ACTA BOTANICA CROATICA
CODEN: ABCRA 25
ISSN 0365-0588
eISSN 1847-8476

ACCEPTED, AHEAD OF PRINT VERSION OF THE MANUSCRIPT
81(1), 1st April 2022

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Please cite this article as: Aykurt C, Çıngay B, Sümbül H, Gülben M, Cabi E, Öz Z: *Festuca albomontana* (Poaceae), a new chasmophytic fescue from the Western Taurus Mountains (Antalya, Turkey). Acta Botanica Croatica, **DOI: 10.37427/botcro-2022-002**

This is a PDF file of a manuscript that has been accepted for publication and language edited. The manuscript will undergo additional technical editing and formatting before it is published in its final form.

Festuca albomontana (Poaceae), a new chasmophytic fescue from the Western Taurus Mountains (Antalya, Turkey)

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Running title: *FESTUCA ALBOMONTANA* (POACEAE), A NEW SPECIES FROM TURKEY

Abstract – A new species of *Festuca* from the Western Taurus Mountains (Antalya, Turkey) is described here and named *F. albomontana*. The new species can clearly be distinguished from the other species included in the *F. alpina* group by its leaf anatomical features. It has a geographically isolated position in the Western Tauruses whereas a closely related species, *F. sommieri*, is very local in the Black Sea Region of Turkey. It is suggested that it should be in the "critically endangered" threat category according to the International Union for Conservation of Nature (IUCN) criteria. Observations on the ecology of the population are noted.

Keywords: anatomy, *Festuca*, morphology, new species, taxonomy, Turkey

Introduction

The grass family (Poaceae), with about 12,000 species and 780 genera, ranks as the second largest monocot family and the fifth largest plant family in the world (Clayton and Renvoize 1986, Kellogg 2015, Christenhusz and Byng 2016, Soreng et al. 2017). In the checklist of the family Poaceae in Turkey, Cabi and Doğan (2012) reported that Turkey hosts 146 grass genera including 547 species (658 taxa). After the publication of the checklist of the Poaceae, still more new grass taxa were recorded or described for the Turkish flora (e.g. Cabi et al. 2013, 2015a,b, Doğan et al. 2015, Cabi and Soreng 2016, Cabi et al. 2018, Terzioğlu and Özkan 2020, Behçet and Yapar 2021).

Festuca L. is a genus of the family Poaceae with about 636 species, distributed in Europe, Africa, temperate Asia, tropical Asia, Australasia, the Pacific, North America, South America and Antarctica (Clayton and Renvoize 1986, Watson and Dallwitz 1992, Clayton et al. 2006-onwards, Martínez-Sagarra and Devasa 2019, POWO 2021). It is characterized by its perennial habit, paniculate inflorescence, usually with 4–5 flowered spikelets, rounded

lemmas on the back and linear hilum running the length of the caryopsis. *Festuca* is not a well-researched genus for the Turkish flora, probably because of the high phenotypic plasticity and variability at the taxon level, which makes identification demanding. Taxonomic opinion since the first major monograph of Hackel (1882) on the genus, has varied, and it has been divided into several subgenera and sections or even segregate genera (Saint-Yves 1922, Tzvelev 1971, Alexeev 1977, 1978, 1981, 1986, Clayton and Renvoize 1986, Aiken et al. 1997). In recent years, molecular phylogenetic studies conducted on the genus *Festuca* and its putative relatives have demonstrated the paraphyly of *Festuca* s.l. (Darbyshire and Warwick 1992, Charmet et al. 1997, Gaut et al. 2000, Torrecilla and Catalán 2002, Catalán et al. 2004, 2007, Inda et al. 2008, Foggi et al. 2012). Clayton and Renvoize (1986) and Aiken et al. (1997) recognized the following subgenera: *Drymanthele* Krecz. and Bobrov, *Helleria* Alexeev, *Leucopoa* (Griseb.) Hack., *Schedonorus* (P. Beauv.) Peterm., *Subulatae* (Tzvelev) Alexeev, *Xanthochloa* (Kriv.) Tzvelev and *Festuca*. Then, the subgen. *Leucopoa*, subgen. *Schedonorus*, subgen. *Drymochloa* Holub and subgen. *Parafestuca* E.B. Alexeev were recognized as segregated genera (Foggi et al. 2005). Additionally, species from the *F. paniculata* complex were recently separated into a separate genus *Patzkea* (L.) G.H.Loos (Loos 2010).

The subgenus *Festuca* is the largest and taxonomically most complex group (Hackel 1882, Saint-Yves 1922, Markgraf-Dannenberg 1980) in this genus. Drawing on molecular data, Catalán et al. (2007) proposed a new circumscription of the subgenus, recognizing only the sections *Festuca, Aulaxyper* Dumort. and *Eskia* Willk., and later, Inda et al. (2008) added the sections *Dimorphae* Joch. Müll. and Catalán, *Amphigenes* (Janka) Tzvel., *Scariosae* Hack., *Pseudoscariosa* Krivot, *Lojaconoa* Catalán and Joch. Müll. and *Subbulbosae* Nyman ex Hack.

This genus is especially diverse in the northern hemisphere, and it is likely that the Eurasian region was its center of origin (Catalán et al. 2004, Inda et al. 2008). The genus *Festuca* is represented by 66 taxa of which 27 are endemic to Turkey according to Cabi and Doğan (2012) and were arranged in three subgenera and four sections (Markgraf-Dannenberg 1985).

Antalya is the richest province of Turkey in terms of plant diversity (Deniz and Aykurt 2014). A large part of the acreage of Antalya province is the mountainous Western Taurus range, and this area is one of the important endemism centers of Turkey. During the project, in which we investigated the Poaceae diversity of the high mountainous area of Antalya province, a large number of Poaceae samples were collected and evaluated in detail in terms of morphology. *Festuca* is one of the genera with the largest number of species in this area. The taxa of this genus, which is taxonomically highly complex, occurring in the Western Taurus Mountains, are included in Sect. *Festuca* Subsect. *Festuca*, except *F. gigantea* (L.) Vill. and *F. anatolica* Markgr.-Dann. subsp. *anatolica*. The species of this subsection were evaluated under five groups, which are *Frigida*, *Laevis*, *Indigesta*, *Valesiaca* and *Ovina*, in Turkey (Markgraf-Dannenberg 1985). The most useful character to segregate species groups within the different taxonomic sections is the arrangement of the sclerenchyma, and a remarkable variability of this character is found in the species of *Festuca* Sect. *Festuca* (Martínez-Sagarra et al. 2017).

For *Festuca* taxonomy, leaf anatomical characters may be the most important diagnostic character (e.g. Markgraf-Dannenberg 1985, Foggi and Rossi 1996, Martínez-Sagarra 2017). The anatomical characteristics of the species distributed in the subalpine and alpine zones of the Western Taurus Mountains are given in this study. The leaf anatomical features of the new species have been compared with morphologically similar species within the same group and the species included in the other species groups of the Sect. *Festuca* Subsect. *Festuca* occurring in Turkey.

Materials and methods

A large number of *Festuca* specimens were collected during field studies for a floristic survey for the project named "A research study on the grass family (Poaceae) distributed in the high mountain zone in Antalya province" between the years 2018 and 2020. The morphological characteristics of all these specimens were recorded both in the field and in the laboratory. Specimens collected were evaluated by the use of related literature (Tzvelev 1971, Alexeev 1977, Markgraf-Dannenberg 1980, 1985, Clayton and Renvoize 1986, Watson and Dallwitz 1992, Kellogg et al. 2015) and the specimens were deposited in AKDU and Nezahat Gökyiğit Botanical Garden (NGBG). The overall morphology of the specimens was examined under a stereo-binocular microscope. The new species described here is known from only its type locality. We visited this locality three times between the years 2019 and 2020 and collected a few individuals without damaging the population. Ten individuals were evaluated for morphological determination of *F. albomontana*. We used standard measurements and terminology in accordance with Hackel (1882), Markgraf-Dannenber (1985), Ellis (1987), Fuente and Ortúñez (1998), Foggi et al. (1999), Martínez-Sagarra and Devasa (2019).

For the anatomical studies, the tiller leaves taken from herbarium samples were used. Leaves were kept in distilled water for c. five minutes. Transverse sections ± 0.05 mm thick were cut from pieces of tiller leaf fixed in styrofoam, by hand using a razor blade. This was done under a stereomicroscope using reflected light.

Results

The occurrence of nine *Festuca* species (10 taxa) was determined in the high mountainous area (Western Taurus) of Antalya province with the project mentioned above. Apart from *F. anatolica* subsp. *anatolica* (Sect. *Variae*) and *F. gigantea* (Sect. *Bromoides*), all the remaining *Festuca* species in the Western Taurus, *F. callieri* (Hack.) Markgr. subsp. *callieri*, *F. callieri* subsp. *zederbaueri* Markgr.-Dann., *F. elwendiana* Markgr.-Dann., *F. valesiaca* Schleich. ex Gaudin, *F. jeanpertii* (St.-Yves) F. Markgr. subsp. *jeanpertii*, *F. pinifolia* (Hack. ex Boiss.) Bornm. var. *pinifolia*, *F. sipylea* (Hack.) Markgr.-Dann., and *F. albomontana* Aykurt, Çıngay, Sümbül & Cabi described here as a new species, are included in the Sect. *Festuca* Subsect. *Festuca*. This subsection is divided into five groups according to Flora of Turkey. Considering the new species described here, the species representing each group are distributed in the Western Taurus Mountains: *Festuca albomontana* in the *Frigida* group, *F. jeanpertii* subsp. *jeanpertii* in the *Laevis* group, *F. pinifolia* var. *pinifolia* in the *Indigesta* group, *F. valesiaca*, *F. callieri* (subsp. *callieri* and subsp. *zederbaueri*) and *F. elwendiana* in the *Valesiaca* group, and *F. sipylea* in the *Ovina* group. The transverse sections taken from the tiller leaf blades of these taxa are shown in Fig. 1. *F. pinifolia* var. *pinifolia* and *F. sipylea* have sclerenchyma forming a continuous ring. All the remaining taxa except for *F. pinifolia* var. *pinifolia* have sclerenchyma forming abaxial strands. In *F. pinifolia* var. *pinifolia*, sclerenchyma strands are located both abaxially and adaxially. *Festuca alpina* group species are distinguished by relatively small strands.

The transverse section of tiller leaves of the new species is more or less rounded, polygonal, not closed and not V-shaped. There are 5 vascular bundles and 5–8 small sclerenchyma strands, also with 2 very small submarginal accessory sclerenchyma strands, located under the abaxial side of the epidermis in *F. albomontana*. The median strand is generally slightly larger than the others. The 3 adaxial ribs are prominent.

Festuca albomontana is a chasmophytic species growing on rock crevices of the subalpine zone of Akdağ (Alanya, Antalya) and known only from its type location. The

bedrock of this location is called Payallar formation and consists of Paleozoic schist, phyllite, quartzist, quartz etc. This formation is represented by lowly metamorphosed schists with quartzite, nodular limestone, marble dolomite interlayers (Şenel et al. 2016).

Densely tufted new fescue is morphologically characterized by 1. its fine, soft and glabrous leaves; 2. simple panicles with few spikelets; 3. lemmas with a long awn. A detailed comparison of both the morphological and anatomical characters of the new species and its morphologically close relatives are shown in Tab. 1.

Discussion

In Turkey, the species included in the *Frigida* group, which are *F. cratericola* Markgr.-Dann., *F. sommieri* Litard. and *F. bushiana* (St.-Yves) Tzvelev, are low plants of high alpine habitats, with short, simple panicles. These species are characterized by their (1) leaf sheaths closed nearly at the mouth and weakly decaying into fibres; (2) leaf blades which are usually fine, with 5 veins, l(–3) ribs, and 3–7 sclerenchyma strands (Markgraf-Dannenberg 1985) and they resemble species in the *F. alpina* group in terms of both morphological and anatomical features. Foggi et al. (2012) indicated that the *F. alpina* group, which comprises several small species typically found in exposed (mostly calcareous) rocky habitats in the high mountains of Europe, is characterized by tiller leaf sheaths completely closed or open in their upper half. The leaf anatomical features of this group and their systematic significance were evaluated by Martínez-Sagarra et al. (2017) and a leaf model was presented for the "*F. alpina* group" species: The leaves are conduplicate and quite narrow (0.34–0.62 mm) in transverse section. The number of vascular bundles is 3–5 and the sclerenchyma strands are quite thin. The species of this group are also characterized by their small size, flexible leaves, and short panicles with few spikelets (López et al. 2016). *Festuca alpina* Suter, *F. alfrediana* Foggi & Signorini, *F. glacialis* (Miégev ex Hack.) K. Richt. and *F. frigida* (Hack.) K. Richt. were included in this group (Foggi et al. 2012, Martínez-Sagarra et al. 2017). In recent years, it has been seen that the species with the morphological and anatomical features mentioned above are grouped under the "*F. alpina* group" rather than the "*Frigida* group". For this reason, the new species described here is evaluated in the *F. alpina* group and it has a geographically isolated position in the Mediterranean region of Turkey. The other representatives of this group also have a limited distribution area and they are also known from a single location according to the Flora of Turkey. *Festuca bushiana* and *F. sommieri* occur in alpine habitats in the Black Sea region, Rize and Trabzon provinces, respectively. The other species, *F. cratericola*, of this group is endemic to Erciyes Mountain in Central Anatolia.

Here, we compared the new species with morphologically and anatomically similar taxa, i.e., *F. sommieri, F. cratericola, F. alpina* and *F. alfrediana*, by using literature information (e.g. Markgraf-Dannenberg 1985, Foggi et al. 2012, POWO 2021). *Festuca alpina* and *F. alfrediana* are also the two most common species in this group, growing in rocky habitats across the European mountain chains. According to Foggi et al. (2012), *F. olympica* Vetter from Greece and *F. pirinica* I.Horvat ex Markgr.-Dann. from Bulgaria both have open leaf-sheaths and therefore they do not belong to the *Alpina* group.

The lemmas with long awns are one of the most remarkable morphological features of *F. albomontana*, and the new species most resembles *F. sommieri* and *F. alfrediana* with respect to this character. However, the leaf anatomical features of the new species are quite different from both of them. The number of sclerenchyma strands and having 3 distinct ribs on the adaxial side of the leaf cross-section are the most useful diagnostic characters for separation of the new species from its close relatives.

Taxonomic treatment

***Festuca albomontana* Aykurt, Çıngay, Sümbül & Cabi sp. nov. (Figs. 2, 3).**

Type: Turkey: Antalya, Alanya, north of Akdağ (White Mountain), rock crevices near little lake, 2100 m elevation, 36°41′22.98′′ N / 32°16′47.76′′ E, 17.07.2019, *C. Aykurt 5525 & H. Sümbül* (holotype: AKDU; isotype: AKDU).

Diagnosis: *Festuca albomontana* differs from the related species *F. sommieri* by its subulate and 2.5–2.8 mm long lower glumes (vs. lanceolate and c. 3.5 mm long), subulate and 3.2–3.5 mm long upper glumes (vs. lanceolate and 6–6.4 mm long), 5–7 sclerenchyma strands (vs. 3), and 3 distinct adaxial ribs (vs. indistinct).

Description: More or less densely tufted grass with ascending vegetative shoots. Basal innovations intravaginal. Culms 6–14 cm long, smooth, glabrous along entire length. Leaves filiform, smooth, soft, minutely scabrid on margins, acute to obtuse, few scabrid at apex; ligule c. 0.4 mm long, auriculate, ciliate at apex. Tiller leaf sheaths papyraceous, scabrid on back, sometimes minutely so, completely fused, sometimes decaying into fibres; blades 2–8 × 0.03–0.05 cm; transverse section of tiller leaf blades polygonal, not closed, more or less orbicular, slightly angled, with 5 vascular bundles, 5–8 small sclerenchyma strands, also with 2 very small submarginal accessory sclerenchyma strands (the median strand is generally slightly larger than the others); with 3 distinct adaxial ribs with a few minute hairs. Culm leaf sheaths glabrous, closed to mouth; blades 1–2.5 × 0.03–0.04 cm. Panicle 2.4–4.5 cm long, with spreading short branches; branches glabrous, smooth. Spikelets 5–7 mm long with 2–4 florets; rachilla scabrid. Glumes unequal, subulate, upper glume distinctly longer than the lower glume, glabrous; lower glumes 2.5–2.8 × 0.5–0.9 mm, 1-veined; upper glumes 3.2–3.5 × 0.9–1.2 mm, 3-veined. Lemmas 3.7–4.2 × c. 1 mm, subulate, glabrescent to scabrid in the distal part; awn 3.5–4.5 mm long, minutely scabrid. Palea 3.5–3.8 × c. 1 mm, more or less finely hairy along its entire length. Anthers c. 1.5–2 mm long. Ovary glabrous. Caryopsis thin and glabrous.

Phenology: Flowering period starts in July, continues towards end of August. Fruiting period is late August.

Etymology: The specific epithet '*albomontana*' refers to the Ak Mountain where the new species was discovered. "Ak Mountain" in translates as "Alba Montana".

Habitat, ecology and conservation status: *Festuca albomontana* is a local species endemic to the high mountain zone of the Ak Mountain (Alanya, Antalya), inhabiting schistose rock crevices at an elevation of 2100 m. Within this area, the new species is associated with plants such as *Eremopoa capillaris* R.R. Mill, *Poa davisii* Bor, *Melica persica* Kunth subsp. *jacquemontii* (Decne. at Jacquem.) P.H. Davis, *Paracaryum lithospermifolium* (Lam.) Grande subsp. *cariense* (Boiss.) R.R.Mill, var. *cariense*, *Lamium eriocephalum* Benth., *Stachys citrina* Boiss. & Heldr. ex Benth. subsp. *citrina*, and *Galium sorgerae* Ehrend. & Schönb.-Tem.

The area of occupancy of the species is limited to less than 10 km^2, and the total number of mature individuals is approximately 50. Overgrazing by goat herds was noticed near the type locality. Therefore, this new species should be considered as "critically endangered" (CR B2 ab(v); D) according to the IUCN categories (IUCN, 2019).

The identification key for species of the *F. alpina* group in Turkey

1a. Leaf blades fine, 0.25–0.5(-0.6) mm broad; sclerenchyma strands very slender……..…2

1b. Leaf blades stouter, (0.3–)0.4–0.65(–0.8) mm broad; sclerenchyma strands 3, strong…….....*F. bushiana*
2a. Lemma awn c. 1/3 × lemma length……..*F. cratericola*
2b. Lemma awn 1–2 × lemma length…….3
3a. Tiller leaves with 5–8 sclerenchyma strands, also with 2 very small submarginal accessory sclerenchyma strands; adaxial ribs 3, distinct……..…….....*F. albomontana*
3b. Tiller leaves with 3 sclerenchyma strands; adaxial ribs indistinct……...*F. sommieri*

Additional specimens examined:

F. callieri* subsp. *callieri*:** TURKEY. Antalya, Kaş, Akdağ, rocky areas near İkizgöller, 2355 m, 03.07.2020, *C. Aykurt 5641* (AKDU). ***F. callieri* subsp. *zederbaueri*:** TURKEY. Antalya, Alanya, Gökbel Plateau, 1700 m, 18.06.2019, *C. Aykurt 5248* (AKDU). ***F. elwendiana*:** Antalya: İbradı, around Derme Plateau, 1900 m, 24.06.2020, *C. Aykurt 5634* (AKDU). ***F. valesiaca*:** TURKEY. Antalya: Alanya, Sarıveliler road, 1500 m, 17.06.2019, *C. Aykurt 5131b* (AKDU). ***F. pinifolia* var. *pinifolia: TURKEY. Antalya, Kaş, Akdağ, above İkizgöller, 2450 m, 03.07.2020, *C. Aykurt 5649* (AKDU), ***F. sipylea*:** TURKEY. Antalya, Gazipaşa, Taşeli Plateau, above Mihrap Plateau, on rocks, 2015 m, 22.06.2020, *C. Aykurt 5602* (ADDU). ***F. jeanpertii* subsp. *jeanpertii*:** TURKEY. Antalya: Elmalı, between Yuva and Seki, stony slopes, 1450 m, *C. Aykurt 4813* (AKDU). ***F. alpina*:** AUSTRIA. **Kärnten:** Bezirk Spittal an der Drau, Innerfragant, Wanderweg von der Fraganter Hütte zum Schobertörl, hinter der Eggerhütte, 1900 m, 13 June 2010, *C. Gilli, A. Berger* (WU0067019). **Österreich:** Bezirk Liezen, Gemeinde Bad Mitterndorf, Katastralgemeinde Klachau; ca. 7 km ESE Bad Mitterndorf, um den Gipfel des Grimming, 2340 m, *K. Zernig*, (GJO0035680). **F. *bushiana***: RUSSIA. Caucasus: Stavropol Krai, Karachay-Cherkessia & Kabardino-Balkaria 18 June 1924, *A. Shchukina* (MW0649040). Krasnodar Krai & Adygea, North Ossetia, 2350 m, 30 June 1971, *Khudyakova* (MW0649040). Ingushetia and Chechnya, 27 June 1979, *V.G. Onipchenko* (MW0658393). North Ossetia, Ingushetia & Chechnya, 13 Aug 1981, *V. V. Shcherbakov* (MW0649045). ***F. cratericola*:** TURKEY. Kayseri: Erciyes Mountain, E-Setie, 2900 m, 7 June 1979, *Carle, R. & Kurschner, H.* (E00407254). Erdschias-dagh, auf feuchten Stellen beim nördlichen Krater, 2900 m., 24 June1924, *Markgraf-Dannenberg, I.*, (W1916-0007506). ***F. sommieri*:** GEORGIA. Tschernomorsky (Province de la Mer Noire): M. Adzitouko (sources de la Mdzymta [Mzymta]), 2850 m, *Markgraf-Dannenberg, I* (1973-04), (W1916-0007510). RUSSIA. Caucasus: Stavropol Krai, Karachay-Cherkessia & Kabardino-Balkaria, 17 June 1994, *Onipchenko V. G.*, (MW0649225). Caucasus boreali-occidentalis, in valle fl. Urup, mons Bolschaja Azgara, in rupibus subalpinae, 12 June 1971, *E. B. Alexeev,* (NMNH14809073). TURKEY. Rize: pass from Ikizdere to Ispir, 2600-2900 m, Sorger 82-119-60 (W).

Acknowledgements

We wish to thank the Akdeniz University Scientific Research Projects Unit (Project number: FBA-2018-3773) for financial support of this study. We also would like to thank the curators of the AKDU, E, G, GJ, MW, W, WU and NMHN for access to specimens.

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CAPTIONS

Tab. 1. Comparison of diagnostic morphological and anatomical characters of *Festuca albomontana* and closely related species *F. alfrediana*, *F. alpina*, *F. cratericola* and *F. sommieri*.

Characters	*F. albomontana*	*F. alfrediana* (Foggi et al. 2012, POWO 2021)	*F. alpina* (Foggi et al. 2012, POWO 2021)	*F. cratericola* (Markgraf–Dannenberg 1985, POWO 2021)	*F. sommieri* (Markgraf–Dannenberg 1985, POWO 2021)
Habit	More or less densely tufted grass with ascending vegetative shoots	More or less densely tufted grass, sometimes with prostrate-ascending basal vegetative shoots	More or less densely tufted grass, sometimes with prostrate-ascending basal vegetative shoots	Densely caespitose grass	Densely caespitose, glaucous grass
Culms (length and indumentum)	6–14 cm long, smooth, glabrous and distinctly fused for their entire length	5–30 cm long, smooth and glabrous for their entire length	3–21 cm long, smooth and glabrous along entire length	10–15 cm long, thin, glabrous	5–15 cm long, culm-internodes distally glabrous
Sheats of tiller leaves	Papyraceous, scabrid on back, sometimes minutely so, completely fused, sometimes decaying into fibres	Papyraceous, glabrous, completely fused, sometimes decaying into fibres	Papyraceous, glabrous, fused for entire length, sometimes decaying into fibres	Glabrous, decaying into irregular fibres	Glabrous, irregularly decaying into transverse, undulate fibres
Ligula	Ciliate at apex	With an eciliate membrane	With an eciliate membrane	Shortly ciliate, scabrid	With an eciliate membrane
Panicle length (cm)	2.4–4.5	1.5–4.2	1.2–3.6	3–4 cm	1.5–3.5 cm
Panicle branches	Glabrous, smooth, sometimes few scabridulous towards apex	Generally scabrid	Generally scabrid	Scabrid	Generally glabrous
Spikelet	5–7 mm long, with 2–4 flowers	6.6–8.2 mm long, with 4–5(–6) flowers	4.1–6.4 mm long, with (2–)3–4(–5) flowers.	7–7.3 mm long, with 3–4 flowers	3–flowered one 7–7.5 mm, with 2–3(–5) flowers
Lower glume	Subulate, 2.5–2.8 mm long	Subulate, 2.5–3.5 mm long	Subulate, 1.8–3.3 mm long	Lanceolate	Lanceolate, c. 3.5 mm long
Upper glume	Subulate, 3.2–3.5 mm long	Subulate, 3.6–4.8 mm long	Subulate, 2.7–4.1 mm long	Oblong-lanceolate, 4–4.6 mm long	Oblong-lanceolate, 6–6.4 mm long
Lemma	Subulate, 3.7–4.2 mm long, c. 1 mm wide, glabrescent to scabrid in the distal part	Subulate, 4.3–5.7 mm long, 0.4–0.7 mm wide, slightly scabrid in the distal part	Subulate, 2.8–4.3 mm long, 0.3–0.6 mm wide	Lanceolate, 4.5–5.2 mm long, 1.1–1.2 mm wide, scabrid in upper part.	Oblong-lanceolate, 5.7–6.9 mm long, 1.4–1.6 mm wide, scabrid in upper part
Lemma awn length	3.5–4.5 mm	2.6–5.3 mm	1.2–2.6 mm	1,5–2 mm (c. 1/3 × lemma)	To 9 mm, often 2 × lemma
Palea	3.5–3.8 mm long, more or less finely hairy along its entire length	4.1–5.2 mm long, more or less finely hairy along the carena.	2.5–4.1 mm long, glabrous or sparsely finely hairy on the carena	4.5–5.2 mm long	5.7–6.9 mm long
Anther length (mm)	1.5–2	0.9–2.2	0.6–1.4	2.3–2.5	1.8–2
Tiller leaf anatomical features					

Transverse section of tiller leaf blades	More or less rounded, polygonal (not closed), not V-shaped	Elliptic, V-shaped or slightly closed polygonal	V-shaped or slightly closed polygonal	Irregularly V-shaped, slightly closed, polygonal	Nearly rounded, not closed
Number of vascular bundles	5	(3–)5	3 to 5	5	5(–7)
Number of sclerenchyma stands	5–8 small sclerenchyma strands, also with 2 very small submarginal accessory sclerenchyma strands	3 narrow sclerenchyma strands, sometimes with two others submarginal	3 small sclerenchyma strands, sometimes with two others submarginal	7, very thin, subequal, median strand of only 5–8 cells	3, very small
Number of ribs	3 distinct adaxial ribs, without or with 1–2 minute hairs	3 adaxial ribs of which two lateral ribs are generally only slightly developed	3 adaxial ribs, with two lateral ribs generally less developed, with few hairs	1	Indistinct

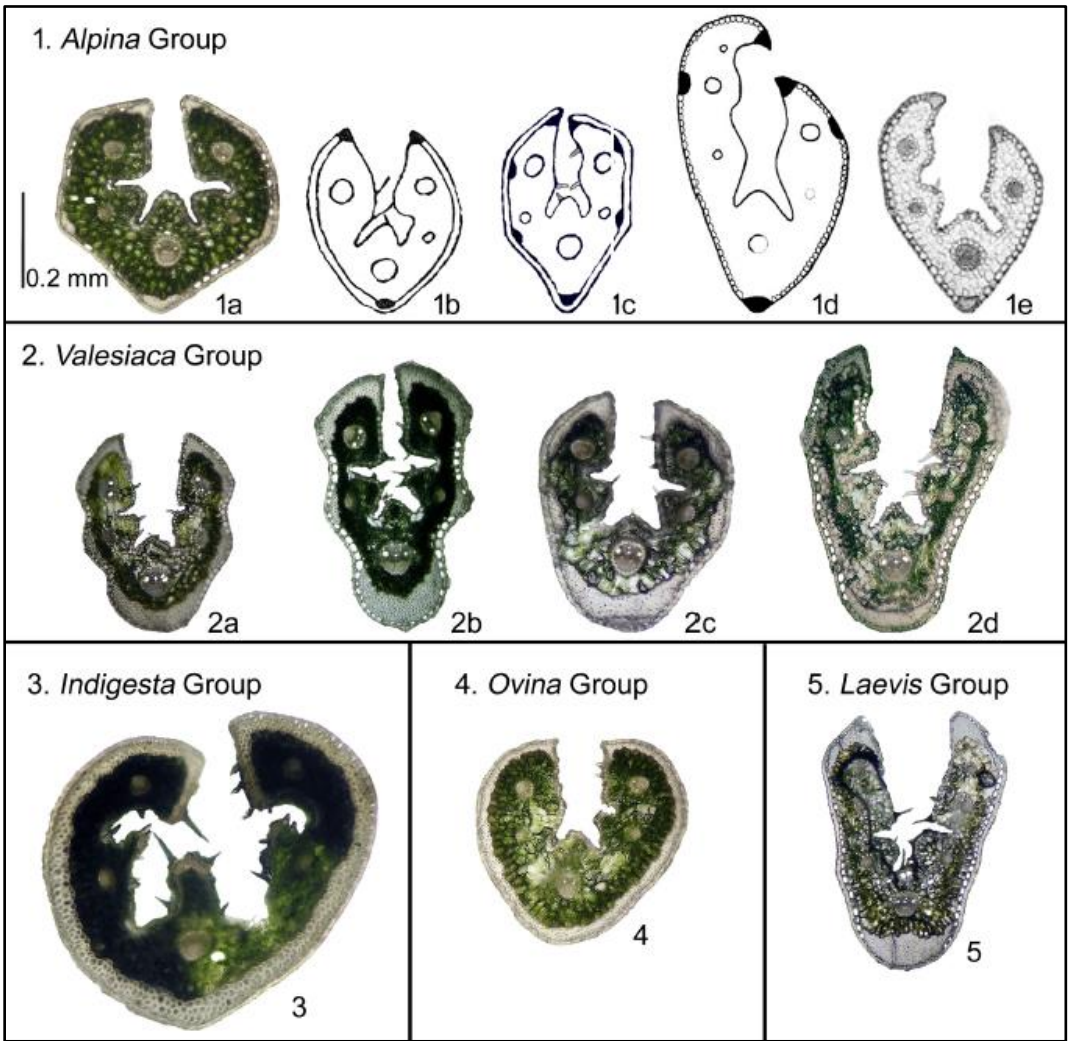


Fig. 1. Transverse sections of tiller leaf blades: 1a – *Festuca albomontana* (from holotype), 1b – *F. sommieri* (from Markgraf-Dannenberg 1985), 1c – *F. cratericola* (from Markgraf-Dannenberg 1985), 1d – *F. alpina* (Martínez-Sagarra et al. 2017), 1e – *F. alfrediana* subsp. *alfrediana* (from Foggi and Rossi 1996), 2a – *F. callieri* subsp. *callieri* (from *C. Aykurt 5641*), 2b – *F. callieri* subsp. *zederbaueri* (from *C. Aykurt 5248*), 2c – *F. elwendiana* (from *C. Aykurt 5634*), 2d – *F. valesiaca* (from *C. Aykurt 5131b*), 3 – *F. pinifolia* var. *pinifolia* (from *C. Aykurt 5649*), 4 – *F. sipylea* (from *C. Aykurt 5602*), 5 – *F. jeanpertii* subsp. *jeanpertii* (from *C. Aykurt 4813*).

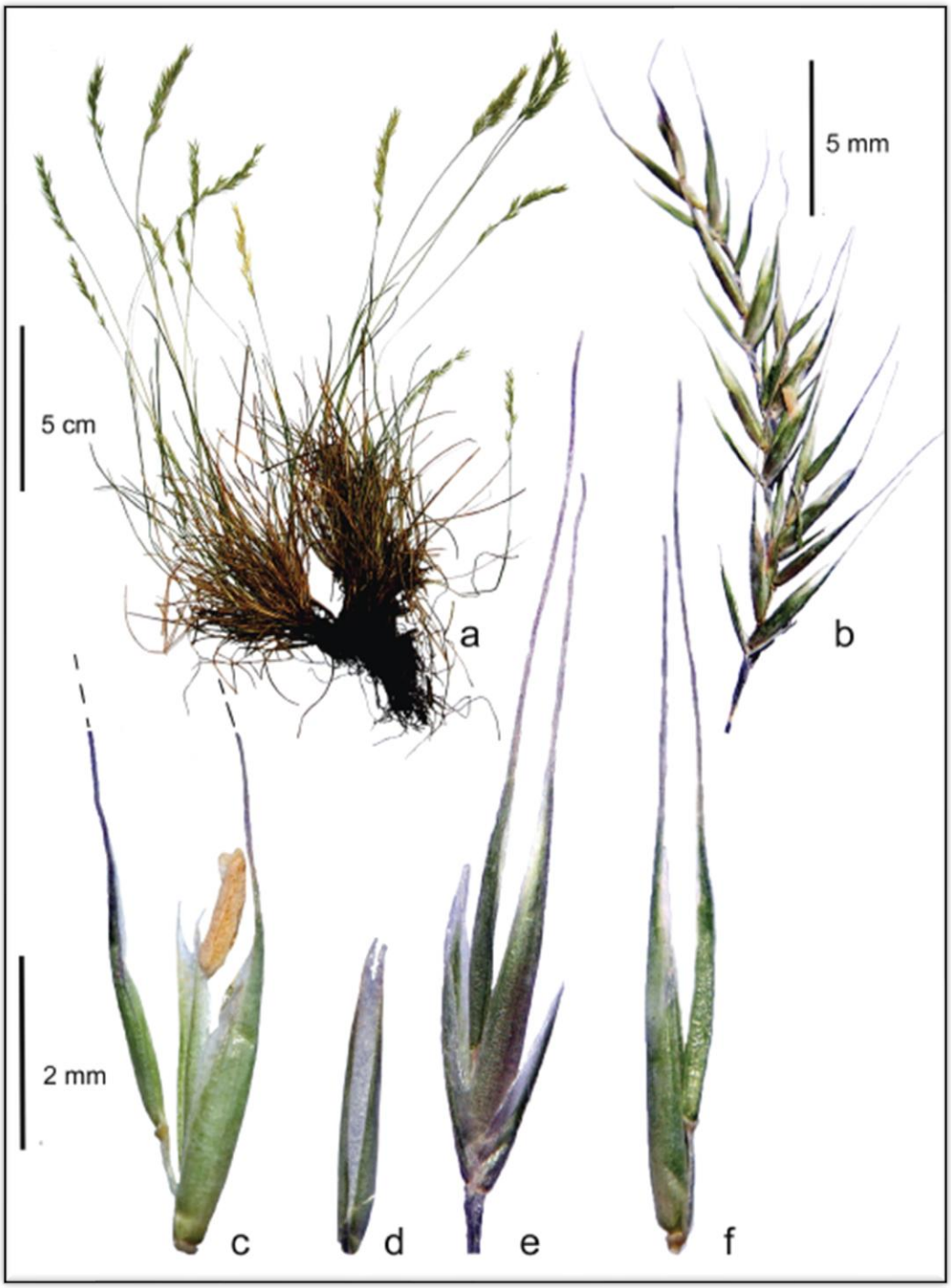


Fig. 2. *Festuca albomontana* from holotype (*C. Aykurt 5525*): a – habit, b – panicle, c – upper two florets with anther, d – palea, e – spikelet, f – lemma with awn.



Fig. 3. Field photographs of *Festuca albomontana* from the type location: a – habit, b, c, d – panicle and spikelets.