

Alien species of *Eragrostis* P. Beauv. in the British Isles

T. B. RYVES

44 Galsworthy Road, Kingston Hill, Surrey

ABSTRACT

A key to and an annotated list of all 51 species of *Eragrostis* P. Beauv. which are known to have occurred in the British Isles are given.

INTRODUCTION

This paper provides a key to and an annotated list of the 51 species of *Eragrostis* P. Beauv. known to have occurred in the British Isles. At present there is no readily available key to these species, which originate from many parts of the world.

Species of *Eragrostis* bear a superficial resemblance to those of *Poa*, both genera having unawned compressed spikelets consisting of many florets. However, the former differ in having 3-nerved lemmas (5-nerved in *Poa*), ligules which are nearly always ciliate or absent (membranous or almost absent in *Poa*), pointed leaves (often blunt in *Poa*), and no basal cottony hairs on the callus of the lemma (possessed by some species of *Poa*).

There are at least 300 species of *Eragrostis* (some authorities give twice that number, according to taxonomic opinion) distributed over the warm-temperate and tropical regions of the world. Less than a dozen species are established in central and southern Europe, being mostly annuals which fruit freely in hot summers and with seeds that survive cold winters. Only one is established in the British Isles (in the Channel Islands) (McClintock 1975) but several other species, occurring as casuals, may occasionally set seed or even survive a mild winter. In warmer countries, especially Australia, many species have become naturalised. There is little information on the occurrence of hybrids, but many species show considerable variation and sometimes precise identification of isolated alien plants is not possible. In the British Isles 51 species of *Eragrostis* are known to have occurred as aliens, some in wool waste or shoddy, and some around docks or, more rarely, on waste tips. To date only 35 of these species have been recorded in the literature, and the rest are here listed for the first time, although many have been represented as herbarium specimens for many years. Probst (1949) listed 35 species of *Eragrostis* from wool in Europe, nearly all of which have since been found in the British Isles. Species of *Eragrostis* have undoubtedly been under-recorded in the past in the British Isles; for example, Hayward & Druce (1919) identified only one species. The surprisingly large total presented in this paper has resulted from:

- the expert identification readily given by the late Dr C. E. Hubbard, who had an unrivalled knowledge of the genus;
- several exceptionally rich localities, notably Blackmoor, N. Hants, v.c. 12, and around Maulden, Beds., v.c. 30;
- extensive collections of material, mostly from Blackmoor (where the use of wool waste is now discontinued), some of which were grown in frost-free surroundings to obtain semi-mature inflorescences, particularly from 1970 to 1975.

Several species other than the 51 listed here have been recorded. *E. verticillata* (Cav.) P. Beauv. has been recorded by J. E. Lousley, but with no detail. *E. articulata* (Schrank) Nees is in RNG; this species resembles young *E. schweinfurthii*, as do specimens of *E. racemosa* in RNG, herb. E.J.C. and herb. T.B.R. Specimens of *E. setifolia* (or *E. falcata* (Gaudich.) Gaudich. ex Steudel) in several collections may well be immature *E. lacunaria* or *E. dielsii*. The specimen labelled *E. capillaris* in RNG was incorrectly identified and is, in fact, *E. trachycarpa*. In Europe a few other alien species have been recorded recently, particularly from Sweden and Holland, adding to the earlier records listed by Probst (1949). In this account *E. subulata* Nees has been included in *E. curvula*.

CONSTRUCTION OF THE KEY AND ANNOTATED LIST

The artificial key has been constructed using many reference books (Black 1960, Bogdan 1958, Bor 1968, Cabrera 1970, Clayton 1972, Hitchcock 1950, Norton 1971, de Winter 1955), examination of specimens in the author's herbarium, and notes from Dr C. E. Hubbard.

The list of species gives brief details of native distribution, localities and the frequency of records in the British Isles, and several representative herbaria (certainly not a complete list) where specimens are held. Most species have occurred at Blackmoor, but the numerous individual detailed records have been omitted (see Lousley (1961), Dony (1969) and Ryves (1974) for many earlier records). Specimens of nearly all of the listed species were identified by Dr C. E. Hubbard.

In addition to contrasting characters, the key contains additional information, not readily available elsewhere, to aid the identification of these aliens. The 'collar' is the outer side of the leaf at the junction of blade and sheath; this zone is often a distinctive colour.

ARTIFICIAL KEY

- 1 Rhizomatous perennial 10–45 (60) cm with a dense tuft of short (<10 cm) glaucous, expanded basal leaves; spikelets *c.* 5 × 1.5 mm; lemma purplish below with yellow tip 1. *E. bicolor*
- 1 Different combination of characters
 - 2 Annual; leaf-margins with prominent warty glands (not bulbous-based hairs) (also *E. neomexicana*, *E. procumbens* occasionally); panicle <20 cm; grain without dorsal pit
 - 3 Leaves glabrous; pedicel without prominent gland; spikelets 2–4 mm wide, often olive or grey; lemmas 2–2.8 mm 2. *E. cilianensis*
 - 3 Leaves often with sparse, coarse hairs; pedicels with gland; spikelets 1.3–2 mm wide, often purplish; lemmas 1.5–2 mm 3. *E. poaeoides*
 - 2 Leaf-margins without prominent glands (except *E. neomexicana*, *E. procumbens* occasionally)
 - 4 Culm-nodes with ring of glandular tissue below; pedicels with gland
 - 5 Annual; axillary panicles <20 cm; exerted from lower sheaths; spikelets 5–15 × 1.5–2 mm, yellow-green 4. *E. barrelieri*
 - 5 Perennial; panicles >20 cm; spikelets *c.* 7–10 × 2 mm, grey-green 5. *E. leptostachya*
 - 4 Culm-nodes without ring of glandular tissue below; branch axes with glandular tissue occasionally; pedicels without gland
 - 6 Annual; sheaths with many prominent circular glands, with or without stout hairs; spikelets 5–8 × 1.5–3 mm
 - 7 Culms 40–100 cm; leaves 5–10 mm wide; panicle large, 20–40 cm, with ascending branches; spikelets with 8–12 florets 6. *E. neomexicana*
 - 7 Culms <40 cm; panicle small, spreading; spikelets usually with ≤7 florets 7. *E. mexicana*
 - 6 Sheaths without prominent glands
 - 8 Spikelets short, ≤5 mm, with 3–5 (6) florets (also *E. caesia*, *E. atherstonei*)
 - 9 Panicle spike-like; spikelets with 3 florets, ≤1 mm; glume > first lemma 8. *E. kennedyae*
 - 9 Panicle open or very diffuse
 - 10 Sheath with or without bulbous-based hairs, throat of sheath with tuft of stiff, long, white bristles; panicle open with spikelets on very short pedicels ± appressed to branches; spikelets with 3–5 florets, ≤3 mm 9. *E. glandulosipedata*
 - 10 Panicle very diffuse, with spikelets on long (up to 2 cm) divaricate pedicels
 - 11 Throat of sheath densely hairy but without glands; spikelets with 2–4 florets *c.* 2–3 × 1.5 mm; grain ovoid, rough, 0.5 mm 10. *E. capillaris*
 - 11 Ligule and sheath glabrous with scattered, very small glands; spikelets with 3–5 (6) florets; grain spherical, pitted, 0.8 mm 11. *E. trachycarpa*
- 8 Spikelets usually ≥5 mm long, some with 5–20 florets

- 12 Spikelets \pm ovate (rarely longer), usually ≥ 3 mm wide
- 13 Annual; spikelets $5-10 \times 3-4$ mm; glume $<$ lemma, acute, pale green .. 12. *E. wilmaniae*
- 13 Perennial; spikelets \pm ovate (like *Briza media*)
- 14 Spikelets distant on branches, $3-5 \times 3-4$ mm; pedicels up to 3 mm; palea ciliate on keel .. 13. *E. obtusa*
- 14 Spikelets clustered on branches, $4 \times 2.5-3$ mm; pedicels shorter; palea with short wing on keel .. 14. *E. echinochloidea*
- 12 Spikelets linear to elliptic
- 15 Leaves short, rigid; spikelets terete, very narrow, very long (often > 20 mm), with imbricate lemma
- 16 Panicle contracted; spikelets sessile, clustered, \pm curved, usually pale green; lemma tightly imbricate .. 15. *E. dielsii*
- 16 Panicle diffuse; spikelets distant, pedicelled, \pm straight, often purplish; lemma loosely imbricate .. 16. *E. lacunaria*
- 15 Spikelets linear, lanceolate to elliptic, not terete, with lemma \pm overlapping
- 17 Basal sheath strongly compressed, glabrous, spreading like a fan; spikelets appressed, $6-10 \times 2$ mm, shiny olive-green (resembles *Diplachne fusca*); glumes very short, unequal; grain 1.5 mm, compressed, bumpy .. 17. *E. plana*
- 17 Basal sheath not strongly compressed
- 18 Culm slightly flattened and angled, very straight with very hairy sheath; collar very indistinct; panicle and spikelets as in *E. curvula* .. 18. *E. planiculmis*
- 18 Culm terete; collar \pm conspicuous
- 19 Panicle interrupted, spike-like, with spikelets in dense, sessile clusters along axis; spikelets $3-6 \times 2$ mm .. 19. *E. elongata*
- 19 Spikelets not in dense clusters along axis of panicle
- 20 Perennial; panicle lax, open; spikelets with lemmas free for most of their length, finally spreading out to show a saw-tooth margin .. 20. *E. tenuifolia*
- 20 Spikelets with lemmas not spreading out conspicuously, loosely or tightly overlapping
- 21 Mature spikelets ≥ 1.5 mm wide, often 4 times as long as wide (see *E. curvula*, *E. macilentia*, with spikelets up to 2 mm wide)
- 22 Annual; pedicels \leq spikelets
- 23 Culms up to 35 cm; leaves mostly basal, up to 7 cm, covered and bordered with bulbous-based, coarse hairs; panicle loose and spreading, with short (up to 3 cm) simple branches spreading at 90° , bearing up to 6 spikelets; spikelets c. 5 mm .. 21. *E. schweinfurthii*
- 23 Different details
- 24 Panicles contracted, spike-like, with spikelets in dense clusters on branches; axillary panicles present; spikelets c. 7 mm .. 22. *E. procumbens*
- 24 Panicle rather lax, spike-like, with 3-5 spikelets on each branch; branches short, ascending, appressed; spikelets 8-10 mm .. 23. *E. kiwuensis*
- 22 Perennial
- 25 Panicle divaricate, effuse; pedicels 1-3 cm, $>$ spikelets (up to 1 cm); lemma 3 mm, acute (also *E. molybdea*) .. 24. *E. patentissima*
- 25 Panicle dense, or spike-like, or open; pedicels usually $<$ spikelets; lemma usually < 3 mm (see *E. molybdea*)
- 26 Panicle spike-like, c. 10×1 cm; spikelets $4-7 \times 1.5-2$ mm, with 2-7 florets; lemma 2-3 mm, with elongate black spots near nerves .. 25. *E. caesia*
- 26 Different details
- 27 Culm-base bulbous, slightly woody; panicle spike-like, $12 \times$ up to 3 cm; spikelets $8-20 \times 1.5$ mm; lemma c. 2 mm, soon diverging .. 26. *E. setifolia*
- 27 Different details, panicle usually not spike-like
- 28 Rhizomatous; leaves up to 20 cm; panicle open or contracted, with spikelets clustered on branches; spikelets 4-15 mm; palea

- falling with lemma at maturity; stamens 3; grain spindle-shaped, ≤ 1 mm 27. *E. atrovirens*
- 28 Palea persisting after lemma falls at maturity
- 29 Panicle very open; pedicels 3–15 mm; spikelets up to 1 cm; lemma 3 mm; grain oblong, with truncate ends and deep ventral groove, c. 1 mm 28. *E. molybdea*
- 29 Panicle various; pedicels \leq spikelets; lemma < 3 mm; grain \pm ovoid, ≤ 1 mm
- 30 Culms up to 45 cm; leaves up to 7 cm, often very hairy; panicle rather dense, oval-elliptic, c. 7×3 cm; spikelets distant on short spreading branches; lower glume < 1 mm; lemma 1.5 mm; grain ≤ 0.5 mm 29. *E. neesii*
- 30 Panicle different; glumes c. 1.5 mm; lemma c. 2 mm; grain > 0.5 mm
- 31 Resembles *E. schweinfurthii*; culms up to 100 cm but panicle narrower 30. *E. racemosa*
- 31 Different details
- 32 Without rhizomes; spikelets \pm densely clustered on stiff branches; spikelets 5–10 mm, with 6–24 closely packed florets; palea-margin conspicuously ciliate; stamens 2; grain oblong-ovoid, 1 mm (resembles *E. atrovirens*) 31. *E. bahiensis*
- 32 Spikelets \pm clustered on longer, \pm flexuous branches; spikelets 5 mm, with c. 10 looser florets; grain obovoid, c. 0.6 mm
- 33 Panicle contracted or open; spikelets c. 2 mm wide; palea-margin hardly ciliate (can resemble *E. elongata*) 32. *E. brownii*
- 33 Panicle finally open, with less clustered spikelets on branches; mature spikelets brittle (rhachilla easily fracturing), breaking from the top downwards; spikelets c. 1.7 mm wide; palea-margin shortly ciliate 33. *E. philippica*
- 21 Mature spikelets ≤ 1.5 mm wide (see *E. curvula*, *E. macilenta*), often > 5 times as long as wide
- 34 Perennial
- 35 Top of sheath very hairy; leaves \pm hairy, flat; panicle diffuse, c. 15×15 cm; spikelets lanceolate, 3–4 mm; lemmas acute, closely overlapping 34. *E. lugens*
- 35 Top of sheath usually not very hairy; spikelets linear to lanceolate, ≥ 4 mm; lemmas rather loose
- 36 Basal branches whorled (≥ 3 branches)
- 37 Base of branches with tuft of hairs; spikelets 5×1 –1.5 mm, with 3–5 florets; lemmas ≥ 2 mm 35. *E. atherstonei*
- 37 Base of branches without tufts of hairs; spikelets c. 9×1 mm, with 6–16 florets; lemmas ≤ 1.5 mm, obtuse 36. *E. rotifer*
- 36 Basal branches single or sub-opposite
- 38 Panicle c. 20×20 cm; pedicels sub-sessile, < 2 mm; spikelets with 10–12 florets; grain \pm spherical (see *E. parviflora*, *E. pilosa*, *E. leptocarpa*) 37. *E. microcarpa*
- 38 Some pedicels ≥ 2 mm; grain oblong
- 39 Culms rooting at the nodes; nodes usually hairy 38. *E. barbinodis*
- 39 Culms usually not rooting at nodes; nodes \pm glabrous
- 40 Glumes very unequal; lemmas narrow, acute, angular, scabrous 39. *E. heteromera*
- 40 Glumes \pm equal; lemmas \pm obtuse, blunt, membranous
- 41 Culms branched, geniculate, 30–60 cm; lower sheath papery with rounded well-separated nerves; spikelets 1(–1.5) mm wide; lemmas c. 1.5 mm 40. *E. lehmanniana*

- 41 Culms unbranched, erect or geniculate, 30–120 cm; lower sheath tough with flattened close-set ribs; spikelets 1.5(–2) mm wide; lemmas 2–2.5 mm
- 42 Leaves filiform, curling, rather short; panicle open, lax; spikelets spreading 41. *E. chloromelas*
- 42 Leaves \pm narrow, not curling, long; panicle lax or contracted; spikelets usually appressed 42. *E. curvula*
- 34 Annual
- 43 Collar with fringe of stiff hairs; panicle axils hairy; spikelets breaking up from top downwards; lemma and palea falling together, enclosing the grain; spikelets 4.9 \times 1–1.5 mm, with 4–16 florets; lemma obtuse 43. *E. aspera*
- 43 Spikelets breaking up from base upwards; lemma falling before palea
- 44 Spikelets narrow 3–6 \times 0.8 mm, pale grey; lemmas 1.5–2 mm, scabrous or with short appressed hairs; grain oblong-linear, c. 1 mm 44. *E. leptocarpa*
- 44 Spikelets \geq 1 mm; lemmas \pm glabrous to slightly hairy or scabrous; grain oblong to ovoid
- 45 Throat of sheath without tuft of long hairs (see *E. macilenta*)
- 46 Panicle up to 15 cm; spikelets 3–6 \times 1.5 mm; lemmas acute; palea \leq 2/3 lemma; grain oblong, c. 0.7 mm 45. *E. multicaulis*
- 46 Leaves flat with a pale midrib; panicle up to 25 cm, with spikelets appressed along branches; spikelets 3–10 \times 1 mm, usually very dark brown; lemmas obtuse; palea c. 2/3 lemma; grain ovoid, c. 0.6 mm 46. *E. parviflora*
- 45 Throat of sheath (when young) with conspicuous tuft of long (2 mm), white, stiff hairs
- 47 Panicle very diffuse, c. 15 cm wide, with sub-opposite or single branches spreading divaricately; spikelets not clustered; spikelets oblong 3–6 \times 1–2 mm, very dark or black; grain oblong, c. 0.6 mm 47. *E. macilenta*
- 47 Panicle diffuse or loosely contracted, often with whorled branches; spikelets usually linear, often pale
- 48 Immature spikelets with upper lemma < lower lemma
- 49 Branch axils glabrous; spikelets often yellow-green; lower lemma 2–3 mm; grain ovoid, 1–1.5 mm 48. *E. tef*
- 49 Branch axils usually with long, white hairs; spikelets purplish grey; lower lemma c. 1.5 mm; grain oblong, 0.5–1 mm 49. *E. pilosa*
- 48 Branch axils glabrous or hairy; spikelets yellow-green to purple-green; in immature spikelets upper lemma equalling lower lemma, c. 1.5 mm
- 50 Culms 20–70 cm; spikelets 4–6 \times 1 mm; grain ovoid with wide, shallow ventral pit, c. 1 mm 50. *E. virescens*
- 50 Culms 15–25 cm; spikelets 4–6 \times 1.5 mm; grain ovoid, without pit, c. 1 mm 51. *E. pectinacea*

ANNOTATED LIST OF SPECIES

The name, distribution and alien habitat in the British Isles are given. Distributions in italics indicate that the occurrence is adventive. Frequency is expressed as: (VR) = very rare, one to three records; (R) = rare, four to ten records; (Oc) = occasional, eleven to 20 records; (Fr) = frequent, more than 20 records. Representative herbaria where specimens are held are given, usually **K** and **RNG**. The private collections of T. B. Ryves (**herb T.B.R.**) and E. J. Clement (**herb E.J.C.**) are occasionally cited. Brackets indicate the originator of the record when the location of the specimen is uncertain.

1. *E. bicolor* Nees. South Africa. Wool alien (VR). **RNG**.
2. *E. cilianensis* (All.) F. T. Hubbard. *Europe*, Mediterranean, Asia, *South Africa*, *America*, *Australia*. Occurs as a wool alien (Fr), in bird seed (VR) and on tips (R). **BM, K, RNG**.
3. *E. poaeoides* P. Beauv. *Europe*, the Mediterranean, Asia, *South Africa*, *America*, *Australia*. Occurs as a wool alien (Fr), in bird seed (VR) and on docks (VR). **RNG, LTN**.
4. *E. barrelieri* Daveau. *Europe*, the Mediterranean, Asia, *South Africa*, *America*, *Australia*. Occurs as a wool alien (Oc) and on docks (VR). **RNG, LTN**.
5. *E. leptostachya* Steudel. *Australia*. Wool alien (R). **K, E, RNG**.
6. *E. neomexicana* Vasey. North and *South America*, *Australia*. Occurs as a wool alien (VR), on tips (VR) and on docks (VR). **RNG, LTN**.
7. *E. mexicana* (Hornem.) Vasey. North America, *Australia*. Wool alien (VR). (J. G. Dony).
8. *E. kennedyae* F. Turner. *Australia*. Wool alien (VR). **E, herb T.B.R.**
9. *E. glandulosipedata* De Winter. South Africa. Wool alien (VR). **Herb T.B.R.**
10. *E. capillaris* (L.) Nees. North America. (G. C. Druce).
11. *E. trachycarpa* (Bentham) Domin. *Australia*. Wool alien (Oc). **K, E, RNG**.
12. *E. wilmaniae* C. E. Hubbard & Schweich. South Africa. Wool alien (VR). **Herb T.B.R.**
13. *E. obtusa* (Munro ex Ficalho) Hiern. South Africa. Wool alien (R). **K, RNG**.
14. *E. echinochoidea* Stapf. South Africa. Wool alien (VR). **RNG, herb T.B.R.**
15. *E. dielsii* Pilger. *Australia*. Wool alien (R). **K, E, RNG**.
16. *E. lacunaria* F. Mueller. *Australia*. Wool alien (R). **K, E, RNG**.
17. *E. plana* Nees. Africa. Wool alien (Oc). **RNG, herb T.B.R.**
18. *E. planiculmis* Nees. South Africa. Wool alien (VR). **Herb T.B.R.**
19. *E. elongata* Jacq. *Australia*. Wool alien (VR). **RNG**.
20. *E. tenuifolia* Hochst. ex Steudel. Africa. *Australia*. Wool alien (VR). **K, RNG**.
21. *E. schweinfurthii* Chiov. Africa. Wool alien (R). **K, E, RNG**.
22. *E. procumbens* Nees. South Africa. Wool alien (R). **RNG**.
23. *E. kiwuensis* Jedw. Africa. Wool alien (VR). **K, E, RNG**.
24. *E. patentissima* Hackel. South Africa. Wool alien (VR). **K, RNG**.
25. *E. caesia* Stapf. Wool alien (VR). **E, RNG**.
26. *E. setifolia* Nees. *Australia*. Wool alien (VR). (J. E. Lousley, M. McCallum Webster).
27. *E. atrovirens* (Desf.) Trin. Africa. Wool alien (VR). **K, RNG**.
28. *E. molybdea* Vickery. *Australia*. Wool alien (R). **Herb T.B.R.**
29. *E. neesii* Trin. South America. Wool alien (R). **K, E, RNG**.
30. *E. racemosa* (Thunb.) Steudel. Africa. Wool alien (VR). **E, herb E.J.C.**
31. *E. bahiensis* Schrader. North and South America. Wool alien (R). **K, herb T.B.R.**
32. *E. brownii* Nees ex Steudel. *Australia*. Wool alien (Oc). **K, RNG**.
33. *E. philippica* Jedw. *Australia*. Wool alien (R). **K, E, RNG**.
34. *E. lugens* Nees. *America*. Wool alien (Oc). **K, E, RNG**.
35. *E. atherstonei* Stapf. Africa. Wool alien (VR). **RNG, herb T.B.R.**
36. *E. rotifer* Rendle. South Africa. Wool alien (VR). **K**.
37. *E. microcarpa* Vickery. *Australia*. Wool alien (VR). **RNG**.
38. *E. barbinodis* Hackel. South and East Africa. Wool alien (VR). **K**.
39. *E. heteromera* Stapf. Africa. Wool alien (R). **Herb T.B.R.**
40. *E. lehmanniana* Nees. South Africa. Wool alien (Oc). **K, E, RNG**.
41. *E. chloromelas* Steudel. South Africa. Wool alien (Oc). **K, E, RNG**.
42. *E. curvula* (Schrader) Nees. South Africa, *America*, *Australia*. Wool alien (Fr). **K, E, RNG**.
43. *E. aspera* (Jacq.) Nees. Africa. Wool alien (VR). **RNG**.
44. *E. leptocarpa* Bentham. *Australia*. Wool alien (VR). **Herb T.B.R.**
45. *E. multicaulis* Steudel. *Europe*, North and *South America*, Asia. Occurs in grain (VR). (A. Copping).
46. *E. parviflora* (R. Br.) Trin. *Australia*. Wool alien (Fr). **K, E, RNG**.
47. *E. macilenta* (A. Richard) Steudel. Africa. Wool alien (R). **K, E, RNG**.
48. *E. tef* (Zucc.) Trotter. Africa. Occurs as a wool alien (Oc), in bird seed (VR) and as an ornamental (VR). **K, E, RNG**.
49. *E. pilosa* (L.) P. Beauv. *Europe*, Asia, the Mediterranean, *South Africa*, *America*, *Australia*, *Jersey*. Occurs as a wool alien (R), on tips (VR) and on docks (VR). **K, E, RNG**.

50. *E. virescens* C. Presl. South America, *Europe*, *South Africa*. Occurs as a wool alien (R) and on tips (VR). **RNG, herb T.B.R.**
51. *E. pectinacea* (Michx) Nees. North and *South America*. Occurs as a wool alien (VR) and on docks (VR). **K, E, RNG.**

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