Caryopsis obovate-elliptic. Ligule of the upper leaves usually short (2.0-4.0 mm) ***Gastridium ventricosum***
- 3' - Glumes larger; lower glume subulate. Lemma surface smooth and with a different distribution pattern of hair and bristles. Awn larger and greatly protruding from panicle. Caryopsis elliptic-fusiform. Ligule of the upper leaves usually longer (3.0-7.0 mm) 4
 - 4 - Lower glume 4.5-7.5 mm, upper glume (3.0) 3.5-6.0 (6.5) mm. Lemmas 1.0-1.5 mm: awned lemma entirely bristly, truncate-toothed at the apex (*setae* max 0.1 mm); unawned lemmas completely, or rather completely, smooth, entirely densely bristly or glabrous. Awn (4.0) 4.5-7.5 mm ***Gastridium phleoides***
 - 4' - Lower glume 6.0-7.0 (7.5) mm; upper glume 4.5-5.0 (6.0) mm. Awned lemma 1.5-2.3 (2.5) mm, entirely bristly, toothed at the apex by four *setae* of which the laterals are larger (0.5-1.0 mm); unawned lemmas smooth and predominantly glabrous, shorter, and toothed at the apex. Awn 7.5-8.0 (9.0) ***Gastridium lainzii***
 - 2' - Glumes broadly lanceolate (half the width of the upper glume 0.34-0.37 mm by mean), scabrid on the surface and keel, sub-equal at least in unawned spikelets; lower glume merely acute, 3.0-5.0 mm, upper glume

(2.0) 2.5-4.0 mm. Most of the florets with unawned lemmas, glabrous and smooth; awned lemmas (awn 3.5-5.0 mm) usually entirely densely bristly. Spiciform panicles usually slightly spaced, rather contracted even during flowering, with spikelets densely overlapping ***Gastridium scabrum***

1' - Panicles dense, ovoid to fusiform; glumes not clearly swollen below; lemma with a geniculate dorsal awn from near the base and two outer, long, apical setae, about as long as lemma ***Triplachne nitens***

Italian distributional novelties

The possible cause of knowledge gaps and doubts reported in the Italian literature over the years (Pignatti, 1982, 2017; Scholz, 1998; Conti *et al.*, 2005; Giardina *et al.*, 2007) was the problematic identification of *G. phle-*

oides compared to the closest congeneric *G. ventricosum*. This statement is easily deduced from Table 1 in Scoppola & Cancellieri (2019) suggesting that over 40% of the names under which the specimens (both ancient and current) were stored in the quoted herbaria was different from the concerned species, and the percentage rises to 88% considering only *G. phleoides*.

G. phleoides was already cited for Veneto (Masin & Tietto, 2006) and Sardinia (Scholz, 1998; Lazzeri *et al.*, 2013). Our revisions and field surveys started in 2015 and led to reporting the species in Tuscany, Lazio, Campania (only ancient data), Calabria, and Sicily (Scoppola *et al.*, 2017). The new Italian Checklist (Bartolucci *et al.*, 2018) has further updated its occurrence, confirming this distribution. Based on the latest revisions, a new update is here provided for *G. phleoides*, with three new regional records in mainland Italy. The historical

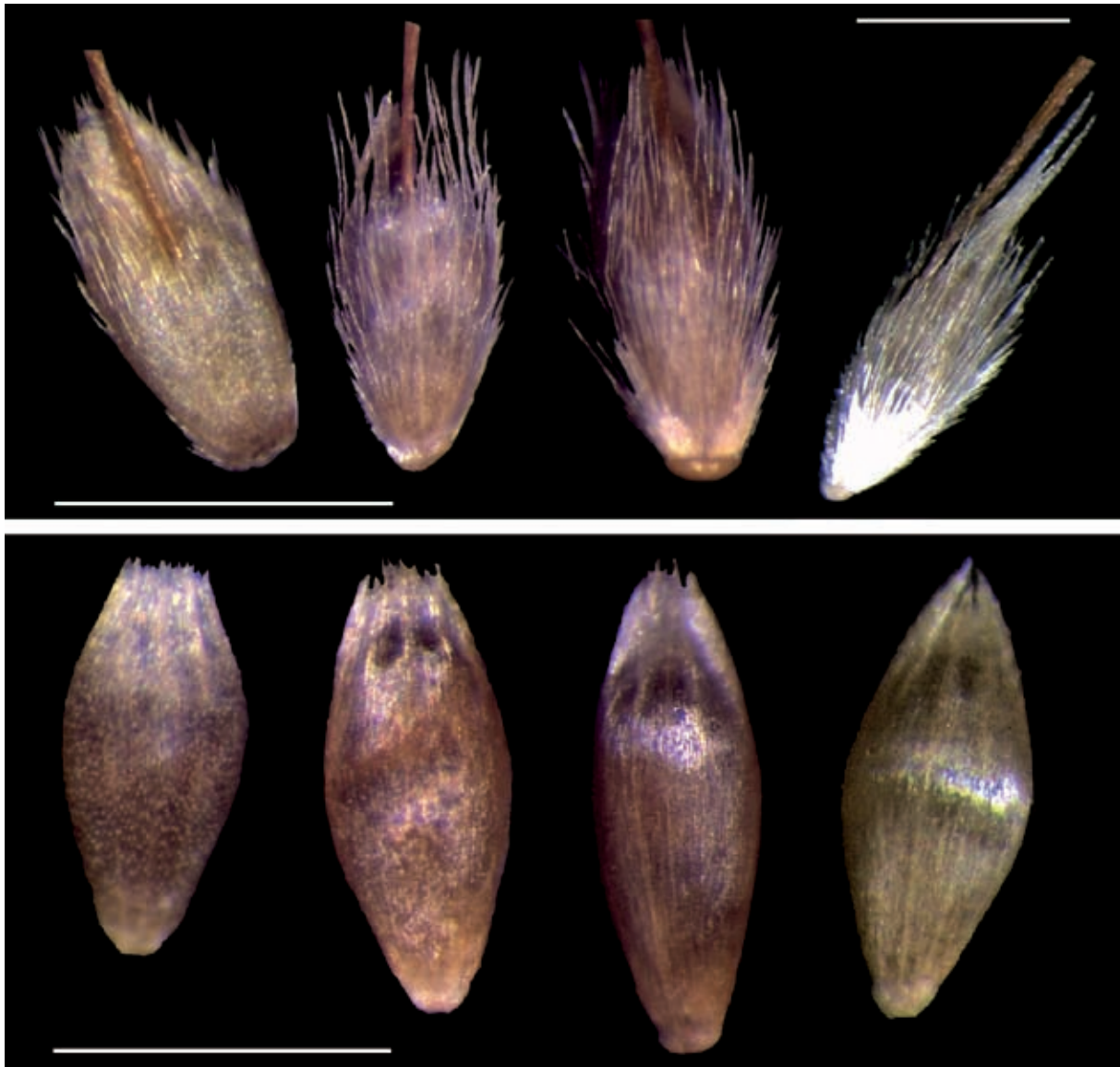


Fig. 2 - Distribution patterns of hairiness and roughness in the awned (above) and unawned (below) dispersal units of the studied species. From left to right: *G. ventricosum*; *G. phleoides*; *G. scabrum*; *G. lainzii*. The photos were taken using a stereomicroscope with integrated high-resolution digital camera (scale bar = 1 mm).

presences in Liguria (Varazze, 1923, *legit* Gresino) and Puglia (Leucaspide, 1877, *legit* Profeta; Otranto, 1880, *legit* Profeta) are due to specimens revised in FI. The record in Puglia has been confirmed by recent occurrences highlighted by three exsiccata in MSNM (Capo d'Otranto, 1986, *legit* Banfi sub *G. scabrum*; S. Isidoro, 1991, *legit* Banfi; Salento, 1992, *legit* Galasso sub *G. ventricosum*). The ancient presence in Campania is here confirmed by a specimen revised in HLUC (Acciaroli, Cilento, 2004, *legit* Rosati *G. ventricosum*) and the recent finding by A. Stinca (Caserta, 2016, PORUN). The wide diffusion of *G. phleoides* on the middle and lower Tyrrhenian side, including islands, is supported by many other specimens (ancient and recent) found in the quoted herbaria and coming from Tuscany, Lazio, Calabria, Sicily, and Sardinia (see 'Selected specimens examined').

According to Bartolucci *et al.* (2018), *G. scabrum* is confirmed in Lazio, Molise, Puglia, Calabria, Sicily, and Sardinia. We could not find recent specimens about from Sardinia, although the species was already mentioned by Pignatti (1982) and by Conti *et al.* (2005). The possible presence on Elba island, originally reported by Sommier (1903) and not confirmed thereafter (cf. Carta *et al.*, 2018), remains to be validated by future findings. We report two new records for Liguria and Basilicata. The first is related to an ancient regional presence due to old specimens, correctly identified, preserved at GE and FI (Bordighera, 1901, Herb. Bicknell); its current presence, therefore, requires confirmation. The second refers to a unique sample, correctly identified, stored at HLUC (Trivigno, 1979, *legit* Aita) which, although presenting a good affinity to *G. scabrum*, shows a slightly rugged surface of the lemmas (possible transitional form towards *G. ventricosum*?). *G. scabrum* is somewhat rare in mainland Italy and the main islands (Pignatti, 2017), as well as in France, where it is considered in regression (Tison *et al.*, 2014).

CONCLUSIONS

Based on the above considerations, we believe that the newly provided key can allow a better assessment of the distribution of the genus. Overall, the knowledge of *G. scabrum* in the W Mediterranean region needs more accurate field research; in Italy, it could be found for example in the dry pastures on the clays of the sub-coastal plains of Tuscany and Campania and deserves to be confirmed in Sardinia. New records are also required to precisely evaluate the distribution of *G. phleoides*, currently spreading in the Mediterranean area. It should be searched for example in the uncultivated thermophilous and semi-ruderal grasslands in Molise and Basilicata, on siliceous sandy soils. Our current field studies are focused on clarifying unresolved issues and updating records on both species. *G. ventricosum* remains, however, the most widespread in the whole Italian territory.

Finally, special efforts are needed to explore the real distribution of *G. lainzii* in the W Mediterranean, taking in proper consideration that only a careful check can help to distinguish this species from *G. phleoides*.

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APPENDIX - Selected specimens examined.

Gastridium lainzii (Romero García) Romero Zarco – **SPAIN**. Sevilla. Constantina. Carretera de la Puebla de los Infantes, km 12, 17 June 1978, *E. Tello* (SEV digital image! sub *G. phleoides* subsp. *lainzii* rev.); Córdoba. Entre Rute y Carcabuey, a 7 km de Rute, 17 June 1982, *J.E. Pastor & B. Valdés* (SEV digital image!); Cádiz, loc. Puerto de Gáliz (Cádiz), 9 July 2017, *J. López Tirado* (UTV!); Nava de Cabra (Cabra, Córdoba), 29 June 2018, *J. López Tirado* (UTV! transitional form).

Gastridium phleoides (Nees & Meyen) C.E.Hubb. – **MOROCCO**. In Atlantis Medii montibus supra urbem Taza, 18 June 1925, *R. Maire* (RO! sub *G. lendigerum*). **FRANCE**. Levie (Corse), rive gauche du Fiumicicoli, en amont du pont de Pargula (route D59), 18 June 1995, *R. Deschâtres* (MSNM!). **SPAIN**. Ctra. Aldemaqueada - Castellar de Santiago (Jaén), 31 May 2018, *J. López Tirado* (UTV!); Venta de Curro Fal (Sevilla), 1 June 2018, *J. López Tirado* (UTV!); Córdoba, loc. Cruce carretera Santo Domingo, 5 June 2017, *J. López Tirado* (UTV!). **ITALY**. **Veneto**: Colli Euganei (Padova), June 2001, *R. Masin* (MSNM!); **Liguria**. Varazze, 4 July 1923, *G. Gressino* (FI! sub *G. lendigerum*); **Tuscany**: In apricis insulae Gorgoniae, July 1840, *P. Savi* (FI! sub *G. lendigerum*); In promontorio Argentario, verso il telegrafo, 3 July 1886, *E. Levier & S. Sommier* (FI! sub *G. lendigerum*); Isola del Giglio, fra il porto e il paese, 7 July 1898, *S. Sommier* (FI! sub *G. lendigerum*); Gorgona, sopra Cala Maestra, 18 August 1886, *G. Arcangeli* (PI! sub *Gastridium*); In-sula Pianosa, 18 May 1909, *S. Sommier* (FI!, PI! sub *G. lendigerum*); Punta Ala, Grosseto, 19 July 2000, *E. Banfi* (MSNM! sub *G. ventricosum*); Mti di Castro, Loc. Campigliola, Manciano, 9 June 1015, *A. Scoppola* (UTV!); **Lazio**: Fra Monte Porcino e Riserva delle Saliere [Sezze], 8 August 1894, *T.A. Baldini* det. *G. Lusina* (RO! sub *G. lendigerum* subfo. *luxurians* Lusina); Velletri, Regione Morice, 21 July 1939, *S. Senni* (FI! sub *G. lendigerum*); Farfa-Toffia-Fara Sabina, 16 June 1959, *B. Anzalone* (RO! sub *G. ventricosum*); Isola di Zannone, Arcip. Ponziano, 22 May 1968, *B. Anzalone* (RO! sub *G. ventricosum*); Barbarano Romano (Viterbo), loc. Campecora, 17 July 2008, *A. Scoppola* (UTV! sub *G. ventricosum*); Sughereta di Fossanova, Priverno, 16 July 2017, *A. Scoppola* (UTV!); Mti di Castro, Ischia di Castro (Viterbo), 17 July 2017, *A. Scoppola* (UTV!); Piana di Cervaro, S. Giovanni Incarico (Frosinone), 2 June 2018, *A. Scoppola* (UTV!); Vigna di Valle, Bracciano (Roma), 10 June 2018, *A. Scoppola* (UTV!); **Campania**: Palmarola, 16 May 1900, *A. Béguinot* (FI! sub *G. lendigerum*); Scogli di S. Anna, Ischia, 22 June 1907, *M. Guadagno* (PI! sub *G. lendigerum*); Sul Monte Pendolo sopra Gragnano, 6 July 1907, *G. Pellanda* (PI! sub *G. lendigerum* var. *scabrum*); Tifati (Puccianello), 3 July 1927, *L. Grande* (RO! sub *G. ventricosum*); Acciaroli, Cilento, 4 May 2004, *L. Rosati* (HLUC! sub *G. ventricosum*); Caserta (CE), Casino Leonetti, 5 May 2016, *A. Stinca* (PORUN!); **Calabria**: Presso Nicastro, 12 June 1899, *A. Fiori* (FI! sub *G. lendigerum*); San Giovanni in Fiore, a destra del Neto, 18 September 1910, *G. Lopez* (FI! sub *G. lendigerum*); Dintorni di Catanzaro, 5 June 1983, *Andrea Fiori* (FI! sub *G. lendigerum*); Pizzuti,

Cropolati, Cosenza, 2 June 1984, *D. Puntillo* (CLU! sub *G. ventricosum*); Fiumara Trionto, Crosia, Cosenza, 10 June 1993, *L. Bernardo & C. Gangale* (CLU! sub *G. ventricosum*); Eastern part of Aspromonte, Gole Fiumara La Verde, Reggio Calabria, 6 June 1997, VIII Iter Mediterraneum OPTIMA n. 718 (CLU! sub *G. ventricosum*); Dalia Nuova, Aspromonte, 8 July 1999, *E. Banfi* (MSNM! sub *Gastridium*); Aiello Calabro, Loc. Petrone, 1 June 2005, *V. Pignataro* (CLU! sub *G. ventricosum*); Sersale (Catanzaro), Contrada Cippino Sottana, 5 June 2008, *G. Galasso* (MSNM! sub *G. ventricosum*); **Apulia**: Leucaspede, April 1877, *D. Profeta* (FI! sub *G. lendigerum*); Montagna dell'Oro, presso la Palascia, Otranto, May 1880, *D. Profeta* (FI! sub *G. lendigerum*); Capo d'Otranto (Lecce), 13 August 1986, *E. Banfi* (MSNM! sub *G. scabrum*); S. Isidoro (Lecce), 22 May 1991, *E. Banfi* (MSNM! sub *G. ventricosum*); Salento (Lecce), Ugento, 13 August 1992, *G. Galasso* (MSNM! sub *G. ventricosum*); **Sicily**: Sicilia, 1841, *F. Parlatore* (FI! sub *G. lendigerum*). Palermo in collibus, s.d., *V. Riccobono* (PI! sub *G. australe*); Sotto il paese di Pollina, Madonie, 23 May 1989, *F.M. Raimondo & G. Certa* (PAL! sub *G. ventricosum*); Salina, Isole Eolie, 1 June 1990, *E. Lattanzi* (UTV! sub *G. ventricosum*); **Sardinia**: Gallura, Capo Ferro, Tre Monti, June 1893, *A. Vaccari* (B digital image!); Selva dei Sette Fratelli, July 1900, *F. Cavara & R. Pirotta* (FI! sub *Koeleria cristata*); Geremeas [Quartu Sant'Elena], 1-4 June 1904, *A. Casu* (RO! sub *G. lendigerum* forma); Telti, km 21 SS Settenzionale Sarda a Ovest del paese, 21 June 1972, *S. Steinberg & C. Ricceri* (FI! sub *G. ventricosum*); Lula, Monte Albo, Nurai, 22 June 1978, *I. Camarda* (SS! sub *G. ventricosum*); Mte Arci, Oristano, 25 July, 1981, *E. Banfi* (MSNM! sub *G. ventricosum*).

Gastridium scabrum C.Presl – **TURKEY**. Bornova, Izmir, 2 July 2019, *A. Scoppola* (UTV! specimen obtained from caryopses provided by the U.S. National Plant Germplasm System [1 April 1953, *R.K. Godfrey*] and germinated in pot. **ITALY**. **Liguria**: Bordighera, 7 July 1901, *C. Bicknell* (FI!); Ibidem, 21 July 1903, *L. Pollini* (PI!); **Lazio**: Tivoli, Bagni dell'Acqua Solfa: Lago Colonna, 20 July 1895, *A. Pappi* (RO!); Civitavecchia, 10 July 1900, *G. Parisi* (RO!); S. Severa, Rio Fiume, 9 July 2017, *A. Scoppola* (UTV!); Tolfa, loc. Monte Rosso, lungo la SP 3B, 23 July 2017, *A. Scoppola* (UTV!); San Giovanni Incarico (Frosinone), 3 June 2018, *A. Scoppola* (UTV!); **Basilicata**: Trivigno, 3 July 1979, *L. Aita* (HLUC!); **Calabria**: Marina di Cotrone a Scarzo, 21 June 1911, *G. Lopez* (FI! sub *G. lendigerum*); Via del mare, pr. Crotona, Catanzaro, 26 September 1935, *G. Lusina* (RO sub *Gastridium*); Cosenza, Cetraro, Loc. Santa Lucia, 17 June 2005, *C. Antonucci & L. Peruzzi* (CLU! sub *G. ventricosum*); **Apulia**: Torre del Monte, 23 August 1904, *E. Carano* (RO! sub *G. lendigerum* var. *scabrum*); **Sicily**. Nebrodi: Fiume Troina, 9 June 1990, *F.M. Raimondo et al.* (PAL!); Bosco Favara, Montemaggiore Belsito (Palermo), 1 May 1991, *S. Buscaglia* (PAL!).

Gastridium ventricosum (Gouan) Schinz & Thell. – **ENGLAND**. Inter Slinfold et Horsham in comitatu Sussexia, 15 August 1883, *J.W. White* (RO! sub *G. lendi-*

gerum). **CROATIA**. Isola di Veglia, Quarnaro, 12 August 1920, *G. Lusina* (RO! sub *G. lendigerum*); Lussingrande, 24 May 1945, *G. Lusina* (RO! sub *G. lendigerum*). **FRANCE**. Bougon près de La Mothe-Saint-Héray (Deux-Sèvres), 30 July 1853, *C. Sauzé & P.N. Maillard* (B digital image! sub *G. lendigerum*). **SPAIN**. Córdoba, loc. Torre del Beato (Córdoba), 5 June 2017, *J. López Tirado* (UTV! sub *G. phleoides* cfr.). **ITALY**. **Liguria**: Liguria occidentale (Imperia), Colle Merello sopra Bordighera, 23 June 1993, *G. Barberis, G. Paola & S. Peccenini* (GE! sub *Gastridium*); **Tuscany**: Ponte del Forno, valle del Frigido, 20 June 1936, *P. Pellegrini* (PI! sub *G. lendigerum*); Duna Feniglia, Orbetello, 19 June 2009, *M. Landi* (SIENA!); Promontorio di Punta Falcone, 19 June 2015, *D. Cantini* (SIENA!); Mti di Castro, loc. Campigliola, Manciano, 27 June 2015, *A. Scoppola* (UTV!); **Lazio**: Isola di Zannone, Arcip. Ponziano, 22 May 1968, *B. Anzalone* (RO!); Colle Piseglio, Arcinazzo, 25 June 2011, *E. Lattanzi* (UTV!); Sughereta di Tuscania (Viterbo), 8 June 2017, *A. Scoppola & M. Rodriguez Carracedo* (UTV!); **Abruzzo**: Gran Sasso, Colle S. Marcello, Fano Adriatico (Teramo), 17 June 2010, *E. Lattanzi* (UTV!); **Campania**: In arvis Sannio, Avellino, September 1848, s.n. (FI! sub *Milium lendigerum*); **Basilicata**: Presso Matera, 7 June 1913, *A. Fiori* (FI! sub *G. lendigerum*); **Calabria**: Torre di Ruggero (Catanzaro), 26 July 1983, *D. Puntillo* (CLU!); Pollino, Castrovillari, 6 June 1996, *L. Bernardo & N. Passalacqua* (CLU!); **Apulia**: Isole Tremiti, S. Domino, 30 May 2005, *E. Banfi* (MSNM!); **Sicily**: Monte Cofano, 31 May 1990, *F.M. Raimondo et al.* (PAL!); Gangi, Gurghi di monte Zimmarra, 8 June 1990, *F.M. Raimondo et al.* (PAL!); **Sardinia**: Azienda “Le Progionette”, Capo Caccia, Alghero, 6 June 2001, *A. Scoppola* (UTV!).