

32. KOBRESIA Willdenow, Sp. Pl. 4: 205. 1805.

嵩草属 song cao shu

Zhang Shuren (张树仁); Henry J. Noltie

Herbs, perennial. Rhizomes usually very short, sometimes obliquely and shortly creeping, rarely stoloniferous and spreading. Stems usually tufted, rarely scattered. Leaves basal or sub-basal; basal leaf sheaths persistent and usually prominent; blade with midrib not distinct abaxially (margin involute, sometimes filiform), or with midrib distinct abaxially (flat, sometimes folded). Inflorescence terminal, paniculate to spicate, sometimes unisexual; lowest involucral bract leafy or glumelike, sheathless; branches of inflorescence sessile. Spikelets subtended by glumes, unisexual or bisexual; bisexual spikelets with 1 female flower at base and 1 to several male flowers at distal parts enclosed by prophylls; unisexual spikelets with a solitary female flower within prophylls. Sterile rachilla in female spikelet usually present. Flowers unisexual. Female flowers reduced to naked pistils; ovary 2- or 3-carpellate; style elongated; stigmas 2 or 3. Male flowers subtended by male glumes; stamens 1–3; filaments free, longer than glumes, slender; male glumes usually distinct in shape from glumes of female spikelets. Nutlets trigonous or flattened, usually included in prophylls, beaked or not, stipitate or not.

About 54 species: mainly in temperate regions of the N Hemisphere; 44 species (16 endemic, one unconfirmed) in China.

- 1a. Prophylls leathery in texture, utriculiform, inflated, much larger than nutlet at maturity.
 - 2a. Leaves flat with midrib conspicuous abaxially; culms over 6 cm; prophylls over 5 mm; plants of meadows and slopes up to 4600 m 16. *K. inflata*
 - 2b. Leaves filiform, U-shaped in cross section, midrib not conspicuous abaxially; culms under 4 mm; prophylls to 5 mm; dwarf mat-forming plants of stony plateaus over 4800 m 17. *K. yadongensis*
- 1b. Prophylls thinly textured, open or utriculiform, if utriculiform then closely enveloping nutlet at maturity.
 - 3a. Nutlets mostly with 2 stigmas, compressed (biconvex) with 2 sharp edges.
 - 4a. Spikes linear, more than 5 × as long as broad; sometimes some nutlets with 3 stigmas 28. *K. myosuroides*
 - 4b. Spikes short, ca. 3 × as long as broad; nutlets all with 2 stigmas.
 - 5a. Glumes pale brown to brown, margin hyaline or not; nutlets obovoid, very shortly stipitate; lower spikelets with 1 female and 2–5 male flowers (E China) 43. *K. pusilla*
 - 5b. Glumes dark brown, occasionally brown, margin narrowly hyaline or not; nutlets oblong, distinctly stipitate; lower spikelets with 1 female and 1–3 male flowers (W China) 44. *K. karakorumensis*
 - 3b. Nutlets all or mostly with 3 stigmas (in *K. capillifolia*, *K. filifolia*, and *K. myosuroides* sometimes with 2), trigonous, although one of angles sometimes extremely weak (so nutlet appearing compressed).
 - 6a. Rhizomes elongate, stoloniferous.
 - 7a. Stigmas 3; nutlets not stipitate; prophylls usually over 7 mm; plants robust 1. *K. gammiei*
 - 7b. Stigmas 2; nutlets long stipitate at maturity (stipes to 1 mm); prophylls to 6.5 mm; plants slender.
 - 8a. Leaf blade flat, midrib distinct abaxially; prophylls to 3.6 mm; spikelets usually unisexual; glumes fawn brown 14. *K. macrantha*
 - 8b. Leaf blade filiform, U-shaped, midrib not distinct abaxially; prophylls over 4 mm; lower spikelets of lateral spikes usually bisexual; glumes dark reddish brown 15. *K. hohxilensis*
 - 6b. Rhizomes extremely short, so plants densely tufted.
 - 9a. Inflorescence paniculate.
 - 10a. Prophylls utriculiform (open only near apex); most spikelets unisexual (some near base of inflorescence branches sometimes bisexual).
 - 11a. Prophylls to 3.5 mm; glumes of female spikelets to 3 mm 6. *K. fragilis*
 - 11b. Prophylls over 3.5 mm; glumes of female spikelets over 4 mm.
 - 12a. Leaves usually over 5 mm wide; prophylls over 8 mm, rachilla much shorter than nutlet; inflorescence branches linear, elongate 3. *K. curticeps*
 - 12b. Leaves never over 5 mm wide; prophylls under 7 mm (if more than inflorescence dense, clublike and lowest involucral bract glumelike), rachilla subequaling or exceeding nutlet.
 - 13a. Nutlet elliptic, ca. 2 × as long as wide (Yunnan only) 5. *K. loliacea*
 - 13b. Nutlet narrowly elliptic to linear, ca. 3 × as long as wide (more widespread).
 - 14a. Surface of prophyll glabrous; branches ± equal in length throughout inflorescence, curving outward 2. *K. laxa*
 - 14b. Surface of prophyll minutely hispid near apex; lower inflorescence branches longer than upper, appressed or obliquely ascending.
 - 15a. Rachilla shorter than nutlet; margins of glumes hyaline; culms

- slender 4. *K. sikkimensis*
- 15b. Rachilla almost or exceeding prophyll; margins of glumes
not hyaline; culms stout 7. *K. uncinoides*
- 10b. Prophylls open almost to base; spikelets bisexual or unisexual.
- 16a. Spikelets bisexual.
- 17a. Leaves filiform; some nutlets with 2 stigmas 11. *K. filifolia*
- 17b. Leaves flat; all nutlets with 3 stigmas.
- 18a. Culms very stout, acutely triquetrous; inflorescence very dense,
club-shaped 12. *K. kansuensis*
- 18b. Culms slender, not obviously triquetrous; inflorescence branches
slightly spreading 13. *K. royleana*
- 16b. Spikelets unisexual.
- 19a. Rhizome stout, oblique, very shortly creeping, bearing short, bladeless
sheaths 8. *K. kuekenthaliana*
- 19b. Rhizome not developed, culms densely tufted, not bearing bladeless sheaths.
- 20a. Leaves filiform 9. *K. condensata*
- 20b. Leaves flat, midrib distinct abaxially.
- 21a. Prophylls over 5 mm, keels hispid 10. *K. tunicata*
- 21b. Prophylls to 4 mm, keels not hispid 13. *K. royleana*
- 9b. Inflorescence spicate.
- 22a. Prophylls over 6 mm 21. *K. robusta*
- 22b. Prophylls under 6 mm.
- 23a. Lower spikelets bisexual, with at least 1 male flower enclosed within prophyll.
- 24a. Leaves flat, midrib distinct abaxially.
- 25a. Prophylls with basal female and 2–7 male flowers 18. *K. humilis*
- 25b. Prophylls with basal female and 1 or 2 male flowers.
- 26a. Prophylls utriculiform, open only above middle; glumes not or minutely
aristate; leaves short, stiff 19. *K. duthiei*
- 26b. Prophylls open almost to base; glumes long aristate; leaves longer,
flaccid 20. *K. filicina*
- 24b. Leaves filiform, midrib not distinct abaxially.
- 27a. Prophylls open in upper half (SW Xizang) 22. *K. burangensis*
- 27b. Prophylls open almost to base.
- 28a. Plants and spikes robust, basal sheaths conspicuous, papery, commonly
orange-brown, shiny; male flowers up to 7 per prophyll.
- 29a. Glumes aristate, with conspicuous greenish midrib; inflorescence
elongate; nutlets 3–4.5 mm 23. *K. cuneata*
- 29b. Glumes usually not aristate, midrib not conspicuous;
inflorescence shorter and broader; nutlets 1.7–3.5 mm 24. *K. schoenoides*
- 28b. Plants and spikes more slender, basal sheaths often dark brown;
male flowers 1–5 per prophyll.
- 30a. Culm stout (to 1.5 mm in diam.), erect, exceeding leaves; spike
very short in relation to culm 27. *K. tibetica*
- 30b. Culm more slender (to 1.3 mm in diam.), not or slightly exceeding
leaves; spike more elongate.
- 31a. Sheaths usually dark chocolate brown, sometimes shiny;
glumes wide, blunt, with broad hyaline margin 26. *K. capillifolia*
- 31b. Sheaths paler, dull; glumes narrower, more acute, not
or narrowly hyaline margined.
- 32a. Spike club-shaped; glumes orange-brown; male
flowers usually 3–5 per spikelet; nutlets all
with 3 stigmas 25. *K. setschwanensis*
- 32b. Spike linear; glumes dark brown; male flowers
usually 1 per spikelet; some nutlets sometimes
with 2 stigmas 28. *K. myosuroides*
- 23b. All spikelets unisexual, prophylls enclosing a nutlet and sterile rachilla, male and
female spikelets sometimes in separate inflorescences or on separate plants.
- 33a. Spikes clearly bisexual (androgynous), with female spikelets below and male
spikelets at apex.

- 34a. Prophylls utriculiform, open only in upper half; glumes orange-brown 29. *K. nepalensis*
 34b. Prophylls open to base; glumes dark brown 30. *K. cercostachys*
 33b. Spikes unisexual (occasionally with a few reduced male spikelets at apex).
 35a. Leaves flat.
 36a. Prophylls narrowly elliptic or oblong, not embracing nutlets, keels obscure 32. *K. fissiglumis*
 36b. Prophylls linear or linear-oblong, embracing nutlets, keels obvious and scabrid.
 37a. Prophylls 2–3.5 mm, utriculiform when young; female inflorescence linear, 1.7–6.5 cm 31. *K. esenbeckii*
 37b. Prophylls 5–5.5 mm, open to base even when young; female inflorescence oblong, 1.5–2 cm 33. *K. falcata*
 35b. Leaves filiform.
 38a. Prophylls utriculiform, open only in upper half.
 39a. Midvein of glume conspicuous, ca. 1/3 width of glume, green 34. *K. vidua*
 39b. Midvein of glume less than 1/3 width of glume, not conspicuously green.
 40a. Plants slender; glumes reddish brown to brown; prophylls elliptic (Sichuan) 35. *K. yangii*
 40b. Plants rigid; glumes pale brown; prophylls narrowly oblong or lanceolate (more widespread, especially Xizang).
 41a. Plants robust (culms 1–2 mm in diam.); inflorescences large, female ones 15–40 × 2–3 mm, male ones 17–30 × 4–5 mm; prophylls 3.5–5 mm 36. *K. littledalei*
 41b. Plants slender (culms less than 1 mm in diam.); inflorescences small, female ones 10–20 × 2–3 mm, male ones 6–13 × 2–5 mm; prophylls 2.5–3 mm 37. *K. prainii*
 38b. Prophylls open almost to base.
 42a. Spikes club-shaped (ca. 2 × as long as wide).
 43a. Dwarf, turf-forming plants; culms commonly under 5 cm; prophylls ca. 2.5 mm (widespread) 38. *K. pygmaea*
 43b. Erect, tufted plants; culms usually over 7 cm; prophylls over 3 mm (Gansu, Qinghai) 39. *K. squamiformis*
 42b. Spikes linear (more than 5 × as long as wide).
 44a. Plants slender, culms ca. 0.5 mm in diam.; spikes slender, linear 40. *K. vaginosa*
 44b. Plants stout, culms ca. 1 mm or more in diam.; spikes oblong.
 45a. Basal sheaths fibrillose, dull; female glumes 5–6 × 1.5–2 mm, apex acute to obtuse, not hyaline; prophylls 5–6 mm 41. *K. graminifolia*
 45b. Basal sheaths not fibrillose, slightly shiny; female glumes 6.2–8 × 2.5–4 mm, apex broad, very blunt, hyaline; prophylls 7–9 mm 42. *K. woodii*

1. *Kobresia gammiei* C. B. Clarke, Bull. Misc. Inform. Kew, Addit. Ser. 8: 68. 1908.

根茎蒿草 gen jing song cao

Kobresia williamsii T. Koyama.

Rhizomes elongated, stoloniferous. Basal sheaths few, pale reddish brown, dull, retaining dried leaf blades. Culms loosely tufted, trigonous to subterete, 7–58 cm tall, slender, 1–1.5 mm in diam. Leaves basal or sub-basal, shorter than culms; blade flat, 1.5–4.5(–5) mm wide, midrib distinct abaxially. Inflorescence loosely or densely panicle, reddish brown with green, club-shaped, 2.6–8 × 0.5–1.2 cm; lowest involucral bract leafy or glumelike with long arista, shorter than or exceeding inflo-

rescence. Lowest spikelets of inflorescence branches bisexual with 1 basal female flower and 1 distal male flower, middle ones unisexual with only 1 female flower, apical ones male; glumes reddish brown, with green midvein, elliptic to oblong, (3.5–)5.5–8.5 × 3.2–4 mm, midvein broad, margin broadly hyaline, apex subacute to rounded-truncate. Prophylls pale green, partly brown, utriculiform, lanceolate, (5.6–)7–10.3 × 1–2 mm, membranous, 2-keeled, keels smooth, apex attenuate into a beak. Nutlets yellowish green, obovoid, trigonous, 3.3–4 × 1.5–2 mm, not beaked. Rachilla in unisexual spikelets, shorter than or subequaling nutlet, flat, prominent, sometimes with a sterile male glume at apex. Stigmas 3, base of style disklike. Fl. and fr. May–Aug.

Grassy slopes, damp slopes in *Abies* forests, streamsides, cliffs; 3700–4400 m. Xizang [Bhutan, India (Sikkim), Nepal].

2. *Kobresia laxa* Nees in Wight, Contr. Bot. India, 119. 1834 [“*Cobresia*”].

疏穗高草 shu sui song cao

Elyna laxa (Nees) Kunth; *Hemicarex laxa* (Nees) Benth.; *Kobresia pseudolaxa* C. B. Clarke; *Schoenoxiphium laxum* (Nees) K. V. Ivanova.

Rhizomes shortly elongated. Basal sheaths few, pale to dark brown, dull, retaining dried leaf blades or not. Culms loosely tufted, obscurely trigonous, (4–)13–35 cm tall, slender, ca. 1 mm in diam. Leaves sub-basal, shorter than culms; blade flat, 1.4–4 mm wide, midrib distinct abaxially. Inflorescence a loose or sometimes slightly compact panicle, reddish brown, linear or oblong, 3.5–8 × 1–1.5 cm; inflorescence branches all similar in length, curving outward, lower branches again branched; lowest involucre bract leaflike, sometimes surpassing inflorescence. Inflorescence branches usually androgynous in upper part of inflorescence, those in lower part usually female, sometimes whole inflorescence composed of primarily male or primarily female spikelets; spikelets unisexual; glumes reddish brown, with green midvein, narrowly ovate or oblong, 3.5–5 × 1–1.4 mm, midvein narrow, margin broadly hyaline, apex aristate, acute, or rounded. Prophylls pale green, utriculiform, linear or linear-lanceolate, sometimes slightly curved, (3.5–)4.5–6.6 × 0.5–0.8 mm, membranous, 2-keeled, keels slightly scabrid, margins fused to apex or free in upper half. Nutlets pale yellow or brown, narrowly oblong or elliptic-oblong, trigonous, 2.5–3 × 0.4–0.6 mm, slightly beaked. Rachilla in female spikelets longer than nutlet, exerted from or included in prophyll, green, flat, margins scabrid. Stigmas 3. Fl. and fr. May–Jul.

Moist meadows, on wet rocks; 2200–3700 m. Xizang [Afghanistan, India (Himachal Pradesh, Sikkim), Kashmir, Nepal, Pakistan, Tajikistan].

3. *Kobresia curticeps* (C. B. Clarke) Kükenthal in Engler, Pflanzenz. 38(IV. 20): 47. 1909.

短梗高草 duan geng song cao

Carex curticeps C. B. Clarke in J. D. Hooker, Fl. Brit. India 6: 729. 1894.

Rhizomes short. Basal sheaths stout, pale brown, dull, retaining dried leaf blades, sometimes decaying to fibers. Culms tufted, erect, rigid, trigonous, 22–95 cm tall, 1.1–2.2 mm in diam. Leaves borne on lower half and subequaling culm; blade flat, (3.7–)5–7.5 mm wide, midrib distinct abaxially. Inflorescence densely paniculate, brown, narrow, 6.5–9.5 × 0.8–2.3 cm; lowest involucre bract erect, leaflike, sometimes exceeding inflorescence; branches usually androgynous in upper part of inflorescence, those in lower part usually female, sometimes whole inflorescence composed of primarily female spikelets; spikelets unisexual. Lower inflorescence branches linear, stiffly appressed (lowest to 6 cm), androgynous or female, sometimes again branched, bearing spikelets to base. Female glumes cream

or brown, with green midvein, narrowly ovate or oblong, encircling branch, 5.5–10 × 2–3 mm, midvein broad, 3–5-ribbed, apex aristate. Prophylls utriculiform, linear-lanceolate, (6–)8–11.3 × 1–1.6 mm, 2-keeled, keels minutely scabrid, herbaceous and strongly ca. 4-veined between keels, usually minutely hispid near margins above, margins fused from base to just below apex. Nutlets cream or pale brown, very narrowly ellipsoid, trigonous, 5.5–6.5 × 1.3–1.7 mm, shortly stipitate. Rachilla in female spikelets less than 1/2 length of nutlet. Stigmas 3. Fl. and fr. Jun–Oct.

Open stony or sandy slopes in damp conifer (including *Abies*) forests [in Bhutan]; 2700–4100 m. S Xizang (Yadong) [Bhutan, India (Sikkim, West Bengal), Nepal].

4. *Kobresia sikkimensis* Kükenthal in Engler, Pflanzenz. 38(IV. 20): 47. 1909.

锡金高草 xi jin song cao

Carex prainii Kükenthal, Bull. Herb. Boissier, sér. 2, 4: 51. 1903, not C. B. Clarke (1904), nor *Kobresia prainii* Kükenthal (1904).

Rhizomes short. Basal sheaths cream, dull, slender, retaining dried leaf blades. Culms tufted, rigid, erect, trigonous, 16–38 cm tall, ca. 1 mm in diam. Leaves borne on lower half, 1/2 as long as to equaling culm; blade flat, 2.4–3 mm wide, midrib conspicuous abaxially. Inflorescence densely paniculate, brown, narrowly pyramidal, 4–7 × 1–2 cm; lowest involucre bract erect, leaflike, exceeding inflorescence; branches androgynous; spikelets unisexual. Lower inflorescence branches narrowly oblong, not stiffly appressed (lowest to 4 cm), androgynous, not bearing spikelets in lower 1/3. Female glumes brown, with green midvein, narrowly ovate or oblong, ca. 5.5 × 2 mm, midvein narrow, 3-ribbed, margin hyaline, apex aristate. Prophylls utriculiform, linear-lanceolate, 4.1–5.8 × 1–1.7 mm, 2-keeled, keels minutely scabrid, herbaceous and weakly ca. 4-veined between keels, usually minutely hispid above, margins fused from base to just below apex. Nutlets cream or pale brown, very narrowly ellipsoid, trigonous, 3–3.3 × 0.8–1.5 mm, shortly stipitate. Rachilla in female spikelets more than 1/2 length of nutlet. Stigmas 3. Fl. and fr. Jul–Aug.

?S Xizang [Bhutan, India (Sikkim), Nepal].

Although not yet recorded in China, this species is almost certain to occur in S Xizang, as it occurs very close to the border in NW Bhutan and also in India (Sikkim) and NE Nepal (where it occurs at forest margins and on scree in *Juniperus* forests at elevations of 3000–4200 m).

5. *Kobresia loliacea* F. T. Wang & Tang ex P. C. Li, Acta Bot. Yunnan. 12: 13. 1990.

黑麦高草 hei mai song cao

Rhizomes short. Basal sheaths few, pale brown, dull, retaining dried leaf blades. Culms tufted, 15–45 cm tall, slender, 1–1.5 mm in diam. Leaves basal or sub-basal, shorter than culms; blade flat, 1.5–2 mm wide, midrib distinct abaxially. Inflorescence loosely paniculate, yellowish green, linear, 2.5–6 × 0.4–0.5 cm; lowest involucre bract leafy, longer than inflo-

rescence. Spikelets bisexual with 1 basal female flower and 1–4 distal male flowers, sometimes unisexual with only 1 female flower; glumes yellowish green, oblong, 4.5–5.5 × 2–2.5 mm, apex mucronate. Prophylls yellowish green, utriculiform, oblong or elliptic, 5–6.6 × ca. 2 mm, papery, 2-keeled, keels smooth, many veined between keels, apex attenuate into beak. Nutlets pale to dark brown, obovoid-oblong, obscurely trigonous, 2.8–3.8 × 1–2 mm, not beaked. Rachilla in unisexual spikelets prominent, flat, ca. 2/3 as long as nutlet, with a sterile male glume at apex. Stigmas 3. Fl. and fr. Jul–Sep.

• Slopes, roadsides, grasslands; 3200–3400 m. Sichuan, Xizang, Yunnan.

6. *Kobresia fragilis* C. B. Clarke, J. Linn. Soc., Bot. 36: 267. 1903.

囊状嵩草 nang zhuang song cao

Carex curvata Boott, Ill. Gen. Carex 1: 2. 1858, not Knaf (1847); *Kobresia bonatiana* Kükenthal; *K. clarkeana* (Kükenthal) Kükenthal; *K. curticeps* (C. B. Clarke) Kükenthal var. *gyrongensis* Y. C. Yang; *K. curvata* C. B. Clarke; *K. hispida* Kükenthal; *K. yuennanensis* Handel-Mazzetti; *Schoenoxiphium clarkeanum* Kükenthal; *S. fragile* (C. B. Clarke) C. B. Clarke.

Rhizomes short. Basal sheaths few, pale brown, dull, not retaining dried leaf blades. Culms tufted, erect, trigonous or subterete, (1.5–)6–45 cm tall, slender, 0.5–1.1 mm in diam. Leaves basal or sub-basal, shorter than or equaling culms, sometimes curved; blade V-shaped in transverse section, inrolled, 1–2 mm wide, midrib not distinct abaxially. Inflorescence a loose or sometimes slightly compact panicle, yellowish brown, or green and partly brown, linear or narrowly cylindrical, sometimes curved, 1–8 × 0.2–0.7 cm; branches mainly androgynous, subequal in length, appressed or slightly spreading; lower inflorescence branches compound or simple, linear-oblong to ovate; lowest involucral bract leaflike, usually surpassing inflorescence. Spikelets usually unisexual (occasionally bisexual); glumes pale yellow to brown, sometimes marked with brown spots and lines, ovate or oblong, 2–3.5 × 1–1.7 mm, midvein green, broad, margin hyaline, apex aristate, acute, or rounded. Prophylls pale yellow or pale green, sometimes with reddish brown spots and lines, utriculiform, oblong, narrowly elliptic, or narrowly ovate to lanceolate, 2.4–3.5 × 0.8–1.5 mm, membranous, 2-keeled, keels slightly scabrid or smooth, margins fused to apex. Nutlets pale yellow or brown, narrowly oblong or elliptic-obovoid, trigonous, 1.5–2.5 × 0.5–1 mm, shortly beaked. Rachilla in female spikelets longer than nutlet, included in prophyll, green, flat, margins scabrid. Stigmas 3. Fl. and fr. Jun–Sep.

Open grassy slopes, grasslands under *Quercus* woods, riversides; 2600–4300 m. Qinghai, Sichuan, Xizang, Yunnan [Bhutan, India (Sikkim), Nepal].

This species represents a complex on which further work is required. There are two distinct forms differing in micromorphology of nutlet surface, but these cannot be correlated with the forms that differ (often dramatically) in gross morphology (e.g., in habit—erect vs. weak) or the forms that are predominantly male.

7. *Kobresia uncinoides* (Boott) C. B. Clarke in J. D. Hooker,

Fl. Brit. India 6: 698. 1894 [“*uncinoides*”].

钩状嵩草 gou zhuang song cao

Carex uncinoides Boott, Ill. Gen. Carex 1: 8. 1858.

Rhizomes very stout, shortly oblique. Basal sheaths few, pale brown or cream, dull, retaining dried leaf blades, decaying to fibers. Culms tufted, rigid and erect, obtusely trigonous or subterete, (1.5–)6–50 cm tall, 1–2.5 mm in diam. Leaves basal or sub-basal, shorter than culms; blade flat, 2–4 mm wide, midrib distinct abaxially. Inflorescence densely paniculate (very rarely spicate), yellowish brown and partly green, narrowly club-shaped, (1–)2.5–7 × 0.8–1.7 cm; lowest involucral bract glumelike, apex aristate, arista short or long (occasionally subequaling inflorescence); branches oblong or lanceolate, appressed, androgynous or female, lower branches sometimes distant; spikelets unisexual with only 1 female flower; female glumes yellowish brown, with green midvein, oblong or ovate, 5–8 (excluding awn) × 2.4–3.6 mm, membranous, midvein extending into arista, margin not hyaline, apex aristate. Prophylls yellowish brown, utriculiform, narrowly lanceolate, 5.5–8.5(–10.5) × 1.4–1.5 mm, herbaceous, upper part often hairy, 2-keeled and many veined, keels scabrid, margins fused from base to just below apex. Nutlets chestnut-brown, narrowly oblong, trigonous, 3.1–4.5 × 0.8–1.4 mm, not beaked (but style base sometimes persistent), shortly stipitate. Rachilla in female spikelets longer than nutlet, slightly exserted from prophyll, green, flat, margins ciliate. Stigma 3. Fl. and fr. Jun–Oct.

Alpine meadows, streamsides, lakesides, grassy slopes, forest margins, among shrubs; 2900–4900 m. Sichuan, Xizang, Yunnan [Bhutan, India (Sikkim), Myanmar, Nepal].

8. *Kobresia kuekenthaliana* Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 57: 290. 1920.

宁远嵩草 ning yuan song cao

Schoenoxiphium kuekenthalianum (Handel-Mazzetti) K. V. Ivanova.

Rhizomes shortly and obliquely elongate, bearing pale brown scales (bladeless sheaths). Basal sheaths persistent, brown, not retaining dried leaves. Culms densely tufted, erect, obtusely trigonous, 25–40 cm, slender, ca. 1 mm in diam. Leaves basal, longer than culms; sheaths with reddish brown, membranous margins; blade flat or folded, 1.5–2.5 mm wide, midrib distinct abaxially. Inflorescence densely paniculate, pale brown, linear-lanceolate, 2.6–4 × 0.6–0.8 cm; branches ± equal in length, slightly spreading; lowest involucral bract glumelike, apex aristate. Inflorescence branches androgynous, with 1 (perhaps sometimes more) basal female spikelet, and ca. 6 upper and terminal male flowers. Glumes pale brown or brown, with yellowish brown midvein, ovate or ovate-oblong, 4.5–5.5 × 1.5–2 mm, membranous, midvein narrow, margin hyaline, apex acute or mucronate. Prophylls yellowish brown, oblong or oblong-elliptic, 4.3–5 × 1–1.5 mm, membranous, 2-keeled, keels smooth, margins free from apex almost to base, apex rounded or slightly 2-toothed. Immature nutlets yellowish, oblong-obovoid, ca. 3 × 1 mm. Rachilla sometimes present in female spikelets, very short. Stigmas 3. Fl. and fr. Apr.

- Sandy ground; ca. 2700 m. S Sichuan (Xichang).

This taxon is known only from the immature type specimen; further collections are required to assess its status, in particular its relationship with *Kobresia royleana* subsp. *minshanica*.

9. *Kobresia condensata* (Kükenthal) S. R. Zhang & Noltie, comb. et stat. nov.

密穗嵩草 mi sui song cao

Basionym: *Kobresia capillifolia* (Decaisne) C. B. Clarke var. *condensata* Kükenthal, Notes Roy. Bot. Gard. Edinburgh 7: 134. 1912.

Rhizomes short. Basal sheaths prominent and persistent, outer ones dark brown, inner ones orange-brown, margins and apices fibrillose, retaining dried leaf blades. Culms densely tufted, erect, stiff, obtusely trigonous, 14–44 cm, slender, 1–1.8 mm in diam. Leaves basal, shorter than culms; blade stiffly erect, filiform, V-shaped in cross section, 0.5–1 mm wide. Inflorescence a dense panicle, brown, oblong-lanceolate, to 2–4 × 0.6–1 cm; branches short, obliquely appressed; lowest involucral bract glumelike, apex shortly aristate. Lateral branches androgynous with 1 or 2 basal female spikelets and up to 10 male flowers, or unisexual with up to 6 female spikelets. Glumes brown, with conspicuous green midvein, ovate-oblong, 5.5–6 × 2.7–3 mm, papery, midvein broad, margin hyaline, apex acute or mucronate. Prophylls yellowish brown, oblong, 4–4.5 × 1.5–1.8 mm, membranous, strongly 2-keeled, keels minutely scabrid, margins free nearly to base, apex hyaline, truncate. Nutlets cream, oblong, compressed trigonous, 3–3.5 × 1.1–1.7 mm, not or very shortly beaked, very shortly stipitate. Stigmas 3. Fl. and fr. Jun–Jul.

• Streambeds, river terraces and wet meadows with shrubs, open areas in mixed conifer forests; 3200–4000 m. SW Sichuan (Daocheng, Xiangcheng), NW Yunnan (Lijiang).

10. *Kobresia tunicata* Handel-Mazzetti, Symb. Sin. 7: 1254. 1936.

玉龙嵩草 yu long song cao

Rhizomes short. Basal sheaths prominent and persistent, brown, not shiny, not retaining dried leaf blades. Culms densely tufted, erect and rigid, trigonous, 20–25 cm tall, ca. 1.5 mm in diam. Leaves basal, longer than culms; blade flat or folded, 1.5–3 mm wide, midrib distinct abaxially. Inflorescence loosely paniculate, brown, lanceolate, ca. 5 cm × 7 mm; lowest involucral bract glumelike, blunt; inflorescence branches linear, androgynous; spikelets unisexual, terminal spikelets male (up to 3), lower ones (up to 9) female. Female glumes brown, with green midvein, ovate-lanceolate or oblong-ovate, 5–5.5 × 1.5–2 mm, midvein narrow, margin hyaline, apex subacute or obtuse. Prophylls pale brown, linear-lanceolate, 5.2–6 × ca. 1 mm, papery, apex hyaline, 2-keeled, keels scabrid, margins free to base, overlapping. Immature nutlets narrowly elliptic, obscurely trigonous, ca. 4 mm (including stipe) × 0.8 mm, stipitate, crowned with stout beaklike style base, beak ca. 1 mm. Stigmas 3. Sterile rachilla of female spikelets flat, ca. 2 mm, sometimes with vestigial glume at apex. Fl. and fr. May–Sep.

- Alpine grasslands, marshes at edges of pools; 3300–4300 m. Sichuan, Yunnan.

Both Kükenthal and Ivanova (in schedis, 1939, 1941) referred the type specimen of *Kobresia tunicata* (Handel-Mazzetti 3525, WU) to *K. kansuensis*, of which it may only be a less-robust form with unisexual spikelets. It is also possible that it is a form of *K. graminifolia* with a branched inflorescence, but further collections are required.

11. *Kobresia filifolia* (Turczaninow) C. B. Clarke, J. Linn. Soc., Bot. 20: 381. 1883.

丝叶嵩草 si ye song cao

Elyna filifolia Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 28(1): 353. 1855; *Kobresia capillifolia* (Decaisne) C. B. Clarke var. *filifolia* (Turczaninow) Kükenthal; *K. filifolia* var. *macrophylla* Y. C. Yang; *K. gracilis* Meinshausen; *K. macrophylla* (Y. C. Yang) P. C. Li; *K. pratensis* Freyn.

Rhizomes short. Basal sheaths prominent and persistent, orange-brown, not retaining dried leaf blades, sometimes decaying to fibers. Culms densely tufted, obtusely trigonous, 15–50 cm, slender, 0.6–1 mm in diam. Leaves basal, shorter than or subequaling culms; blade filiform, weak, margin involute, 0.5–1.5 mm wide. Inflorescence a dense spike-like panicle (occasionally reduced to a spike), reddish brown or pale brown, cylindrical, 1–3 × 0.3–0.7 cm, branches short, appressed; lowest involucral bract glumelike, apex aristate. Lower inflorescence branches with terminal spikelets male, lower spikelets bisexual. Bisexual spikelets 2–7-flowered, basal one female, other 1–6 male. Glumes reddish brown or brown, with yellowish brown midvein, ovate or ovate-oblong, (3–)4–4.5(–6.2) (excluding arista) × 1.5–2.8 mm, membranous, margin broadly hyaline, apex acute or aristate. Prophylls brown or yellowish brown, ovate-oblong or oblong-elliptic, 3–4 × 1–1.8 mm, membranous, 1- or 2-keeled, keels slightly scabrid, margins free to base, apex rounded or slightly 2-toothed. Nutlets dark brown, obovoid or oblong-obovoid, trigonous or biconvex, 2.1–3.5 (excluding beak) × 1–1.2 mm, very shortly stipitate, shortly beaked, beak slightly conic. Stigmas usually 3, occasionally both 3 and 2 on same inflorescence. Fl. and fr. May–Oct. *2n* = ca. 60.

Wet grassy slopes, boggy meadows; 1700–2900 m. Gansu, Hebei, Nei Mongol, Qinghai, Shanxi [Mongolia, Russia].

Forms with simple (spicate) inflorescences are similar to *Kobresia myosuroides* subsp. *bistaminata* and to *K. capillifolia* (both of which share the bistigmatic tendency). Such forms differ from both taxa in having weaker leaves; and they differ from the latter in having dull, orange-brown, shorter basal sheaths and usually more than 2 male flowers per spikelet.

12. *Kobresia kansuensis* Kükenthal, Acta Horti Gothob. 5: 38. 1930.

甘肃嵩草 gan su song cao

Kobresia pseuduncinoides Noltie.

Rhizomes short, thick, woody. Basal sheaths prominent, dark brown, shiny, leathery, not retaining dried leaf blades. Culms densely tufted, erect, sharply triquetrous, (14–)20–70 cm tall, stout, 2.2–4(–6) mm in diam. Leaves basal, shorter than or

± equaling culms; blade flat, sometimes folded at base, 4–9 mm wide, midrib distinct abaxially. Inflorescence densely paniculate (occasionally spicate), brown or dark brown, partly green, narrowly oblong to lanceolate, (2–)3–6.5 × 0.7–1.8 cm, with numerous short, appressed branches; inflorescence branches simple; lowest involucral bract glumelike, broad green midvein elongated into filiform arista not exceeding inflorescence. Terminal spikelets of inflorescence branches male, lower ones bisexual with 1 basal female flower and 2–4(–6) distal male flowers, sometimes with some unisexual female ones above (or throughout). Glumes brown, with yellowish green or green midvein, oblong, oblong-elliptic, or oblong-ovate, 5–10 × 2–3.5 mm, midvein narrow, margin narrowly hyaline near apex, apex acute to strongly aristate. Prophylls yellow or yellowish green in lower part, brown in upper part, narrowly oblong, 4.5–7.4 × 1–1.3 mm, papery, 2-keeled, keels minutely scabrid, sometimes 2–4-veined between keels, margins open to base. Nutlets brown or grayish brown, narrowly obovoid or narrowly oblong, trigonous, 2.8–4(–5) × 0.8–1 mm, very shortly stipitate, shortly beaked, beak to 0.6 mm. Stigmas 3. Fl. and fr. May–Oct.

Shaded and wet places, open marshes, among shrubs, alpine meadows, grassy slopes, streamsides; 3000–4700 m. Gansu, Qinghai, Shaanxi, Sichuan, Xizang, Yunnan [Bhutan, Nepal].

Specimens from Bhutan, Nepal, and SE Xizang (described as *Kobresia pseuduncinoides*) tend to be extremely robust, with large prophylls and strongly aristate glumes, but variation in these characters is found to be continuous. Forms with simple spikes can be distinguished from robust forms of *K. cuneata* by their flat leaves.

13. Kobresia royleana (Nees) Boeckeler, *Linnaea* 39: 8. 1875.

喜马拉雅嵩草 xi ma la ya song cao

Rhizomes short, thick, woody. Basal sheaths prominent, brown or reddish brown, dull, not fibrillose, retaining dried leaf blades. Culms densely tufted, rigid, acutely trigonous, or subterete in lower part, (2–)6–75 cm tall, 1–2.5 mm in diam. Leaves basal, shorter than culms; blade flat, 2–4 mm wide, midrib distinct abaxially. Inflorescence a dense or slightly loose panicle, brown, 1–3.5 × 0.6–1.2 cm; inflorescence branches simple, obliquely ascending, decreasing in length toward apex; lowest involucral bract glumelike, apex aristate. Terminal spikelets of inflorescence branches male, lower ones bisexual or unisexual. Bisexual spikelets with 1 basal female flower and 2 or 3(–6) distal male flowers. Glumes brown, with green midvein, ovate-oblong, 2.6–5.1 × 1.7–3.5 mm, margin hyaline or not, apex acute or aristate. Prophylls pale brown, oblong or oblong-lanceolate, 2.7–5 mm, membranous, 2-keeled, keels scabrid, margins open to base. Nutlets narrowly oblong, trigonous, 1.7–4 mm, beak to 1 mm, very shortly stipitate. Sterile rachilla sometimes present in female spikelets, to 1/3 as long as nutlet. Stigmas 3. Fl. and fr. May–Sep.

Moist habitats, among scrub; 700–5200 m. Gansu, Qinghai, Sichuan, Xinjiang, Xizang, Yunnan [Afghanistan, India (Himachal Pradesh, Uttarakhand), Kashmir, Kyrgyzstan, Nepal, Pakistan, Tajikistan].

- 1a. Spikelets bisexual; culms rigid, acutely trigonous, or subterete in lower part, 5–35 cm tall, 1.5–2.5 mm in diam.; leaf blade 2–4 mm wide 13a. subsp. *royleana*

- 1b. Spikelets unisexual; culms trigonous, or subterete in lower part, 30–75 cm tall, slender, 1–1.5(–1.8) mm in diam.; leaf blade 1.5–2(–2.5) mm wide ... 13b. subsp. *minshanica*

13a. Kobresia royleana subsp. *royleana*

喜马拉雅嵩草(原亚种) xi ma la ya song cao (yuan ya zhong)

Trilepis royleana Nees, *Edinburgh New Philos. J.* 17: 267. 1834; *Elyna kokanica* Regel; *E. stenocarpa* Karelin & Kirilov; *Kobresia paniculata* Meinshausen; *K. royleana* var. *kokanica* (Regel) Kükenthal; *K. royleana* var. *paniculata* (Meinshausen) Kükenthal; *K. stenocarpa* (Karelin & Kirilov) Steudel; *K. stenocarpa* var. *royleana* (Nees) C. B. Clarke; *K. stenocarpa* var. *simplex* Y. C. Yang.

Culms rigid, acutely trigonous, or subterete in lower part, 5–35 cm tall, 1.5–2.5 mm in diam. Leaves basal, blade flat, 2–4 mm wide. Inflorescence a dense panicle, lower branches sometimes slightly distant, 1–3.5 × 0.6–1.2 cm. Terminal spikelets of inflorescence branches male, lateral ones bisexual or unisexual. Lower spikelets of branches usually bisexual with 1 basal female flower and 2 or 3(–6) distal male flowers. Glumes ovate-oblong, 2.6–4.5 × 3.2–3.5 mm. Prophylls 3–5 mm. Nutlets 2.4–4 mm, beak to 1 mm.

Moist habitats; 700–5200 m. Gansu, Qinghai, Sichuan, Xinjiang, Xizang, Yunnan [Afghanistan, India (Himachal Pradesh, Uttarakhand), Kashmir, Kyrgyzstan, Nepal, Pakistan, Tajikistan].

Records of *Kobresia caricina* Willdenow (FRPS 12: 22–23. 2000) and *K. persica* Kükenthal & Bornmüller (loc. cit.: 35–36) are based on misidentifications of *K. royleana* subsp. *royleana*.

13b. Kobresia royleana subsp. *minshanica* (F. T. Wang & Tang ex Y. C. Yang) S. R. Zhang, *Novon* 9: 453. 1999.

岷山嵩草 min shan song cao

Kobresia minshanica F. T. Wang & Tang ex Y. C. Yang, *Acta Biol. Plateau Sin.* 2: 1. 1984; *K. menyuanica* Y. C. Yang.

Culms trigonous, or subterete in lower part, 30–75 cm tall, slender, 1–1.5(–1.8) mm in diam. Leaf blade flat, 1.5–2(–2.5) mm wide. Inflorescence narrowly paniculate, compact or slightly loose in lower part, 1.2–3.5 × 0.7–0.9 cm. Lower spikelets of inflorescence branches usually unisexual with 1 female flower only (occasionally bisexual with 1 basal female flower and 2–5 distal male flowers). Glumes ovate-oblong, 3.3–5.1 × 1.7–2.1 mm. Prophylls 2.7–4.4 mm. Nutlets 1.7–3 mm, beak ca. 0.4 mm. Sterile rachilla in female spikelets much shorter than nutlet.

• Moist places, hillsides, among scrub; 2900–3800 m. Gansu, Qinghai, Sichuan, Yunnan.

14. Kobresia macrantha Boeckeler, *Beitr. Cyper.* 1: 39. 1888.

大花嵩草 da hua song cao

Blysmocarex macrantha (Boeckeler) K. V. Ivanova; *B. macrantha* subsp. *nudicarpa* (Y. C. Yang) D. S. Deng; *B. nudicarpa* Y. C. Yang; *Kobresia macrantha* var. *nudicarpa* (Y. C. Yang) P. C. Li; *K. nudicarpa* (Y. C. Yang) S. R. Zhang.

Rhizomes elongate, slender, stoloniferous. Basal sheaths pale brown, retaining dried leaf blades. Culms scattered, erect, trigonous, 3–17 cm tall, 1–1.5 mm in diam. Leaves basal, shorter than culms; blade flat, 1–3 mm wide, midrib distinct abaxially. Inflorescence paniculate, cylindrical to ovoid, 1–2 × 0.6–1 cm; inflorescence branches androgynous or unisexual (whole inflorescence sometimes ± unisexual), lowest branch sometimes slightly distant; lowest involucre bract leaflike or glumelike, apex long aristate. Spikelets usually unisexual; glumes chestnut-brown with green midvein, ovate to ovate-lanceolate, 4–6.3 × 2–2.3 mm, margin broadly hyaline, apex acute or obtuse. Prophylls yellowish brown, ovate-lanceolate, 3–3.6 × 1.2–2 mm, thinly membranous, 2-keeled, keels smooth, margins free or connate at base. Nutlets elliptic-ovoid or subcircular, flattened, 1.4–2 × 0.8–1 mm, not beaked, conspicuously stipitate, stipe 0.6–1 mm. Sterile rachilla of female spikelets terete, minute, subequaling stipe of nutlet. Stigmas 2, very long. Fl. and fr. Jun–Aug.

Open ground, sandy soils, meadows in river valleys; 2500–4800 m. Gansu, Qinghai, Sichuan, Xinjiang, Xizang [Nepal].

15. *Kobresia hohxilensis* R. F. Huang, Biol. & Human Physiol. Hoh Xil Region, 101. 1996.

匍茎嵩草 pu jing song cao

Blysmocarex macrantha (Boeckeler) K. V. Ivanova subsp. *stolonifera* (Y. C. Tang ex P. C. Li) D. S. Deng; *Kobresia stolonifera* Y. C. Tang ex P. C. Li.

Rhizomes elongate, slender, stoloniferous. Basal sheaths yellowish brown or brown, 2–5 cm, retaining dried leaf blades or not. Culms scattered, erect or curved, subterete, slender, 3–20 cm tall, 0.6–1 mm in diam. Leaves basal, shorter than culms; blade filiform, margin involute, 0.4–0.8 mm wide. Inflorescence narrowly paniculate, sometimes spicate, reddish brown, cylindrical to narrowly ovoid, 1.5–2 × ca. 0.8 cm; lower inflorescence branches androgynous, or with mixed female and male spikelets, upper part of inflorescence spicate consisting of bisexual and terminal male spikelets; lowest involucre bract glumelike, apex long aristate. Spikelets unisexual and bisexual; glumes reddish brown, with yellowish brown midvein, narrowly ovate, 5.6–6.5 × 2–3 mm, margin hyaline, apex rounded or acute. Prophylls yellow to yellowish brown, narrowly ovate, 4.3–6.5 × 1.6–2.7 mm, papery to leathery, margins free or connate at base and overlapping. Nutlets broadly oblong, flattened, 2–3 × 1.5–1.8 mm, not beaked, stipe 0.6–1 mm. Sterile rachilla of female spikelets terete, minute. Stigmas 2, very long, slender. Fl. and fr. Jun–Sep.

• Sandy or rocky and sandy ground, open grassy plains; 3100–4900 m. Gansu, Qinghai, Xizang.

16. *Kobresia inflata* P. C. Li in S. Y. Jin & Y. L. Chen, Cat. Type Spec. Herb. China (Suppl.), 73. 1999.

膨囊嵩草 peng nang song cao

Rhizomes obliquely and shortly elongate. Basal sheaths yellowish brown, dull, retaining dried leaf blades. Culms tufted, obscurely trigonous, 4–12 cm tall, usually slender, 0.6(–1.4)

mm in diam. Leaves basal, shorter than culms, curved; blade flat, 2–3 mm wide, midrib distinct abaxially. Inflorescence spicate or sometimes paniculate, 2–2.5 × 0.7–2 cm, predominantly unisexual; branches if present short, appressed; lowest involucre bract glumelike, apex aristate to varying degrees. Spikelets unisexual (sometimes bisexual), shortly stipitate; glumes brown to yellowish brown, ovate, 4–7.2 × 3–3.5 mm. Prophylls brown or yellowish green marked with brown, utriculiform, inflated (not tightly appressed to nutlet at maturity), ovoid, beaked, 5.5–8 × 2.3–3 mm, thickly papery or leathery, 2-keeled, keels smooth, apex weakly notched. Nutlets obovoid, triquetrous, 2.5–4 × 1.8–2.5 mm, not beaked, style base disklike. Sterile rachilla of female spikelets flat, subequaling or exceeding nutlet, sometimes with 1 or 2 male flowers distally. Stigmas 3. Fl. and fr. Jul–Sep.

Alpine meadows, grasslands on slopes, dry banks by streams, scree; 3600–4600 m. Xizang, Yunnan [Bhutan].

This species is similar to *Kobresia nitens* C. B. Clarke of the W Himalayas, which differs in having bisexual spikelets.

17. *Kobresia yadongensis* Y. C. Yang in C. Y. Wu, Fl. Xizang, 5: 387. 1987.

亚东嵩草 ya dong song cao

Plants forming dense, round patches; rhizomes very short. Basal sheaths prominent and persistent, brown, dull, not retaining dried leaf blades. Culms erect, subterete, dwarf, ca. 0.5(–4) cm tall, scarcely emerging from sheaths. Leaves basal, usually longer than culms (to 1.5 cm); blade stiffly erect, filiform, ca. 0.8 mm wide, margin involute. Inflorescence spicate, unisexual; all spikelets 1-flowered. Male spikes not seen. Female spike pale brown, subspherical, ca. 1 cm, spikelets ca. 5; lowest involucre bract glumelike with long green arista. Female glumes ovate, ca. 5 (excluding arista) × 3.5 mm, brown laterally, with yellowish green midrib, midrib broad, 3-veined, margin broadly hyaline, apex acute or aristate. Prophylls flushed brown, utriculiform, triangular-ovoid, inflated (not tightly appressed to nutlet at maturity), 4–5 × 2.5–4 mm, thickly papery or leathery, keels obscure, minutely hispid, margins fused to above middle, apex acute, notched. Nutlets triangular-ovoid, 3-lobed, 2.5–3 × ca. 2.3 mm, attenuate to apex. Stigmas 3. Sterile rachillas flat, minute, ca. 1/3 as long as nutlet. Fl. and fr. Sep.

• Alpine meadows, gravelly river terraces; 4800–5100 m. S Xizang (upper Targo Tsangpo basin, Yadong).

18. *Kobresia humilis* (C. A. Meyer ex Trautvetter) Sergievskaja in Komarov, Fl. URSS 3: 111. 1935.

矮生嵩草 ai sheng song cao

Elyna humilis C. A. Meyer ex Trautvetter, Trudy Imp. S.-Peterburgsk. Bot. Sada 1: 21. 1871; *Kobresia royleana* (Nees) Boeckeler var. *humilis* (C. A. Meyer ex Trautvetter) Kükenthal.

Rhizomes short. Basal sheaths prominent, pale brown to brown, dull, retaining dried leaf blades. Culms densely tufted, erect, obtusely trigonous, 2–15 cm tall, 0.8–1.5 mm in diam. Leaves basal, shorter than culms, sometimes recurved; blade flat, midrib distinct abaxially, folded at base, 1–2.2 mm wide.

Inflorescence spicate, brown, densely cylindric, 0.8–1.7 × 0.4–0.6 cm, with up to 10 spikelets; lowest involucre bract glume-like, aristate. Terminal spikelets of inflorescence male, lower ones bisexual with 1 basal female flower and 2–7 distal male flowers. Glumes brown, with a yellowish green or green midvein, oblong, ovate-elliptic, or ovate, 3–5 × 1.5–2.5 mm, margin broadly hyaline, apex obtuse or rounded, sometimes aristate. Prophylls pale brown, oblong or elliptic, 3–5 × 1.5–2 mm, membranous, glabrous, 2-keeled, keels scabrid, margins open to base. Nutlets brown or grayish brown, narrowly obovoid or elliptic, trigonous, 2.5–3 × 1–1.5 mm, very shortly stipitate, shortly beaked. Stigmas usually 3. Fl. and fr. Jun–Sep.

Sunny slopes, alpine meadows; 2500–4400 m. ?Ningxia, ?Qinghai, Xinjiang, Xizang [Afghanistan, India (Sikkim), Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Tajikistan, Uzbekistan; SW Asia].

This species sometimes has two stigmas, and may then resemble *Kobresia pusilla*.

19. *Kobresia duthiei* C. B. Clarke in J. D. Hooker, Fl. Brit. India 6: 697. 1894.

线形蒿草 xian xing song cao

Rhizomes short. Basal sheaths persistent, brown, reddish brown, or yellowish brown, dull, not fibrillose, retaining dead leaf blades or not. Culms densely tufted, stiffly erect, subterete, (0.5–)4–20(–40) cm tall, 0.6–1.2 mm in diam. Leaves basal, shorter than culms; blade flat, 1.4–2.3 mm wide, midrib distinct abaxially. Inflorescence spicate, greenish or pale brown, linear or linear-oblong, 1–5 × 0.2–0.4 cm, dense; all spikelets bisexual, occasionally male flowers reduced; lowest involucre bract glume-like, apex acute or aristate. Spikelets usually 2-flowered, basal one female, distal one male. Glumes pale brown laterally, with green midvein, ovate, 2–4.5 × 1.5–2.6 mm, midvein broad, 3-ribbed, margin hyaline, apex acute or obtuse, sometimes with very short scabrid arista; male glume 2.3–3.6 mm, stamen 1. Prophylls pale green or yellowish brown with ferruginous spots and lines, oblong or linear-oblong, (2.2–)3–5 × 0.7–1 mm, membranous, 2-keeled, keels scabrid, margins united to above middle, apex obtuse or 2-toothed. Nutlets pale brown, narrowly oblong, trigonous, 1.9–2.8 (excluding beak) × 0.6–0.9 mm, beak 0.5–1.5 mm, exerted from prophyll when mature, shortly stipitate. Stigmas 3. Fl. and fr. May–Sep.

Bare mossy peat, wet and open marshes, exposed and dry rocky ridges, grassy slopes; 3600–4600 m. Sichuan, Xizang, Yunnan [Bhutan, India (Sikkim, Uttarakhand), Nepal].

20. *Kobresia filicina* (C. B. Clarke) C. B. Clarke in J. D. Hooker, Fl. Brit. India 6: 696. 1894.

蕨状蒿草 jue zhuang song cao

Hemicarex filicina C. B. Clarke, J. Linn. Soc., Bot. 20: 384. 1883; *Kobresia filicina* var. *subfilicinoides* P. C. Li.

Rhizomes short. Basal sheaths persistent, brown, reddish brown, or yellowish brown, dull, not fibrillose, retaining a few dried leaf blades. Culms tufted, flaccid or slightly stiff, obtusely trigonous, 8–35 cm tall, slender, 0.4–0.8 mm in diam. Leaves basal, slightly shorter than to exceeding culms; blade flat or

partly folded, 0.6–2(–3) mm wide, usually flaccid, midrib distinct abaxially. Inflorescence spicate, yellowish green or partly brown, linear or linear-oblong, 1–4(–5) × 0.1–0.3 cm, dense above, basal spikelets usually slightly distant; a few terminal spikelets male, lower ones bisexual; lowest involucre bract glume-like, apex aristate, arista to 8 mm. Bisexual spikelets usually 2-flowered, basal one female, distal one male, male flower with 1 or 2(or 3) stamens. Glumes yellowish brown laterally, with green midvein, ovate-oblong, 2–3 (excluding arista) × 0.5–1 mm, midvein broad, 3-ribbed, margin hyaline, apex aristate or acute, arista to 2 mm. Prophylls yellowish green or yellowish brown with ferruginous spots and lines, oblong or linear-oblong, 2–2.6 × 0.5–0.7 mm, membranous, 2-keeled (sometimes obscurely), keels scabrid, margins open to middle part or below, apex rounded. Nutlets narrowly oblong, trigonous, 1.9–2.4 (excluding beak) × ca. 0.6 mm, beak ca. 0.5 mm, exerted from prophylls when mature, shortly stipitate, stipe ca. 0.2 mm. Stigmas 3, short. Fl. and fr. Jul–Oct.

Forest understories, dry riverbeds, on rocks; 2000–4000 m. Sichuan, Xizang, Yunnan [Bhutan, India (Himachal Pradesh, Sikkim, Uttarakhand), Nepal].

A specimen with wide leaves and long spikes from Yunnan was described as *Kobresia filicina* var. *subfilicinoides*, but similar forms have been seen from Nepal and are not worth taxonomic recognition.

21. *Kobresia robusta* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 29: 218. 1883.

粗壮蒿草 cu zhuang song cao

Kobresia robusta var. *sargentiana* (Hemsley) Kükenthal; *K. sargentiana* Hemsley.

Rhizomes short or obliquely elongated and rarely stoloniferous, thick, woody. Basal sheaths prominent and persistent, yellow to yellowish brown, slightly shiny, to 5 cm, not retaining dried leaf blades. Culms tufted, erect or curved, rigid, obtusely trigonous or subterete, 5–60 cm tall, stout, 1.2–3 mm in diam. Leaves basal, longer or shorter than culms; blade rigid, erect or curved, filiform, 0.7–1.7(–2) mm wide, margin involute. Inflorescence densely spicate, with ca. 10 spikelets, lower spikelets sometimes distant, very pale orange-brown, cylindric, 2–5 × 0.4–0.8 cm; terminal spikelets male, lower spikelets bisexual; lowest involucre bract glume-like, apex rounded. Bisexual spikelets with 1 basal female flower and 1–3 distal male flowers. Glumes yellowish brown laterally, with pale yellow to yellow midvein, broadly ovate, (7.2–)7.8–10 × 5.5–6.5 mm, midvein broad, 3–9-veined, margin very broadly hyaline, apex obtuse. Prophylls yellowish brown, utricle-like, broadly elliptic or ovate-elliptic, abruptly narrowed above, 6.5–10 × 2.5–3.5 mm, membranous, obscurely 2-keeled, keels smooth, margins free in upper 1/3 or almost to base. Nutlets grayish brown, oblong or broadly elliptic, trigonous, concave, 4–5 × 2–2.4 mm, very shortly beaked, stipitate, stipe ca. 1 mm. Stigmas 3. Fl. and fr. May–Sep.

• Sandy soils, herb-rich meadows; 2900–5200 m. Gansu, Qinghai, Xinjiang, Xizang [?Mongolia].

22. *Kobresia burangensis* Y. C. Yang, Fl. Xizang. 5: 374. 1987.

普兰蒿草 pu lan song cao

Rhizomes short. Basal sheaths prominent, yellowish brown to pale brown, shiny, not retaining dried leaf blades. Culms densely tufted, rigid and erect, subterete, 8–12 cm tall, 1–1.2 mm in diam. Leaves basal, erect, longer than or ± equaling culms; blade filiform, 0.5–0.8 mm wide, margin involute. Inflorescence densely spicate, yellowish brown, narrowly elliptic to lanceolate, 1.8–2(–2.5) × 0.2–0.3 cm; terminal spikelets male, lower ones bisexual; lowest involucre bract glumelike, apex obtuse or rounded. Bisexual spikelets with 1 basal female flower and 2 or 3 distal male flowers. Glumes yellowish brown, with pale green or yellowish green midvein, ovate-oblong or oblong, 5–7 × 2.5–3 mm, obtuse and rounded, midvein broad, margin broadly hyaline. Prophylls lower part pale yellow, upper part brown, obovate-oblong, 3.5–4 × ca. 1.2 mm, membranous, apex truncate and hyaline, 2-keeled, keels slightly scabrid, margins united from base to halfway. Immature nutlets elliptic, obscurely trigonous. Stigmas 3. Fl. Jul.

- Grassy slopes; ca. 5000 m. SW Xizang (Burang).

This species is known only from the immature type specimen.

23. *Kobresia cuneata* Kükenthal, Acta Horti Gothob. 5: 39. 1930.

截形蒿草 jie xing song cao

Kobresia lepidochlamys F. T. Wang & Tang ex P. C. Li.

Rhizomes short, thick, woody. Basal sheaths prominent, brown or dark brown, margins fibrillose, retaining dried leaf blades. Culms densely tufted, erect and stout, obtusely trigonous, (10–)15–45 cm tall, 1.5–2.5 mm in diam. Leaves basal, shorter than or ± equaling culms; blade filiform, 1–3(–5) mm wide, V- or U-shaped in cross section, midrib not distinct abaxially. Inflorescence a dense spike, sometimes interrupted at base, brown or dark brown, oblong to narrowly oblong, 2–6 × 0.5–1.2 cm; lowest involucre bract glumelike, apex aristate. Spikelets (except a few terminal ones that may be male only) bisexual with a basal female flower and (1–)3–7 distal male flowers; glumes brown or chestnut-brown, with yellowish green or green midvein, oblong, oblong-elliptic, or oblong-ovate, 5–6 × 2–3 mm, margin hyaline or not, apex obtuse or rounded and aristate; arista sinuate, 1–5 mm, margin hispid. Prophylls yellow or whitish yellow in lower part, brown above, oblong, 5–8 × 1.8–3 mm, papery, 2-keeled, keels smooth or very minutely scabrid, with up to 8 veins between keels, margins open to base, apex truncate. Nutlets yellow or yellowish brown, oblong, trigonous, 3–4.5 × 2–3 mm, very shortly stipitate, not or shortly beaked. Stigmas 3. Fl. and fr. May–Sep.

- Alpine meadows among shrubs, alpine swampy meadows, wet grassy slopes, grassy areas under woods; 3000–4800 m. Gansu, ?Qinghai, Sichuan, Xizang, Yunnan.

This is like a robust form of *Kobresia schoenoides*, from which it is distinguished by its fibrillose sheaths; longer spikes; midribs of glumes broader, green, developed into an arista; and nutlets larger, narrower. In the description of *K. lepidochlamys*, the male flowers were misinterpreted as perianth scales. A specimen from Yunnan (*Rock 9600*) is intermediate between *K. cuneata* and *K. kansuensis*: it has the spicate

inflorescence and fibrillose leaf sheaths of the former, but the very robust habit and flat leaves (midribs distinct abaxially) of the latter.

24. *Kobresia schoenoides* (C. A. Meyer) Steudel, Syn. Pl. Glumac. 2: 246. 1855.

赤箭蒿草 chi jian song cao

Elyna schoenoides C. A. Meyer in Ledebour, Fl. Altaic. 4: 235. 1833; *Kobresia deasyi* C. B. Clarke; *K. glaucifolia* F. T. Wang & Tang ex P. C. Li; *K. lacustris* P. C. Li; *K. maquensis* Y. C. Yang; *K. pamiroalaica* K. V. Ivanova; *K. septatonodosa* T. Koyama.

Rhizomes short. Basal sheaths prominent, commonly yellowish- to reddish brown (occasionally dark brown), shiny, leathery, not retaining dried leaf blades. Culms densely tufted, erect, subterete or upper part trigonous, 3–60(–70) cm tall, stout, 1–2.5 mm in diam. Leaves basal, erect or sometimes curved, longer or shorter than culms; blade filiform, 1–2 mm wide, midrib not distinct abaxially, margin involute. Inflorescence densely spicate, dark to yellowish brown, oblong to clavate, occasionally ovate or narrowly ovate, 1–4 × 0.2–1 cm. Spikelets (except a few terminal ones that may be male only) bisexual; lowest involucre bract glumelike, apex aristate or not. Bisexual spikelets with 1 basal female flower and (1–)4–7 distal male flowers; glumes brown, with yellowish green midvein, oblong to narrowly ovate or sometimes broadly ovate, 3–6 × 1.2–3.6 mm, midvein broad, margin broadly to narrowly hyaline, apex obtuse or mucronate. Prophylls yellowish brown to brown, oblong, narrowly elliptic, or lanceolate, (3–)3.5–7.3 × (0.9–)1.4–2.5 mm, papery to membranous, 2-keeled (sometimes obscurely so), keels smooth, sometimes many veined between keels, margins free to base. Nutlets pale yellow to grayish brown, obovoid or oblong-obovoid, trigonous, 1.7–3.5 × 1–2.1 mm, 1/2–2/3 as long as prophyll, shortly stipitate, shortly beaked, beak 0.5–0.7 mm. Stigmas 3. Fl. and fr. May–Sep.

Boggy places among shrubs, sedge moors, streamsides, shaded places; 2500–5800 m. Gansu, Qinghai, Sichuan, Xinjiang, Xizang, Yunnan [Afghanistan, Bhutan, India (Himachal Pradesh, Sikkim), Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia, Tajikistan, Uzbekistan; SW Asia (Iran)].

25. *Kobresia setschwanensis* Handel-Mazzetti, Symb. Sin. 7: 1254. 1936.

四川蒿草 si chuan song cao

Kobresia handel-mazzettii K. V. Ivanova; *K. longearistita* P. C. Li; *K. pinetorum* F. T. Wang & Tang ex P. C. Li.

Rhizomes short. Basal sheaths prominent and persistent, pale brown, dull or slightly shiny, not fibrillose, not retaining dried leaf blades. Culms densely tufted, stiffly erect, obtusely trigonous, 5–20(–40) cm, slender, 0.7–1.3 mm in diam. Leaves basal, shorter than culms; blade folded or margin involute, stiff, 1–2 mm wide, midrib not distinct abaxially. Inflorescence usually a dense spike (occasionally with 1 or 2 branches at base), greenish brown, cylindrical, 1–3.5 × 0.3–0.6 cm; lowest involucre bract glumelike, apex long or shortly aristate; terminal few spikelets male, lower ones bisexual with 1 female and 2–5 male

flowers. Glumes brown, with yellowish green to green midvein, oblong-ovate to oblong-lanceolate, $3\text{--}4.5 \times 1.5\text{--}2.5$ mm, papery, midvein broad, margin usually narrowly hyaline, apex usually subacute, sometimes shortly aristate. Prophylls yellowish brown, oblong, $2\text{--}4.5 \times 1\text{--}1.6$ mm, membranous, 2-keeled, keels smooth or slightly scabrid, sometimes veined between keels, margins free nearly to base, apex rounded or acute. Nutlets yellowish, narrowly obovoid, compressed trigonous, $2.1\text{--}3 \times 1\text{--}1.3$ mm, not beaked, subsessile. Stigmas 3. Fl. and fr. May–Sep.

• Grassy slopes, alpine meadows, swampy meadows and marshes by lakes, dry limestone slopes, forest (including *Pinus*) understories, *Quercus* scrub; 2300–4300 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan.

This is a slender version of *Kobresia schoenoides* with narrower spikes—linking that species with *K. capillifolia* and *K. tibetica*, together forming a complex that requires further work.

Plants with slender culms, filiform leaves, and small spikes from *Pinus* forests (i.e., dry habitats) in NW Yunnan were described as *Kobresia pinetorum*; but specimens with equally small spikes have been seen from wet habitats, and forms from *Pinus* forests with robust culms and larger spikes are also known: all of these seem best referred to a variable *K. setschwanensis*.

26. *Kobresia capillifolia* (Decaisne) C. B. Clarke, J. Linn. Soc., Bot. 20: 378. 1883.

线叶嵩草 xian ye song cao

Elyna capillifolia Decaisne in Jacquemont, Voy. Inde 4(Bot.): 173. 1844; *Kobresia brunnescens* Boeckeler; *K. capilliformis* N. A. Ivanova; *K. elata* Boeckeler; *K. kashgarica* Dickoré; *K. macrolepis* Meinshausen; *K. ×ovczinnikovii* T. V. Egorova; *K. yushuensis* Y. C. Yang.

Rhizomes short. Basal sheaths prominent and persistent, brown to dark brown, often shiny, apices and margins sometimes fibrillose, not retaining dried leaf blades. Culms densely tufted, erect, slightly stiff, obtusely trigonous, (5–)10–45 cm tall, slender, 0.6–1 mm in diam. Leaves basal, shorter than to equaling culms; blade stiffly erect, filiform (tubular in section), margin involute, 0.7–1 mm wide. Inflorescence a dense spike, lowest spikelets sometimes slightly distant, brown, narrowly cylindrical, $2\text{--}4.5 \times 0.2\text{--}0.4$ cm; lowest involucre bract glume-like, apex aristate or not; terminal few spikelets male, lower ones bisexual. Bisexual spikelets with 1 basal female floret and (1 or)2–4 distal male florets. Glumes pale brown to dark brown, with yellowish green to green midvein, usually broadly oblong-lanceolate to ovate, $4\text{--}6 \times 2.5\text{--}2.8$ mm, papery, midvein narrow or wide, margin broadly hyaline, apex usually rounded. Prophylls brown, oblong, lanceolate, or elliptic, $2.5\text{--}5.3 \times 0.8\text{--}1.8$ mm, membranous, 1- or 2-keeled, keels smooth or slightly scabrid, margins free nearly to base, apex rounded or truncate. Nutlets brown to dark brown, elliptic to obovoid, trigonous, (2–)2.5–3.5 \times 0.8–1.6 mm, shortly beaked, subsessile. Stigmas (2 or)3. Fl. and fr. May–Sep.

Dry and open grassy and rocky slopes, slopes in *Juniperus* scrub, disturbed slopes in *Picea* forests, grassy areas within *Abies* forests; 2000–4800 m. Gansu, Qinghai, Sichuan, Xinjiang, Xizang [Afghanistan, Bhutan, India (Himachal Pradesh, Sikkim), Kashmir, Kazakhstan,

Kyrgyzstan, Mongolia, Nepal, Pakistan, Tajikistan].

Kobresia kashgarica, described from high elevations in Xinjiang, appears to be an extremely reduced form of *K. capillifolia* but is also similar to *K. myosuroides* subsp. *bistaminata*. Reduced forms of many species can be found; they appear to represent phenotypic responses to extreme habitats and (while often difficult to identify) do not merit specific treatment.

27. *Kobresia tibetica* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 29: 219. 1883.

西藏嵩草 xi zang song cao

Kobresia capillifolia (Decaisne) C. B. Clarke var. *tibetica* (Maximowicz) Kükenthal.

Rhizomes short. Basal sheaths prominent, brown to dark brown, dull, not retaining dried leaf blades. Culms densely tufted, rigid and erect, subterete or upper part trigonous, 10–40 cm tall, 1–1.5 mm in diam. Leaves basal, erect, shorter than culms; blade filiform (tubular in section), 0.5–1 mm wide. Inflorescence spicate, brown or dark brown, broadly and densely cylindrical, $1\text{--}2.5 \times 0.3\text{--}0.4$ cm; terminal spikelets male, lower ones bisexual; lowest involucre bract glume-like, apex aristate or not. Bisexual spikelets with a basal female flower and 2–4 distal male flowers. Glumes brown or dark brown, with pale midvein, oblong to ovate-oblong, $3.5\text{--}4.5 \times 1.5\text{--}2.5$ mm, obtuse, midvein narrow, margin narrowly hyaline or not. Prophylls pale colored to yellowish brown or occasionally brown, oblong-ovate, $2.1\text{--}3 \times 1\text{--}1.4$ mm, hyaline to very thinly membranous, usually without keels and veins, rarely obscurely keeled, margins free to base. Nutlets brown or dark brown, oblong or narrowly ovoid-oblong, flattened-trigonous, slightly shorter than prophylls, $1.5\text{--}2.5(3) \times 1\text{--}1.4$ mm, very shortly stipitate, shortly beaked. Stigmas 3. Fl. and fr. May–Aug.

• Alpine swampy meadows, weedy plains, marshes, riversides; 2500–4600 m. Gansu, Qinghai, Sichuan, Xinjiang, Xizang.

This species is distinguished from *Kobresia capillifolia* with difficulty: the culm is wider, and longer in relation to the leaves, and the spike is shorter in proportion to breadth, and much shorter in proportion to the length of the culm (resembling an *Eleocharis*).

28. *Kobresia myosuroides* (Villars) Fiori in Fiori et al., Fl. Italia 1: 125. 1896.

嵩草 song cao

Rhizomes short. Basal sheaths prominent and persistent, reddish brown to dark brown, dull or slightly shiny, margins and apices sometimes fibrillose, not retaining dried leaf blades. Culms densely tufted, erect, slightly stiff, obtusely trigonous or subterete, 3–30(–40) cm tall, 0.5–1 mm in diam. Leaves basal, shorter than or ca. as long as culms; blades stiffly erect, filiform (tubular in cross section), 0.25–0.7 mm wide. Inflorescence a dense spike, reddish brown to brown, narrowly cylindrical, $1\text{--}3 \times 0.2\text{--}0.3$ cm, lowest spikelets sometimes slightly distant; lowest involucre bract glume-like, apex aristate or not; a few terminal spikelets male, others bisexual (lower ones occasionally female only). Bisexual spikelets with basal female flower and 1(or)2 male flowers. Glumes yellowish- or reddish brown to dark brown, with pale midvein, ovate or oblong-ovate, $2\text{--}4 \times 1.2\text{--}2.7$ mm, submembranous, midvein very narrow, margin broadly to

not or narrowly hyaline, apex acute or rounded. Prophylls pale below, brown above, oblong or oblong-ovate, 2.2–3.5 × 1–1.4 mm, membranous, 2-keeled, keels slightly scabrid, margins free to lower 1/3 or nearly to base, upper margin hyaline, apex rounded or acute. Nutlets brown to dark brown, slightly shiny, oblong-obovoid, trigonous or flattened-trigonous, 1.8–3 (including beak) × 0.8–1 mm, shortly beaked, subsessile. Stigmas 2 or 3 (sometimes both on same plant). Fl. and fr. May–Sep. *2n* = 56.

Moist or dry open places in calcareous soils, alpine meadows, on rocks, dry ridges, grassy slopes, among shrubs; 1500–4500 m. Gansu, Hebei, Jilin, Nei Mongol, Ningxia, Qinghai, Shanxi, Sichuan, Xinjiang, Xizang [Japan, Kazakhstan, Korea, Mongolia, Russia; Europe, North America].

- 1a. Stigmas 3; glumes 2.5–4 mm, usually pale brown; nutlets ca. 2.5 mm 28a. subsp. *mysuroides*
- 1b. Stigmas usually 2, but sometimes 3, or a mixture of both on same plant; glumes 2–3 mm, dark brown; nutlets 1.8–2.3 mm 28b. subsp. *bistaminata*

28a. Kobresia mysuroides subsp. mysuroides

蒿草(原亚种) song cao (yuan ya zhong)

Carex mysuroides Villars, Prosp. Hist. Pl. Dauphiné, 17. 1779; *C. affinis* R. Brown; *C. bellardii* Allioni; *Elyna mysuroides* (Villars) Fritsch ex Janchen; *E. spicata* Schrader; *Kobresia bellardii* (Allioni) Degland ex Loiseleur-Deslongchamps; *K. filiformis* Dewey; *K. scirpina* Willdenow.

Basal sheaths reddish brown. Inflorescences 1–3 × 0.2–0.3 cm. Glumes yellowish brown or reddish brown to brown, 2.5–4 × 1.2–2 mm. Prophylls oblong, 2.5–3.5 × 1–1.3 mm. Nutlets 2.5–3 (including beak) × 0.8–1 mm. Stigmas 3. Fl. and fr. May–Sep. *2n* = 56.

Moist or dry open places in calcareous soils, alpine meadows, on rocks, dry ridges, grassy slopes, among shrubs; 1500–3500 m. Gansu, Hebei, Jilin, Nei Mongol, Shanxi, Xinjiang [Japan, Kazakhstan, Korea, Mongolia, Russia; Europe, North America].

28b. Kobresia mysuroides subsp. bistaminata (W. Z. Di & M. J. Zhong) S. R. Zhang, Novon 9: 453. 1999.

二蕊蒿草 er rui song cao

Kobresia bistaminata W. Z. Di & M. J. Zhong, Acta Bot. Boreal.-Occid. Sin. 6: 275. 1986.

Basal sheaths brown to dark brown. Inflorescence 1–2.5 × ca. 0.2 cm. Glumes pale brown to dark brown, 2–3 mm. Prophylls oblong or oblong-ovate, 2.2–2.8 mm. Nutlets 1.8–2.3 mm (including beak). Stigmas usually 2 (sometimes 3, or both 2 and 3 on same plant). Fl. and fr. Jun–Sep.

• Alpine meadows, grassy slopes, among shrubs; 2100–4500 m. Gansu, Nei Mongol, Ningxia, Qinghai, Sichuan, Xinjiang, Xizang.

The frequent bistigmatic tendency found in Chinese plants has not been noted elsewhere in the range of the widespread circumboreal *Kobresia mysuroides*. A similar tendency (though to a lesser degree) is also found in Chinese *K. capillifolia*. Further work may confirm that

specific rank for the bistigmatic “Greater Tibetan” taxon is more appropriate.

29. Kobresia nepalensis (Nees) Kükenthal in Engler, Pflanz.-enr. 38(IV. 20): 40. 1909.

尼泊尔蒿草 ni bo er song cao

Uncinia nepalensis Nees in Wight, Contr. Bot. India, 129. 1834; *Carex linearis* Boott (1858), not Clairville (1811); *C. linearis* var. *elachista* C. B. Clarke; *Kobresia nepalensis* var. *elachista* (C. B. Clarke) Kükenthal.

Rhizomes short. Basal sheaths prominent and persistent, pale brown or brown, dull, fibrillose, not retaining dried leaf blades. Culms densely tufted, erect and rigid, occasionally filiform, obtusely trigonous, (2–)10–44 cm tall, 0.7–1.5 mm in diam. Leaves basal, ± equaling culms; blade filiform, margin involute, 0.3–1.1 mm wide. Inflorescence spicate, androgynous, linear, 1.5–8 × 0.2–0.5 cm, dense above, looser below; lowest involucre bract glumelike, apex long aristate. Spikelets all unisexual, 1-flowered. Male glumes yellowish brown laterally, with green midvein, narrowly oblong, ca. 7.5 × 1.5 mm, sides papery, margin not hyaline, apex obtuse. Female glumes brown laterally, with green midvein, ovate to lanceolate, 3.3–5 × 2–2.4 mm, midvein broad, margin hyaline or not, apex mucronate, acute, or obtuse. Prophylls lower part pale green, apex brown, utriculiform, linear-oblong, 4–7.5 × 0.8–1.7 mm, membranous, 2-keeled, keels scabrid, margins open only near apex. Nutlets narrowly oblong or oblanceolate, trigonous, stipitate and beaked, 3.5–6.5 (including beak and stipe) × 0.7–1 mm, beak 1.5–2.2 mm, stipe ca. 0.5 mm. Stigmas 3. Sterile rachilla of female spikelets green, linear, 1/4–2/3 as long as nutlet, margin ciliate. Fl. and fr. Jun–Oct.

Scree slopes, dry grassy slopes, on rocks, alpine shrubby meadows, damp rocky cliffs; 3600–4600 m. Sichuan, Xizang, Yunnan [Bhutan, India (Sikkim, Uttarakhand), Kashmir, Nepal, Pakistan].

30. Kobresia cercostachys (Franchet) C. B. Clarke, J. Linn. Soc., Bot. 36: 267. 1903.

尾穗蒿草 wei sui song cao

Carex cercostachys Franchet, Bull. Soc. Philom. Paris, sér. 8, 7: 27. 1895; *Kobresia nepalensis* (Nees) Kükenthal var. *stiebritziana* (Handel-Mazzetti) R. C. Srivastava; *K. stiebritziana* Handel-Mazzetti.

Rhizomes short. Basal sheaths prominent and persistent, brown or pale brown, dull, margins strongly fibrillose, not retaining dried leaf blades. Culms densely tufted, erect or sometimes curved, rigid, obtusely trigonous, 5–35 cm tall, 0.7–1.5 mm in diam. Leaves basal, shorter than or equaling culms; blade filiform, folded or involute, 1–2 mm wide, midrib not distinct abaxially. Inflorescence densely spicate, androgynous, brown, linear, 1.7–7 × 0.3–0.7 cm; lowest involucre bract glumelike, apex obtuse, acute, or shortly aristate; upper spikelets male, lower spikelets female (rarely androgynous in lowest part of inflorescence). Male glumes brown, oblong-lanceolate, 4–6 mm, membranous, margin hyaline near apex. Female glumes brown to dark brown, with pale brown or pale green

midvein, oblong-lanceolate or lanceolate, 4–6.5(–7.5) × 1.5–2.3 mm, midvein narrow or broad, margin hyaline, apex acute or obtuse, occasionally aristate. Prophylls: lower part pale green, apex brown, narrowly oblong or lanceolate, 4.5–7 × 0.8–1 mm, papery, 2-keeled, keels scabrid, margins free to base, overlapping, apex truncate or notched, hyaline. Nutlets narrowly oblong or oblanceolate, trigonous, shortly stipitate and beaked, 2.7–4 (excluding beak) × 0.6–1.2 mm, beak 0.5–1 mm. Stigmas 3. Sterile rachilla of female spikelets to 1/2 as long as nutlet, sometimes with vestigial glume(s) at apex. Fl. and fr. Jul–Oct.

Scree slopes, grassy slopes among shrubs, on rocks, alpine meadows; 3600–5000 m. Sichuan, Xizang, Yunnan [Bhutan, India (Sikkim), Nepal].

31. *Kobresia esenbeckii* (Kunth) Noltie, *Edinburgh J. Bot.* 50: 43. 1993.

三脉嵩草 san mai song cao

Carex esenbeckii Kunth, *Enum. Pl.* 2: 522. 1837, based on *C. trinervis* Nees in Wight, *Contr. Bot. India*, 120. 1834, not Degland (1807); *C. mutans* Boott ex C. B. Clarke; *Hemicarex hookeri* (Boeckeler) Benth; *H. trinervis* (Boeckeler) Benth & J. D. Hooker ex C. B. Clarke; *Kobresia angusta* C. B. Clarke; *K. foliosa* C. B. Clarke; *K. hookeri* Boeckeler; *K. hookeri* var. *dioica* C. B. Clarke; *K. seticulmis* Boeckeler; *K. trinervis* Boeckeler.

Rhizomes short. Basal sheaths prominent and persistent, brown or dark brown, shiny, sometimes decaying to fibers, not retaining dried leaf blades. Culms densely tufted, erect, trigonous (sometimes obtusely), 3–32 cm tall, slender, 0.5–1 mm in diam. Leaves basal, ± equaling culms; blade flat, 1.5–5 mm wide, midrib distinct abaxially. Inflorescence spicate, unisexual or androgynous, male and female spikes sometimes borne on same plant; all spikelets 1-flowered (occasionally a few at base bisexual with a single male flower). Male spikes compact, 3.5–5 × ca. 0.4 cm; male glumes yellowish brown, narrowly oblong, 7–8.5 × 1.5–2 mm, 1-veined, margin broadly hyaline, apex obtuse. Female and androgynous spikes linear, 1.7–6.5 × 0.15–0.4 cm, spikelets usually loosely arranged; lowest involucre bract glumelike, apex aristate. Female glumes brown laterally, with green midvein, oblong or ovate, 2.2–4 × 1–2 mm, midvein narrow, margin narrowly hyaline, apex mucronate, acute, or obtuse. Prophylls utriculiform when young, splitting to base when mature, pale brown, linear-oblong, 2–3.7 × 0.4–0.7 mm, membranous, 2-keeled, keels ciliate, apex truncate and rounded. Nutlets narrowly oblong or elliptic, curved or not, very shortly stipitate and beaked, 2.5–3.7 (excluding beak) × 0.7–1 mm, stipe ca. 0.5 mm, beak 0.8–2 mm. Stigmas 3, twisted, white in field, thick. Sterile rachilla of female spikelets linear, minute, to 1/4 as long as nutlet. Fl. and fr. May–Oct.

Wet rocks, crevices of cliffs, grassy slopes, lakeshores, on trees; 2800–4300(–4900) m. Sichuan, Xizang, Yunnan [Bhutan, India (Himachal Pradesh, Sikkim, Uttarakhand), Myanmar, Nepal].

32. *Kobresia fissiglumis* C. B. Clarke in J. D. Hooker, *Fl. Brit. India* 6: 696. 1894.

柄果嵩草 bing guo song cao

Kobresia esenbeckii (Kunth) Noltie var. *fissiglumis* (C. B. Clarke) Noltie.

Rhizomes short. Basal sheaths prominent and persistent, brown, dull, not retaining dried leaf blades. Culms densely tufted, erect, triquetrous or obtusely trigonous, 3–14 cm tall, slender, ca. 0.5 mm in diam. Leaves basal, shorter than to exceeding culms; blade flat, 1.5–2 mm wide, midrib distinct abaxially. Inflorescences spicate, unisexual, dense above, looser below, male and female inflorescences borne on same plant; all spikelets unisexual, 1-flowered; lowest involucre bract of female spikes glumelike, apex obtuse. Male spikes linear, ca. 1.5 × 0.3 cm; male glumes reddish brown, oblong, 6–7 × ca. 2 mm, 1-veined, margin hyaline, apex obtuse. Female spikes linear, 2.2–4 × 0.2–0.3 cm; female glumes brown or reddish brown laterally, with green midvein, oblong or narrowly ovate, 3.5–5 × 1–1.5 mm, midvein narrow, margin of upper parts hyaline, apex rounded or obtuse. Prophylls pale brown or brown, oblong or elliptic-oblong, 2–3 × 0.5–0.9 mm, membranous, not keeled, margins open to base even in juvenile stage, apex rounded. Nutlets narrowly oblong, trigonous, stipitate and beaked, 2–3.5 (excluding beak) × 0.5–0.9 mm in diam., stipe 0.6–0.7 mm, beak 1–1.5 mm. Stigmas 3, curved, slender. Sterile rachilla of female spikelets linear, minute. Fl. and fr. Jun–Aug.

Grassy slopes, on rocks and cliff ledges; 3200–4300 m. Xizang, Yunnan [Bhutan, India (Himachal Pradesh, Sikkim), Nepal].

33. *Kobresia falcata* F. T. Wang & Tang ex P. C. Li, *Acta Bot. Yunnan.* 12: 18. 1990.

镰叶嵩草 lian ye song cao

Rhizomes short. Basal sheaths prominent and persistent, dark brown, dull, not retaining dried leaf blades. Culms densely tufted, erect, trigonous, 12–15 cm tall, slender, ca. 1 mm in diam. Leaves basal, slightly shorter than or ± equaling culms; blade flat, slightly curved and falcate, 2–3.7 mm wide. Inflorescence moderately densely spicate, androgynous, oblong, 1.5–2 × 0.3–0.4 cm; all spikelets 1-flowered, terminal 3 or 4 male, others female; lowest involucre bract glumelike, apex aristate, arista to 9 mm. Male glumes brown, lanceolate, 5–6 mm, membranous. Female glumes brown laterally, with yellowish brown midvein, narrowly oblong, 6–6.5 (excluding arista) × ca. 2 mm, papery, margin of upper parts very narrowly hyaline, apex rounded and aristate, arista 1–1.5 mm. Prophylls yellow in lower part, upper parts and margin brown, linear-oblong, 5–5.5 × 0.5–0.7 mm, membranous, 2-keeled, keels scabrid, margins open to base even in juvenile stage, apex rounded. Nutlets narrowly oblong, trigonous, 4.8–5.2 mm (including beak), beak ca. 2 mm, included in prophylls when mature. Stigmas 3. Sterile rachilla of female spikelets linear, minute, ca. 1/5 as long as nutlet. Fl. and fr. Jul–Aug.

• In rock crevices; 2800–4000 m. Gansu, Sichuan.

34. *Kobresia vidua* (Boott ex C. B. Clarke) Kükenthal in *Engler, Pflanzendr.* 38(IV. 20): 40. 1909.

短轴嵩草 duan zhou song cao

Carex vidua Boott ex C. B. Clarke in J. D. Hooker, *Fl.*

Brit. India 6: 713. 1894; *Kobresia harrismithii* Kükenthal; *K. prattii* C. B. Clarke.

Rhizomes short. Basal sheaths prominent and persistent, brown to dark brown, slightly shiny, not fibrillose, not retaining dried leaf blades. Culms densely tufted, stiffly erect, subterete, (1.5–)3–20 cm tall, slender, 0.8–1(–2) mm in diam. Leaves basal, shorter to longer than culms; blade erect, filiform, 0.5–1.1 mm wide, margin involute. Inflorescence spicate, unisexual; all spikelets 1-flowered. Male spikes pale brown, narrowly ellipsoid, (0.7–)1–2.5 × 0.2–0.5 cm; male glumes pale brown laterally, with yellow midvein, linear-oblong, 4.5–7 × 1–3 mm, apex obtuse. Female spikes compact or slightly lax, brown and partly green, linear or cylindrical, 1.3–3.5 × 0.2–0.4 cm; lowest involucre bract glumelike; female glumes brown or chestnut-brown laterally, with green midvein, oblong-ovate, 1.9–5 × 1.3–2.4 mm, papery, midvein very broad (ca. 1/3 width of glume), margin narrowly hyaline, apex rounded or mucronate. Prophylls: lower parts pale green, upper parts brown or chestnut-brown, utriculiform, elliptic or oblong, 2.2–4 × 0.6–1.7 mm, papery, 2-keeled, keels ciliate or smooth, margins fused to apex. Nutlets pale brown, oblong or elliptic, trigonous, 1.6–3.5 × 0.9–1.3 mm, very shortly stipitate, shortly beaked, beak 0.4–1 mm. Stigmas 3. Sterile rachilla of female spikelets less than 1/2 as long as nutlet. Fl. and fr. May–Sep.

Grassy slopes, alpine meadows, on rocks, among shrubs; 3000–5100 m. Gansu, Qinghai, Shaanxi, Sichuan, Xizang, Yunnan [Bhutan, India (Sikkim), Nepal].

35. *Kobresia yangii* S. R. Zhang, Acta Phytotax. Sin. 33: 160. 1995.

纤细嵩草 xian xi song cao

Kobresia gracilis Y. C. Yang, Acta Biol. Plateau Sin. 2: 10. 1984, not Meinshausen (1901).

Rhizomes very short. Basal sheaths prominent and persistent, brown, dull, fibrillose, not retaining dried leaf blades. Culms densely tufted, erect, subtriquetrous, 8–23 cm tall, slender, less than 0.5 mm in diam. Leaves basal, shorter than to subequaling culms; blade filiform, thinner than culms, margin involute. Inflorescence spicate, unisexual; all spikelets 1-flowered. Male spikes pale brown, linear, occasionally with 1 or 2 female spikelets at base; male glumes pale brown, oblong, ca. 4 mm, membranous, apex acute or rounded. Female spike compact, brown or pale brown, linear or cylindrical, (0.5–)1–2 × 0.1–0.2 cm; lowest involucre bract glumelike, apex rounded; female glumes brown or chestnut-brown laterally, with green midvein, oblong-ovate, 3–3.5 mm, membranous, midvein broad, margin narrowly hyaline, apex rounded. Prophylls yellowish green, with brown apex, utriculiform, narrowly elliptic, 2–3 × 0.7–1 mm, membranous, 2-keeled, keels smooth, margins fused to apex. Nutlets pale brown, oblong, trigonous or compressed trigonous, very shortly stipitate, shortly beaked, 1.5–2.5 mm, beak ca. 0.8 mm. Stigmas 3. Sterile rachilla of female spikelets narrowly lanceolate, ca. 1/2 as long as nutlet. Fl. and fr. Aug.

• Grassy slopes, grasslands among *Quercus*; 3600–4400 m. Sichuan.

36. *Kobresia littledalei* C. B. Clarke, Bull. Misc. Inform. Kew,

Addit. Ser. 8: 67. 1908.

康藏嵩草 kang zang song cao

Kobresia tibetica Maximowicz subsp. *littledalei* (C. B. Clarke) P. C. Li.

Rhizomes short. Basal sheaths prominent and persistent, very pale brown, dull, not fibrillose, not retaining dried leaf blades. Culms densely tufted, erect, rigid, subterete, 10–25 cm tall, 1–2 mm in diam. Leaves basal, shorter than or ± equaling culms; blade stiffly erect, filiform, ca. 1 mm wide, margin involute. Inflorescence spicate, usually unisexual; all spikelets 1-flowered. Male spikes linear or linear-oblong, 1.7–3 × 0.4–0.5 cm, occasionally with a few female spikelets at base; male glumes yellowish brown to brown, with pale green midvein, lanceolate, margin broadly hyaline, apex obtuse. Female spikes slightly lax, pale brown, linear, 1.5–4 × 0.2–0.3 cm; lowest involucre bract glumelike, apex aristate or not; female glumes brown or yellowish brown laterally, with pale green midvein, ovate to lanceolate, 4–6 × 1.5–2 mm, margin narrowly hyaline, apex acute. Prophylls pale brown or brown, utriculiform, oblong or lanceolate, 3.5–5 × 1.2–1.3 mm, membranous, 2-keeled, keels ciliate, margins fused to middle part or to apex, apex rounded. Nutlets oblong, trigonous, 2–2.7 × ca. 1 mm, not stipitate, not beaked. Stigmas 3. Sterile rachilla of female spikelets linear, flat, ca. 1/2 as long as nutlet or slightly longer. Fl. and fr. May–Sep.

• Grassy slopes, alpine meadows, alpine shrubby meadows, rocky and sandy grassy slopes; 4300–5300 m. Qinghai, Sichuan, Xizang.

37. *Kobresia prainii* Kükenthal, Bull. Herb. Boissier, sér. 2, 4: 50. 1903.

不丹嵩草 bu dan song cao

Kobresia prainii var. *elliptica* Y. C. Yang; *K. utriculata* C. B. Clarke.

Rhizomes short. Basal sheaths prominent and persistent, pale brown, dull, not retaining dried leaf blades. Culms densely tufted, erect, rigid, subterete, 3–10(–25) cm tall, slender, 0.5–1 mm in diam. Leaves basal, shorter to longer than culms; blade erect or recurved, filiform, less than 0.5 mm wide, margin involute. Inflorescence spicate, unisexual; all spikelets 1-flowered. Male spikes cream to pale brown, narrowly elliptic, often curved, 6–13 × 2–5 mm; male glumes whitish or pale brown, linear-lanceolate, 5.5–7.5 × 0.8–1 mm, membranous, apex obtuse. Female spike slightly lax, pale brown, linear-elliptic or narrowly oblong, 1–2 × 0.2–0.3 cm; lowest involucre bract glumelike, blunt; female glumes brown or yellowish brown laterally, with paler midvein, ovate to lanceolate, 3.5–6 × 1–1.5 mm, midvein narrow, margin narrowly hyaline, apex acute or obtuse. Prophylls lower parts yellowish green, upper parts brown, utriculiform, oblong, 2.5–3 × 0.8–1 mm, membranous, 2-keeled, keels ciliate, margins fused to apex, apex rounded. Nutlets brown, oblong or elliptic, trigonous, 1.8–2.4 × 0.7–1 mm, not stipitate, not beaked. Stigmas 3. Sterile rachilla of female spikelets linear, less than 1/2 as long as to subequaling nutlet. Fl. and fr. May–Sep.

Grassy slopes, alpine meadows, rocky and grassy slopes; 3300–5600 m. Xizang [Bhutan, India (Sikkim), Nepal].

38. *Kobresia pygmaea* (C. B. Clarke) C. B. Clarke in J. D. Hooker, Fl. Brit. India 6: 696. 1894.

高山嵩草 gao shan song cao

Hemicarex pygmaea C. B. Clarke, J. Linn. Soc., Bot. 20: 383. 1883; *Kobresia microstachya* K. V. Ivanova; *K. pygmaea* var. *filiculmis* Kükenthal.

Plants usually extremely densely tufted, forming turf or cushions. Basal sheaths persistent, brown or pale brown, dull, not retaining dried leaf blades. Culms stiffly erect, obtusely trigonous, very short, (0.4–)1–10 cm tall, ca. 0.5 mm in diam. Leaves basal, ca. as long as culms; blades erect, filiform, 0.3–0.5 mm wide, margin involute. Inflorescence a dense ovoid spike, brown, 0.3–10 × 0.1–0.3 cm, androgynous; lowest involucre bract glumelike, apex sometimes shortly aristate; all spikelets unisexual, terminal spikelets male, lower ones female (occasionally with a sterile glume within prophyll). Male glumes brown, oblong-lanceolate, ca. 4 × 1.8 mm, membranous. Female glumes brown, with yellowish green to green midvein, ovate or oblong-ovate, 2–3.5 × 2–2.5 mm, papery, midvein broad, margin narrowly hyaline, apex acute or obtuse. Prophylls brown, oblong or elliptic, 2–2.5 × 1–1.2 mm, membranous, 1- or 2-keeled, keels smooth or slightly scabrid, margins free to base, sometimes overlapping, apex truncate. Nutlets brown to dark brown, shiny, obovoid, trigonous, 1.5–2 × ca. 1 mm, very shortly beaked and stipitate. Stigmas 3. Fl. and fr. May–Sep.

Dry and open grassy places, wet alpine meadows, turf in wet habitats, rocky slopes, on sand and gravel beside rivers; 3100–5600 m. Gansu, Hebei, Nei Mongol, Qinghai, Shanxi, Sichuan, ?Xinjiang, Xizang, Yunnan [Bhutan, India (Himachal Pradesh, Sikkim, Uttarakhand), Kashmir, Myanmar, Nepal, Pakistan].

39. *Kobresia squamiformis* Y. C. Yang, Acta Biol. Plateau Sin. 2: 9. 1984 [*“squamaeformis”*].

夏河嵩草 xia he song cao

Kobresia setschwanensis Handel-Mazzetti subsp. *squamiformis* (Y. C. Yang) S. R. Zhang.

Rhizomes short, plants densely tufted. Basal sheaths persistent, brown, dull, not retaining dried leaf blades. Culms stiffly erect, obtusely trigonous, very short, 9–16 cm tall, ca. 0.8 mm in diam. Leaves basal, ca. as long as culms; blade erect, filiform, ca. 0.5 mm wide, margin involute. Inflorescence a dense spike, brown, cylindric, 1–1.5 × 0.3–0.5 cm, androgynous; lowest involucre bract glumelike, apex shortly aristate; spikelets usually all unisexual, terminal few male, lower ones female (occasionally with a single reduced male flower within prophyll). Male glumes brown, with yellowish green midvein, lanceolate, ca. 3.5 × 1.5 mm, apex rounded. Female glumes brown, with yellowish green midvein, ovate or oblong-ovate, 3–3.5 × 1.8–2.5 mm, papery, midvein broad, margin very narrowly hyaline, apex rounded. Prophylls brown, oblong, 3–3.8 × 1.2–1.5 mm, membranous, 2-keeled, keels smooth, margins free to base. Nutlets brown to dark brown, shiny, oblong-elliptic,

trigonous, 2.3–2.5 × 1.3–1.6 mm, not beaked, not stipitate. Stigmas 3. Sterile rachilla of female spikelets much shorter than to subequaling nutlet, sometimes bearing a vestigial male glume. Fl. and fr. Jul–Oct.

• Grassy slopes; 2900–3600 m. Gansu (Xiahe), E Qinghai (Zêkog).

This appears to form a link between *Kobresia pygmaea* and *K. setschwanensis*; it seems more logical to recognize it as a distinct species than as a slender subspecies of the latter, when it could equally well be made a robust subspecies of the former.

40. *Kobresia vaginosa* C. B. Clarke in J. D. Hooker, Fl. Brit. India 6: 695. 1894.

发秆嵩草 fa gan song cao

Kobresia cercostachys (Franchet) C. B. Clarke var. *capillacea* P. C. Li; *K. nepalensis* (Nees) Kükenthal subsp. *vaginosa* (C. B. Clarke) T. Koyama; *K. nepalensis* var. *vaginosa* (C. B. Clarke) R. C. Srivastava.

Rhizomes short, or shortly and obliquely elongated, plants forming a turf. Basal sheaths prominent and persistent, reddish brown or pale brown, dull, fibrillose, not retaining dried leaf blades. Culms densely tufted, erect or curved, subterete, 3.5–10 cm tall, slender, ca. 0.5 mm in diam. Leaves basal, equaling or exceeding culms; blade filiform, flaccid, ca. 0.5 mm wide, margin involute. Inflorescence spicate, linear, rather lax, usually unisexual, occasionally gynaeandrous or androgynous, plants with male and female inflorescences on same individual, or sometimes dioecious; spikelets unisexual. Male spikes 1.5–3 × ca. 0.2 cm; male glumes oblong-lanceolate, 6–8 × 1.2–2 mm, midvein green, margin and apex hyaline. Female spikes 2–3.5 × ca. 0.2 cm; lowest involucre bract glumelike, apex acute or shortly aristate; female glumes brown, with pale brown or pale green midvein, lanceolate, 5–6.2 × 1.7–2 mm, midvein narrow, margin broadly hyaline, apex subacute or obtuse. Prophylls lower part yellow, upper part and margin brown, linear, 4.7–5.7 × ca. 0.7 mm, 2-keeled, keels scabrid, margins free to base, apex truncate, hyaline. Nutlets narrowly oblong or oblanceolate, trigonous, shortly stipitate and beaked, 3.5–4 (excluding beak) × 0.6–1.2 mm, beak 0.5–1 mm. Stigmas 3. Sterile rachilla of female spikelets to 1/2 as long as nutlet. Fl. and fr. Jul–Sep.

Dry slopes, on rocks in alpine meadows; 4000–4800 m. Xizang, Yunnan [India (Sikkim), ?Nepal].

41. *Kobresia graminifolia* C. B. Clarke, J. Linn. Soc., Bot. 36: 268. 1903.

禾叶嵩草 he ye song cao

Rhizomes short. Basal sheaths prominent and persistent, pale brown or yellowish brown, dull or slightly shiny, margins and apices fibrillose, not or retaining a few dried leaf blades. Culms densely tufted, erect and rigid, obscurely trigonous, (7–)20–45 cm tall, 1–1.5 mm in diam. Leaves basal, shorter to longer than culms; blade semicircular or V-shaped in transverse section, 0.5–1.5 mm wide, midrib not usually distinct abaxially. Inflorescence ± densely spicate, usually unisexual (sometimes androgynous or gynaeandrous), male and female spikes borne

on same plant. Male inflorescence narrowly cylindrical or narrowly ellipsoid, $1.5-3(-5) \times 0.3-0.6$ cm; male glumes narrowly oblong, $6-8(-10) \times 1-2$ mm, margin narrowly hyaline, apex rounded. Female inflorescence brown, narrowly cylindrical, $2.5-7.5 \times 0.3-0.6$ cm, lower spikelets distant; lowest involucre bract glumelike, apex acute or shortly aristate; female glumes brown, with paler midvein, oblong-ovate or narrowly triangular-ovate, $5-6 \times 1.5-2$ mm, midvein narrow, margin very narrowly hyaline, apex acute or obtuse. Prophylls lower part pale green, apex brown, narrowly oblong-elliptic, $4-6 \times 0.8-1.8$ mm, papery, 2-keeled, keels scabrid, margins free to base or fused in lower 1/4, not overlapping, apex truncate or notched. Nutlets narrowly elliptic or oblanceolate, trigonous, very shortly stipitate and shortly beaked, $3.5-5.5$ (including stipe and beak) $\times 0.8-1.5$ mm. Stigmas 3. Sterile rachilla of female spikelets $1.2-2$ mm, less than 1/2 length of nutlet. Fl. and fr. Jun–Sep.

Grassy slopes, among shrubs, on mossy rocks, alpine meadows; 3100–4700 m. Gansu, Qinghai, Shaanxi, Sichuan, Xizang, Yunnan [Nepal].

This is possibly a form of *Kobresia cercostachys*, which it resembles (especially in its fibrillose leaf sheaths and somewhat intermediate leaf morphology) but differs from it in its (usually) contrasting female and male spikes.

42. *Kobresia woodii* Noltie, Edinburgh J. Bot. 50: 48. 1993.

阔鳞蒿草 kuo lin song cao

Rhizomes short. Basal sheaths prominent and persistent, inner ones straw-colored, outer ones chocolate brown with darker margins, slightly shiny, not fibrillose, retaining dried leaf blades. Culms densely tufted, erect and rigid, subterete, 24–28 cm tall, ca. 1 mm in diam. Leaves basal, slightly longer than culms; blade filiform, semicircular or V-shaped in transverse section, ca. 1.5 mm wide, midrib not distinct abaxially. Inflorescence spicate, narrowly cylindrical, unisexual, male and female spikes borne on same plant. Male inflorescence ca. 4×0.3 cm; male glumes oblong-oblanceolate, ca. 8×2.5 mm, margin narrowly hyaline, apex rounded. Female inflorescence dense, lower spikelets sometimes distant, brown, ca. 6×0.6 cm; lowest involucre bract glumelike, apex aristate, arista ca. 5 mm; female glumes brown laterally, with green midvein, oblong-ovate, $6.2-8 \times 2.5-3.9$ mm, midvein broad, margin very narrowly hyaline or not hyaline, apex obtuse. Prophylls lower part pale brown, apex brown, linear-oblong, $7-10 \times 1-1.5$ mm, papery, 2-keeled, keels minutely scabrid, margins free to base, overlapping. Nutlets linear, obscurely trigonous, body ca. 2.5×0.7 mm, with stipe ca. 1 mm, beaked with stout style base (ca. 1.5 mm). Stigmas 3. Fl. and fr. May–Sep.

Grasslands, alpine meadows; 3300–4800 m. S Xizang (Yadong) [Bhutan].

43. *Kobresia pusilla* N. A. Ivanova, Bot. Zhurn. S.S.S.R. 24: 496. 1939.

高原蒿草 gao yuan song cao

Kobresia coninux F. T. Wang & Tang; *K. daqingshanica* X. Y. Mao; *K. helanshanica* W. Z. Di & M. J. Zhong.

Rhizomes short. Basal sheaths pale brown to brown, dull, retaining dried leaf blades. Culms densely tufted, erect, obtusely trigonous, 2–15 cm tall, 0.7–1 mm in diam. (relatively stout for length). Leaves basal, shorter than or \pm equaling culms, sometimes recurved; blade flat, folded at base (V-shaped in cross section), 1–1.5(–2) mm wide, midrib distinct abaxially or not. Inflorescence densely spicate (occasionally branched in lower part), brown, narrowly elliptic or narrowly ovate-oblong, $0.5-1.2 \times 0.3-0.4$ cm; lowest involucre bract glumelike, apex shortly aristate. Terminal spikelets of inflorescence male, lower ones bisexual with 1 basal female flower and (1 or)2–5 distal male flowers. Glumes brown or pale brown, with yellowish green or green midvein, oblong, ovate, or lanceolate, $3.2-5 \times 1.5-2.5$ mm, margin hyaline or not, apex obtuse or acute. Prophylls pale brown, oblong, ovate-oblong, or elliptic, $2.9-4 \times 1-2$ mm, membranous, abaxially sometimes hairy, 2-keeled, keels scabrid, margins open to base, apex truncate or 2-toothed. Nutlets brown and shiny, elliptic or oblong-obovate, flattened, body $1.6-2.5 \times 0.8-1.5$ mm, shortly stipitate, very shortly beaked. Stigmas 2. Fl. and fr. May–Oct.

• Exposed dry slopes, alpine meadows, shaded places, marshes; 3100–5300 m. Gansu, Hebei, Nei Mongol, Qinghai, Sichuan, Xizang.

This species is similar to *Kobresia humilis*, differing largely in its bistigmatic nutlets.

44. *Kobresia karakorumsensis* Dickoré, Stapfia 39: 77. 1995.

喀拉昆仑蒿草 ka la kun lun song cao

Rhizomes short. Basal sheaths pale brown to brown, dull, retaining dried leaf blades. Culms densely tufted, dwarf, erect and rigid, subterete in lower part, trigonous above, (2–)3–15(–20) cm tall, 0.5–0.7 mm in diam. Leaves basal, usually shorter than culms; blade V-shaped in section, recurved, 1–2.5 mm wide, midrib not distinct abaxially. Inflorescence spicate (rarely compound), brown or dark brown, densely and broadly cylindrical, $0.5-1.2 \times 0.2-0.4$ cm; lowest involucre bract glumelike. Terminal spikelets of inflorescence male, lower ones bisexual with 1 basal female flower and (1 or)2(or 3) distal male flowers. Glumes brown or dark brown, with pale midvein, ovate, $2.5-3 \times ca. 2$ mm, midvein narrow, margin very narrowly or not hyaline, apex obtuse. Prophylls pale brown at upper part, narrowly elliptic, ca. 3.3×0.9 mm, membranous, glabrous, hyaline at base, obscurely 2-keeled, margins connate in lower 1/4(–1/2). Nutlets brown or pale brown, oblong-elliptic, flattened, body ca. 1.5×0.9 mm, stipe ca. 0.5 mm, very shortly beaked. Stigmas 2. Fl. and fr. Jul–Sep.

High alpine turf; (3100–)3800–5000 m. Xinjiang, Xizang [Afghanistan, India (Himachal Pradesh), Kashmir, ?Nepal, Pakistan, Tajikistan].

This is, perhaps, a western form of *Kobresia pusilla*, but it is also close to *K. myosuroides* subsp. *bistaminata*.

