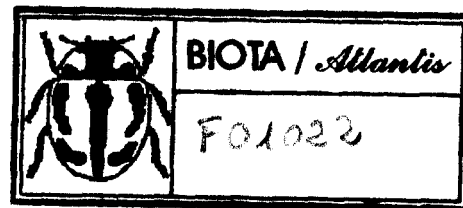


Freie Universität Berlin, Botanischer Garten und Botanisches Museum, Berlin
 Universität Regensburg, Institut für Botanik, Regensburg

H. SCHOLZ¹, Ch. STIERSTORFER² & M. v. GAISBERG²

Lolium edwardii sp. nova (Gramineae) and its relationship with *Schedonorus* sect. *Plantynia* DUMORT.

With one Figure and one Map



Summary

Lolium edwardii, probably an endemic of the Canary Islands, is new to science. It differs clearly from *L. canariense* by means of morphological characters provided in a key, and of its ecological preferences and distribution patterns presented for the Island of El Hierro. The relationship to the genus *Schedonorus* P.BEAUV. is discussed.

Zusammenfassung

Lolium edwardii sp. nova (Gramineae) und dessen Verwandtschaftsbeziehungen zu *Schedonorus* sect. *Plantynia* DUMORT.

Lolium edwardii, möglicherweise ein Endemit der Kanaren, ist neu für die Wissenschaft. Die Art unterscheidet sich von *L. canariense* deutlich in Morphologie, dargestellt in einem Schlüssel, sowie in Verbreitung und Ökologie, wie am Beispiel der Insel El Hierro gezeigt wird. Die Verwandtschaftsbeziehungen zur Gattung *Schedonorus* P.BEAUV. werden diskutiert.

Introduction

During field work in El Hierro, Canary Islands, in 1997–2000 (M. v. G., CH. ST.) habitat preferences of two distinct taxa of *Lolium* L., so far indistinguishable, named *L. canariense* STEUD., soon became evident. Both taxa, also occurring on other islands of the Canary archipelago (as results from studies on herbarium material, H. S.), do not seem to come into any contact and thus are treated in the following as two independent indigenous species (other species of *Lolium* are introduced); transitions between them have never been observed.

In order to use the equivocal name *Lolium canariense* correctly for one of the two Canary Islands species, the lectotype of *L. canariense* STEUD. from the Island of Gran Canaria, formerly in CN now in P, was consulted; a little spike sample has been kindly provided by Mr P. AUTHIER (Paris).

Material and methods

Samples of the lemmas were coated with gold-palladium in a Polaron SC 5 15 SEM Coating System (Fisons Instruments) and examined near the callus in a Zeiss Digital Scanning Microscope DSM 950.

The entire flora and vegetation of the vascular plants of the island of El Hierro have been researched continuously since 1997 by means of grid mapping based on the UTM 1 km² and phytosociological relevés (M. v. G., CH. ST.). This database was used to show the distribution area and ecology of *Lolium edwardii* and *L. canariense*. Detailed data from the other Canary Islands are missing so far.

Lolium edwardii H. Scholz, Stierstorfer & v. Gaisberg, sp. nova

– Icon.: Fig. 13 in TERRELL 1968: 31 (“*L. canariense*”)

HOLOTYPE: El Hierro, 22.03.2000, CH. STIERSTORFER s.n. (B; isotype M. TFC).

Differt a *Lolium canariense* STEUD. glumis acutissimis, flosculis angustioribus 6–9 (–10) mm (nec 4–6.5 mm) longis, palea lemmateaequilonga vel superante, callo leninatis obtuso vel acuto (nec truncato) valde gibboso atque antheribus longioribus 2.5–4 mm (nec 1.5–2.5 mm) longis.

Annuals, up to 50 (–70) cm high. Culms 3–4-noded, erect nor spreading, loosely tufted, sometimes with scattered branches, glabrous, smooth. Leaves glabrous, leaf-blades shiny beneath, short-hirsute or scabrous above, with or without falcate auricles. Ligules to 2 mm long, blunt, glabrous. Spike straight, to 20 cm long; rachis slender, its edges scabrous to nearly smooth. Spikelets 3–20 mm long, 3–9-flowered. Glumes several-veined, attenuate, very acute, half as long as to a little longer than the spikelet. Lemmas 6–9 (–10) × 1–1.9 mm, on the back glabrous and smooth or more or less strongly rough to puberulent, bifid and often purplish at apex, at base with a prominent callus. Awns filiform, ± flexuous, to 15 mm long, scabrous. Palea as long as or longer than the lemma. Anthers 2.5–4 mm long. Caryopses 5–6 × 1 mm.

The new species, *Lolium edwardii*, is dedicated to EDWARD E. TERRELL (*1923), the famous North American botanist and expert on grasses, esp. *Lolium* (TERRELL 1966, 1968). In his *Lolium* monograph he described very comprehensively *L. canariense* but already mentions its heterogeneity on the Canary Islands and thus reservedly anticipates the division into *L. canariense* (syn.: *L. gracile* PARL. non DUMORT.) and *L. edwardii*. Some plants "are not very much like any other species of *Lolium*, or at least they are distinct enough to be indicative of species rank" (TERRELL 1968, P. 33). His drawings (habitus and detail pictures) cited above decidedly show all the features of *L. edwardii*, i.e. narrow and long lemmas, acute lemma callus, etc.

Specimens seen

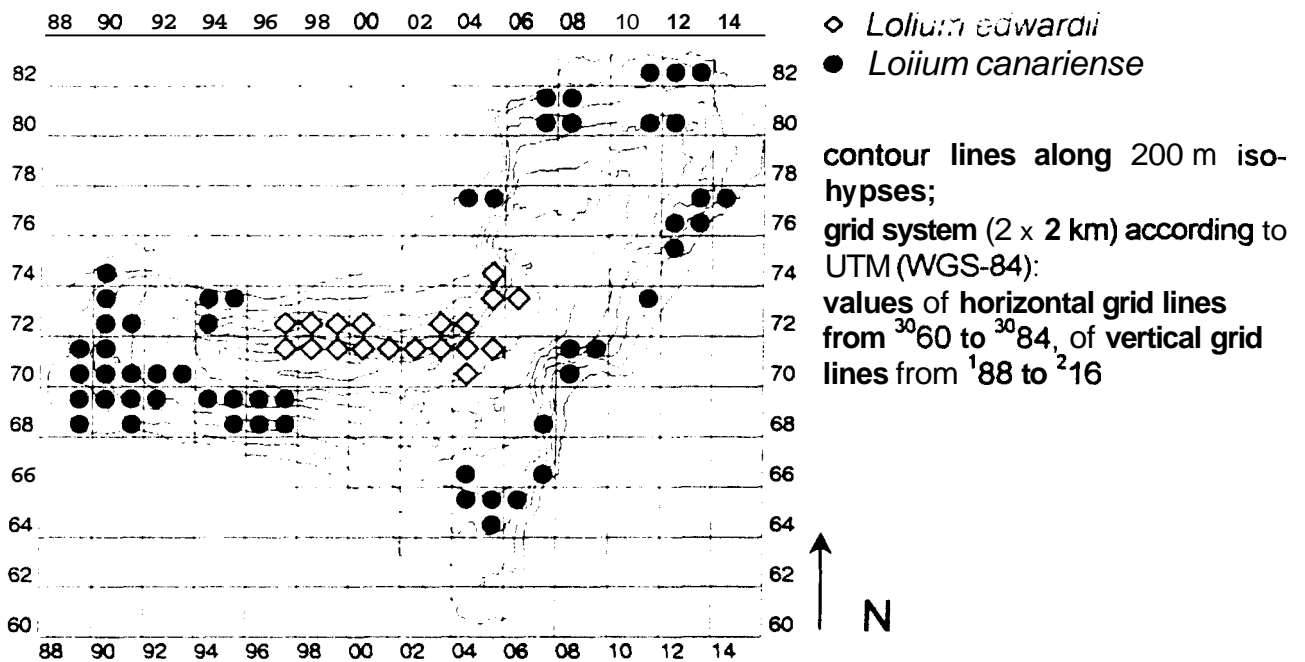
Teneriffa: in udis convallium opacarum. Güírnar, 24. 04. 1855, E. BOURGEOU 1565 (B; COI. Fl. G. K. MA. P, US, W sec. TERRELL 1968; "*L. gracile*"). – Gomera: El Cedro, top of ridge, roadside through *Erica arborea* woodland, 04. 1977, S. A. RENVOIZE 2814 (B, "*L. canariense*"); Laguna Grande, Lorbeerwald, mit *Brachypodium sylvaticum*, 09.04.

1998, R. BÖCKER s.n. (B); Wald bei Arure, ca. 1000 m, 13.04.1998, R. BÖCKER s.n. (B). – El Hierro: Degollada Bailadero de las Brujas/Mña. de la Fuente, 1310 m, 16.04.1997, CH. STIERSTORFER s.n. (B); ibid., 1310 m, 16.04.1997, CH. STIERSTORFER s.n. (B); El Fayal, NE Jable de Mequena, 1300 m, 22.03.2000, CH. STIERSTORFER s.n. (B); SW Mña. Colorada, 1050 m, 24.03.2000, CH. STIERSTORFER s.n. (B); ibid., 1050 m, 24.03.2000; CH. STIERSTORFER s.n. (B); SW Eremita de Caridad, Paso de Jinama, 1100 m, 25.03.2000, CH. STIERSTORFER s.n. (B).

Ecol; y (see map)

On El Hierro/Canary Islands *Lolium edwardii* exclusively grows within laurel forests and the substitutional *Erica-Myrica* scrub ("fayal-brezal", *Myrica fayae-Ericetum arboreae* OBERDORFER 1965), respectively. Thus it is strongly confined to the vegetation class of the *Prunulauretea azoricae* OBERDORFER ex RIVAS-MARTÍNEZ, ARNÁIZ, BARRENO & A. CRESPO 1977. These forests exist from 600 m to 1400 m a.s.l. on the windward slopes of "El Golfo", a huge bay open to the north, where the north-eastern trade winds form clouds most of the year. The dominating tree species are *Myrica faya* and *Erica arborea*, sometimes accompanied by *Laurus azorica* and below 900 m a.s.l. by *Ilex canariensis*. These form a dense canopy with shady and moist conditions on the forest floor. Former areas in the north-east of the island occupied by laurel forests were cleared totally by humans and transformed into pastures and agricultural land. *L. edwardii* is missing there, which is an evidence for its need of a shady habitat.

In contrast, *L. canariense* is confined to the vegetation class of the *Kleinio-Euphorbietea canariensis* (RIVAS GODAY & ESTEVE 1965) SANTOS 1976 and prefers open *Juniperus* woodland and its substitute communities. Shrubs like *Kleinia neriifolia*, *Euphorbia obtusifolia* var. *wildpretii*, and other species adapted to drought dominate beside *Juniperus turbinata* subsp. *canariensis* depending on altitude, exposure, soil conditions, and succession stage. Stunted specimens of *L. canariense* even grow near the coast in the succulent scrub. In the south-west (lee side) of El Hierro, *L. canariense* can reach altitudes up to 1000 m a.s.l., which is also the upper limit of the *Juni-*



Map 1
Distribution area of *Lolium edwardii* and *L. canariense* on El Hierro, Canary Islands

perus woodland. In the east and north-east (windward side), its upper limit declines to 600 m or even 400 m a.s.l. as does *L. canariense*.

2. Key to *Lolium edwardii* and *L. canariense*

(Plants annual. Spikelets 2–10-flowered; lemmas with awns more than 3 mm long and attached 0.2–1 mm below apices. Rhachis slender, 0.5–1.5 mm thick. – See TERRELL 1968, p. 6)

- 1 Glumes acute. Lemmas 6–9 (–10) mm long, equalling or shorter than the paleas, at base with a distinct, rounded or acute callus. Anthers 2.5–4 mm long *L. edwardii*
- 1* Glumes ± obtuse (often notched). Lemmas 4–6.5 mm long, longer than the paleas, at base with a truncate, indistinct callus. Anthers 1.5–2.5 mm long *L. canariense*

Probably *Lolium edwardii* is an endemic of the Canary Islands. *L. canariense* is more widespread and extending to all the Macaronesian islands.

3. Relationship of *Lolium edwardii* (see Fig. 1)

Plant structure and morphology give the basic data for every taxonomy and subsequent phylogenetic studies, for example as to the diploid genus *Lolium* L. (8–12 species, spicate inflorescences: TERRELL 1968, TZVELEV 1989) and

its controversial and much discussed delimitation against the diploid-polyploid *Schedonorus* P.BEAUV., lectotype *S. pratensis* (HUDS.) P.BEAUV., (3–4 species, paniculate inflorescences; TZVELEV 1976, as subgenus), a segregate genus from *Festuca* L. (SORENG & TERRELL 1997; the vast literature prior to 1997 has been reviewed by ZWIERZYKOWSKI & NAGANOWSKA 1996 and CONERT 1996; see also CAO et al. 2000). A truncate lemma callus delimited by a narrow transverse groove from the main lemma body characterizes the genus *Lolium* incl. *L. canariense* as well as the genus *Schedonorus*, except both the Canarian *L. ed-*



Fig. 1

Calli of the lemmas

From top to bottom: *Lolium edwardii* H. SCHOLZ, STIERSTORFER & V. GAISBERG, *Lolium canariense* STEUD. and *Schedonorus giganteus* (L.) SORENG & TERRELL

wardii and the eurasiatic *S. giganteus* (L.) SORENG & TERRELL which instead exhibit a deep depression above the more pointed and protruded callus. [Very rare seed-setting *S. giganteus* plants with truncate calli, specimens in B. possibly represent an unnamed genera or species hybrid unlike \times *Schedololium*

brinkmannii (A. BRAUN) SORENG & TERRELL (*Schedonorus giganteus* \times *Lolium perenne* L.), \times *Schedololium nilssonii* (CUGNAC & A. CAMUS) SORENG & TERRELL (*Schedonorus giganteus* \times *Lolium multiflorum* LAM.) and *Festuca* (*Schedonorus*) \times *schlickumii* GRANTZOW (*S. giganteus* \times *pratensis*), which are said to be male-sterile, and need closer studies, just so a coastal and river taxon of *S. arundinaceus* (SCHREBER) DUMORT. probably endemic in the Baltic Sea countries, with lemma calli more pointed than usually in this species.]

The special configuration of the lemma callus of *Lolium edwardii* and *Schedonorus* (sect. *Plantynia*) *giganteus* is additional to a character combination decisive for fruit dispersal and survival in shady habitats: Narrow and about to 9 mm long lemmas with long awns, soft and thin leaf-blades, and, here first reponed for *Lolium*, indistinctly cross-veined, tessellate leaf-laminas (CONERT 1996 for *S. giganteus*, "*Festuca gigantea*", not mentioning cross-veins, but see CLAYTON & RENVOIZE 1986). Therefore, *L. edwardii* and *S. giganteus* seem to be somewhat discordant elements within the otherwise rather homogeneous genera *Lolium* and *Schedonorus*. Thence the assumption may be reasonable to regard the genus *Lolium* as a diphyletic entity, i.e. to affiliate the bulk of the *Lolium* species and *L. edwardii* to *Schedonorus* sect. *Schedonorus* and to *Schedonorus* sect. *Plantynia* DUMORT., respectively. The description of *L. edwardii* roughly and readily reads as referring to a heritably dwarfed, paedomorphic or neotenic descendant of the more robust *S. giganteus* (on the relevance of paedomorphies and related phenomena in plant evolution see LI & JOHNSTON 2000). If the annual *L. edwardii*, now in isolation in the Canary Islands' mountains, was not directly descended from the ancestral and formerly more widespread perennial *S. giganteus* in this place or other, in remote time *L. edwardii* and *S. giganteus* might have divergently evolved from a common ancestor similar to the rare *S. giganteus* var. *pseudololiaceus* (GRANTZOW) with intermediary panicle-spike shape ("panicle poor-spikeleted, spikelets linear-lanceolate, nearly all almost sessile and erect"; ASCHERSON & GRAEBNER 1900, p. 511, translated from German).

Other relatives of *Lolium edwardii* include some African shade species of the genus *Pseudobromus* K.SCHUM., in particular the Central African high mountains settling *P. engleri* (PILGER) W.D.CLAYTON, also known as *Festuca gigantea* var. *africana* ROBYNS & TOURNAY and marked by an acute lemma callus and cross-veined leaf-blades (CLAYTON 1970 and WATSON & DALLWITZ 1994 for the genus, often united with *Festuca* incl. *Schedonorus*). This species deserves more attention in future in order to elaborate the phylogenies of *L. edwardii* and *Schedonorus*.

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Addresses of the authors:

Professor Dr. Hildemar Scholz, Freie Universität Berlin, Botanischer Garten und Botanisches Museum Berlin-Dahlemer, Königin-Luise-Straße 6–8, D-14 191 Berlin, Germany;

Christian Stierstorfer, Markus v. Gaisberg, Universität Regensburg, Institut für Botanik, Universitätsstraße 31, D-93040 Regensburg, Germany.

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