

Fescues of the Intravaginal group of *Festuca* L. section *Festuca* in the lowland and montane areas of the northeastern Iberian Peninsula

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Abstract

FESCUES OF THE INTRAVAGINAL GROUP OF *FESTUCA* L. SECTION *FESTUCA* IN THE LOWLAND AND MONTANE AREAS OF THE NORTHEASTERN IBERIAN PENINSULA.— Morphologically similar fescues occur across the study area (Mediterranean area of the northeastern Iberian Peninsula) at low and middle elevations. With the exception of the high mountain or alpine species, these populations are reviewed here, with particular attention being paid to the *Festuca inops* (*F. gracilior*) group, as well as to some other species, in particular *F. lemanii*, which are not easily understood and can complicate identification, especially where the taxa occur sympatrically. The application of the binomen *F. inops* De Not. to some of the Iberian populations constituting the *F. inops* group is discussed. New records for *F. tarraconensis*, *F. occitanica*, *F. michaelis* and *F. heteroidea* amplify the distribution range of these little-known taxa within the Iberian Peninsula.

Key words: distribution; *Festuca*; identification; Mediterranean; morphology; NE Iberian Peninsula; Poaceae.

Resumen

ESPECIES DEL GRUPO INTRAVAGINAL DE *FESTUCA* L. SECCIÓN *FESTUCA* EN LOS PISOS BASAL Y MONTANO DEL NORDESTE DE LA PENÍNSULA IBÉRICA.— Diferentes especies de *Festuca* morfológicamente afines crecen en gran parte del territorio objeto de esta reseña (tierras mediterráneas del nordeste de la Península Ibérica), a baja y mediana altitud. Excluyendo las especies de alta montaña, estas poblaciones se han estudiado aquí haciendo hincapié en *Festuca* grupo *inops* (*F. gracilior*), y se han tratado otras especies (*F. lemanii* en especial) que a veces complican la identificación de los miembros de dicho grupo, sobre todo cuando solapan sus distribuciones. Se comenta la aplicación del binomen *F. inops* De Not. a algunas poblaciones ibéricas del grupo *F. inops*. Nuevas citas de *F. tarraconensis*, *F. occitanica*, *F. michaelis* y *F. heteroidea* amplían la distribución de estos taxones dentro de la Península Ibérica.

Palabras clave: distribución; *Festuca*; identificación; Mediterráneo; morfología; NE de la Península Ibérica; Poaceae.

INTRODUCTION

In the north-east territories of the Iberian Peninsula, mainly Aragon, Catalonia and N Valencia, the fescue populations in the Intravaginal group (i.e. those with tiller leaves emerging from the distal opening of the leaf sheaths) of *Festuca* sect. *Festuca* are numerous and confusing. The high-mountain species, often diploid, are perhaps better understood due to their having been studied more thoroughly, but populations that extend across the low and middle-mountain areas are frequently the subject of doubtful classification. This is partly due to their variability as well as to their morphological similarity, and also because they sometimes inhabit more altered environments where recently introduced species may become established and obscure the identity of our native plants.

The aim of this paper is to provide field and herbarium notes which should help towards a better understanding of these plants and assist in their identification. Many of the grasses in this group—particularly those with a continuous sub-cutaneous sclerenchyma layer in the tiller leaves—were formerly placed under the *Festuca ovina* L. aggregate, or using the name “*Festuca indigesta* subsp. *aragonensis*”, and in the earlier literature of the region’s flora were often referred to under the ambiguous name of *Festuca duriuscula* L. Obviously, these labels were difficult to apply with any degree of precision, and in time most of the more classifiable plants have received taxonomic treatment at the specific level, this giving us a large group of species that are often difficult to distinguish in the herbarium or laboratory, and even more so in the field.

MATERIALS AND METHODS

Field observations over 20 years in Aragon and Catalonia and neighbouring territories, along with ex situ cultivation and the examination of herbarium material principally from BC, JACA and VAL, but including sheets from other centres, forms the basis of the work. Material for contrasting the taxa includes type sheets (*F. occitanica*, *F. tarraconensis*, *F. valentina*), loans from other centres outside the area and original publications.

RESULTS AND DISCUSSION

Festuca inops group

- F. inops* De Not., Repert. Fl. Ligust. 466 (1844).
F. occitanica (Litard.) Auquier & Kerguélen in *Lejeunia* 75: 162 (1975).
F. gracilior (Hack.) Markgr.-Dann. in Bot. J. Linn. Soc. 76: 325 (1978), incl. *F. occitanica* subsp. *martinii* Kerguélen in *Lejeunia*, Nouv. Sér. 110: 60 (1983).
F. valentina (St.-Yves) Markgr.-Dann. in Bot. J. Linn. Soc. 76: 328 (1978).
F. tarraconensis (Litard.) Romo in *Willdenowia* 16(1): 115 (1986).
F. michaelis Cebolla & Rivas Ponce in *Fl. Medit.* 11: 363–371 (2001).

Among the species discussed in this paper are those considered as belonging to the *F. inops* group of species. This group takes its name from *F. inops* De Not., a plant first described from Liguria, NW Italy, but considered by a growing number of specialists to be conspecific with *F. gracilior* (Hack.) Markgr.-Dann., at least with the populations to the east of the river Rhône (Foggi *et al.*, 2006). As much these plants (which include *F. occitanica* subsp. *martinii* Kerguélen) as *F. inops* are reported as being diploid ($2n = 14$), whereas the more westerly populations, including those from the Iberian Peninsula, and also englobing *F. occitanica*, *F. valentina*, *F. tarraconensis* and *F. michaelis* are (so far as is known) tetraploid.

Plants at present representing *F. inops* in our area (NE Iberian Peninsula), widely referred to as *F. gracilior* are, generally speaking, grey-green or glaucous, smooth or slightly distally scabrid-leaved plants with very reduced ligule and auricles. They are plants with short panicles (3–7 cm is the usual length) and unawned, mucronate or very shortly awned (up to 1.2 mm) glabrous lemmas. Anther size ranges from 2–2.6 mm on examined *exsiccata*. The sclerenchyma pattern is a continuous ring of variable thickness but usually thicker on the flanks, as in the other close taxa. Plants of this description are widespread, occurring across the area in dry pastures, open woodland and scrubland (including *Rosmarinetalia*), on basic soils (limestone, gypsum, marls and clays) and with a wide altitudinal range, though most frequently in low mountain areas

(500–1600 m). Plants with longer awns (1–1.5 mm) but in other respects identical to these, grow in various places, as do plants with pubescent spikelets, and these are at present placed within this taxon. A comparison of some morphological characters is given in Table 1. Localities can be seen in the Appendix at the end of this article.

Plants of the wider group which tend to fall outside this description belong to *F. occitanica*, *F. valentina*, *F. tarraconensis* and *F. michaelis*.

Festuca inops, in its strict sense, is morphologically very similar to plants of the first description, as the text and figures in Foggi *et al.* (2006) and *exsiccata* examination have proved. Its habit seems to be as variable as that of the more westerly plants studied. The sclerenchyma pattern is similar to our western plants, though one specimen examined showed a discontinuous band. The panicles are generally slightly longer and contain more spikelets. Anther size could be significant, stated in this work to be (1)2–2.3(2.8) mm. Material studied agreed with this.

On comparing material, and taking into account the variability of these plants, the Italian and Spanish plants prove to be very close, and the elaboration of an effective key separating them would be no easy task, though this is by no means unusual in *Festuca*.

According to Foggi *et al.* (2006), the correct name for *F. gracilior* should be *F. inops*, since these two taxa (referring especially to those from Italy and south-eastern France) can not be held to be morphologically distinct, and where they occur sympatrically their separation into two distinct species is not possible. In fact, it is quite difficult to distinguish the Iberian populations from their more easterly counterparts without carrying out a chromosome count, except in the case of the four previously-mentioned taxa of the wider group.

The name *F. inops* (1844) has priority over Markgraf-Dannenberg's *F. gracilior*, published in 1978 (based on Hackel's 1882 *F. ovina* var. *duriuscula* subvar. *gracilior*) and can thus be applied to the *F. gracilior* populations, even those to the west of the Rhône which at present go under the name *F. gracilior*. However, if considered distinct, these plants would require another name, since the type chosen for this species is from a herbarium sheet of plants collected in the Maritime Alps; that is, from the eastern part of the taxon's range, where the populations appear to be diploid.

The Euro+Med Plantbase accepts the inclusion

of at least some Iberian populations within *F. inops* (Foggi & Müller, 2009), but this could be a provisional measure. Within Spain, the name *F. gracilior* has gained wide acceptance, following Fuente & Ortúñez (1998), and at present is a necessary name to use with non-specialists when referring to these plants. Since there is much uncertainty as to which name to apply to these plants, we need to look at the close group of taxa in more detail.

This group contains several taxa, all attaining specific ranking at one stage or another, though commencing as varieties (*occitanica*, *valentina*, *tarraconensis*) subvariety (*gracilior*) or species (*michaelis*). In our area, two have been included in the synonymy of *F. gracilior* by Fuente & Ortúñez (1998) but recognised as accepted species in the Euro+Med Plantbase (Foggi & Müller, 2009). These are *F. valentina* (St.-Yves) Markgr.-Dann., whose type comes from the Sierra de Mariola, in the provinces of Valencia and Alacant, and *F. tarraconensis* (Litard.) Romo, with type from the Serra de Cardó, north of Tortosa, Tarragona.

The type material of *F. valentina* (basonym: *F. ovina* var. *valentina* St.-Yves, Bull. Soc. Bot. France 72: 1010–1011) observed in sheets BC69803, has shortly awned non-ciliate lemmas and smooth leaves, slightly scabrid towards the tip. Over much of our area similar plants can be found, with considerable variability in overall size, leaf dimensions and panicle density. The morphological feature that could be used to distinguish the type locality populations from these widespread more northerly ones is the presence of prominent auricles (observed on all type material seen). These auricles (0.3–0.7 mm long) connect this taxon with a more southerly (Betic) one, *F. longiauriculata* Fuente, Ortúñez & Ferrero Lom. (Fuente *et al.*, 1999), whose lemmas have longer awns.

The Sierra de Mariola populations are similar to other plants found in the province of Alacant and also in Valencia province to the south of the river Túria (though these generally have shorter auricles), and if considered worthy of specific recognition, together they probably constitute an Ibero-Levantine or Ibero-Maghrebian endemism. Plants growing in the north of Valencia, south of Castelló and the extreme south of Teruel, often possessing long-ciliate lemmas and with very short auricles, such as the population from Pina de Montalgrau (JACA458095/VAL22084), constitute a distinct race at present difficult to classify. These, and more northerly pop-

Table 1. Comparison of Iberian taxa belonging loosely to the *Festuca inops* group of species.

| | <i>F. valentina</i> | <i>F. tarraconensis</i> | <i>F. occitanica</i> | <i>F. michaelis</i> | <i>F. inops</i> (Iberian Peninsula) |
|--|----------------------------|-------------------------|------------------------------|--------------------------|--|
| Abaxial leaf surface (mid-leaf) | glabrous | scabrid | glabrous to slightly scabrid | scabrid to short-hirsute | glabrous to slightly scabrid |
| Auricle length (mm) | (0.2)0.5–0.7 | 0.2–0.4 | 0–0.25 | 0–0.2 | 0–0.3 |
| Upper glume/lower lemma (aprox. ratio) | 2/3–3/5 | 2/3–3/5(3/4) | 2/3–3/5 | 3/4 or more | 2/3–3/5(3/4) |
| Upper margin of lemma | smooth or slightly scabrid | long-ciliate | smooth or slightly scabrid | scabrid to short-ciliate | scabrid to long-ciliate |
| Awn length (mm) | 0.2–0.7 | 0–0.5 | (0.5)1–1.5(2) | 0–0.5(1.5) | (0)0.2–0.8(1.2) |
| Anther length (mm) dry material | 1.5–2.5 | 1.5–2.2 (2.8) | 2–2.4 | 2.5–3 | (2)2.2–2.4(2.6) |

ulations that have been classified using this name are, when closely examined, better assigned to *F. inops* at present.

The type material of *F. tarraconensis* in BC (isotype BC93051) is a small plant with 6 mm mucronate to shortly-awned lemmas, ciliate on the upper margin, and thin (0.4–0.5 mm) scabrid leaves. Plants of the same description, though slightly larger, grow on the limestone Garraf hills above Castelldefels near Barcelona.

The type specimens of both these taxa are small plants with short (up to 10 cm) leaves, but identical plants with longer leaves can be found, and obtained under cultivation, which leads us to believe that environmental conditions are largely responsible for the short, squat plants which these types represent. Leaf pruinosity is variable within populations, as Foggi, Kerguelen, and other authors have emphasized and personal observation bears out. Leaf scabridity might be a more reliable diagnostic character, which is an argument in favour of Romo's higher ranking of *F. tarraconensis*.

Focusing on this character in combination with other details [upper glume length in relation to length of lowest lemma, ciliate (vs. scabrid or smooth) upper margin of lemma, awn length, anther length, auricle length], herbarium and field-collected material (see Appendix) was revised, and the following conclusions arrived at, though pending more field work:

Festuca tarraconensis can be held at species level, at least while the same perspective is maintained for the other taxa in the group. Its morphological

distinctness beside the widespread Spanish *F. inops* (*gracilior*) is significant to the same degree as that of *F. valentina* or *F. occitanica*. The small plant on the isotype sheet studied coincides with the other material mentioned but for its slightly smaller anthers. More material needs to be collected from the type locality to see whether or not this character is significant.

The taxon constitutes a rather rare plant which can be found growing in exposed places on limestone and gypsum substrates, at altitudes between 470 and 1220 m above sea level, and with a limited distribution within the southern half of Catalonia but present in three provinces: Tarragona, Barcelona and Lleida. Further south it has been detected in Castelló and Teruel. More localities are expected to emerge given further research.

F. tarraconensis (Litard.) Romo in Willdenowia 16: 115 (1986).

≡ *Festuca ovina* var. *tarraconensis* Litard. in Candollea 10: 103–146 (1945) [basonym].

Localities studied: Spain, Barcelona: Begues, Pla d'en Querol, UTM 31T DF0870, 475 m, 7.06.2008, S. Pyke (BC905750); Castelldefels, Plateau de Begues, 2.07.1912, Sennen (BC69958). Lleida: Sanaüja, 29.05.1932; Castelldefels, Pla de Basses, 7.06.1917, Font Quer (BC69795); Font Quer (BC831708); Sanaüja, La Rasa del Pujol, UTM 31T CG6140, 510 m, marges carretera, 2.06.2010, I. Soriano et al. (BC903269).

Material collected in the former locality on li-

mestone substrate at 480 m (and wrongly identified by the author in a previous publication) confirms the continuing presence of this plant, and its cultivation has shown the variability of characters such as overall plant size, panicle and awn length under different conditions.

Two other taxa involved, *F. occitanica* and *F. michaelis*, are understood as distinct species which can be fairly easily distinguished from the other taxa on morphological grounds. The former is found in SW France (the type from the department of Hérault) and within the Iberian Peninsula in the north of Catalonia on calcareous substrates. The latter occurs in the eastern half of the Peninsula mainly in the limestone areas of the interior, the type being designated from one of the most westerly populations (Torrelaguna, province of Madrid). At least some of the populations of this latter species are implicit within the parameters of *F. gracilior* in Fuente & Ortúñez (1998). New localities for these two taxa have been located recently and these can be added to those published in Cebolla & Rivas Ponce (2003) and Ninot *et al.* (2010), the former, and Cebolla & Rivas Ponce (2001), the latter.

Festuca occitanica (Litard.) Auquier & Kerguelén in *Lejeunia* 75: 162 (1975).

≡ *F. ovina* L. var. *occitanica* Litard. [basionym].

New locality: Spain, Barcelona: Borredà, prop de l'ermita de Sant Martí de Boatella, UTM 31T DG202632, 760 m, prat, 15.06.2011, *N. Ibáñez et al.* 112 (BC923580).

This population is within the province of Barcelona, a little to the west of the localities indicated in the province of Girona by Cebolla & Rivas Ponce (2003), and within the same mountain system. The plants were found growing on dry hill pastures on a calcareous substrate. The population mentioned corresponds closely to Litardière's original description (Litardière, 1945), while other plants found growing in the same close area (BC923578, same data) differ in being taller (15–30 cm as opposed to culms of 6–13 cm) and with the upper culm node exposed and clearly visible, as are the slender, fragile awns, which are (0.5)1–1.5(2) mm long, and which constitute the main diagnostic feature.

Figure 1 shows a sample plant from each popu-

lation. The panicles are short, but as Clayton *et al.* (2002–) states, can surpass the 2–3 cm of the original description. Evidently, as more populations are discovered, the description must be adjusted to conform to our present knowledge of the species. Regarding this detail, the apparent contradiction (4–12 cm panicle) in this online work should be checked carefully.

Festuca michaelis Cebolla & Rivas Ponce in *Fl. Medit.* 11: 363–371 (2001).

Localities studied: Spain, Huesca: Candasnos, Valcuerna, 240–280 m, 4.06.1980, *P. & G. Montserrat* (JACA149080); Fraga, Valcuerna, UTM 31T BF5590, 200 m, 10.05.2005, *J. M. Montserrat et al.* (BC905800). Zaragoza: El Castellar, UTM 30T XM7041, 540 m, 29.05.1999, *P. Catalán & S. Pyke* (BC925656); Peñaflo, El Vedado, UTM 30T XM9027, 370 m, 17.05.2000, *S. Pyke* (BC872640); Tosos, Pantano de las Torcas, UTM 30T XL6073, 660 m, 8.05.1993, *S. Pyke* (SBP933).

The plants all share the same densely caespitose habit, strongly scabrous filiform leaves, these being more or less glaucous (this varying within the population) and also the long panicles [(6)8–12(14) cm] and the distinctive upper glume which is almost as long as the lower lemma (3/4 or more). The leaves are usually quite short in comparison with the culm length (1/4–1/3), frequently 8–15 cm long, but in some conditions they can attain 18–25 cm. The culms are tall and slender, reaching *ca.* 50 cm. The spikelets are similar to other *F. inops* group plants, 8–9 mm long, with a muticous or short-awned lemma [awn (0)0.3–0.7(1) mm]. The general aspect of part of a larger clump can be seen in Fig. 2. The ecology of these populations seems to be somewhat different from the more westerly ones, stated to be *Quercus faginea* Lam. woodland or domain. The plants mentioned above grow on calcareous, sometimes gypsum, soils in clearings of Mediterranean woodland where *Quercus ilex* L. subsp. *ballota* (Desf.) Samp. was once dominant, but *Pinus halepensis* Mill. is now more frequent. *Quercus faginea* can be found in or near some of the localities, in particular in Tosos, Alcubierre and Mont-Ral (see Appendix) but, in others, the presence of *Quercus coccifera* L. and *Juniperus phoenicea* L. indicates a drier climate.

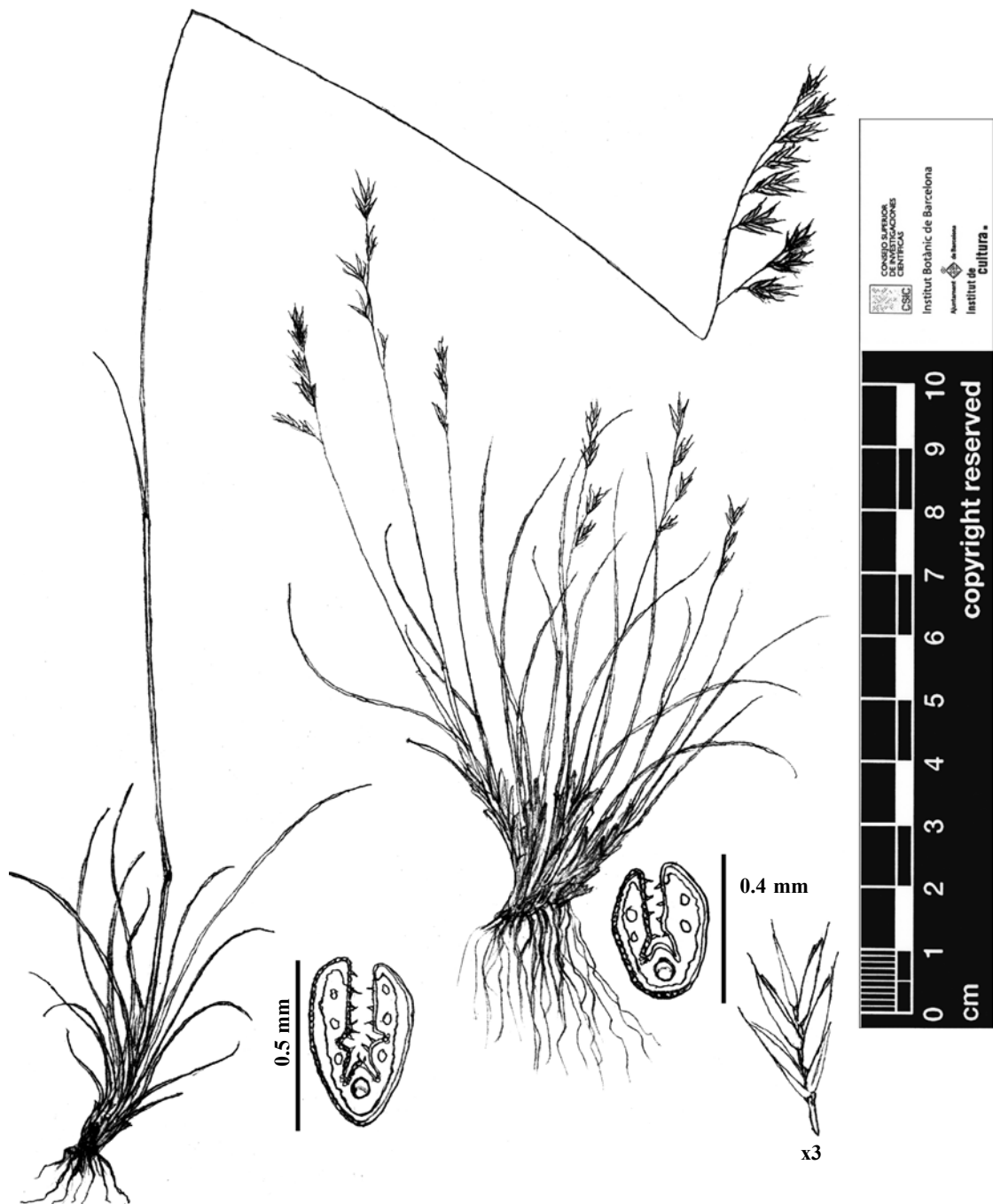


Figure 1. *Festuca occitanica*. Borredà. Showing variability within population, tiller leaf cross sections and spikelet details.

Whereas the close correspondence with the description given by Cebolla & Rivas Ponce (2001) strongly advises including these populations within the given taxon, the habitat notes can best be regarded as expanding on this information. Perhaps a good general description would be “clearings

in Iberian oak woodland communities and their substitution, in areas of continental supra- and meso-Mediterranean bioclimate”. The lower altitude range is increased, with populations occurring from 200 to 800 m above sea level. In Cebolla & Rivas Ponce (2001) populations are stated to occur



Figure 2. *Festuca michaelis*. El Castellar. With details of leaf, tiller cross section and spikelet.

up to 1100 m. These plants were formerly placed within *F. ovina* or *F. duriuscula*, both *sensu lato*, and in Pyke (2003a) the populations from the Ebro Valley were referred to as *F. gracilior*, *sensu* Fuente & Ortúñez (1998). Another plant with strongly scabrid leaves, *F. capillifolia* Dufour, distinguished

by its distinct sclerenchyma pattern, longer-awned lemmas and reddish-purple culm bases, is found to the south of our area, in the Spanish Levant. This plant has been confused with scabrid-leaved fescues such as *F. iberica* (Hack.) K. Richt. of the *F. trichophylla* group.

As for the identity of the remaining widely-distributed populations not conforming to the four taxa detailed above, more detailed studies at the level of Foggi *et al.* (2006)—morphometric, karyological and ISSR analysis—are desirable in order to determine which name (or names) should be applied to these Iberian populations that at present have to go under the name *F. inops*. How different are our plants from the more oriental ones? Do they all constitute one variable taxon or might there be more than one? Is it possible to distinguish them morphologically, or is the ploidy level the only real distinction?

At present these plants, including the Montserrat population referred to by Hackel himself, must be referred to as *F. inops* De Not., since the populations of *F. gracilior* to the east of the Rhône are now being considered under that name as a consequence of the Foggi *et al.* (2006) conclusions, and clear morphological differences have not yet been established. If the more synthetic view taken by Fuente & Ortúñez (1998) is preferred, then a new circumscription of *F. inops* would need to be made.

Other species outside the *F. inops* group

The complicating factor in attempting to correctly identify these plants is that the *F. inops* group across its range, but particularly in the Eastern Pyrenees, comes into contact with other similar species of the Mediterranean complex of intravaginal fescues.

In the field they can be mistaken for members of the *F. marginata* group, which can occur sympatrically, but on examining the leaf sections the doubts are quickly resolved. The thickened leaf margins and midrib can in some cases be visible using a hand lens or even to the naked eye. *Festuca marginata* (Hack.) K. Richt. subsp. *andres-molinae* Fuente & Ortúñez, with its unawned spikelets, is the most similar taxon in general appearance, and shares similar habitats and a partly overlapping distribution. It has very thick sclerenchyma bundles. The awned *F. marginata* subsp. *alopecuroides* (Hack.) K. Richt. (*F. lambinonii* Kerguélen, name applied in most French literature), found in our area in the Eastern Pyrenees and south to the Montseny massif, may need leaf dissection to resolve doubts. Its leaves can be green or glaucous, but new growth is often violet or purple basally. These two taxa are treated at a specific level in the Euro+Med checklist, the

former being assimilated into *F. marginata* (Hack.) K. Richt. The mainly high montane to sub-alpine plant, *F. arvernensis* subsp. *costei* (St.-Yves) Auquier & Kerguélen, which occurs in the Eastern Pyrenean area, is a more robust diploid taxon found on siliceous substrates (Kerguélen & Plonka, 1989). French populations from the Ardèche are composed of smaller plants which are tetraploid, and in appearance closer to *F. marginata* subsp. *alopecuroides*, according to Kerguélen & Plonka (1989). A species that enters into contact with *F. inops* in the north-west extreme of its range, particularly in Navarra, is *Festuca rectifolia* (Fuente & Ortúñez) Cebolla & Rivas Ponce, this plant looking rather like a long-awned *F. inops*. In the southern half of Navarra (Navarra Baja) plants with a broken three-zone sclerenchyma pattern and plants with a continuous unbroken ring, but clearly awned, can be found, these being particularly difficult to classify.

Festuca inops group plants could also be confused with species which in the past were broadly referred to as “*F. indigesta*” which, in our area, include mountain taxa such as *F. yvesii* Sennen & Pau, *F. laevigata* Gaudin, *F. altopyrenaica* Fuente & Ortúñez and the more coastal *F. glauca* Vill. and *F. ruscionensis* Rivas-Mart. & Fuente (Rivas-Martínez *et al.*, 2002), particularly when the leaves thicken under exposed or seasonal conditions. This group includes taxonomically complicated species which, being high mountain plants, fall outside the scope of this article. The Catalanian endemic *F. glauca*, with tough leaves due to its thick sclerenchyma band and to the exposed conditions where it is found, grows on maritime sand and rocky, siliceous substrates from Tossa and Sant Feliu de Guíxols (Girona) to Collioure and Argèles-sur-mer (Roussillon, France) and ascends to about 1100 m in the Albères mountains (Portal, 1999; S. Pyke, pers. obs.) as well as having been found at approximately 1600 m in the siliceous rocks of Montseny (M. Llenas, 07.1907, BC69887). This species normally has green leaves, but the occasional blue-green, pruinose plants found amongst the populations were apparently responsible for its being taken into cultivation, resulting in the well-known “blue fescue” of horticulture. *Festuca ruscionensis*, closely related to this species and, according to Litardière (1927), to *F. yvesii*, is confined to the Cap de Creus area on both sides of the frontier. *Festuca ruscionensis* exhibits a very thick sclerenchyma ring and densely pubescent spikelets, but in other respects appears to be similar to *F. glauca*,

with which it can be found growing and into which I believe it should be included. These last three taxa are hexaploids. *Festuca yvesii*, formerly known under Hackel's more widely applied name of *F. durissima*, is a high mountain plant in the narrow sense, but plants broadly referable to this species descend to the montane zone in our area. It is characterised by its tough, pungent leaves, bearing a thick, continuous ring of sclerenchyma, and lemmas with a long-ciliate upper margin.

Other "*F. ovina*" taxa in the north of our area: *Festuca liviensis* (Verguin) Markgr.-Dann., *F. longifolia* Thuill. and *F. ochroleuca* Timb.-Lagr. s. l.—this last one treated in more detail below, are native species, and inhabit higher, usually wetter mountain areas. The former taxon, diploid, might come into contact with the *F. inops* group in the Pyrenees, but its grey-green or bluish leaves are almost completely smooth, and its leaf-sheaths open to near the base (as opposed to less than halfway in the *F. inops* plants). The presence of well-defined awns also serves to differentiate it, except from *F. occitanica*. The taxon (the type comes from near Llívia, a town in the Cerdagne) is quite widespread, principally in northern Catalonia (both sides of the French border) but also in Aragon (Villar *et al.*, 2001; Fuente & Ortúñez, 2005; S. Pyke, pers. obs., field and JACA). It is a generally short-leaved montane plant said to grow on siliceous soils (first recorded on schists) but, under cultivation, seems to be indifferent to soil type. In Barcelona's Botanic Garden (Jardí Botànic de Barcelona) we have grown it successfully for five years on a calcareous, clay-rich substrate. It is often found in grazed mountain pastures, where it can be abundant.

The latter two species appear to be rare or very rare on the Spanish side of the Pyrenees. Kerguélen & Plonka (1989) consider the diploid *F. longifolia* to be widespread on the French side, and found as high as 1800 m. In Spanish territory populations have been recorded in the Vall d'Aran (on the northern slopes of the Pyrenees) and Alt Àneu, both in Catalanian territory, where it occurs from 600 (near the French border in Vall d'Aran, S. Pyke, pers. obs.) to 2090 m (Ninot *et al.*, 2010). It has also been found in the high Tena valley in Aragon. In the Pyrenees it is associated with siliceous rocks or leached soils in rocky terrain. The original description by Thuillier (1799), based on a lowland population, speaks of the leaves as being "*très longues*" and the plant inhabiting sandy areas. The species is now known

to be more montane, but descends to the plains by means of the rivers. Confusion with *F. liviensis* is possible, though the smaller spikelets and greater leaf length in relation to total plant length help to distinguish it from the latter. The hexaploid *F. lemanii* is also rather similar. Wilkinson & Stace (1991) give more detailed information of this plant alongside *F. longifolia*. A plant related to this species according to Cebolla Lozano *et al.* (1997), *F. rivas-martinezii* Fuente & Ortúñez, can be found within our area in the Iberian mountains of Aragon (Zaragoza province). It has sclerenchyma in three decurrent bundles or sometimes a more or less broken ring. A description and drawing of this plant can be seen in Fuente & Ortúñez (1998) under subsp. *rivas-martinezii*.

Festuca ochroleuca is represented in the region by subsp. *bigorronensis* (St.-Yves) Kerguélen and subsp. *heteroidea* (Verguin) Markgr.-Dann., both being rare. The former is found mainly in French territory in the Central Pyrenees, with some records from the Spanish side (Huesca and Navarra), some of which still need confirming (Fuente & Ortúñez, 2005). Perhaps even rarer in the Iberian Peninsula is the latter subspecies (to which the specific rank has recently been applied), and which inhabits lower mountain areas in the Eastern Pyrenees, the type proceeding from Vallée de l'Aiguette in the Aude. This latter taxon therefore needs to be mentioned in this paper. The following record is from the cultivated material of a plant originally collected by the author in the Mont massif of Girona province. It was maintained in Jardí Botànic de Barcelona until eventually studied carefully. It clearly belongs to this distinctive taxon which I believe merits its recently-published specific level.

Festuca heteroidea (Verg.) Jauzein & J. M. Tison in Biocosme Mésogéen 27: 119 (2010).

≡ *F. ochroleuca* Timb.-Lagr. subsp. *heteroidea* (Verguin) Markgr.-Dann. in Bot. J. Linn. Soc. 76(4): 327 (1978).

Localities studied: Spain, Girona: Albanyà, Mare de Déu del Mont, UTM 31T DG7578, 1100 m, rocas calizas en la umbría cerca de la ermita, 25.09.2004 (cult. H.B.B., specimen herborized 31.05.2006), S. Pyke (BC905802).

This locality is in the Alt Empordà, close to the Garrotxa, within the same geographical area as

the population from Montagut mentioned as first Spanish record by Cebolla & Rivas Ponce (2003) and some 10 km or so to the east. The known altitudinal range is now considerably increased, the previous record being from around 400 m (records from France give roughly 500–2000 m). It appears to be a rare plant of limestone crevices, but a detailed search of this area will undoubtedly produce more records and a better idea of its range and requirements.

The plants, with the characteristic ochre-yellow colour of the older, drying leaves, a feature typical of the species, are only superficially similar to the other *F. ovina*-group plants dealt with here. On examining the leaf tissue, the taxon reveals two different leaf types (see Fig. 3) with different cross-section shape and sclerenchyma pattern as explained in the above-referenced work. In fact, some leaves (these being thinner than the other *F. ochroleuca* taxa) remind us of the *F. rubra* or *trichophylla* groups, and the plants could be mistaken for *F. nigrescens* due to their densely caespitose nature, if sections of only one type of leaf are made. The inflorescence is, with its ochre-coloured, sometimes purple-tinged, long-awned (2–3.5 mm on our material) spikelets, easily distinguishable from the *F. inops*-type plants, and the spikelets on our plants are slightly shorter (7 mm) than those mentioned in the literature, but equalling those on herbarium sheets from Aude department used to check the identity of our plants. Both *F. heteroidea* and *F. ochroleuca* subsp. *bigorronensis* grow in limestone areas and are tetraploid. A third taxon, subsp. *ochroleuca*, grows in the French Pyrenees. It appears rarely on the Spanish side, having been recorded from Navarra, with a very few unconfirmed records from Aragon and Catalonia, and is not always easy to distinguish from subsp. *bigorronensis*, except for its larger spikelets.

Festuca lemanii Bast., Ess. Fl. Maine-Loire p. 36 (1809).

A further species, however, probably native in the provinces of Girona and Barcelona, but frequently found elsewhere as an introduced plant, is particularly confusing. This is the hexaploid *F. lemanii* Bast. (*F. bastardii* Kerguelen & Plonka). This seems to be a very variable plant and frequently colonises disturbed sites both on acidic and basic soils. It has also been used as an ingredient in seed mixtures

and, along with *F. stricta* Host subsp. *trachyphylla* (Hack.) Patzke (*F. brevipila* Tracey), can appear on road verges and railway banks in our area. These species evidently can and do mix with the native fescues in some places and, both being very variable, cause problems for the taxonomist. The chequered history of *F. lemanii* was finally resolved by Wilkinson & Stace (1988) after being satisfactorily neotypified, and Kerguelen & Plonka (1989), in an addenda-type note on page 366, graciously accepted this verdict. Its distribution within Europe is still the subject of some debate.

A chromosome count made on a population from Maçanet de la Selva (Girona), and tentatively assigned to this Western European taxon, turned out to be $2n = 42$, thus confirming the hexaploid nature of the plants from this locality (the voucher specimen BC905778 and chromosome slide preparation are conserved in the Institut Botànic de Barcelona). Apart from a note mentioning a somewhat doubtful record of “*F. ovina*” by S. Llensa in the neighbourhood of Hostalric and Fuirosos, no clear reference is made to fescues from this group in Montserrat’s (1964) floristic treatment of the Cordillera Litoral, a mainly siliceous low mountain area close to Maçanet.

Specimens studied from the Plana de Vic (Barcelona) also adjust well to Auquier’s description of this polymorphic species, as do plants growing by the funicular railway in the Montserrat massif. This author considers *F. lemanii* to be principally associated with *Xerobromion* and *Mesobromion* pastures (Auquier, 1973–1974), although as an alien it is often found in other communities.

Cebolla & Rivas Ponce (2003) consider this taxon to be quite widespread within the province of Girona, and my own observations bear this out. Herbarium material at BC includes populations from Montserrat, in the province of Barcelona, collected by J. Nuet Badia (Monistrol de Montserrat, via del cremallera, 575 m, 9.06.1981, BC675574; and other sheets from the same area). These appear to have been introduced in recent times, possibly due to artificial seeding of the funicular railway surroundings. Curiously, they appear to have been assimilated within another taxon (*F. ovina* subsp. *valentina*, apparently) in the principal work covering the area (Nuet Badia & Panareda Clopés, 1993), though they depart significantly from that taxon. Outside Catalonia, it has been reported from scattered localities across the eastern Iberian Peninsula (for example, *ut F. bastardii*, in

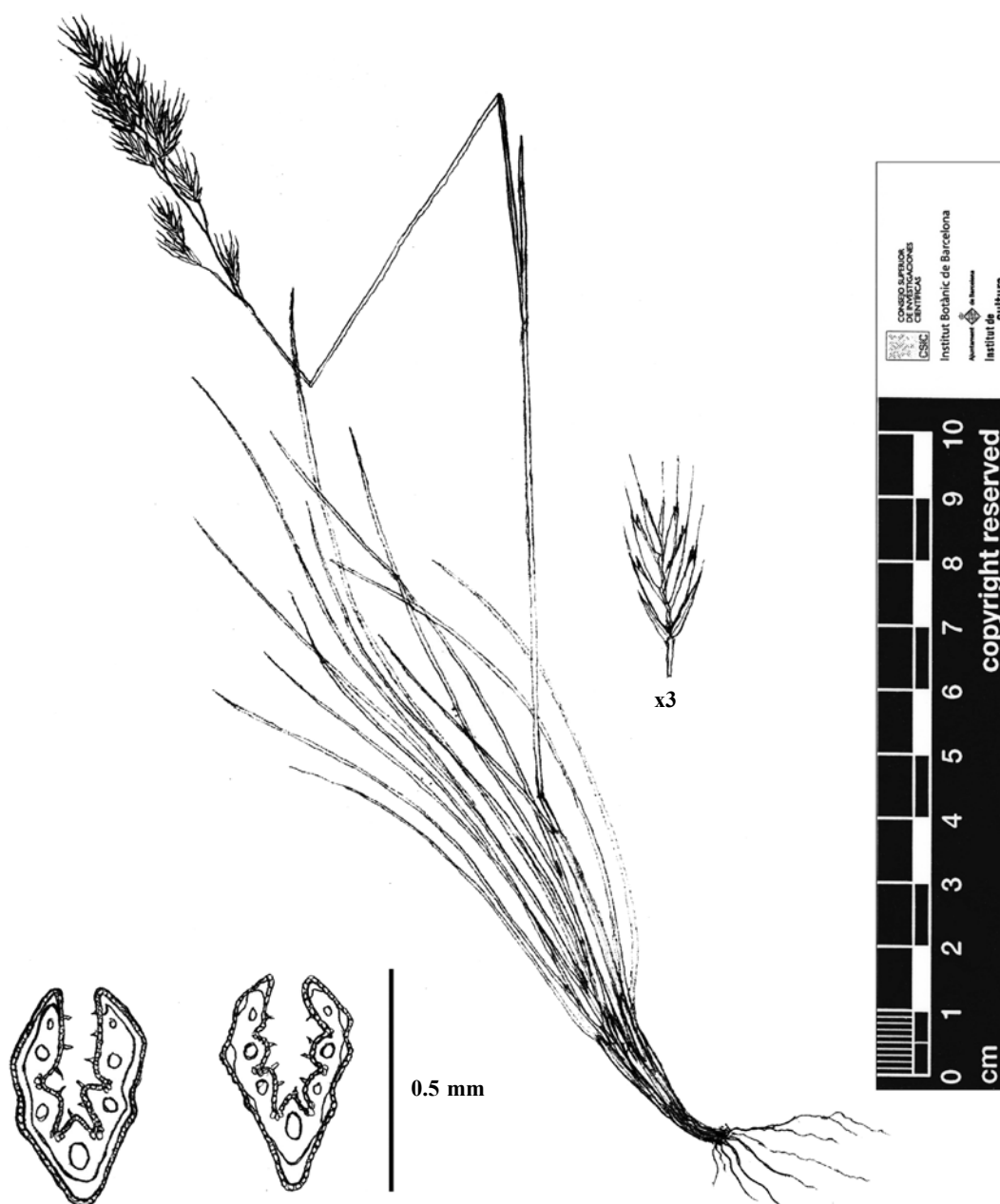


Figure 3. *Festuca heteroidea*. Albanyà. With inset showing sections of internal (left) and external (right) tiller leaves.

Isaba, JACA64471, and Villanueva de Aezcoa, ARAN27437, both in Navarra, and as an ingredient in lawns in Utebo, Zaragoza; S. Pyke, pers. obs.).

This species is not easily distinguished from some *F. inops* group plants. In the field it can look very similar. Some forms of the polymorphic *F. lemanii* look like a longer-awned plant from the *F. inops* group, but generally speaking, the species has denser and longer panicles than the typical Iberian specimens

of the latter taxon. As regards the leaves, they are too variable in both these taxa to be of much help until dissected in the laboratory. The thinner, sometimes broken, sclerenchyma ring of *F. lemanii* can help (but never in isolation) in arriving at a correct conclusion when compared with the usually thicker sclerenchyma, particularly on the flanks, of *F. inops* group plants. Although some Spanish *F. lemanii* plants may differ from their more northerly counterparts, it seems

unwise at present to attempt a fragmentation of this taxon, since hexaploids tend to be highly variable and very adaptable to local conditions.

This species, as also *F. stricta* Host subsp. *trachyphylla* (Hack.) Patzke (*F. brevipila* Tracey), exhibits a pioneer tendency on a wide range of soil types and over a considerable altitudinal range. This edaphic indifference along with tolerance of periodic stress conditions make these plants highly suitable candidates for artificial sowings (lawns, road verges, land recovery projects), and in recent years we have seen a considerable spread of both taxa across Europe.

Both these taxa have awned lemmas, and both can possess either glabrous or pubescent leaf sheaths and spikelets, but whereas *F. lemanii* leaves contain the usually continuous sclerenchyma band typical of the “*ovina*” group of plants, *F. stricta* subsp. *trachyphylla* normally has broken sclerenchyma, thicker at the margins and midrib, though some plants have a continuous ring (Auquier, 1973–1974), thus highlighting the need to make various sections and preferably from more than one plant.

Festuca stricta Host subsp. *trachyphylla* (Hack.) Patzke in *Phyton* (Horn) 24 (1): 58 (1984) and *Haussechtia* 7: 67 (1999).

At the specific level, the accepted name for this plant is *F. brevipila* Tracey (Wilkinson & Stace, 1988), replacing the illegitimate *F. trachyphylla* (Hack.) Krajina (1930) due to its duplicity with a South American taxon: *F. trachyphylla* Hack. ex Druce (published in 1915). Wilkinson & Stace (1998) explain this curious situation in the same paper in order to highlight the considerable taxonomic confusion associated with the European species.

The epithet “*brevipila*” refers to the very short hairs on the inner leaf surface rather than the pubescent sheaths observable in some plants from Central and Northern Europe. The few Spanish plants studied have more or less glabrous sheaths. This plant has been widely distributed by man, and the numerous agricultural strains, under the name “hard fescue” in English, mean that much variation in size, indumentum, etc. can be found. Taxonomically, it is close to *F. valesiaca* Schleich. ex Gaudin.

Semi-naturalized populations have been recorded (Pyke, 2003a, b) from Aragon and Catalonia, their *exsiccata* distributed to JACA and BC, as well as those still in the author’s custody.

Cultivated species

Blue-grey leaved cultivars of *F. glauca* Vill., and *F. valesiaca* (these possibly not correctly named), are sold as ornamentals, but do not seem to become firmly established beyond the areas where planted at present in our region.

CONCLUSIONS

We now have a fairly good general knowledge of the fescues in the area, but there is plenty of work still to be done. A good many herbarium sheets lack a recent expert revision, the distribution of some taxa needs to be better understood, and there still exist doubts as to the exact identity of populations in the low mountain areas around the Ebro Valley and the Eastern Pyrenees, where a number of similar species converge. In such places, intermediate plants, difficult to assign to a particular taxon, appear to be frequent. Field identification is difficult even for the trained eye, and examination of collected material in the laboratory is in many cases an obligation. Collaboration of colleagues, including people with field experience living in the region, is therefore very important, and the recently signed collaboration agreement between Spanish, French and Andorran botanists (*Atlas Florístico del Pirineo. Eje Biodiversidad de la O.P.C.C.*) in an attempt to improve our global understanding of Pyrenean vascular plants is surely going to be of great value.

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Appendix. Material studied.

Material of *Festuca inops* group

Festuca valentina: Spain, Alacant: Sierra de Aitana, 1400 m, 9.07.1958, *A. Rigual* (VAL138083); Sierra de Maigmó, 12.05.1963, *A. Rigual* (VAL138082); Sierra de Serrella, 1100 m, 2.07.1984, *G. Mateo & R. Figuerola* (JACA109086). Alacant/València: Serra de Mariola, 24.06.1923, *E. Gros* (BC69803, type). València: Ayora, Cueva Horadada, UTM 30S XJ82, 1000 m, 15.06.1994, *J. Riera* (VAL38634); Utiel, Sierra del Negrete, 06.1986, *Mansanet & Mateo* (VAL9979). ***Festuca tarraconensis***: Spain, Barcelona: Pla de Basses, sobre Castelldefels, 7.06.1917, *P. Font Quer* (BC69795); Plateau de Begues, 2.07.1917, *Sennen* (BC69958); Begues, Pla d'en Querol, UTM 31T DF0870, 475 m, 7.06.2008, *S. Pyke* (BC905475). Castelló: El Toro, Hoya de Don Jaime, UTM 30S XK92, 11.06.1984, *A. Aguilera* (VAL6943). Lleida: Sanaüja, 29.05.1932, *P. Font Quer* (BC831708); Sanaüja, La Rasa del Pujol, UTM 31T CG6140, 510 m, marges carretera, 2.06.2010, *I. Soriano et al.* (BC903269); Sant Guim de Freixenet, 17.06.1917, *P. Font Quer* (BC69807). Tarragona: Serra de Cardó, 27.05.1942, *P. Font Quer* (BC93051, type); Mas de Barberans, UTM 31T BF71, 460 m, 1.06.1986, *L. De Torres* (BC905476); Vallfogona de Riucorb, 06.1917, *M. Garriga de Gallardo* (BC868874). Teruel: Puerto de Escandón, UTM 30T XK7258, 1220 m, 28.06.1955, *P. Montserrat* (JACA27355). ***Festuca occitanica***: France, Aude: Coustouge, UTM 31T DH86, 350 m, 5.06.1983, *P. Montserrat & L. Villar* (JACA99283); Feuilla, 27.05.1901, *Sennen* (Herb. Sennen); Narbonne, UTM 31T EH1280, 100 m, 4.06.1983, *P. Montserrat & L. Villar* (JACA88083); Tuchan, DH7349, 890 m, 5.06.1983, *P. Montserrat & L. Villar* (JACA104883). Hérault: Lespignan, 21.05.1890, *Sennen* (Herb. Sennen); Pic St.-Loup, 600 m, 06.1909, *Rodié* (G308973); St.-Guilhem-le-Désert, 7.06.1894, *Sennen* (BC85894, type). Pyrénées-Orientales: Mont Louis, 27.06.2008, *A. Romo et al.* (BC905748). Spain, Barcelona: Borredà, UTM 31T DG202632, 760 m, 15.06.2011, *N. Ibáñez et al.* (BC923578, BC923580). ***Festuca michaelis***: Spain, Huesca: Alcubierre, UTM 30T YM03, 800 m, 24.06.1986, *I. Aizpuru & P. Catalán* (ARAN27610); Candanos, Valcuerna, 240–280 m, 4.06.1980, *P. & G. Montserrat* (JACA149080); Fraga, Valcuerna, UTM 31T BF5590, 200 m, 10.05.2005, *J. M. Montserrat et al.* (BC905800); Peraltilla, 430 m, 14.06.1984, *P. Montserrat* (JACA31884). Lleida: Les Avellanes [aprox. 600 m], 12.05.1933, *P. Font Quer* (BC111137). Navarra: Carcastillo, 450 m, 26.05.1987, *I. Aizpuru & P. Catalán* (ARAN27603); San Martín de Unx, UTM 30T XN2010, 700 m, 5.06.1986, *I. Aizpuru & P. Catalán* (ARAN27608). Tarragona: Mont-Ral, 800 m, 1.06.1952, *F. Masclans* (BC124703); Vallfogona de Riucorb, 06.1919, *M. Garriga de Gallardo* (BC868895). Zaragoza: La Almunia de Doña Godina, 500 m, 29.03.1974, *P. Montserrat* (JACA247574); Bujaraloz, 360 m, 4.06.1980, *P. & G. Montserrat* (JACA158780); Monegrillo, 550–600 m, 29.05.1988, *J. M. & G. Montserrat* (JACA122088); Sástago, Retuerta de Pina, *supra* Salada de Sástago, Puyburel, 20.05.1952, *J. Braun-Blanquet & O. Bolòs* (BC124409); Tosos, Pantano de las Torcas, UTM 30T XL6072, 660 m, 8.05.1993, *S. Pyke* (SBP933); Zaragoza, Monte Sillero, UTM 30T XL89, 650 m, *Thero-Lygeion*, 25.05.1952, *J. Braun-Blanquet & O. Bolòs* (BC124408); Zaragoza, El Castellar, UTM 30T XM7041, 540 m, 29.05.1999, *P. Catalán & S. Pyke* (BC925656); Zaragoza, Peñafior, El Vedado, UTM 30T XM9027, 370 m, 17.05.2000, *S. Pyke* (BC872640); Zaragoza, Peñafior, Las Barrillas, UTM 30T XM8829, 320 m, 28.05.2000, *S. Pyke* (BC872640). ***Festuca inops***: France, Alpes-Maritimes: Gorges de Saorge, 29.05.1869, *F. S. Alioth* (G308968); Rochers à Formose près le Col de Tende, 9.07.1861, *E. Bourgeau* (G308969). Drôme: Suze-la-Rousse, 110 m, 25.05.2005, *A. Charpin* (G308966). Var: Draguignan, 07.1910, *L. A. Girod* (G308970). Italy: Apenninus mutinensis, 800 m, 14.06.1928, *A. Lunasoli* (Herb. Sennen). Piemonte: Suza à la Brunetta, 4.07.1857, *A. Chabert* (G308967). Toscana: Pomerance, entre Libbiano et Serrazzano, 520 m, 17.05.2000, *P. Cuccuini & G. Aldobrandi* (BC839928). Spain, Barcelona: Castellnou de Bages, 15.05.1912, *P. Font Quer* (BC69870); Font-Rubí, El Castellot, UTM 31T CF8189, 740 m, 14.02.2010, *S. Pyke 6070* (viveros JBB); Montgros (S^a Montserrat), UTM 31T DG0006, 1120 m, 25.08.2001, *S. Pyke & J. Pallàs* (BC905759); Sant Joan de Montserrat, 6.06.1949, *without collector* (BC868922); Sant Llorenç del Munt, Montcau, 1000 m, 4.05.2011, *S. Pyke 6557* (viveros JBB); Vall de Ribes, 800 m, 20.06.1972, *J. Vigo & A. Anglada* (BC612871). Castelló: Pina de Montalgrao, UTM 30T YK0234, 1240 m, 14.07.1991, *J. Riera* (VAL22084); Sant Joan de Penyalgosa, 1300 m, 07.1963, *J. Vigo* (BC602327); Vistabella del Maestrazgo, 11.06.1958, *M. Caldusch* (BC144915); Vistabella de Maestrazgo, 1225 m, 07.1963, *J. Vigo* (BC602326); Vistabella del Maestrazgo, 07.1963, *J. Vigo* (BC602334). Huesca: Cornudella de Baliera, UTM 31T CG0785, 900 m, 23.07.2006, *S. Pyke* (BC905747); Lanave, 750 m, 1.07.1972, *P. Montserrat & L. Villar* (JACA417872); Lascuarre, UTM 31T BG9571, 1078 m, 23.05.2010, *N. Nualart & D. Pérez Prieto* (BC873255); Monesma y Cajigar, UTM 31T CG0471, 686 m, 24.05.2010, *N. Nualart & D. Pérez Prieto* (BC873256); [Sierra de] Guara, 970 m, 1.07.1972, *P. Montserrat & L. Villar* (JACA412672); Sierra de Guara, La Torrecilla, UTM 31T BG5997, 640 m, 11.06.1982, *J. M. Montserrat et al.* (BC927486); Sierra de Guara, Sarsa de Surta, 900 m, UTM 31T BG5491, 11.06.1982, *J. M. Montserrat et al.* (BC927492); Sierra de Guara, Nocito, UTM 30T YM2794, 1080 m, 25.06.1982, *J. M. Montserrat* (BC927488). Lleida: Mont-Roig, UTM 31T CG2341, 600 m, 18.06.1984, *A. Romo* (BC831555); Montsec d'Ares, 1600 m, 25.06.1916, *P. Font Quer* (BC69871); Montsec d'Ares, 1380 m, 25.06.1986, *I. Aizpuru & P. Catalán* (ARAN27571); Montsec d'Ares, 1678 m, 25.06.1986, *I. Aizpuru & P. Catalán* (ARAN27680); La Pobra de Segur, 6.07.1918, *P. Font Quer* (BC69788). Navarra: Esteribar, UTM 30T XN1647, 600 m, 12.06.1987, *I. Aizpuru & P. Catalán* (ARAN27623). Tarragona: La Censola, 30.06.1917, *P. Font Quer* (BC111124); Llaberia, Montalt, UTM 31T CF14, 670 m, 18.06.1973, *R. Folch* (BC627535); Montañas de Horta, 14.06.1915, *P. Font Quer* (BC69747); Montblanc, 650 m, 8.06.1950, *E. Batalla & F. Masclans* (BC124711); Montsant, 1000 m, 25.06.1918, *P. Font Quer* (BC69810); Els Motllats, 1000 m, 1.06.1952, *E. Batalla* (BC124704); Muntanyes de Prades, La Pena, 900 m, 21.06.1952, *F. Masclans* (BC124705);

Muntanyes de Prades, 950 m, 6.06.1954, *E. Batalla* (BC916013); La Sénia, UTM 31T BF61, 1140 m, 26.06.1983, *L. De Torres* (BC905485); Serra de Cardó, 25.06.1949, *P. Font Quer* (BC868908). Teruel: Cucalón, UTM 30T XL5550, 1180 m, 5.06.1992, *S. Pyke* 2845; Pozondón, 1200 m, 27.06.1921, *P. Font Quer* (BC69789); La Virgen de la Vega, 22.06.1946, *J. Borja* (BC868926). València: Andilla, cerro de la Viruela, UTM 30S XK9015, 1125 m, 10.06.2004, *G. Mateo et al.* (VAL216955); Puebla de San Miguel, 18.06.2000, *M. Guara* (BC32428). Zaragoza: Puerto de Paniza, 900 m, 25.06.1955, *P. Montserrat* (JACA23655); Santed, UTM 30T XL2443, 1100 m, 18.07.1992, *S. Pyke* (BC905760). *cf. F. inops*: Spain, Navarra: Carcastillo, 470 m, 25.06.1986, *I. Aizpuru & P. Catalán* (ARAN27602); Tafalla, 425 m, 25.06.1986, *I. Aizpuru & P. Catalán* (ARAN27609). Zaragoza: Calatayud, UTM 30T XL1583, 640 m, 29.05.2006, *S. Pyke* (BC905757); Cariñena, Monte Herrera, 1300 m, 22.06.1979, *J. M. Montserrat & J. Molero* (BC636238).

Material of *Festuca lemanii*

France, Ardennes: Novy-Chèvières, 22.06.1977, *J. Duvigneaud*, det. Auquier (BC630532). Hérault: Saint-Chinian, 26.05.1896, *Sennen* (Herb. Sennen). Puy-de-Dôme: Cournon d'Auvergne, 400 m, 3.06.1980, *F. Billy*, det. Kerguélén (BC657103). Spain, Barcelona: Manlleu, 7.06.1918, *Gonzalo* (Herb. Sennen); Monistrol de Montserrat, UTM 31T DG0026, 1020 m, 27.05.1981, *J. Nuet Badia* (BC675561); Mura, Montcau, UTM 31T DG1714, 1000 m, 4.05.2011, *A. Salvat et al.* (BC915237); Pont de Molins, 18.05.1918, *Sennen* (Herb. Sennen); Sant Feliu de Torelló, 28.05.1925, *Gonzalo* (BC132780); Seva, 21.05.1915, *P. Font Quer* (BC69950); Torelló a Bellmunt, 07.1910, *Sennen* (Herb. Sennen). Girona: Llers, coteaux, 20.05.1920, *Sennen* (BC69766); Maçanet de la Selva, UTM 31T DG7824, 100 m, 20.06.2003, *S. Pyke* (BC905778); Ripoll, roquers de Sant Quentí, 690 m, 7.07.1914, *Sennen* (Herb. Sennen); Sant Feliu de Pallerols, La Salut [UTM 31T DG5857, aprox. 1000 m], 17.06.1934, *P. Font Quer* (BC111177); Sant Miquel de Fluvià, UTM 31T DG9868, 20 m, 24.06.2013, *S. Pyke* 6839.