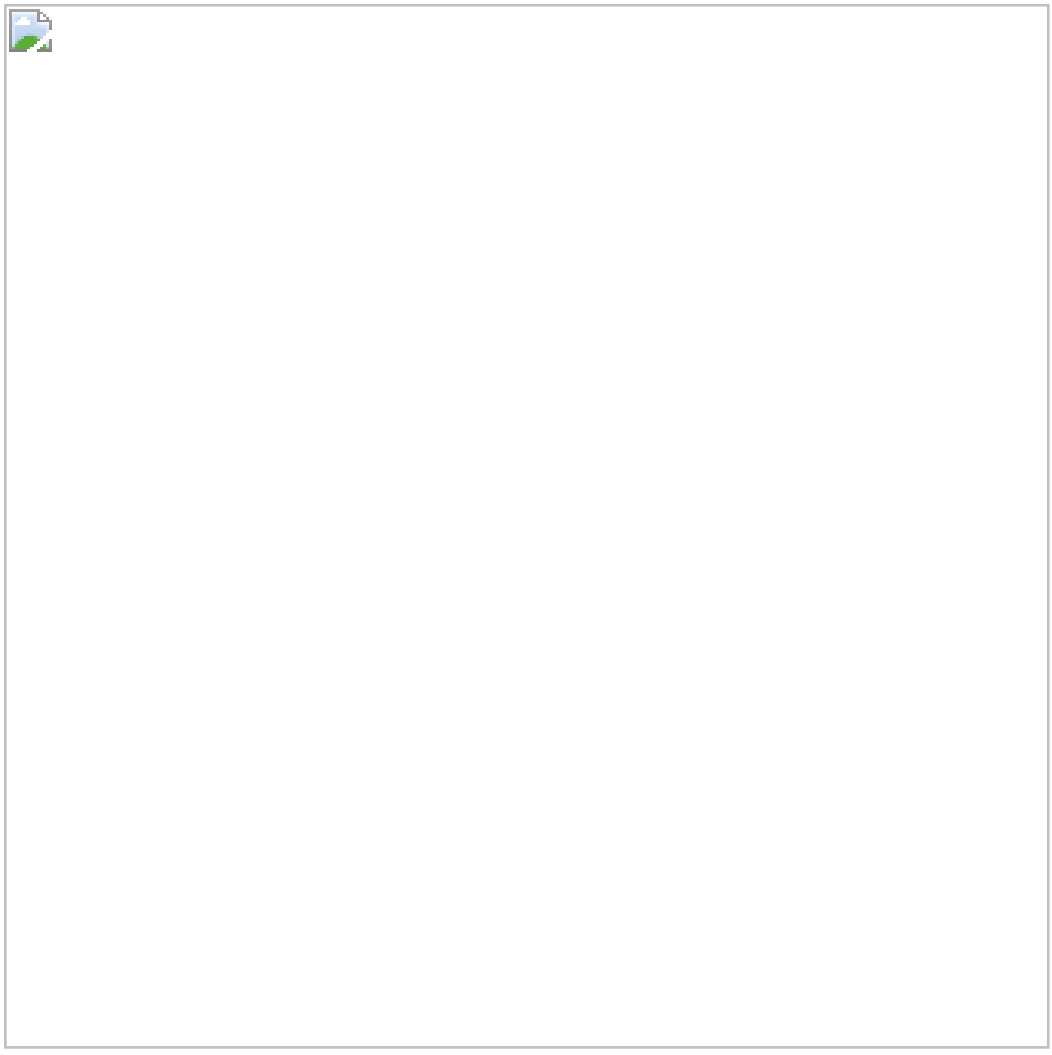

Calamagrostis lonana (Poaceae): a new grass species from the Pennine Alps (Switzerland)

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Calamagrostis lonana (Poaceae): a new grass species from the Pennine Alps (Switzerland)

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Abstract

EGGENBERG, S., L. CHAMPOUD, M. LEIBUNDGUT, C. PARISOD, L. WYSS & G. KOZLOWSKI (2023). Calamagrostis lonana (Poaceae): a new grass species from the Pennine Alps (Switzerland). *Candollea* 78: 1–9. In English, English and French abstracts. DOI: http://dx.doi.org/10.15553/c2023v781a1

Calamagrostis lonana Eggenb. & Leibundg. (*Poaceae*) is described as a new alpine grass species from the Pennine Alps. Unlike other Central European *Calamagrostis* Adans. species, it is only 13–18 cm high and has so far been found only on the high plateaus of the Pas de Lona, along the Torrent de Lona. Compared to similar species, the panicle is only faintly tinged purplish, has remarkably short panicle branches, and thus remains narrow and elongated even when open. The spikelets show callus hairs that only reach about halfway up the lemmas, and these have a short, dorsal awn. The species is probably closely related to the arctic *C. stricta* (Timm) Koeler, which has only a few relict occurrences in Central Europe. However, it is morphologically well separable. The morphological description of the species is completed by information on the distribution, habitat, soil conditions, and potential threats of *C. lonana*.

Resumé

EGGENBERG, S., L. CHAMPOUD, M. LEIBUNDGUT, C. PARISOD, L. WYSS & G. KOZLOWSKI (2023). Calamagrostis lonana (Poaceae): une nouvelle espèce de graminée des Alpes pennines (Suisse). *Candollea* 78: 1–9. En anglais, résumés anglais et français. DOI: http://dx.doi.org/10.15553/c2023v781a1

Calamagrostis lonana Eggenb. & Leibundg. (*Poaceae*) est décrite comme une nouvelle graminée alpine des Alpes pennines. Contrairement aux autres espèces de *Calamagrostis* Adans. d'Europe centrale, elle ne mesure que 13–18 cm de haut et n'a été trouvée jusqu'à présent que sur les hauts plateaux du Pas de Lona, le long du Torrent de Lona. Par rapport aux espèces proches, la panicule n'est que faiblement teintée de violet, possède des branches paniculaires remarquablement courtes, et reste donc étroite et allongée même lorsqu'elle est ouverte. Les épillets présentent des poils sur leurs callus qui n'atteignent qu'environ la moitié des lemmes et ceux-ci ont une courte arête dorsale. L'espèce est probablement proche de l'espèce arctique *C. stricta* (Timm) Koeler, qui n'a que quelques occurrences reliques en Europe centrale. Cependant, elle est morphologiquement bien distincte. La description morphologique de l'espèce est complétée par des informations sur sa distribution, son habitat (dont les conditions de sol) et les menaces potentielles qui pèsent sur *C. lonana*.

Keywords

POACEAE – *Calamagrostis* – Swiss Alps – Valais – New species – Taxonomy

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Introduction

During fieldwork in the alpine floodplains below the Pas de Lona (Val d'Anniviers, Valais, Switzerland, Fig. 1), a grass species was found by one of the authors (ML) which, based on its flower structure, is close to the taxon *Calamagrostis stricta* (Timm) Koeler according to Central European determination keys. However, the extraordinarily small growth habit and some morphological details of the flowers differ greatly from the forms of *C. stricta* described so far in Central Europe. The grass is inconspicuous and flowering stems only appear in late summer or autumn, explaining why it might have been overlooked until now. The comparison of collected plants with herbarium specimens of *Calamagrostis* Adans. from northern Europe revealed a similarity with arctic forms of *C. stricta*, especially with the often small-growing subspecies *C. stricta* subsp. *groenlandica* (Schrank) Á. Löve, a taxon with a distribution across the whole Arctic from North America to Eurasia.

Calamagrostis is a globally distributed genus within tribe *Aveneae* of the family *Poaceae*. In its traditional concept, it contains over 250 species, with high number of species in some mountains of the northern and southern hemispheres (e.g. Andes, Himalayas). The 1-flowered spikelets are arranged in spread or contracted panicles and have a densely haired callus, the hairs of which can reach the length of the lemma or even exceed it (Conert, 1998). Many species have a small axillary process (rachilla) above the floret (e.g. *C. arundinacea* (L.) Roth, *C. varia* (Schrad.) Host, *C. stricta*) and are treated as a separate genus *Deyeuxia* Clarion ex P. Beauv. by several authors (e.g. Simon, 1993; Phillips & Chen, 2003; Zhengyi et al., 2016). However, recent genetic analyses (Saarela et al., 2017) support a polyphyletic genus, indicating that *Deyeuxia* should be placed in synonymy. On top of confirming the suspected polyphyly of the whole *Calamagrostis-Deyeuxia* complex, Saarela et al. (2017) prove its proximity to the genus *Agrostis* L. (Phillips & Chen, 2003) as well as genera with multi-flowered spikelets such as *Deschampsia* P. Beauv. or *Trisetum* Pers. (Saarela et al., 2017). The relationships inside the complex do not seem to be fully resolved yet and thus call for description of the segregating variation towards accurate inferences. In this study, we describe a new species, *C. lonana* Eggenb. & Leibundg., endemic to the Pas de Lona which differs morphologically, ecologically, and genetically from the other *Calamagrostis* taxa known from central and northern Europe.

Material and methods

All morphological and ecological investigations of the new species were carried out by measurements in the alluvial plain of the Torrent de Lona (Grimentz, municipality of Anniviers, Pennine Alps) and through herbarium specimens collected there. Further observations were made on cultivated material

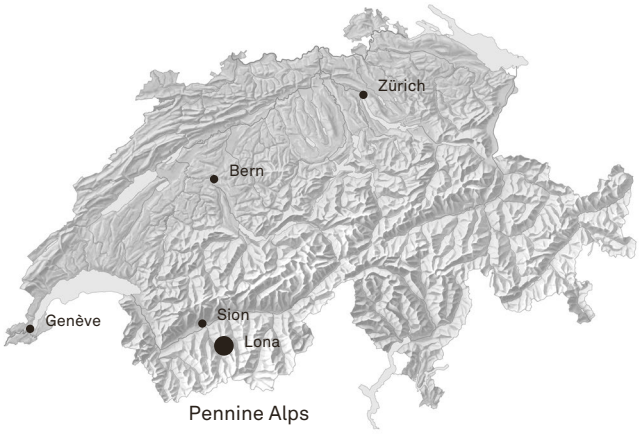

Fig. 1. – Type locality of *Calamagrostis lonana* Eggenb. & Leibundg. [Base map © swisstopo]

at the Botanical Garden of the University of Berne and on herbarium specimens at G. Most observations and measurements were made on fresh material from 20 different individuals. Comparison with related species was made by studying the literature (Hess et al., 1967–1972; Conert, 1998; Fischer et al., 2005; Aiken et al., 2007; Elven et al., 2011; Tison & de Foucault, 2014; Parolly & Rohwer, 2016; Lauber et al., 2018; Müller et al., 2021), supplemented by own measurements on fresh material (*Calamagrostis stricta* from Federsee, Upper Bavaria and Pontarlier, Franche-Comté). Morphological characters of *C. stricta* subsp. *groenlandica* were retrieved from *Flora of Iceland* (Löve, 1983), *Flora of the Russian Arctic* (Tolmachev et al., 1995), *Flora of Russia* (Fedorov, 1999), *Norsk Flora* (Lid, 2005), *Flora of the Canadian Arctic Archipelago* (Aiken et al., 2007), and *Svalbardflora* (Elven et al., 2023).

The ploidy level of individuals of *Calamagrostis lonana*, as well as other *Calamagrostis* taxa from nearby locations in France and Germany, was elucidated using flow cytometry (Bourge et al., 2018). Accordingly, leaf material of *C. lonana* from six samples collected in the field and two samples grown *ex situ* at the Botanical Garden of the University of Berne was silica-gel dried and sent for analyses to the Plant Cytometry Services (Didam, The Netherlands, www.plantcytometry.nl) to estimate genome size as compared to external standards (i.e. *Allium schoenoprasum*, 2c = 15,03 pg; *Clivia miniata*, 2c = 35.77 pg; *Monstera deliciosa*, 2c = 8.90 pg; *Ophiopogon planiscapus*, 2c = 11.90 pg of DNA). Three further samples of *Calamagrostis stricta* collected in each of the locations of La Censure (France), Grand Mont (France), Corne du Marais (France), Görbelmoos (Germany), and Federsee (Germany) were similarly treated and compared with samples of *C. lonana*. All estimates of DNA content were compared with published genome sizes in Smarda et al. (2019) and Zonneveld (2019) to assess the ploidy level of each sample.

In order to estimate the extent of the population, the plains and basins from the Lona area between Becs de Bosson

(3148 m) in the North and Sasseneire (3253 m) in the South were explored several times and at different times of the year between 2018 and 2021. For the ecological studies, six vegetation surveys were carried out, covering the entire population in the alluvial plain of Lona. Of these, all moss species were determined at two sites. For soil examinations samples were taken at two sites. Root mass and rooting depth were studied in soil samples where *Calamagrostis lonana* was the only vascular plant. The soil type was determined on the basis of the reference method of Agroscope (Agroscope, 2020). Content of humus, clay, and silt was determined in field-moist samples or with moistened fine soil samples. For the pH measurement, the soil was dried at 40° C and sieved. Then, 20 g of soil was mixed with 50 ml of demineralised water and measured with pH strips.

The bioclimatic data were derived from the MeteoSwiss standard value maps (Meteoswiss, 2022).

Key to Central European Calamagrostis species (based on Müller et al., 2021)

1. Awn of lemma clearly protruding from spikelet 2
1a. Awn of lemma not protruding from spikelet 3
2. Leaf discolor (blue-green, dull adaxially; dark green, glossy abaxially); awn protruding 2–3 mm from spikelet; callus hairs sparse, c. ⅓ as long as lemma ..... ***C. arundinacea***
2a. Leaf concolor (blue-green, dull on both sides); awn protruding c. 1 mm from spikelet; callus hairs ⅔ to as long as lemma ..... ***C. varia***
3. Callus hairs distinctly shorter than lemma; ligule of upper stem leaves 0.5–2(–3) mm long 4
3a. Callus hairs 1–2 times as long as lemma; ligule of upper stem leaves (2–)3–12 mm long 5
4. Plant 10–20 cm high; ligules 0.5–1 mm long; panicle 2.4–5.5 cm long ..... ***C. lonana***
4a. Plant 30–120 cm high; ligules 2–3 mm long; panicle 8–20 cm long ..... ***C. stricta***
5. Ligule (2–)3–4 mm long; leaves conspicuously shiny below; lemmas 5-veined 6
5a. Ligule (4–)5–12 mm long; leaves dull on both sides; lemmas 3- or 5-veined 7
6. Plant bright to dark green; culms with 3–5 nodes, mostly unbranched; leaves smooth, lax; awn clearly visible, dorsally inserted on lemma ..... ***C. villosa***
6a. Plant light to grey-green; culms with 5–8 nodes, often branched; leaves stiffly erect, rough; awn short, inconspicuous, terminally inserted on lemma ..... ***C. canescens***
7. Glumes 6–8 mm long; awn terminally inserted on lemma; ligule (4–)5–6 mm long ..... ***C. rivalis***
7a. Glumes 4–6 mm long; awn dorsally or terminally inserted on lemma; ligule (4–)6–12 mm long 8
8. Callus hairs about as long as lemma; lemma 5-veined; leaves 5–8 mm wide ..... ***C. phragmitoides***
8a. Callus hairs longer than lemma; lemma 3-veined; leaves 5–15 mm wide 9
9. Plant bright green; glumes subequal; awn dorsally inserted on lemma; panicle erect, 15–25 cm long; leaves 8–15 mm wide, with rough margins; ligule (4–)6–9 mm long, glabrou. ..... ***C. epigejos***
9a. Plant blue-green; upper glume ¾ as long as lower one; awn terminally inserted on lemma; panicle drooping, 10–30 cm long; leaves 5–8 mm wide, rough on both sides and along margins; ligule (6–)8–12 mm long, hair. ..... ***C. pseudophragmites***

Taxonomy

Calamagrostis lonana Eggenb. & Leibundg., **sp. nov.** (Fig. 2, 3).

Holotypus: Switzerland. Valais: commune d'Anniviers, Plateau de Lona, 2588 m, 12.X.2019, *Champoud & Eggenberg s.n.* (BERN!; iso-: G [G00414405]!, SION!).

Calamagrostis lonana Eggenb. & Leibundg. differs from all other Central European Calamagrostis species by its small size: plants are smaller than 20 cm whereas other Calamagrostis species reach (30–)50–150 cm high. Like C. stricta, its callus hairs are distinctly shorter than the lemma and the awn is not protruding from the spikelet but differs by its short panicle with very short branches, short and often glabrous ligule, almost glabrous glumes, and very short anthers.

Perennial, stoloniferous, light to grey-green grass with loose but deep-reaching root system, with extravaginal shoot initiation. *Culms* solitary, glabrous, (10–)13–18(–22) cm high, erect, hairy towards the inflorescence, with 1–3 glabrous nodes; sheaths 1–5 cm long, glabrous. *Ligules* 0.5–1 mm long, glabrous abaxially or pubescent towards the tip. *Leaf blades* 80(–120) × 2–3(–3.5) mm, scabrous adaxially, glabrous abaxially, mostly enrolled. *Inflorescences* a dense panicle, (2.4–)3.1–3.7(–4) cm long, gradually spreading, soon contracting after anthesis; panicle branches 1–3(–4) from main axis, 1–6 mm long, short ciliate; spikelet stalks 0.5–2 mm long. *Spikelets* 2.5–3.2(–3.6) mm long, lanceolate, 1-flowered, light to grey-green, mostly with a purplish tinge towards the tip. *Glumes* narrowly lanceolate, long acuminate, the lower 2.6–3.1 mm long, 1-veined, glabrous, the upper 2.7–3.4 mm long, 3-veined, the prominent median vein often ending in an erect tip, fimbriate dorsally, otherwise glabrous; callus short, rounded, covered with hairs 1–1.4 mm long; axillary process tiny, 0.3–0.5 mm long, hairy, sometimes absent. *Lemmas* 2.1–2.4(–2.7) mm long, almost as long as the glumes, 5-veined, pubescent, ragged distally and ciliate like the veins; awn 1.5–1.9 mm long, straight, erect, ciliate, inserted c. 0.6 mm

above the lemma base. *Paleas* 1.3–1.6 mm long, delicate-skinned, glabrous. *Anthers* 0.9–1.4 mm long, light yellow. *Ovaries* 0.2 mm long, remaining immature, narrow, with two terminal styles and feathery stigmas c. 1 mm long.

Etymology. – The epithet *lonana* refers to the name of the Lona plateau in the Pennine Alps (Valais), where the species was found in 2018.

Distribution. – Based on multiple visits of the Lona area, *Calamagrostis lonana* seems to be restricted to the alluvial plain of the Torrent de Lona and has not been found elsewhere to date. The plain lies at an altitude of 2580 m and extends along the Torrent de Lona, which flows in a west-easterly direction. It is about 720 m long and 200 m wide at its widest point. The distribution area of *C. lonana* is located within this alluvial plain with a maximum extension of 600 × 150 m. Within this area, several subpopulations of *C. lonana* could be found. They are very unevenly distributed and dissimilar in density. It cannot be excluded that further localities will be reported from other high altitude alluvial plains in the Pennine Alps.

Ecology. – The large alluvial plain of Lona shows a mosaic of different habitat types which is typical in dynamic alpine alluvial plains (Fig. 4). In addition to vegetation-free sand and gravel banks, initial alluvial vegetation (*Caricion bicoloris-atrofuscae*), calcareous springs (*Cratoneurion*) and transitions to fens and transitional bogs (*Caricion fuscae, Caricion davallianae,* and *Caricion lasiocarpae*) can be observed. The vegetation classification of the occurrences of *Calamagrostis lonana* was done by the six releves shown in Table 1. The plot size was 10 square metres for all releves. The abundance was estimated using the Braun-Blanquet cover scale. There is usually an extraordinarily high cover of the moss layer at the sites where *C. lonana* is growing, a feature that is quite striking and constant. The following moss species were identified: *Bryum pseudotriquetrum* (Hedw.) G. Gaertn. et al., *Calliergon giganteum* (Schimp.) Kindb., *C. richardsonii* (Mitt.) Kindb. ex G. Roth, *Campylium stellatum* (Hedw.) Lange & C.E.O. Jensen, *Palustriella falcata* (Brid.) Hedenäs [dominant], *Philonotis calcarea* (Bruch & Schimp.) Schimp., *Polytrichum juniperinum* Hedw., *Scorpidium cossonii* (Schimp.) Hedenäs, and *Warnstorfia exannulata* (Schimp.) Loeske [dominant].

Due to the stratification of the vegetation (dominance of mosses) and the species composition of vascular plants and moss species, the assignment to the habitat type "calcareous spring formation" (*Cratoneurion*) is most likely. Typical species are *Bryum pseudotriquetrum, Palustriella falcata, Philonotis calcarea* and the vascular plants *Agrostis stolonifera* L., *Arabis subcoriacea* Gren., and *Saxifraga aizoides* L. which were often found in the vicinity of the vegetation surveys. The habitat of *Calamagrostis lonana* can thus be relatively well characterised. It is almost exclusively found in sites with low vascular plant cover and dominance of mosses.

The bedrock across the Lona plateau shows a diversity of different sediment types with both limestone-rich and limestone-poor sediments. In the alluvial plain we measured an average soil pH value of 6.5. The value was confirmed by laboratory measurements of soil samples. The high pH values of the organic soils of the alluvial plain can be explained by

Table 1. – Six vegetation releves showing the co-occurrence of *Calamagrostis lonana* Eggenb. & Leibundg. with other vascular plants. Species names according to JUILLERAT et al. (2017). [Abbreviations: imm. = immature; r = very low abundance; + = low abundance, cover < 5%; 1 = high abundance, cover < 5%; 2 = cover 5–25%; 3 = cover 25–50%]

Plot ID	**1**	**2**	**3**	**4**	**5**	**6**
Total cover	98%	95%	95%	90%	100%	95%
Cover of herb layer	10%	15%	20%	15%	30%	15%
Cover of moss layer	95%	95%	92%	85%	95%	95%
Calamagrostis lonana	+	1	2	2	+	2
Eriophorum angustifolium	1	+	+	+	r	1
Eriophorum scheuchzeri			2	1		
Eleocharis quinqueflora	1	2				
Carex rostrata	1				3	
Equisetum variegatum	+					
Juncus triglumis	1					+
Polygonum viviparum			r			
Salix hastata (imm.)			r			

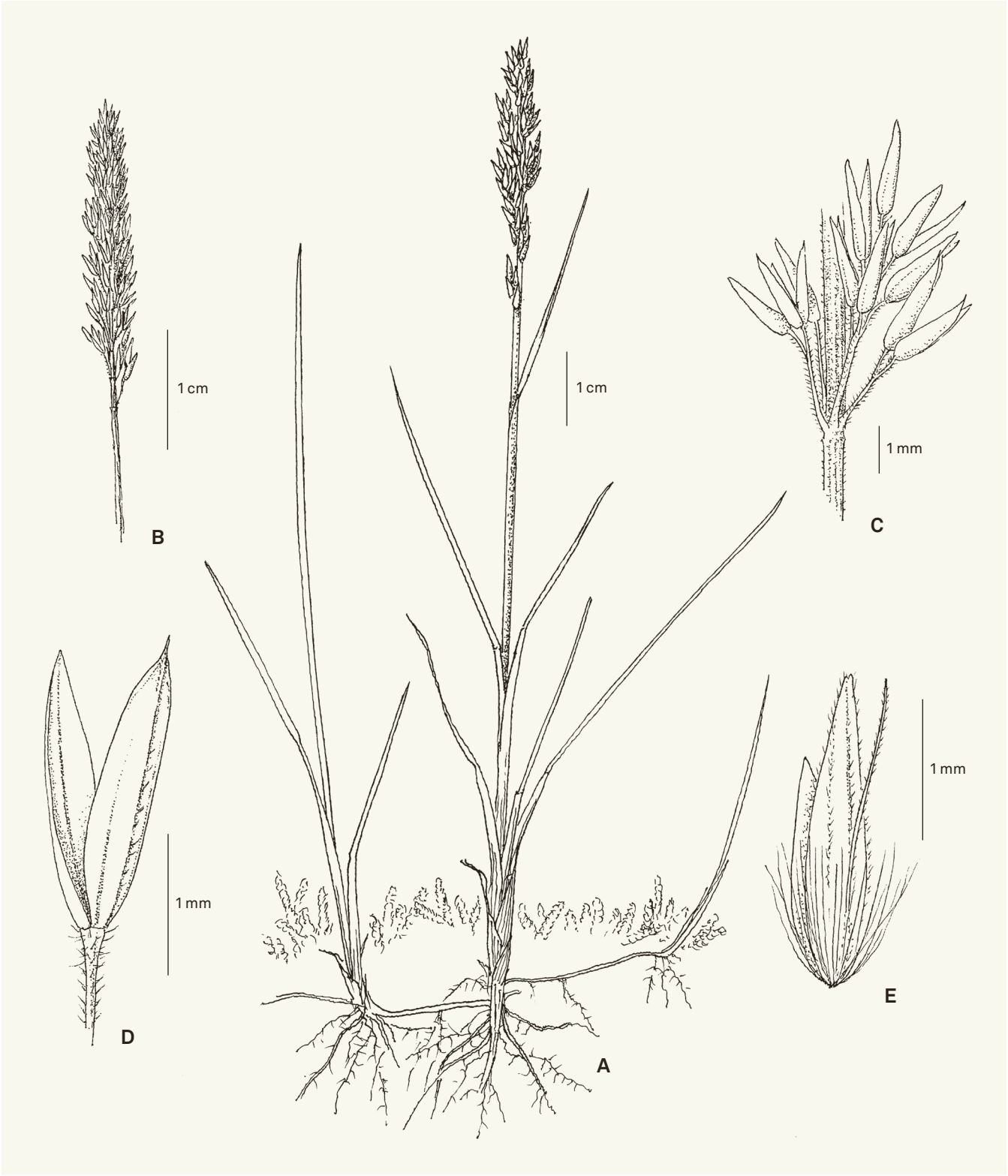

Fig. 2. – *Calamagrostis lonana* Eggenb. & Leibundg. **A.** Habit with stolons within the moss layer; **B.** Inflorescence (contracted panicle); **C.** Section of inflorescence with adjacent panicle branches; **D.** Spikelet peduncle with glumes; **E.** Glume and palea with callus hairs and awn (dorsally inserted).
[Drawings: S. Eggenberg]

Fig. 3. – *Calamagrostis lonana* Eggenb. & Leibundg. **A.** Habit of the aerial parts with moss cushion of *Warnstorfia exannulata* (Schimp.) Loeske. **B.** Upper root space in the moss layer.
[Photos: S. Eggenberg]

widespread calcareous sediments in the area. The examined soil profiles of *Calamagrostis lonana* growth sites always show a similar structure: a 10–15 cm thick moss layer (Fig. 3) is directly followed by a layer of grey alluvial loam more than 50 cm deep, intermixed with dead mosses probably from earlier inundations. The pH value remains unchanged over the entire profile depth (pH 6.5). Roots of *C. lonana* were found both in the moss layer (Fig. 3) and in the alluvial loam and can be detected down to a depth of about 40 cm. The root mass of *Calamagrostis* in a more closely examined soil sample was between 0.11 g (top layer) and 0.02 g or 0.04 g (lower layers) per 100 g of soil material. Whether during inspections at the beginning of August, in September or at the beginning of October the soil was always found to be completely water saturated.

The climate conditions are typical for dry central alpine areas with annual precipitation sum of only approx. 1000 mm (Meteoswiss, 2022). Most of the annual precipitation falls in summer, with a maximum in July. The annual mean temperatures of around 0° C are characteristic of the alpine belt, monthly averages rise to 6° C in summer (Meteoswiss, 2022). However, the basin form of the alluvial plain regularly leads to the formation of cold air depositions, so that temperatures in the alluvial plain are probably well below the mean temperatures of the area. Geomorphological landforms also reveal periglacial conditions across the whole Lona plateau. Mean temperatures are low and frost can occur throughout the year.

Phenology. – Flowering late summer (from August) and fruiting early autumn (from September).

Threats. – It can be assumed that the high plateaus of Lona have been used for grazing by sheep and cattle for a long time (Bätzing, 2015). The herds can move freely, there is no fencing. From late summer, when the slopes begin to dry out, the herds often gather in the green and fresh alluvial plains and the alluvial plain of the Torrent de Lona is exposed to increased trampling in late August and September. Therefore, the question arises to what extent the population of *Calamagrostis lonana* might be seriously damaged by trampling and grazing. The trampling impact on the plain is obvious, and tracks remain for a long time. The trampling tracks reveal a lower disturbance in mossy and *Cyperaceae*-dominated parts of the plain, the sites where *C. lonana* thrives most. These parts seem to be less attractive for the herds. Judging from the current situation, it does not seem necessary to fence out the

alluvial plain. However, long-term monitoring of trampling is recommended.

Notes. – With its short, hairy axillary process, short callus hairs, and long lemmas, *Calamagrostis lonana* belongs to subgenus *Deyeuxia*. In central Europe, this subgenus includes the species *C. arundinacea*, *C. varia*, and *C. stricta*. The short, straight awns show a close relationship to *C. stricta* (Greene, 1980; Escalona, 1988), but it differs from this species in having smaller habit, shorter spikelets with shorter callus hairs, and shorter anthers (Table 2). As in *C. arundinacea* and *C. varia*, the spikelets have an axillary process, which distinguishes it from other Central European *Calamagrostis* species. However, this axillary process is very short in *C. stricta* (up to 0.5 mm long). *Calamagrostis lonana* differs from *C. arundinacea* and *C. varia* by the short, straight, dorsal awn, which is usually shorter than the lemma. In *C. arundinacea* and *C. varia*, the awn is basally inserted, geniculated, and largely exceeding the lemma. *Calamagrostis lonana* differs from all other Central European species by its small habit, which it also maintains in cultivation conditions. Important morphological characteristics are compared in Table 2.

The Arctic forms of *Calamagrostis stricta* show greater morphological plasticity than the Central European taxa, especially *C. stricta* subsp. *groenlandica* that shows similarities with the new species. According to literature (see Material and methods), *C. stricta* subsp. *groenlandica* is a variable species concerning the habit and the panicle length, displaying panicles as short as (3–)4 cm long. However, the panicles often remain contracted (spreading at anthesis in *C. lonana*), the callus hairs are usually more than ½ of lemma length (less than ½ of lemma length in *C. lonana*), the ligule is (0.5–)1.5–3(–6) mm long (0.5–1 mm long in *C. lonana*), and the glumes are more or less scabrous (glabrous or fimbriate on the keels in *C. lonana*).

Based on its morphology and cytology, the taxon found in the Lona alluvial plain belongs to the *Calamagrostis stricta* aggregate (syn. *C. neglecta*). The aggregate is part of the boreal and arctic flora with relict occurrences in Central Europe. Morphologically, the aggregate is very variable and therefore the taxonomy of the whole complex is controversially discussed. *Calamagrostis lonana* shows the same tetraploid level as all other non-apomictic taxa ($2n = 28$, x = 7; Elven et al., 2023) and differs from higher-ploidy taxa collected in and around the

Table 2. – Comparison of morphological characters between *Calamagrostis lonana* Eggenb. & Leibundg. (own measurements) and the Central European *C. stricta* (Timm) Koeler (measurements retrieved from Hess et al., 1967–1972; Quinger, 1987; Conert, 1998; Müller & al., 2021; Parolly & Rohwer, 2016).

		C. lonana	*C. stricta*
Habit	**Culm length [cm]**	(10–)13–18(–22)	30–100(–120)
Leaves	**Size [mm]**	80(–120) × 2–3(–3.5)	up to 600 × (1.5–)2–4(–5)
	Colour and form	light green to greyish green, mostly enrolled	fresh to greyish green, flat or rolled
	Ligule length [mm]	0.5–1	2–3
	Ligule indument (abaxial side)	glabrous	hairy
Panicles	**Length [cm]**	(2.4–)3.1–3.7(–4)	8–15(–20)
	Shape	contracted but spread at anthesis	contracted, rarely spread at anthesis
	Colour	grey to lilac	grey to pale lilac
	Branche length [mm]	1–6	15–60
Spikelets	**Length [mm]**	2.5–3.2(–3.6)	3–4(–4.5)
	Glume length [mm]	2.6–3.1	3–4(–4.5)
	Callus hair length [mm]	1–1.4, < ½ of lemma length	1.5–2.5, ½ to ¾ of lemma length
	Axillary process length [mm]	0.3–0.5	0.8–1
	Lemma length [mm]	2.1–2.4(–2.7)	2.6–3.5
	Awn length [mm]	1.5–1.9	2–3
	Palea length [mm]	1.3–1.6	1.8–2.3
	Anther length [mm]	0.9–1.4	2–2.5
Cytology	**Chromosome number**	$2n = 28$	$2n$ = c. 70

Fig. 4. – Alpine alluvial plain of Lona, with fens, alluvial and spring vegetation patches on both sides of the meandering Torrent de Lona. [Photo: S. Eggenberg]

Alps. Despite the tiny axillary process, Saarela et al. (2017) place other tetraploid forms of *C. stricta* aggregate close to *C. canescens* (Weber) Roth and *C. villosa* (Chaix) J.F. Gmel., i.e., to species that do not possess an axial process. However, the subspecies that often shows small growth, *C. stricta* subsp. *groenlandica*, lies outside this clade (Saarela et al., 2017), which implies a clearer delimitation from *C. stricta*. Further genetic studies should better resolve the *C. stricta* aggregate and provide more clues to the taxonomic position of the new species found in the alluvial plain of Lona.

The flower organs develop very late. Anthers and ovaries with feathery stigmas could be observed from the end of September, but no fertile pollen was observed. Conversely, the species shows a strong growth of underground runners. In cultivation, the species shows especially strong vegetative growth and forms dense, vigorous mats within one growing season.

The 2*n*-genome size estimates obtained by flow cytometry varied between 7.33 pg and 8.10 pg of DNA for samples of *Calamagrostis lonana*, perfectly matching estimates for tetraploid *Calamagrostis* taxa (2*n* = 28) published in the literature (Smarda et al., 2019; Zonnefeld, 2019). In contrast, all other samples of presumably *C. stricta* collected across nearby locations in France and Germany presented genome size estimates ranging from 14.39 pg to 16.50 pg, rather matching decaploid taxa of *Calamagrostis* with 2*n* = c. 70 chromosomes.

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