EDICIONES COMPLUTENSE

Mediterranean Botany
ISSN-e: 2603-9109

SYSTEMATICS, TAXONOMY, AND NOMENCLATURE

Revisiting *Cytisus x praecox* (Leguminosae), a poorly known natural hybrid

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https://doi.org/10.5209/mbot.98953

Received: 8 November 2024 / Accepted: 11 March 2025 / Published online: 26 May 2025

Abstract. *Cytisus x praecox* Bean, a hybrid between *C. multiflorus* (L'Hér.) Sweet and *C. oromediterraneus* Rivas Mart., T.E. Díaz, Fern. Prieto, Loidi & Penas, is described and discussed respect to the references about its artificial origin. Next to the material indicated as neotype, an epitype and isoepitypes are designated.
Keywords: *Cytisus*, hybrids, Leguminosae, Iberian Peninsula, taxonomy, type material.

How to cite: Galán de Mera, A. & Linares Perea, E. 2025. Revisiting *Cytisus x praecox* (Leguminosae), a poorly known natural hybrid. Mediterr. Bot. 46(1), e98953. https://doi.org/10.5209/mbot.98653

Introduction

The genus *Cytisus* Desf. comprises some 60 species (Mabberley, 2017) of which 14 occur on the Iberian Peninsula (Talavera, 1999). The presence of natural hybrids among *Genisteae* (Adans.) Benth. species is known and interpreted as an evolutionary mechanism within the tribe (Kleist & Jasieniuk, 2011). In the Iberian Peninsula, several authors described new hybrids in *Genista* L. (Elorza Gabilondo *et al*., 2018). In *Cytisus,* Cabezas Lefler *et al*. (1987) collected *Cytisus x praecox* Bean in the mountains of Sanabria (Zamora), while Talavera (1999) reports it only in the Spanish Sistema Central (without the name of the nothospecies). Some researchers of Iberian vegetation (Sánchez Mata, 1989; Sardinero, 2004; Gavilán *et al*., 2011) include it in phytosociological associations involving *C. multiflorus* (L'Hér.) Sweet and *C. oromediterraneus* Rivas Mart., T.E. Díaz, Fern. Prieto, Loidi & Penas, providing numerous herbarium sheets gathered in GBIF (2024).

According to IPNI (2024), *Cytisus x praecox* is an artificial hybrid. It was cultivated at the Horticultural Garden at Chiswick (London) (Robinson, 1882) and Kew (Anon., 1892), and described by William Jackson Bean on the basis of *Cytisus albus* (Lam.) Link (= *C. multiflorus*) and *Cytisus purgans* auct. non (L.) Boiss. (= *C. oromediterraneus*), who wrote a very succinct description but where he indicates its pale yellow ('sulphur-coloured') corollas and leaves with a single leaflet, without providing any herborized material or illustration (Bean, 1897). It has subsequently been included in other papers and gardening works (Steffen, 1929; Chittenden, 1981). Auvray & Malecot (2013) neotypify *C. x praecox* on Bean material indicating that it is only an artificial hybrid that is separated from *C. multiflorus* by its pale-yellow flowers and glabrescent fruits. These authors indicate neither characters of *C. oromediterraneus* nor the presence of natural hybrids. The scarce descriptions by Bean (1897) and Auvray & Malecot (2013) require a new interpretation based on natural specimens of *C. x praecox*, completing the type material with an epitype and isoepitypes, as it is a nothospecies of some importance in supramediterranean Iberian shrub communities ('piornales').

Material and Methods

During our herborizations in NW Spain (region of Sanabria, Zamora), we observed the presence of *Cytisus x praecox* as part of the communities of *Cytisus multiflorus* and *C. oromediterraneus*. Its artificial origin, detailed by some authors, led us to study and compare our collections of the hybrid at the herbarium of the Universidad San Pablo-CEU (USP) and its parental species with the literature on its natural occurrence in Spain (Talavera, 1999; López González, 2002) and the digital images found at the BR, K, and MA herbaria (see GBIF, 2024) together with the only existing material of Bean at K (abbreviations from Thiers, 2024).

Four collections were made during 2024, both of the parents and the hybrid at different phenological phases: mid-May, in full bloom; early June, when we found mature flowers, leaves and immature fruits; late June, with flowers already withered and green fruits; and early October, with the fruits already open, revealing mature seeds. In order to differentiate the plants corresponding

Figure 1. *Cytisus x praecox* (pale yellow flowers) together with *C. multiflorus* (white flowers) and *C. oromediterraneus* (yellow flowers) in the Sanabria region (Zamora, Spain).

to the hybrids during fruiting, we have marked the flowering plants with a flagging tape, in order to study the fruits in autumn.

For the nomenclatural discussion we used the nomenclatural code for algae, fungi and plants (Turland *et al*., 2018).

Results

The presence of this hybrid in the high mountain shrub communities of central and NW Spain (Figures 1 and 2), has allowed us to write a new description and complete the type material, taking into account numerous morphological aspects of its parental species.

Description

Shrub up to 1.5 m in height, with a retamoid, highly branched appearance. Branches green when young, brownish when older, with about 9 longitudinal ribs, densely sericeous when young, scabrous later; indumentum of glanduliferous hairs together with straight and appressed tector hairs on the ribs, and curly in the valleys. Stipulate leaves, all unifoliolate; stipular organ bifid, with 3 ribs, the central one less developed than the 2 lateral ones, 0.7-1.1 mm; leaflets oblanceolate, 2.9-14.3 x 0.9-5.4 mm, sericeous on both sides; petioles 1.6-4.9 mm. Flowers axillary, solitary or in pairs; pedicel 2.8-6.2 mm, tomentose, with 3 triangular bractlets 0.1-0.5 mm, mostly below the calyx, sometimes in the upper half, other times difficult to see. Calyx 1.6-2.3 x 2.7-3.5 mm, campanulate, hairy; tube 0.9-1.7 x 2-2.6 mm; lips 1.1-2 mm long, ovate, divergent, subequal, with upper lip teeth 0.1-0.3 mm and lower lip teeth 0.2-0.5 mm. Corolla of pale yellow colour, sometimes more intense or almost white; standard rounded, retuse, glabrous, pale yellow, with veins of a more intense yellow towards the base, sometimes with pink grooves on the abaxial side and even somewhat pink on the outer margins, 7.8-11.2 x 5-8.6 mm, with a claw of 0.8-1.6 mm; wings oblong, glabrous, 8.7-10.7 x 2.1-4.3 mm, with a claw of 1.7-2.7 mm; keel oblong, with a ciliate auricle and a powdery interior, 7.6-10.2 x 4.8-6.8 mm, with a claw of 1.5-2.4 mm. Androecium 6.9-9.2 mm; staminal tube sub-oblique, much larger than calyx; fertile anthers with pollen grains c. 12 µm, some smaller and deformed. Gynoecium 7.3-10.2 mm; ovary sessile, sericeous; style cylindrical, arched at anthesis; stigma somewhat extrorse. Fruit linear-elliptic, flattened, hairy, 16.6-34.8 x 6.2-9.2 mm, dark brown in dehiscence, with a sericeous endocarp and 2-7 seeds. Seeds ovoid, somewhat flattened, 2.1-3.7 x 1.6-3.1 mm, brown; strophiolus 0.2-0.9 x 0.6-1.6 mm, white.

Type material

The only material collected by W.J. Bean preserved at K (003011914!) is a sheet of a cultivated flowering specimen representing the neotype indicated by Auvray & Malecot (2013), but where it is not possible to observe the colouring of the flowers, nor the branches of a natural plant, nor the fruits and seeds, so we chose an epitype and isoepitypes with different data of collection next to the neotype according to article 9.9 of the Code (Turland *et al.,* 2018):

Neotype (designated by Auvray & Malecot, 2013: 82): ARBORETUM./ROYAL BOTANIC GARDENS, KEW.//"*Cytisus praecox*/(*C. albus* x *C. purgans*)//

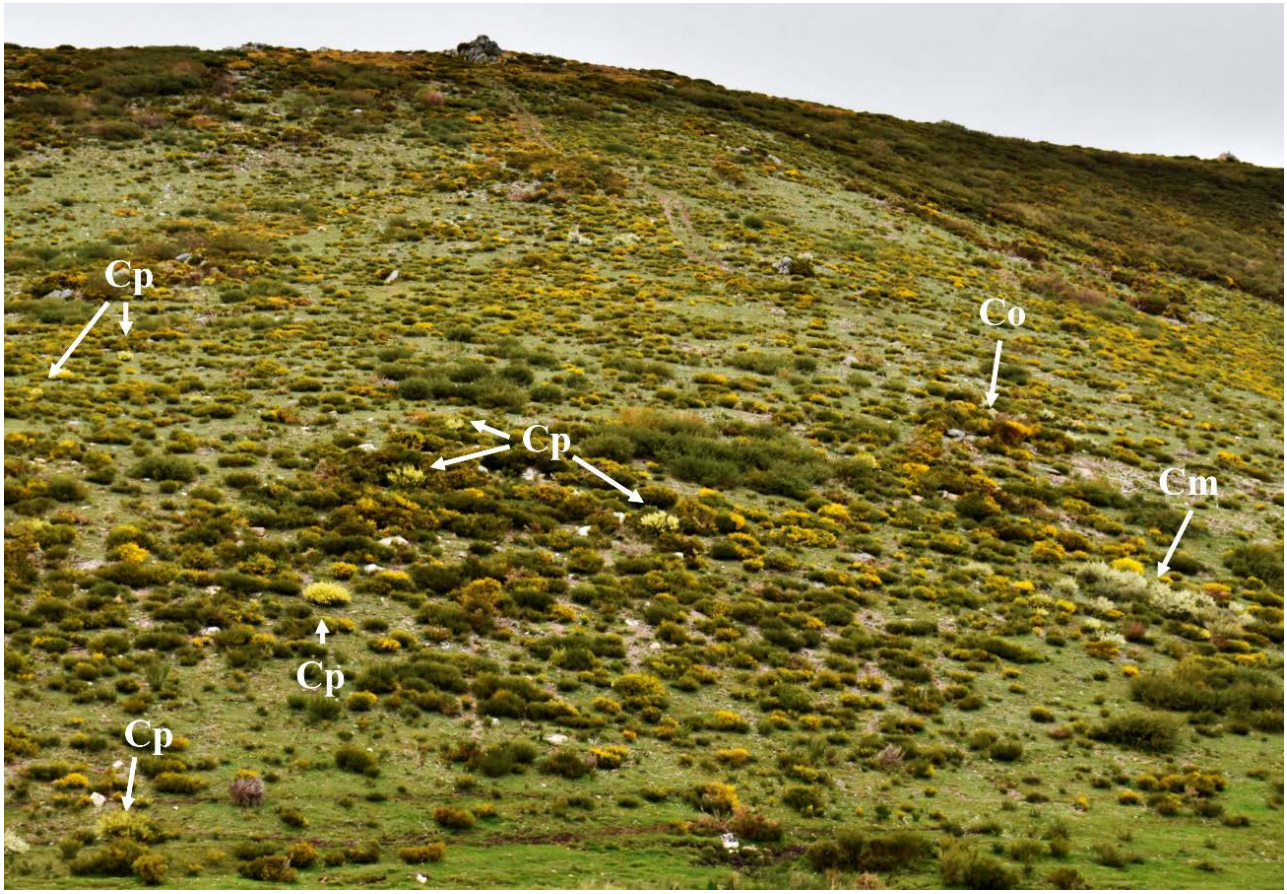

Figure 2. *Cytisus multiflorus* (Cm), *C. oromediterraneus* (Co) and *C. x praecox* (Cp) in a landscape of the Sanabria region (Zamora, Spain).

Figure 3. *Cytisus x praecox*. A, neotype; B, epitype; C, isoepitype

Collection//Coll. W.J. Bean./*May 3, 1905.*" (K003011914) (Figure 3A).
Epitype (designated here): ESPAÑA. Zamora, comarca de Sanabria, entre San Martín de Castañeda y la laguna de los Peces, 29T 687491-4668709, 1568 m, 18 May 2024, *E. Linares & A. Galán 5571* (USP3647) (Figure 3B); Isoepitypes: 5 October 2024, *E. Linares & A. Galán 5574* (USP3648), *E. Linares & A. Galán 5558* (USP3649) (Figure 3C).

Discussion

Although populations in the Spanish Sistema Central and in the mountains of the Sanabria region (Zamora) can be easily distinguished in the landscape by the pale yellow colour of their flowers (Figures 1 and 2), we have no news of its presence in Portugal (Menezes de Sequeira *et al*., 2011), where it was not found by the authors either. Tison & De Foucault (2014) suggest looking for natural

Table 1. Comparison of the main morphological characters separating *Cytisus multiflorus*, *C. oromediterraneus* and *C. x praecox*.

Character	*Cytisus multiflorus*	*Cytisus oromediterraneus*	*Cytisus x praecox*
Characteristics of the branches	Densely sericeous when young, then glabrous, ash-green in colour	Densely sericeous when young, green, then scabrous and brownish	Densely sericeous when young, green, then scabrous and brownish
Leaves	Unifoliate and trifoliate	Unifoliate	Unifoliate
Ribs of the stipular organ	3, the one in the centre (0.8) 1–2.5 mm, elongated	2, with a small protuberance of 0.3–0.7 mm in the middle	3, the one in the centre 0.7–1.1 mm, very short
Number of flowers on brachyblasts	Solitary or 2–4	Solitary or in pairs	Solitary or in pairs
Corolla	White	Yellow	Pale yellow
Standard and claw measurements (mm)	10–13.5 x 8–11, claw c. 1.5	9–12.5 x 8–12, claw 1.5–2	7.8–11.2 x 5–8.6, claw 0.8–1.6
Colouring and shape of the standard apex	White, acute	Yellow, with more intense yellow veins towards the base, sometimes with pink grooves on the abaxial side, retuse	Pale yellow, with more intense yellow veins towards the base, sometimes with pink grooves on the abaxial side, retuse
Staminal tube	Straight, about 2 times longer than the calyx	Sub-oblique, much longer than the calyx	Sub-oblique, much longer than the calyx
Fruit measurements (mm)	10–31 x 4.5–6.5	15–33 x 6–9	16.6–34.8 x 6.2–9.2
Seed measurements (mm)	2.7–3 x 2.2–2.7	3–4–3 x 2.4–3.5	2.1–3.7 x 1.6–3.1

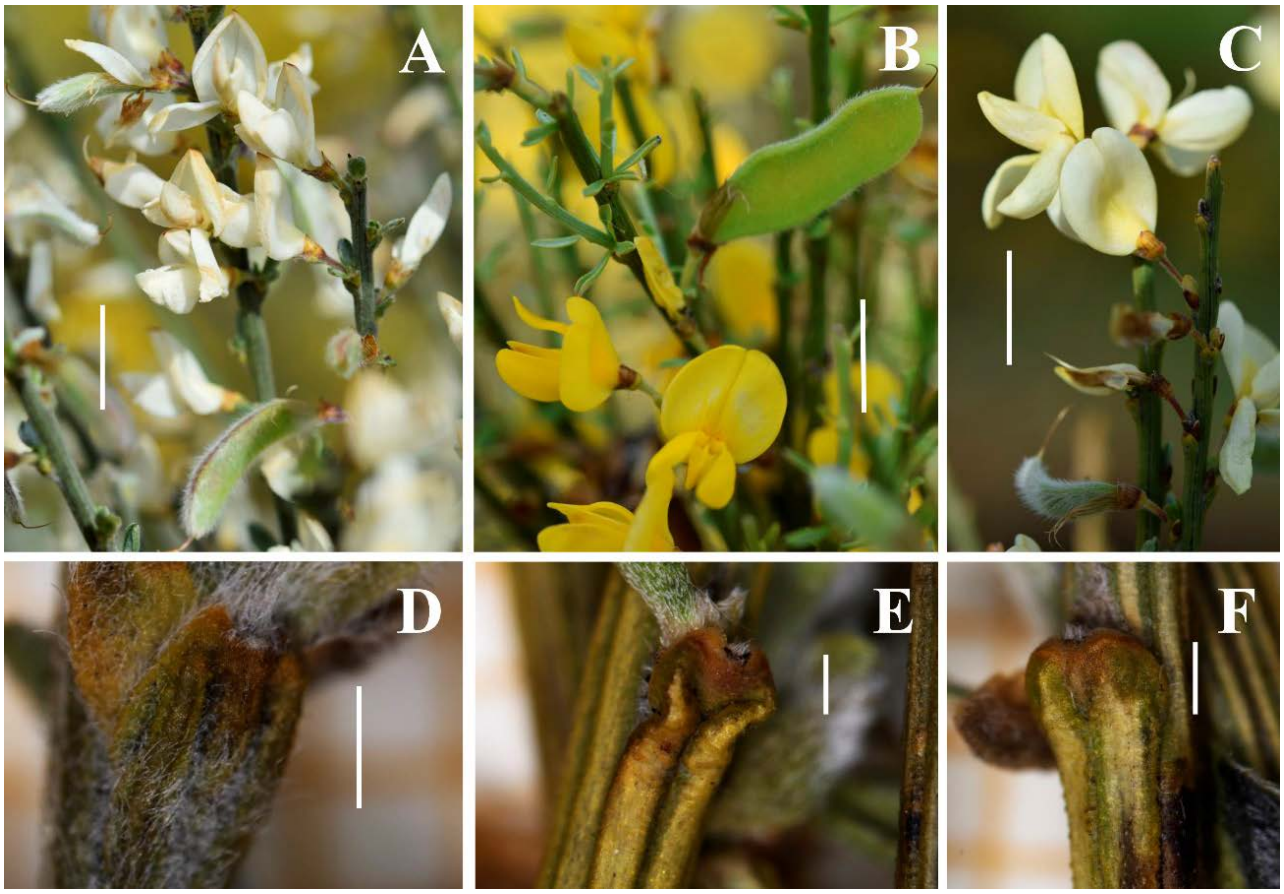

Figure 4. A, flowering branches showing the standard of their flowers and immature fruits of *Cytisus multiflorus*; B, *C. oromediterraneus*; C, *C. x praecox*; D, Stipular organ in *C. multiflorus*; E, *C. oromediterraneus*; and F, *C. x praecox*. Scale bar = 10 mm (A-C), 1.5 mm (D), 0.5 mm (E), and 0.8 mm (F).

specimens of *Cytisus x praecox* in southern France (Cévennes), as both parents are found in the territory.

Cytisus x praecox is not only distinguished by the colour of its flowers. Its lignified branches are scabrous, unifoliolate leaves, solitary or in pairs flowers, retuse standard with yellow veins and pink grooves, the staminal tube sub-oblique and much longer than the calyx, are characters also present in *Cytisus oromediterraneus*. Fruit measurements are also closer to *C. oromediterraneus*. However, seed measurements are closer to *Cytisus multiflorus*. The central rib of the stipular organ is intermediate between the more elongate rib of *C. multiflorus* and the protuberance between the lateral ribs in *C. oromediterraneus* (Table 1, Figure 4).

Auvray & Malecot (2013) indicate that the fruits of *Cytisus x praecox* are glabrescent, thus differentiating it from *Cytisus multiflorus*. In contrast, the fruit of the natural hybrid is hairy until the seeds fall to the ground, with more marked glabrescence observed in the two parents (Figure 5). The pollen grains of *C. x praecox* are similar to those of *C. multiflorus* and *C. oromediterraneus*, although some are smaller and deformed (see Figure 5E).

On the other hand, the corollas of cultivated hybrids can have very varied colourations due to their genic polymorphism (Cheers, 2013; International Dendrology Society, 2024), which is not uncontroversial as Article H.4.1 of the Code of Nomenclature (Turland *et al*., 2018) indicates that the name of a hybrid encompasses all its generational variants, whereas Article 28.1 considers first the name of organisms found in nature while retaining the same name for those that are then cultivated. In this case, a cultivated artificial hybrid can represent with difficulty the populations found in nature, so it is necessary to complete the type material (epitype and isoepitypes) which retain the colour of the flowers, contain fruit and where more characters can be appreciated.

The combination *Cytisus x praecox* (Rob.) Hort. suggested by Auvray & Malecot (2013) is invalid as Robinson (1882) does not indicate that *Genista praecox* is a hybrid nor who its parents are, not complying with articles H.3.1 and H.3.2 of the Code, so the binomen must be attributed to Bean (1897). Its protologue and synonymy references would read as follows:

Cytisus x praecox Bean, Gard. Chron., ser. 3, 21: 301 (1897)

Cytisus x praecox (Rob.) Royal Gardens, Kew, Bull. Misc. Inform. Kew Appendix I: 24 (1892), nom. inval.

Genista praecox Rob., Garden 21: 283 (1882) [basion.], nom. inval.

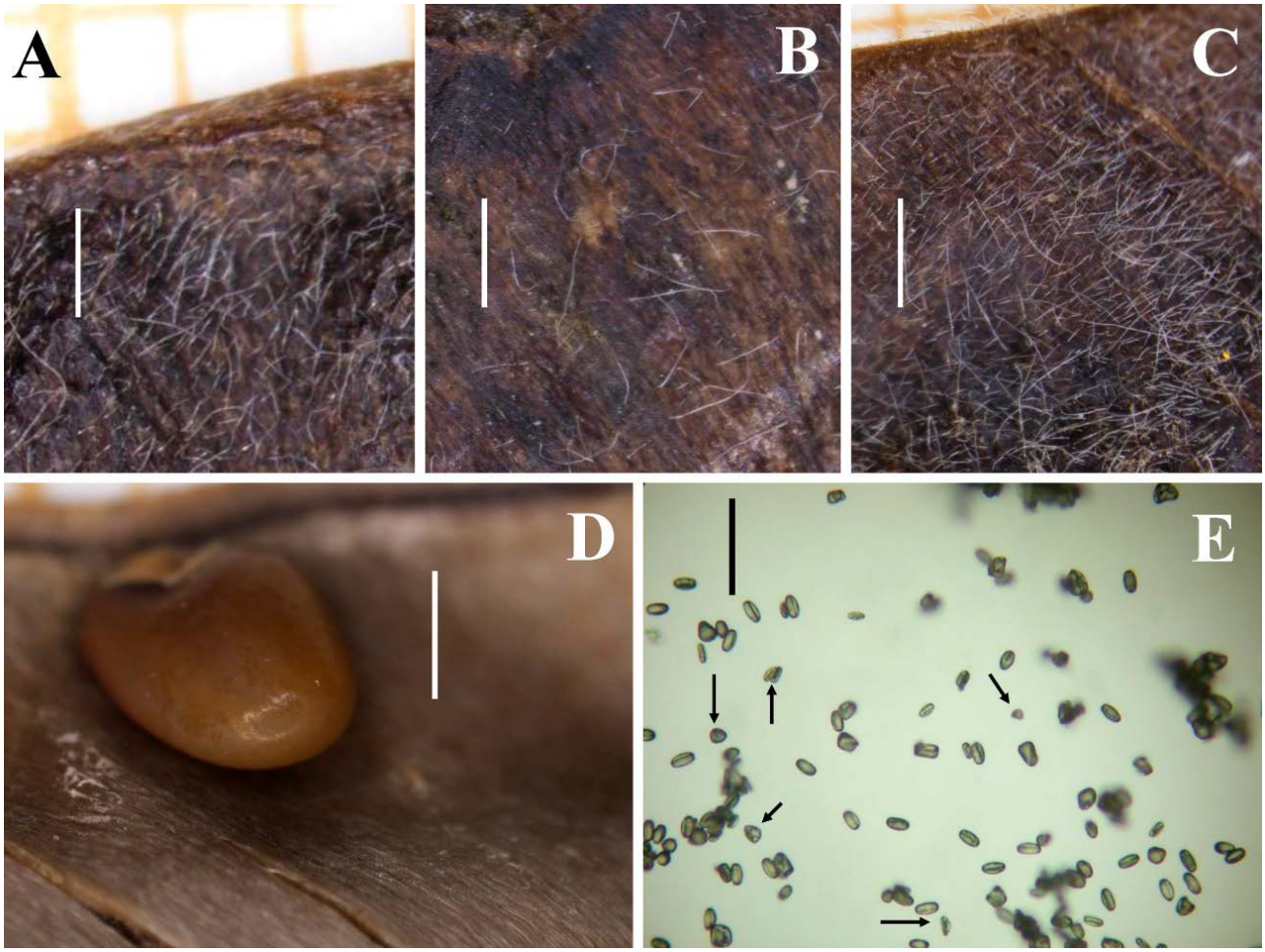

Figure 5. Some features on fruits. A, glabrescent cover of an open fruit of *Cytisus multiflorus*; B, *C. oromediterraneus*; C, *C. x praecox*; D, endocarp of *C. x praecox* with a seed; E, pollen grains of *C. x praecox*, arrows indicate smaller and deformed grains. Scale bar = 1 mm (A-C), 1.5 mm (D), and 40 µm (E).

Additional wild specimens studied

Cytisus multiflorus
ESPAÑA. Zamora, comarca de Sanabria, entre San Martín de Castañeda y la laguna de los Peces, 29T 687493-4668746, 1571 m, 8 June 2024, *E. Linares & A. Galán 5560* (USP3657); Idem, *E. Linares & A. Galán 5568* (USP3659).

Cytisus oromediterraneus
ESPAÑA. Zamora, comarca de Sanabria, entre San Martín de Castañeda y la laguna de los Peces, 29T 687493-4668746, 1571 m, 8 June 2024, *E. Linares & A. Galán 5562* (USP3655); Zamora, comarca de Sanabria, entre San Martín de Castañeda y la laguna de los Peces, 29T 687479-4668763, 1567 m, 18 May 2024, *E. Linares & A. Galán 5570* (USP3662).

Cytisus x praecox
ESPAÑA. Zamora, comarca de Sanabria, entre San Martín de Castañeda y la laguna de los Peces, 29T 687493-4668746, 1571 m, 8 June 2024, *E. Linares & A. Galán 5567* (USP3650); Idem, *E. Linares & A. Galán 5567* (USP3651); Idem, *E. Linares & A. Galán 5565* (USP3652); Idem, *E. Linares & A. Galán 5564* (USP3653); Idem, *E. Linares & A. Galán 5563* (USP3654); Idem, *E. Linares & A. Galán 5559* (USP3658); Zamora, comarca de Sanabria, entre San Martín de Castañeda y la laguna de los Peces, 29T 687491-4668709, 1568 m, 22 June 2024, *E. Linares & A. Galán 5561* (USP3656); Idem, *E. Linares & A. Galán 5569* (USP3660); Zamora, comarca de Sanabria, entre San Martín de Castañeda y la laguna de los Peces, 29T 687479-4668763, 1567 m, 18 May 2024, *E. Linares & A. Galán 5572* (USP3661); Zamora, comarca de Sanabria, junto a la laguna de los Peces, 29T 688110-4669448, 1608 m, 18 May 2024, *E. Linares & A. Galán 5573* (USP3663).

Authorship contribution

AGM: Conceptualization and writing; AGM & ELP: Data curation; AGM & ELP: Research; ELP: Resources; AGM & ELP: Supervision.

Conflict of interest

None.

Acknowledgements

We are grateful to Nicola Biggs (Royal Botanic Gardens, Kew) for sending us the photograph of the neotype of *Cytisus x praecox*.

References

Anonymous. 1892. Bulletin of Miscellaneous Information. Appendix I, List of seeds of hardy herbaceous plants and of trees and shrubs. Pp. 1–27. Royal Gardens, Kew.

Auvray, G. & Malecot, V. 2013. A revision of Cytisus sections Alburnoides, Spartopsis and Verzinum (Genisteae, Fabaceae). Edinburgh J. Bot. 70(1): 61–120. doi: 10.1017/S0960428612000352

Bean, W.J. 1897. Trees and shrubs. Gard. Chron., ser. 3, 21: 301–302.

Cabezas Lefler, L., Sevilla Felgendreher, P. & Navarro Andrés, F. 1987. Notas corológicas sobre plantas sanabresas, II. Stvdia Botanica 6: 95–98.

Cheers, G. (Ed.). 2013. Botánica. Guía ilustrada de plantas. Ullmann, Potsdam.

Chittenden, J. 1981. Dictionary of Gardening. Oxford University Press, Oxford.

Elorza Gabilondo, J., López Retamero, J.R., Miguel Rojo, E., Patino Sánchez, S., Urrutia Uriarte, P. & Valencia Janices, J. 2018. Algunas noticias y novedades del género Genista L. en el SW de Europa. Flora Montiberica 71: 107–116.

Gavilán, R.G., Vilches de la Serna, B. & Fernández-González, F. 2011. Syntaxonomical review of Cytisetea scopario-striati communities in central Spain. Lazaroa 32: 29–72. doi: 10.5209/rev_LAZA.2011.v32.37252

Kleist, A. & Jasieniuk, M. 2011. A molecular phylogenetic analysis of invasive and ornamental brooms and their relationships within the Genistoid legumes. Mol. Phylogenet. Evol. 61: 970–977. doi: 10.1016/j.ympev.2011.08.030

López González, G. 2002. Guía de árboles y arbustos de la Península Ibérica y Baleares. Mundi-Prensa, Madrid, Barcelona and México.

Mabberley, D.J. 2017. Mabberley's Plant-Book. Cambridge University Press, Cambridge.

Menezes de Sequeira, M., Espírito Santo, M.D., Aguiar, C., Capelo. J. & Honrado, J. 2011. Checklist da Flora de Portugal (Continental, Açores e Madeira). Associação Lusitana de Fitossociologia, Lisboa.

Robinson, W. 1882. Notes of the week. Garden 21: 283–284.

Sánchez Mata, D. 1989. Flora y vegetación del macizo oriental de la sierra de Gredos (Ávila). Institución Gran Duque de Alba, Ávila.

Sardinero, S. 2004. Flora y vegetación del macizo occidental de la Sierra de Gredos (Sistema Central, España). Guineana 10: 1–474. doi: 10.1387/guineana.5662

Steffen, A. 1929. Schöne Cytisus für den Garten. Mitt. Deutsch. Dendrol. Ges. 1929: 379–380.

Talavera, S. 1999. Cytisus Desf. [nom. cons.]. In: Castroviejo, S. (Coord.). Flora iberica, vol. 7(1). Pp. 147–182. Real Jardín Botánico-CSIC, Madrid.

Thiers, B.M. 2024. Index Herbariorum: A global directory of public herbaria and associated staff. Available from: http://sweetgum.nybg.org/science/ih/. [Accessed 10 October 2024].

Tison, J.-M. & De Foucault, B. (Coord.). 2014. Flora Gallica. Flore de France. Biotope, Mèze.

Turland, N.J., Wiersema, J.H., Barrie, F.R., Greuter, W., Hawksworth, D.L., Herendeen, P.S., Knapp, S., Kusber, W.-H., Li, D.-Z., Marhold, K., May, T.W., McNeill, J., Monro, A.M., Prado, J., Price, M.J. & Smith, G.F. (Eds.). 2018. International Code of Nomenclature for algae, fungi, and plants (Shenzhen Code) adopted by the Nineteenth International Botanical Congress Shenzhen, China, July 2017. Regnum

Vegetabile 159. Koeltz Botanical Books, Glashütten. doi: 10.12705/Code.2018

Websites

GBIF. 2024. The Global Biodiversity Information Facility. Available from: https://www.gbif.org/ [Accessed 4 October 2024].

IPNI. 2024. International Plant Names Index. Available from: https://www.ipni.org. [Accessed 4 October 2024].

International Dendrology Society. 2024. Trees and Shrubs Online. Available from: https://www.treesandshrubsonline.org/articles/cytisus/cytisus-x-praecox/. [Accessed 21 October 2024].