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1154. *Fritillaria* of the Maritime Alps

Liliaceae

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Summary

The three taxa of the *Fritillaria tubaeformis* group are illustrated here. These plants are narrow endemic geophytes of the Alpine chain, where they are rare and representative of the subalpine grasslands, a very diverse and heterogeneous mosaic of habitats. A detailed description of each is provided, with notes on taxonomy, ecology, and cultivation. Remarks on distribution patterns and habitat specificity are also included. This comprehensive information allows for a clearer delimitation of the three taxa.

Previously recognised in a much broader sense in many classifications, the circumscription of Liliaceae has stabilised, largely as a result of DNA-based studies (see, e.g., Fay & Chase, 2000; APG IV, 2016; POWO, 2025), to include 15 genera (c. 780 species). As wild plants, these are almost entirely restricted to temperate regions of the Northern Hemisphere, although a few species occur at high elevations in tropical Asia. Five genera (*Amana* Honda, *Cardiocrinum* (Endl.) Lindl., *Notholirion* Wall. ex Boiss., *Tricyrtis* Wall. and *Tulipa* L.) are restricted to the Old World, four (*Calochortus* Persh, *Medeola* Gronov. ex L., *Prosartes* D.Don and *Scoliopus* Torr.) are only native to the New World, and six (*Clintonia* Raf., *Erythronium* L., *Fritillaria* Tourn. ex L., *Gagea* Salisb., *Lilium* Tourn. ex L. and *Streptopus* Michx.) are found in both.

Of these genera, *Fritillaria* is the second largest (with 162 species) only exceeded by *Gagea* (226 species). *Fritillaria* has a wide distribution in Eurasia and North Africa, occurring natively from Morocco and Portugal to East Asia, with a smaller burst of speciation consisting of

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20 species in western North America. None occur in eastern North America. The taxonomic diversity is greatest in Asia, and all the North American species are members of a single subgenus, *Fritillaria* subgenus *Liliorhiza* (Kellogg) Benth. & Hook.f.; this subgenus is predominantly North American, although *F. camschatcensis* (L.) Ker-Gawl. occurs on both sides of the Bering Straits and *F. dagana* Turcz. and *F. maximowiczii* Freyn are East Asian.

The largest subgenus, *Fritillaria* subgenus *Fritillaria*, consists of c. 100 species, and it includes the type species of the genus, *F. meleagris* L. (SNAKE'S-HEAD FRITILLARY). This subgenus has been shown to be polyphyletic by Rønsted et al. (2005) and, with denser sampling, by Day et al. (2014), with most of the species falling in "Clade A" (predominantly composed of species from Europe, the Middle East and North Africa); "Clade B" is a small group of Chinese and Central Asian species, and these are more closely related to other subgenera than they are to Clade A. This means that a revision of the subgeneric classification of *Fritillaria* is required to achieve monophyly of *Fritillaria* subgenus *Fritillaria*.

The taxa discussed in this article, *F. tubaeformis* Gren. & Godr. (= *F. tubaeformis* subsp. *tubaeformis*), *F. burnatii* (Planch.) Backh. (= *F. tubaeformis* var. *burnatii* (Planch.) Rouy) and *F. moggridgei* (Boiss. & Reut. ex Planch.) L.A.Cusin (= *F. tubaeformis* subsp. *moggridgei* (Boiss. & Reuter ex Planch.) Rix) are members of *Fritillaria* subgenus *Fritillaria* "Clade A". Relationships in this clade were not well resolved in the analyses of Day et al. (2014), and further work will be required to identify the closest relatives of *F. tubaeformis* s.l.

With increased sampling, Mucciarelli and Fay (2014) demonstrated that *F. tubaeformis* s.l. is monophyletic, and that *F. tubaeformis* subsp. *tubaeformis* is sister to the other two taxa on the basis of phylogenetic analysis of DNA sequences. Using plastid DNA polymorphisms, they also demonstrated that *F. tubaeformis* var. *burnatii* and subsp. *moggridgei* are distinct from each other. On the basis of morphometric analyses, Mucciarelli et al. (2016) showed that the three taxa were distinct, although there was some overlap between *F. tubaeformis* subsp. *tubaeformis* and *moggridgei*. These results allow these taxa to be treated as one species or three species. Currently, POWO (2025) treats them as one (*F. tubaeformis* s.l.), but the first author (M. M.) and colleagues have recently published an expanded molecular study of the group, on the basis of which they recognise all three taxa at the species level: *F. burnatii*, *F. moggridgei* and *F. tubaeformis* (Dovana et al. 2025) (Plate 1051, Figures 1-3). In addition to these three endemic alpine species, the slightly more widespread *Fritillaria involucrata* also occurs in southeastern France and northwest Italy, including the Maritime Alps. It has green flowers, variably tessellated in maroon-brown.

CULTIVATION

The cultivation of *Fritillaria tubaeformis* and allies requires a precise approach for seed germination, reflecting their ecological adaptation to the alpine environment. Seeds, in fact, are dormant and contain underdeveloped embryos at dispersal. Before being able to germinate, they need a cold period. Carasso et al. (2010, 2011) demonstrated that when fresh seeds of *F. moggridgei* are incubated at 4°C, embryos resume growth and after approximately five months of incubation, they reach maturity i.e. full embryo length. *Fritillaria tubaeformis* seeds germinate in late winter or early spring at snowmelt, a strategy to avoid the temperature and drought stress of alpine environments (Carasso et al., 2020). Seeds should be sown in a cold frame to experience winter cold and gradual spring warming. However, seedling development is very slow, taking about two months from germination to form a fully elongated cotyledon that functions as a haustorium, drawing nutrients from seed reserves (Leck et al., 2008). A bulb primordium forms at the hypocotyl base and grows to 5–8 mm diameter before the root and cotyledon wither, marking entry into a second phase of dormancy. In nature, the newly formed bulb survives summer drought at this stage in the soil and will sprout with the first new leaf only



PLATE 1051 *F. tubaeformis*, *F. burnatii* and *F. moggridgei* ALESSANDRO INFUSO.

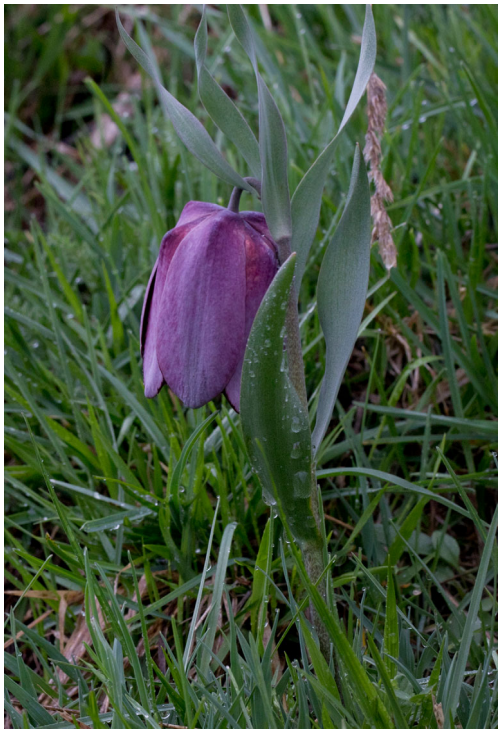


FIGURE 1 *Fritillaria tubaeformis* Gren. and Godr. Photograph Alessandro Infuso.



FIGURE 2 *Fritillaria moggridgei* (Boiss. & Reut. ex Planch.) L.A.Cusin. Photograph Alessandro Infuso.

at the beginning of the second year. This complex developmental sequence highlights the importance of precise environmental control and timing for the successful cultivation of these plants in both conservation and horticultural settings.

In vitro propagation of *F. moggridgei* has been developed using immature embryos extracted from fresh seeds. Cold stratification at 4°C for 30 days on Murashige & Skoog medium induced callus formation and somatic embryogenesis, followed by bulblet sprouting and rooting after the addition of phytohormones in the culture medium (Carasso & Mucciarelli, 2014). Regenerated plants can be successfully acclimatized to open-air conditions. This method offers an efficient alternative to seed propagation, supporting conservation and potential horticultural use, though the three species under consideration here are notoriously difficult to cultivate and appear to be extremely rare in gardens. None is available in the British horticultural trade, at least.

Many *Fritillaria* species are cultivated at Gothenburg Botanical Gardens, Sweden, with most accessions kept under glass. While most *Fritillaria* species require a completely dry and fairly warm summer dormancy, a number of species from alpine meadows and forests need more moisture during their summer rest. *Fritillaria burnatii, F. moggridgei* and *F. tubaeformis* belong to this group. Together with other alpine geophytes with similar requirements, such as *Fritillaria latifolia* Willd., *Fritillaria collina* Adams, *Erythronium caucasicum* Woronow, *Crocus vallicola* Herb., *Crocus scharojanii* Rupr. and *Scilla rosenii* K. Koch., they are kept in an alpine house where they are part-shaded. It is important to give this alpine group as low a summer temperature as possible. During cold periods in winter the temperature is kept at a minimum of -5°C.

The *Fritillaria* are grown in 9–20 cm diameter clay pots, between three and twenty together depending on bulb size. The growing medium is comprised of equal parts sterilised loam, peat,



FIGURE 3 *Fritillaria burnatii* (Planch.) Backh. Photograph Alessandro Infuso.

coarse sand and grit, with added bone meal and basalt meal. Pots are topped-off with a 1–1.5 cm topdressing of washed granite chips. Pots are plunged in sand, and the plunge-bed is slightly raised along the centre of the bed to assist airflow and prevent surface water from lingering, which also helps to display the material better. Repotting for this alpine group is usually carried out during August and September and the first watering takes place soon afterwards. A weak solution of a liquid fertilizer is given with every watering. When plants are in full growth in spring they are watered twice a week. Throughout their dormancy the sand-plunge is watered about once a week depending on the weather.

At present only *Fritillaria moggridgei* (of the three species discussed here) is cultivated at Gothenburg. But both *F.burnatii* and *F. tubaefomis* have grown successfully under this regime in the past.

NOMENCLATURE AND DESCRIPTIONS

Fritillaria tubaeformis Gren. & Godr., Mém. Soc. Émul. Doubs. sér. 2, 6: 13 (May 1854 publ. 1855).
Lectotype: FRANCE. Hautes-Alpes: Lusette en Luz (Drôme), 1847, *Boullu* s.n. (Bartolucci & Peruzzi, 2012, p. 24: P barcode P00654037!).

Homotypic synonyms include:
Fritillaria delphinensis Gren. in J.C.M.Grenier & D.A.Godron, Fl. France Corse 3: 180 (1855), nom. illeg.
Fritillaria meleagris subsp. *delphinensis* Bonnier & Layens in Tabl. Syn. Pl. Vasc. France: 295 (1894).

Fritillaria tubaeformis var. *delphinensis* (Bonnier & Layens) Rouy in Fl. France 12: 403 (1910), not validly pub.
For other synonyms, see POWO (2025).

Glabrous, bulbous perennial. *Bulb* to 1.5 cm in diam., usually globose, with few tightly-packed scales and a thin translucent tunic which disappears with increased bulb size. *Stem* 8–18(−24) cm, single, erect, pale green, leafless in the lower half. *Leaves* 4–6(7), lanceolate or broadly linear, (9) 11–21.2(32) mm wide, alternate (or the lowest two subopposite) sometimes close to each other near to the flower, ± glaucous, the lower ones obtuse, the upper ones acute at apex. *Flowers* solitary, nodding. Perigone campanulate, large, with sub-rectangular profile. *Tepals* 6, uniformly purple, glaucous and covered with pruina that sometimes gives a typical silver reflexion, conniving at the apex, concave, with nectaries conspicuous and at the point of inflection (tepals are truncate-humped at the base). *Outer tepals* elliptic-oblong, obtuse (33.5)37.8–47.1(50.9) × (10.8)13.3–19.9(22.9) mm. *Inner tepals* wider, obovate, rounded at apex (33.9)39.5–48.3(52.5) × (17.7)20.6–27.4(30.7) mm. *Tepals* often marked on the surface with squares of white or yellow-cream colour (tessellation). (In this taxon, the tessellations on the outer surface are mostly hidden by pruina). *Stamens* 6, about as long as the style, with filament inserted slightly above the base of the anther. *Anthers* (5.5)5.9–8.2 (9.2) mm long. *Style* 3-fid, smooth, slightly claviform and hollow inside (fistulous), (3.6)6.4–13.2 (16.6) mm long and with three short stigma lobes (1.1)1.4–2.8(3.1) mm long. *Ovary* (5.9)6.6–9.8 (13.5) mm long, normally shorter than the style. *Capsule* 3 valved loculicidal, 3-angled, oblong 1× or 2× longer than wide, obtuse, erect, shortly stipitate, containing numerous triangular seeds, flat, smooth with a narrow membranous margin, (4)5–6 mm long, light brown. (Figure 4).

Fritillaria moggridgei (Boiss. & Reut. ex Planch.) L.A.Cusin in Herb. Fl. Fr. 21: t. 12 (1876). Lectotype: ITALY. Maritime Alps: Col de Carbon, prés le val Pesio (Prov. de Cuneo), Piémont, 29 Jul 1872, *E. Burnat* s.n. (Bartolucci & Peruzzi, 2012, p. 24: G-BU barcode G00096153!, individual on the left; isolectotype: G-BU barcode G00096152!).

Homotypic synonyms include:
Fritillaria delphinensis f. *moggridgei* Boiss. & Reut. ex Planch. in Bull. Soc. Bot. France 20: 116 (1873).
Fritillaria delphinensis var. *moggridgei* (Boiss. & Reut. ex Planch.) Nyman in Consp. Fl. Eur.: 722 (1882).
Fritillaria delphinensis subsp. *moggridgei* (Boiss. & Reut. ex Planch.) K.Richt. in Pl. Eur. 1: 212 (1890).
Fritillaria meleagris subsp. *moggridgei* (Boiss. & Reut. ex Planch.) K.Richt. in Pl. Eur. 1: 212 (1890).
Fritillaria tubaeformis var. *moggridgei* (Boiss. & Reut. ex Planch.) Rouy in Fl. France 12: 404 (1910).
Fritillaria tubaeformis Gren. & Godr. subsp. *moggridgei* (Boiss. & Reuter ex Planch.) Rix., Bot. J. Linn. Soc. 76: 356 (1978).
For other synonyms, see POWO (2025).

Glabrous, bulbous perennial. *Bulb* to 2 cm in diam., usually globose, with few tightly-packed scales and thin translucent tunic which disappears with increased bulb size. *Stem* 12.3–22.9(24.1) cm, single, erect, green. *Leaves* 4–6(7), largely linear-lanceolate, (9)11–21.2(32) mm wide, alternate, the lower ones slightly obtuse, the upper ones acute at apex. *Flowers* solitary, nodding. *Perigone* campanulate, large, with a markedly sub-rectangular profile. *Tepals* 6 with a yellow ochre background and tessellated with purple lines or spots (more numerous at tepal base and apex) and occasionally interspersed with green veins, conniving at the apex, concave, with nectaries conspicuous at the point of inflection (tepals are truncate-humped at the base). *Outer tepals* elliptic-

oblong, obtuse (33.5)37.8–47.1(50.9) × (10.8)13.3–19.9(22.9) mm. *Inner tepals* wider, obovate, rounded at apex (33.9)39.5–48.3(52.5) × (17.7)20.6–27.4(30.7) mm. *Stamens* 6, about as long as the style, with the filament inserted slightly above the base of the anther. *Anthers* (5.9)8.6–14.6 (15) mm long. *Style* 3-fid, smooth, slightly claviform and hollow inside (fistulous), (3.6)6.4–13.2 (16.6) mm, with three stigma lobes (1.1)2.9–5.3(5.4) mm. *Ovary* (7.9)8.9–12.2(12.2) mm long, normally shorter than the style. *Capsule* 3 valved, loculicidal, 3-angled, oblong, 1× or 2× longer than wide, obtuse, 25–35 mm long, erect, shortly stipitate, containing numerous triangular seeds, flat, smooth, with a narrow membranous margin, (4)5–6 mm long, light brown.

Fritillaria burnatii (Planch.) Backh., Gard. Chron., n.s., 11: 685 (1879). Lectotype: FRANCE. Maritime Alps: Pâturages au mont Piernaude près le col de Tende, 29 Juin 1861, *F. Bourgeau* 346 (Bartolucci & Peruzzi, 2012, p. 28: G-BU barcode G00096148! complete individual on the right).

Homotypic synonyms include:
Fritillaria delphinensis var. *burnatii* Planch. in Bull. Soc. Bot. France 20: 115 (1873).
Fritillaria delphinensis subsp. *burnatii* (Planch.) K. Richt. in Pl. Eur. 1: 212 (1890).
Fritillaria tubaeformis var. *burnatii* (Planch.) Rouy in Fl. France 12: 404 (1910).
Fritillaria meleagris subsp. *burnatii* (Planch.) Rix in Bot. J. Linn. Soc. 76: 356 (1978).
For other synonyms, see POWO (2025).

Glabrous, bulbous perennial. *Bulb* 2 cm in diam., usually globose, with few tightly-packed scales. *Stem* 9–16(23) cm, single, erect, pale green, leafless in the lower half. *Leaves* 5–6(7), lanceolate or largely linear, (4.4)6.3–9.6(13.5) mm wide, alternate, becoming close to each other near to the flower, markedly canaliculate ± glaucous, inward folding after drying, always acute at apex. *Flowers* solitary, nodding. Perigone campanulate, with a U profile, tepals pointed at apex (acute or obtuse). *Tepals* 6, rounded at the base, obliquely subtruncate, not truncated, sombre-purple or wine-purple with evident white or cream-yellow tessellation, concave, with nectaries conspicuous at approximately 10 mm above tepal base. *Outer tepals* elliptic-oblong, obtuse (23.7)32.2–42.5(46.2) × (7.1)10.8–16.1(20) mm. *Inner tepals* obovate, rounded at apex, wider, (21.3)31.1–41.6(41.6) mm × (5)11–18.1(19.6) mm. *Stamens* 6, about as long as the style with filaments inserted slightly above the base of the anther. *Anthers* (5.5)5.9–8.2(9.2) mm long. *Style* 3-fid, smooth, slightly claviform and hollow inside (fistulous), (3.1)5.4–10.8(12.7) mm long and with three stigma lobes (2.4)2.7–8.0(9.1) mm. *Ovary* (4.9)5.0–10.3(11.1) mm long. *Capsule* 3-valved loculicidal, ovoid or subspherical, (10)15–20 mm wide, obtuse, erect, containing numerous triangular seeds, flat, smooth, with a narrow membranous margin, (4)5–6 mm long, brown. (Figure 4).

Cytology. 2n = 24 (*Fritillaria tubaeformis* Gren. & Godr.)
Genome size is 1C = 45.00 pg (Kelly et al., 2015).

Phenology. April to June, beginning shortly after snowmelt. Precise timing varies widely with elevation rather than species, making flowering periods somewhat unpredictable across the three taxa.

Distribution and habitat.

Fritillaria tubaeformis Gren. & Godr. Dauphiné Fritillary/Fritillaire du Dauphiné.
A western alpine orophyte. The species is endemic to the pre-Alpine region of the southwestern slope of the French Alps: from the Provençal Prealps near Grasse up to the Dauphiné

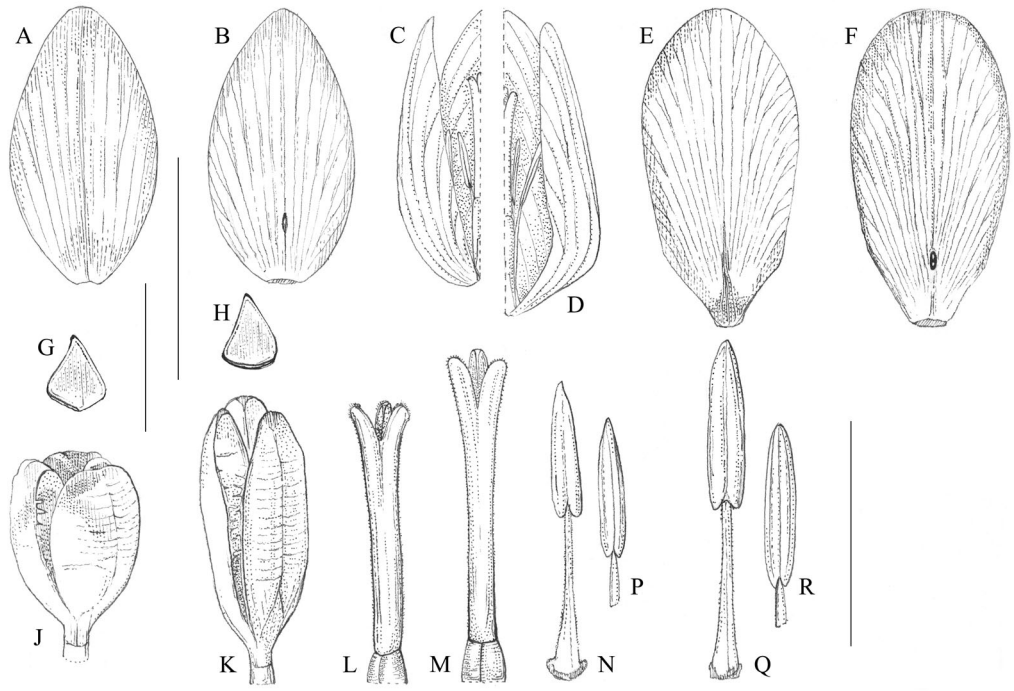


FIGURE 4 Comparison of floral parts and seeds of *Fritillaria burnatii* and *F. tubaeformis*. A, *F. burnatii* perianth segment, external view; B, *F. burnatii* perianth segment, internal view; C, *F. burnatii* half perigone, opened out; D, *F. tubaeformis* half perigone, opened out; E, *F. tubaeformis* perianth segment, external view; F, *F. tubaeformis*, perianth segment, internal view; G, *F. burnatii* seed; H, *F. tubaeformis* seed; J, *F. burnatii* capsule; K, *F. tubaeformis* capsule; L, *F. burnatii* style; M. *F. tubaeformis*, style; N, *F. burnatii* stamen; P. *F. burnatii* anther; Q, *F. tubaeformis* stamen; R, *F. tubaeformis* anther. Scale bars: A, B, C, D, E, F, G, H, J, K, 3 cm; L, M, N, P, Q, R, 1 cm. Drawn by Alessandro Infuso.

Prealps (west-southwest of Gap) (figure 1 in Dovana et al., 2025). Populations, however, are more frequent on the western slopes of the mountain massifs of the Maritime Alps (west to the Tinée valley). The presence in France has been documented for the Alpes-Maritimes, Var, Alpes-de-Haute-Provence, Vaucluse, Hautes-Alpes, Drôme. It reaches its northern limit at the north-east of the Drôme and at the north-west of the Hautes-Alpes. Its presence in Italy can be discounted (Noble & Diadema, 2011).

Many populations of this species can be found in rocky meso-xerophilous grasslands on calcareous ridges and slopes (*Seslerion caeruleae*) between 1200–2300 m asl., generally on north-facing exposures or in small depressions where snow accumulates. Near Gap, on the Col de Gleize, it also occurs in grassy clearings in *Larix* and *Pinus* woods below the pastures. The plant is regarded as strictly calciphile. (Figure 5).

Fritillaria moggridgei (Boiss. & Reut. ex Planch.) L.A.Cusin. Moggridge's Fritillary/ Fritillaire de Moggridge

A western alpine orophyte. The species is endemic to southwestern Alps. The main centre of distribution is represented by the Ligurian and Maritime Alps (France and Italy). In France, the presence has been documented for the Département of Alpes-Maritimes (Roya valley up to the Authion massif and more marginally in the Vésubie and Tinée Valleys) (Charpin & Salamon, 1988; Noble & Diadema, 2011) and, to a lesser extent, in the Département of the Alpes-de-Haute-Provence where it is believed to reach its western limit. In Italy, it has been recorded in Pesio, Vermenagna and Tanaro Valleys within the



FIGURE 5 *Fritillaria tubaeformis* in habitat near Gap in the Maritime Alps. Photograph Alessandro Infuso.

mountains of southern Piedmont and in Arroscia Valley, in Liguria. There is an isolated population on Monte Carmo di Loano (Savona) (https://cailoano.com/index.php/en/fiori-del-monte-carmo-gb). The species reaches its northernmost limit at the southern edge of the Cottian Alps, specifically in the Lauzanier Valley in France and in the opposite Valle Stura di Demonte, Grana and Maira Valleys, in Italy (figure 1 in Dovana et al., 2025).
In France, the species grows in meso-hygrophilous and neutral or slightly basophilous grasslands (Figure 4) that remain covered by the snow for extended periods, as well as in open larch woods, avalanche corridors, and mountain pastures located in the upper montane and subalpine belts, more rarely in the alpine belt. The plant is regarded as preferably calciphile (Noble & Diadema, 2011). *Fritillaria moggridgei* is considered a slightly nitrophilous species, capable of persisting even in areas subjected to intense grazing and, in fact, the maintenance of population numbers is likely dependent on the continuation of agropastoral activities. Its altitudinal range extends from 800 to 2500 m asl, although most populations are concentrated between 1400 and 2100 m. (Figure 6).

Fritillaria burnatii (Planch.) Backh. Burnat's Fritillary/Fritillaria di Burnat.
Fritillaria burnatii is a western alpine orophyte. Once thought to be endemic to the southwestern Alps as it was mistaken for or regarded as a variant of *F. tubaeformis*, it is also found sporadically in central and eastern sectors of Alps, although the centre of diversification is in the French-Italian Alps (Mucciarelli et al., 2016). Here, most of the populations have been recorded in the Maritime and Ligurian Alps (Tende, La Brigue), in the Department of the Alpes-Maritimes and, partially, in continuation with the populations of southwest Piedmont (Roya, Tanaro, Pesio, Vermenagna, Gesso and Stura di Demonte Valleys) (Lonati et al., 2009; figure 1 in Dovana et al., 2025). A second area of presence is in Italy, around the Monviso massif at the southern limit of the Cottian Alps (northern slope of Stura di Demonte, Maira, Grana, Varaita and Po Valleys in the province of Cuneo and



FIGURE 6 *Fritillaria moggridgei* at Limonetto (CN), growing with *Veratrum* sp. Photograph: Martyn Rix.

Pellice-Chisone Valleys in the province of Torino) and in France, in the Départements of Haute Alpes (Queyras) and Alpes-de-Haute-Provence (Ubaye, Val d'Oronaye) (Fritsch, 1990; Noble and Diadema, 2011) (figure 1 in Dovana et al., 2025). In Italy, *F. burnatii* has been recorded also in Alta Valsesia (Val d'Otro, province of Vercelli) that represents the easternmost range in Piedmont. In Valle d'Aosta, the species is present only in the Gressoney valley (Gressoney-Saint-Jean and Gressoney-La-Trinité) (Bovio, 2000) close to Alta Valsesia.

Further east, it has been recorded in two additional areas in Italy (Tison & de Foucault, 2014; Bertolli et al., 2024). The first is located in the central Alps and includes populations thriving on the Prealps of the provinces of Lecco, Bergamo and Brescia, although in this area, wild populations have never been characterised either morphologically or genetically. An additional area is located in the Rhaetian Alps, where *F. burnatii* has been recorded in the Giudicarie region (Western Trentino-Alto Adige) representing the easternmost –albeit very rare– populations. In this context, it is worth noting that at the border between Italy and Slovenia (Slovenian Karst), the species approaches the range of *F. meleagris* L., a taxon widely distributed across the European continent, from which nevertheless *F. burnatii* differs both morphologically and genetically (Dovana et al., 2025).

This plant thrives in meso-xerophilous to xerophilous subalpine and lower alpine meadows on basic to slightly acidic soils, preferably calciphile grasslands (*Seslerion caeruleae* and *Festucion variae*). In France, the species has been recorded also in dwarf juniper heathlands, which it colonizes on well exposed slopes and ridges (Noble & Diadema, 2011) within 1600–2600 m a.s.l. In the Queyras valley, which leads up into the northwestern slopes of Monviso, it grows with *Anemone narcissiflora* and *Narcissus poeticus* in subalpine meadows and open conifer forests; here the plants are noticeably taller than those growing on the drier slopes of Passo Croce Domini (Figure 7).



FIGURE 7 *Fritillaria burnatii* at Passo Croce Domini (BS). Photograph: Martyn Rix.

In Valle d'Aosta, populations of *F. burnatii* are consistently found in calciphilous grasslands (*Seslerion caeruleae*), primarily in the upper subalpine and lower alpine zones (maximal elevation 1850–2400 m a.s.l.). In regularly grazed pastures, the species tends to be confined to the margins, while in other areas, populations are threatened by the gradual encroachment of subalpine shrublands (Bovio, 2000). In Piedmont, populations are mainly located in calciphilous grasslands. Most occurrences are concentrated between 1600 and 2200 m asl.

CONSERVATION. These three species have not been assessed at the global level, but they are protected according to the Regional Laws of Liguria (LIG. LR. 9/1984) and Piedmont (PIE. LR. 32/1982) and assessed as Least Concern in the Liste Rouge UICN de la Flore menacée de France.

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