

*B. sylvaticum* (Huds.) P. Beauv. Per, gen cespitose, 30–200+ cm. **ST**: erect. **LF**: sheaths smooth, blade 8–35 cm, 4–15 mm wide, flat, loose, veins not prominent. **INFL**: 2–20 cm; spikelets 3–12 per st, gen distant. **SPIKELET**: glumes 6–11 mm; florets 6–16(22); lemma

6–12 mm, awn 7–15 mm,  $\geq$  lemma, straight or weakly flexuous; palea ciliate. Forest, woodland, upland prairies; < 600 m. SnFrB; OR, WA, BC, VA; native to Eur and n Afr. Nov–Dec ♦

## BRIZA QUAKING GRASS

Dieter H. Wilken

Ann, per. **ST**: ascending to erect, 5–100 cm. **LF**: basal to cauline; ligule membranous to translucent; blade flat. **INFL**: panicle-like, open. **SPIKELET**: erect to pendent,  $\pm$  laterally compressed, subconic to ovoid; glumes subequal, papery, rounded at tip, 3–9-veined; florets 3–19; axis breaking above glumes and between florets; lemma width > length, papery to translucent, rounded at tip, 7–9-veined; palea  $\pm$  lemma. 10–12 spp.: Eur, n Afr. (Greek: a kind of grain) [Snow 2007 FNANM 24:612–614] *B. media* L., a cult per with ligule < 0.5 mm and spikelets 4–6 mm, best treated as waif in CA.

1. Spikelets 10–19 mm. . . . . *B. maxima*  
1' Spikelets 2–5 mm . . . . . *B. minor*

*B. maxima* L. (p. 1435) RATTLESNAKE GRASS, LARGE QUAKING GRASS. Ann. **ST**: 20–80 cm. **LF**: ligule 1–4 mm; blade 1–7 mm wide. **INFL**: 2–10 cm. **SPIKELET**: 1–14 per infl, pendent, ovoid, obtuse at base; glumes 4–7 mm, 5–9-veined; florets 12–19; lemma 6–8 mm.  $2n=10,14$ . Shaded sites, roadsides, pastures, weedy on coastal dunes; < 970 m. NCo, NCoRO, n SNF, n CCo, n&c SCoRO, n SCo; to BC, e US; native to s Eur. Cult for orn. Apr–Jul ♦

*B. minor* L. (p. 1435) ANNUAL QUAKING GRASS, SMALL QUAKING GRASS. Ann. **ST**: 8–50 cm. **LF**: ligule 3–13 mm, blade 3–10 mm wide. **INFL**: 3–20 cm. **SPIKELET**: gen > 15 per infl, erect, triangular to oval, truncate at base; glumes 1.5–4 mm, 3–5-veined; florets 4–6(13); lemmas 1–2 mm, veins indistinct.  $2n=10,14$ . Shaded or moist, open sites; 20–600 m. NCo, NCoRO, n&c SNF, s ScV, n SnJV, CCo, SnFrB, n SCoRO, DSON (Rancho Mirage); to BC, e US; native to s&w Eur. Apr–Jul

## BROMUS BROME, CHESS

Jeffery M. Saarela & Paul M. Peterson

Ann to per. **LF**: basal and cauline; sheath closed to near top, hairy or glabrous; ligule  $\leq$  7 mm, membranous, entire to fringed; blade flat to inrolled. **INFL**: gen raceme- or panicle-like, open to dense; pedicels gen stiff, rigid. **SPIKELET**: strongly laterally compressed to cylindrical; florets 3–30; axis breaking above glumes and between florets; glumes unequal, gen < lower floret, lower 1–3-veined, upper 3–7-veined, back rounded to strongly keeled, tip acute; lemma 5–9-veined, tip 2-toothed or entire, acute to obtuse, awned from between teeth or awns 0; palea gen < lemma.  $\pm$  160 spp.: temp worldwide. (Greek, ancient name) [Pavlick and Anderton 2007 FNANM 24:193–237; Saarela et al. 2007 Aliso 23:450–467] *B. scoparius* L., *B. erectus* Huds. not known to be naturalized in CA. *B. pacificus* Shear not in CA.

1. Spikelet strongly flattened; lemma strongly keeled (sect. *Ceratochloa*)  
2. Lemma awn 0–3.5 mm; lemma veins prominent . . . . . *B. catharticus* var. *catharticus*  
2' Lemma awn 4–15 mm; lemma veins obscure or prominent . . . . . *B. sitchensis*  
3. Some lower infl branches > 10 cm, spreading to nodding . . . . . *B. sitchensis*  
3' Lower infl branches < 10 cm, or if longer, erect to ascending  
4. Upper glume  $\pm$  lowermost lemma  
5. Ann; lower glume 3–5-veined, upper 9–15 mm, 5–9-veined; lemma 7-veined, margin gen hairy (occ glabrous), backs hairy or glabrous, awn 7–15 mm; anthers  $\leq$  0.5 mm . . . . . *B. arizonicus*  
5' Per; lower glume 5–7(9)-veined, upper 11–20 mm, 7–9-veined; lemma 9–11-veined, gen hairy at least distally, awn 6–12 mm; anthers 0.6–1 mm . . . . . <sup>2</sup>*B. catharticus* var. *elatus*  
4' Upper glume gen < lowermost lemma — lemma scabrous or variously hairy, marginal hairs if present similar in length to those on back  
6. Infl dense, pedicel gen < spikelets; spikelets crowded, overlapping, stalks not visible; st 20–80 cm, occ bent at base; st, lvs glabrous or occ scabrous; ligule  $\leq$  6 mm . . . . . *B. maritimus*  
6' Infl loose to compact, at least some pedicels > spikelets; spikelets not crowded or overlapping, stalk often visible; st 50–120 cm, erect; st, lvs often hairy; ligule gen < 4 mm  
7. Most awns  $\geq$  (6)7 mm  
8. Lemma gen uniformly hairy, occ scabrous, veins 7, obscure . . . . . *B. carinatus* var. *carinatus*  
8' Lemma gen hairy at least distally, veins 9–11 on distal 1/2, prominent . . . . . <sup>2</sup>*B. catharticus* var. *elatus*  
7' Most awns < 7 mm  
9. Sheath throat and/or lemma hairy . . . . . *B. carinatus* var. *marginatus*  
9' Sheath throat, lemma glabrous . . . . . *B. polyanthus*  
1' Spikelet not strongly flattened, lemma rounded over midrib and not strongly keeled  
10. Lemma tip conspicuously 2-toothed, teeth translucent, awn-like to acuminate, 1–7 mm; largest lemmas gen < 2 mm wide  
11. Lemma awn bent and/or twisted (sect. *Neobromus*) . . . . . *B. berterianus*  
11' Lemma awn straight, not twisted (sect. *Genea*)  
12. Lemma mostly > 20 mm; awn 30–65 mm . . . . . *B. diandrus*

- 12' Lemma mostly < 20 mm; awn 8–30 mm
13. Infl dense, branches erect to ascending ..... *B. madritensis*
14. Infl branches occ > spikelets, shortest branch on lowest infl node 6–24 mm, longest branch on lowest node 0–1 × branched; sterile florets ≤ 3; infl internodes gradually reduced upwards; florets not overlapping at maturity ..... subsp. *madritensis*
- 14' Infl branches < spikelets, shortest branch on lowest infl node ≤ 6 mm, longest branch on lowest node 2–5 × branched; sterile florets 3+; infl internodes abruptly reduced upwards; florets overlapping at maturity ..... subsp. *rubens*
- 13' Infl open, branches spreading to nodding
15. Spikelets 1(3) per infl branch; infl gen simple; branches > spikelets (< when infl reduced to 1(3) spikelets); lemma 13–20 mm; awn 15–30 mm. .... *B. sterilis*
- 15' Spikelets 1–14 per infl branch; infl branched 1–5 × branches < or > spikelets; lemma 9–13 mm; awn 8–18 mm ..... *B. tectorum*
- 10' Lemma tip entire or inconspicuously 2-toothed, teeth gen not translucent, 0–3 mm; largest lemmas gen > 2 mm wide (exc in *Bromus vulgaris*)
16. Ann; lower glume 3(5)-veined; upper glume 5–9-veined (sect. *Bromus*)
17. Lemma inflated, 6–8 mm wide; awn 0–1 mm; spikelet ovate ..... *B. briziformis*
- 17' Lemma not inflated, 1–5 mm wide; awn 2–20 mm; spikelet lanceolate to lance-ovate
18. Lemma papery, veins gen strongly raised; infl gen ± dense
19. Awn from > 3 mm below lemma tip, bent; all pedicels << spikelets; infl branches erect ..... *B. caroli-henrici*
- 19' Awn from < 1.5 mm below lemma tip, straight (curved); gen some pedicels > spikelets; infl branches erect to spreading ..... *B. hordeaceus*
- 18' Lemma leathery, veins gen not strongly raised; infl gen ± open
20. Lemma awn from 1.5–5 mm below tip
21. Lower glume 7–10 mm; upper glume 8–12 mm; infl branches conspicuously S-curved ..... *B. arenarius*
- 21' Lower glume 4–7 mm; upper glume 5–9.5 mm; infl branches ± wavy, sometimes S-curved
22. Infl panicle-like, branches gen with > 1 spikelet; membranous lemma margin 0.3–0.6 mm wide ..... *B. japonicus*
- 22' Infl gen raceme-like, branches gen with 1 spikelet; membranous lemma margin 0.6–0.9 mm wide ..... *B. squarrosus*
- 20' Lemma awn from < 1.5 mm below tip
23. Anthers 2.5–5 mm; spikelets lance-linear, narrowing only slightly towards tip; lower lf sheaths with dense, softly appressed hairs; spikelets gen purple-tinged ..... [*B. arvensis*]
- 23' Anthers < 2.5(3) mm; spikelets lance-ovate, narrowing conspicuously towards tip; lower lf sheaths glabrous or sparsely to densely stiff-hairy; spikelets not purple-tinged.
24. Lower lf sheath glabrous or sparsely short-hairy; spikelet widening in fr, stalk becoming tough, persistent, visible as lemma wraps around fr; fr U- and V-shaped in ×-section ..... *B. secalinus*
- 24' Lower lf sheath long-hairy; spikelets not widening substantially in fr, lemmas gen continuing to obscure stalks; fr flat or C-shaped in ×-section
25. Infl broad, spreading, some infl branches > 4 cm, 1–3 spikelets per branch; lowest lemma awn gen < other awns; spikelets 15–30 mm; 2nd lowest lemma 7.5–11 mm, glabrous or hairy, margin often broadly angled; anthers 1.3–2.5 mm ..... *B. commutatus*
- 25' Infl narrow, gen unbranched, infl branches < 4 cm, 1 spikelet per branch; all awns ± equal; spikelet 11–18 mm; 2nd lowest lemma 7–9 mm, glabrous, margin often smoothly curved; anthers 1.5–3 mm ..... *B. racemosus*
- 16' Per, bases fibrous, rhizomes gen 0; lower glume 1(3)-veined; upper glume 3(5)-veined (sect. *Bromopsis*)
26. Pls from rhizomes; awn 0–3 mm ..... *B. inermis*
- 26' Rhizomes 0; awn 1.5–11 mm
27. Lower glume gen 3-veined
28. Upper glume 5-veined
29. Ligule (1.5)2–4 mm; glume glabrous; upper glume 7–11 mm; lf blade, sheath glabrous ..... *B. laevipes*
- 29' Ligule 0.4–1(2) mm; glume scabrous or hairy; upper glume 6–9 mm; lf blade, sheath hairy or glabrous ..... *B. pseudolaevipes*
- 28' Upper glume 3-veined
30. Lemma awn 1.5–3(4) mm; blade 2–5 mm wide; anthers 1.5–3.5(4) mm ..... *B. porteri*
- 30' Lemma awn 3–9 mm; blade 3–12 mm wide; anthers 3–7 mm
31. Lf blade, basal sheath hairy; st nodes 3–7; infl branches gen spreading > 90° ..... <sup>2</sup>*B. grandis*
- 31' Lf blade, basal sheath glabrous; st nodes 2–3(4); infl branches gen ascending to spreading ≤ 90° ..... <sup>3</sup>*B. orcuttianus*
- 27' Lower glume gen 1-veined
32. Glumes glabrous or minutely scabrous
33. Infl narrow in fl, ≤ 2 cm wide; branches erect or tightly ascending ..... <sup>2</sup>*B. suksdorfii*
- 33' Infl broader in fl, > 2 cm wide; branches erect, ascending, or nodding, gen ± widely spreading
34. Ligule (2)3–6(7) mm; lemma awn (4)6–11 mm ..... <sup>2</sup>*B. vulgaris*

- 34' Ligule 0.5–3 mm; lemma awn (2)3–7(9) mm
35. Lemma margin not densely hairy; lemma awn (4)5–7(9) mm; infl branches gen ascending to spreading  $\leq 90^\circ$  ..... <sup>3</sup>*B. orcuttianus*
- 35' Lemma margin densely hairy; lemma awn (2)3–5(6.5) mm; infl branches spreading to nodding  $> 90^\circ$
36. Lemma back glabrous or sparsely hairy with hairs to 0.1 mm; anthers (0.9)1–1.4(1.6) mm; upper glumes (6.2)7.1–8.5(9.5) mm; basal sheath glabrous or long-hairy; upper st blade hairy on upper surface; upper st sheath, nodes gen hairy; fr (5.4)6.2–7.2(7.5) mm ..... *B. ciliatus*
- 36' Lemma back sparsely to densely hairy with hairs  $> 0.1$  mm; anthers (1.2)1.6–2.7(3.4) mm; upper glumes (7.8)8.9–11.3(13.2) mm; basal sheath densely,  $\pm$  short-hairy, upper st sheath glabrous; upper st blade upper surface glabrous; upper st nodes gen glabrous; fr (6.9)7.7–9.7(10.5) mm ..... *B. richardsonii*
- 32' Glumes hairy
37. Infl narrow at fl,  $\leq 2$  cm wide, branches erect or tightly ascending; lf blade, sheath glabrous. .... <sup>2</sup>*B. suksdorfii*
- 37' Infl broader at fl,  $> 2$  cm wide, branches erect, ascending, or nodding; lf blade, sheath hairy or glabrous
38. Ligule (2)3–6(7) mm; lemma awn (4)6–11 mm; infl branches glabrous or scabrous ..... <sup>2</sup>*B. vulgaris*
- 38' Ligule 1–3 mm; lemma awn 3–7(9) mm; infl branches hairy
39. Lower sheath long-soft-hairy, hairs 2–4 mm, or glabrous; lf blade glabrous ..... <sup>3</sup>*B. orcuttianus*
- 39' Lower sheath densely short-stiff-hairy, hairs  $\leq 1$  mm; lf blade hairy
40. Longest lf blade (13)18–38 cm; nodes 3–7 per st ..... <sup>2</sup>*B. grandis*
- 40' Longest lf blade 7.5–16.5 cm; nodes 1–2(3) per st ..... *B. hallii*

*B. arenarius* Labill. (p. 1435) AUSTRALIAN CHESS Ann 15–60 cm. LF: hairy; ligule 1.5–2.5 mm; blade 2–5 mm wide. INFL: 4–19 cm, open; branches nodding to spreading, conspicuously S-curved, gen  $>$  spikelets. SPIKELET: 10–20 mm,  $\pm$  compressed dorsally; glumes hairy, lower 7–10 mm, 3-veined, upper 8–12 mm, 5–7-veined; lemma 7–11 mm, back rounded, hairy, veins not strongly raised, teeth 0.5–2 mm, awn (6)9–14 mm, from 1.5+ mm below tip; anthers 0.7–1 mm. Open, disturbed places;  $< 2000$  m. CA-FP, D; to OR, AZ; native to Australia. Apr–Jul

*B. arizonicus* (Shear) Stebbins (p. 1435) ARIZONA BROME Ann 40–90 cm. LF: glabrous or hairy; ligule 1–2 mm; blade 1.5–10 mm wide. INFL: 5–30 cm; branches ascending to erect, lower  $\pm$  spreading. SPIKELET: 18–25 mm, strongly flattened; glumes glabrous or scabrous, lower 8–13 mm, 3–5-veined, upper 9–15 mm, 5–9-veined,  $\pm$  = lowest lemma; lemma 9.5–14 mm, 7-veined, strongly keeled, margin gen hairy (occ glabrous), back hairy or glabrous, awn 7–15 mm; anthers  $\leq 0.5$  mm.  $2n=84$ . Open, disturbed places, fields;  $< 2200$  m. s NCoRo, GV, SnFrB, SCoR, SCo, ChI, D; AZ, ne Mex, Baja CA. [*B. trinitii* var. *excelsus* Shear] Mar–Jun

*B. berteroi* Colla (p. 1435) CHILEAN CHESS Ann 15–20 cm, often tufted. LF: sparsely to densely hairy; ligule 1–3 mm; blade 2–9 mm wide. INFL: 8–30 cm,  $\pm$  open; branches gen ascending. SPIKELET: 15–20 mm, not strongly flattened; glumes glabrous, lower 8–16 mm, 1(3)-veined, upper 10–18 mm, 3(5)-veined; florets 3–9; lemma 6–15 mm, back rounded, hairy, teeth 3–5 mm, awn-like to acuminate, awn (7)14–22 mm, bent, twisted below middle.  $2n=42$ . Open, sandy or gravelly soils;  $< 1700$  m. NCoRI, CaRF, SN, SnJV, CW, SW, SNE, D; to OR, NE, AZ; also in n Mex, S.Am. [*B. trinitii* var. *t.*] Mar–Jun

*B. briziformis* Fisch. & C.A. Mey. RATTLESNAKE CHESS Ann 17–70 cm. LF: sheath hairy; ligule 0.5–2 mm; blade 1.5–5 mm wide, hairy. INFL: 2.5–15 cm, open, nodding. SPIKELET: 15–27 mm, not strongly flattened; glumes glabrous, lower 4.6–6 mm, 3–5-veined, upper 5–8 mm, 5–9-veined; lemma 6–9 mm, 6–8 mm wide, inflated, back rounded, glabrous or hairy, veins strongly raised, teeth  $< 1$  mm, awn 0–1 mm; anthers 0.7–1 mm.  $2n=14$ . Open places; 1250–1830 m. KR, CaR, n SN, MP; to AK, BC, ne US; native to Eurasia. Often confused with *Briza maxima*. May–Jul

*B. carinatus* Hook. & Arn. (p. 1435) CALIFORNIA BROME Per, occ fl in first yr. LF: glabrous or hairy; ligule 2–3(4) mm; blade 3–12 mm wide. INFL: 9–40 cm; upper branches erect to ascending, lower branches ascending to spreading; sometimes with cleistogamous florets. SPIKELET: 20–40 mm, strongly flattened.  $2n=56$ .

var. *carinatus* Pl 50–100 cm. INFL: 15–40 cm. SPIKELET: 20–40 mm; glumes glabrous or hairy, lower 6.5–12 mm, 3–7-veined, upper 6–12 mm, 5–9-veined; lemma 12–20 mm, strongly keeled, gen

uniformly hairy, 7-veined, veins obscure, awn (6)8–15 mm; anthers 0.5–4.5 mm. Coastal prairies, openings in chaparral, plains, open oak and pine woodland;  $< 3500$  m. CA (exc SnJV, DSON); to BC. Apr–Aug

var. *marginatus* (Steud.) Barkworth & Anderton MOUNTAIN BROME Pl 45–120 cm. LF: sheath, blade gen hairy, or just hairy at throat; ligule 2–3.5 mm; blade 6–12 mm wide, sometimes inrolled. INFL: 9–30 cm. SPIKELET: 25–40 mm; glumes hairy, lower 7–9 mm, 3–5-veined, upper 9–11 mm, 9–11-veined; lemma 11–14 mm, strongly keeled, obscurely 7–9-veined, margin hairy, back glabrous or hairy, awn 4–7 mm; anthers 1–4 mm. Open slopes, meadows, forest;  $< 3500$  m. CA; to BC, WY, w TX, Mex. [*B. breviaristatus* Buckley; *B. luzonensis* J. Presl; *B. m.* Steud.; *B. subvelutinus* Shear] May–Jul

*B. caroli-henrici* Greuter Ann 15–45 cm. LF: hairy; ligule 0.5–1 mm; blade 1–4 mm wide. INFL: 4–10 cm, dense; branches and spikelets erect. SPIKELET: 25–45 mm, not strongly flattened; glumes glabrous or hairy, lower 8–10 mm, 3-veined, upper 9.5–12 mm, 3–5-veined, lemma 11–18 mm, back rounded, glabrous or hairy, veins strongly raised, teeth  $< 1$  mm, awn 10–18 mm, bent, from  $> 3$  mm below lemma tip; anthers 0.5–1.2 mm.  $2n=14,28$ . Open, disturbed places;  $< 100$  m. ScV (Butte, Yolo cos.); native to Medit Eur. [*B. alopecuroides* Poir., misappl.] Reported from ne US. Apr–Nov

*B. catharticus* Vahl Ann or short-lived per, 20–120 cm. LF: glabrous or hairy. INFL: 8–30 cm,  $\pm$  open. SPIKELET: 15–30 mm, strongly flattened.  $2n=42$ .

var. *catharticus* RESCUE GRASS LF: glabrous or sparingly hairy; ligule 2–5 mm; blade 2–9 mm wide. INFL: 10–30 cm, upper branches erect to ascending, lower branches ascending to spreading. SPIKELET: 15–30 mm; glumes glabrous, scabrous, or occ hairy, lower 6–12 mm, upper 8–14 mm, 5–7(9)-veined; lemma 10–17 mm, glabrous or slightly hairy, veins (9)11–13-veined, prominent for most of their length; awn 0.5–3.5 mm; anthers 0.5–1.3 mm. Open, disturbed places;  $< 1500$  m. CA; to e US, Eur, Australia; native to S.Am. Apr–Nov

var. *elatus* (E. Desv.) Planchuelo CHILEAN BROME Per 30–110 cm. LF: glabrous or hairy; ligule 1–4 mm; blade 3–10 mm wide. INFL: 8–20 cm; branches ascending to erect. SPIKELET: 15–25 mm; glumes glabrous or scabrous, lower 8–13 mm, upper 11–20 mm, 7–9-veined, lemma 10–16 mm, 9–11-veined, veins prominent on distal portion, gen hairy at least distally, awn 6–12 mm; anthers 0.6–1. Disturbed areas;  $< 200$  m. s NCo, s NCoR, n&c SNF, deltaic GV, CCo, SnFrB, n ChI; ballast in OR, presumed extirpated; New Zealand; native to S.Am. [*B. stamineus* E. Desv.] Apr–Aug

*B. ciliatus* L. (p. 1435) FRINGED BROME Per 55–149 cm. LF: upper st node and sheath gen hairy; adaxial surface of upper st blade hairy, basal sheath glabrous or long-hairy; ligule 0.5–1.5 mm; blade

4–12 mm wide. **INFL**: 8–21 cm, open; branches spreading to nodding. **SPIKELET**: 15–25 mm, not strongly flattened; glumes glabrous or minutely scabrous, lower 6–7.5 mm, 1(3)-veined, upper (6.2)7.1–8.5(9.5) mm, 3-veined; lemma 8–14 mm, margin hairy along lower 1/2–3/4, back rounded, glabrous or sparsely hairy, hairs to 0.1 mm, awn 2–6.5 mm; anthers (0.9)1–1.4(1.6) mm; fr (5.4)6.2–7.2(7.5) mm  $2n=14$ . Damp meadows, woodland, thickets, streambanks, roadsides; 1100–3230 m. CaRH, SNH, SnBr, n W&I; to AK, ne N.Am, n Mex. Apr–Aug

*B. commutatus* Schrad. HAIRY CHESS, MEADOW BROME Ann 40–120 cm. **LF**: lower sheath long-hairy; ligule 1–4 mm; blade 3–9 mm wide. **INFL**: 6–18 cm; broad, spreading, some branches gen > 4 cm, 1–3 spikelets per branch. **SPIKELET**: 15–30 mm, not strongly flattened, not widening in fr, lemma obscuring most stalks in fr; glumes glabrous, lower 5–7 mm, 3–5-veined, upper 6–9 mm, 5–9-veined; lemma 7.5–11 mm, margin gen broadly angled, back rounded, glabrous or hairy, veins not strongly raised, awn 4–10 mm, from < 1.5 mm below lemma tip, teeth < 1 mm, lowest lemma awn gen < others; anthers 1.3–2.5 mm; fr flat or C-shaped in  $\times$ -section.  $2n=14,28,56$ . Disturbed areas; < 2200 m. NW, CaR, n SN, c&s SNH, SNE, ScV, CCo, SnFrB, GB; to BC, e N.Am; native to Eur. May–Jul

*B. diandrus* Roth RIPGUT GRASS Ann 15–120 cm. **LF**: sheath glabrous or hairy; ligule 1–3 mm; blade 2–7 mm wide, hairy. **INFL**: 6–25 cm,  $\pm$  open; lower branches gen nodding, upper branches spreading to ascending; infl branches gen 1, < or > spikelets, lower (longest) 1-branched. **SPIKELET**: 25–70 mm, not strongly flattened; glumes glabrous to scabrous, lower 12–25 mm, 1(3)-veined, upper 18–35 mm, 3(5)-veined; florets 5–8; lemma 18–35 mm, 1–2 mm wide, back rounded, teeth 3–7 mm, awn 30–65 mm, straight; anthers 0.5–1.3 mm.  $2n=28,42,56$ . Open, gen disturbed areas; < 2170 m. CA; to BC, CO, TX, S.Am; native to Eur. [*B. rigidus* Roth; *B. d. var. r.* (Roth) Sales] Apr–Jul  $\diamond$

*B. grandis* (Shear) Hitchc. TALL BROME Per 70–180 cm; st nodes 3–7. **LF**: blade, st sheath, basal sheath hairy; ligule 1–3 mm; longest blade (13)18–38 cm, 3–12 mm wide. **INFL**: 15–26 cm, open; branches spreading to nodding, hairy. **SPIKELET**: 25–35(45) mm, not strongly flattened; glume hairy, back occ glabrous, lower 5–8.5 mm, 1(3)-veined, upper 7–10(12) mm, 3-veined; lemma 11–14 mm, margin hairy, back rounded, hairy, awn 3–6 mm; anthers 3–5 mm.  $2n=14$ . Dry, open places, shrubland, oak woodland, conifer forest; 365–2400 m. n SNF, c&s SN, CW, TR, PR; Baja CA. [*B. porteri* (J.M. Coult.) Nash var. *assimilis* Burtt Davy] May–Jul

*B. hallii* (Hitchc.) Saarela & P.M. Peterson HALL'S BROME Per 90–150 cm, st nodes 1–2(3). **LF**: st sheath and basal sheath hairy; ligule 1–2 mm; longest blade 7.5–16.5 cm, 3–12 mm wide, hairy. **INFL**: 5–16 cm, open; branches erect, ascending or spreading. **SPIKELET**: 25–35(45) mm, not strongly flattened; glumes scabrous or hairy, lower 5–8(9) mm, 1(3)-veined, upper (7)8–9 mm, 3-veined; lemma 10–14 mm, back rounded, scabrous or puberulent, awn 3.5–7 mm; anthers 3–6 mm. Montane to subalpine forest; 1580–2680 m. s SN, SCoR, TR. [*B. orcuttianus* Vasey var. *h.* Hitchc.] Jun–Jul

*B. hordeaceus* L. (p. 1435) SOFT CHESS Ann 11–65 cm. **LF**: hairy; ligule 1–1.5 mm; blade 1.5–5 mm wide. **INFL**: 2.5–13 cm, dense, branches erect to spreading, some pedicels > spikelet. **SPIKELET**: 12–22 mm, not strongly flattened; glumes glabrous or hairy, lower 5–8 mm, 3–5-veined, upper 6–9 mm, 5–9-veined; lemma 6.5–10 mm, 1.9–2.5 mm wide, back rounded, glabrous or hairy, veins strongly raised, teeth < 1 mm, awn 4–10 mm, from < 1.5 mm below lemma tip, straight, occ curved; anthers 0.2–2 mm.  $2n=28$ . Fields, disturbed areas; < 1000(2560) m. CA; to BC, e US. [*B. h.* subsp. *thominei* (Nyman) Braun-Blanquet] If recognized taxonomically, pls with awn outcurved in fr,  $\pm$  flat near base, assignable to *B. hordeaceus* subsp. *divaricatus* (Bonnier & Layens) Kerguelen, *B. molliformis* Billot, *B. hordeaceus* subsp. *molliformis* (J. Lloyd) Maire & Weiller, inval. Apr–Jul  $\diamond$

*B. inermis* Leyss. SMOOTH BROME, HUNGARIAN BROME Per 45–130 cm, rhizomatous. **LF**: sheath, blade gen glabrous; ligule 0.8–3 mm; blade 5–15 mm wide. **INFL**: 10–20 cm;  $\pm$  open, branches erect. **SPIKELET**: 20–33 mm, not strongly flattened; glumes gla-

brous, lower 6–8 mm, 1(3)-veined, upper 7–10 mm, 3-veined; lemma 9–13 mm, back rounded, glabrous, scabrous, or margin hairy, awn 0–3 mm; anthers 3.5–6 mm.  $2n=28,42,56$ . Disturbed sites, roadsides; < 2700 m. NCo, KR, NCoRI, CaRH, SNH (e slope), SCoRO, SCo, SnGb, SnBr, PR, GB; to AK, e N.Am; native to Eurasia. Cult widely for forage, revegetation after fire. Mar–Aug

*B. japonicus* Thunb. JAPANESE CHESS, JAPANESE BROME Ann 17–85 cm. **LF**: sheath hairy; ligule 1–2.2 mm; blade 1.5–6 mm wide, glabrous to hairy. **INFL**: 3–26 cm,  $\pm$  open; branches spreading to ascending, lower nodding,  $\pm$  wavy, branches mostly longer than spikelets. **SPIKELET**: 20–40 mm, not strongly flattened; glumes glabrous, lower 4–7 mm, 3–5-veined, upper 5–8 mm, 5–7-veined; lemma 7–10 mm, membranous margin 0.3–0.6 mm wide, back rounded, glabrous, veins not strongly raised, teeth < 1 mm, awn 5–11 mm, straight to slightly curved, from 2–5 mm below lemma tip; anthers 0.7–1 mm.  $2n=14$ . Open, disturbed areas; < 2470 m. CA; to BC, e N.Am; native to Eurasia. May–Jul  $\diamond$

*B. laevipes* Shear CHINOOK BROME, WOODLAND BROME Per 50–160 cm. **LF**: glabrous; ligule (1.5)2–4 mm; blade 3–7 mm wide. **INFL**: 7–27 cm, open; branches nodding to spreading, upper  $\pm$  ascending. **SPIKELET**: 23–35 mm, not strongly flattened; glumes glabrous, lower 6–9 mm, 3-veined, upper 7–11 mm, 5-veined; lemma 10–15 mm, back rounded, hairy, margin hairs sometimes denser, teeth < 1 mm, awn 3–6.5 mm; anthers 3.5–5 mm.  $2n=14$ . Shrubland, conifer forest, shaded streambanks, roadsides; < 2500 m. NW, CaR, SN, ScV (Sutter Buttes), CW, SCo, ChI, WTR, PR; to WA, Baja CA. May–Jul

*B. madritensis* L. Ann 10–50 cm. **LF**: glabrous or hairy; ligule 1–3 mm; blade 1–4 mm wide. **INFL**: branches erect to ascending. **SPIKELET**: 20–50 mm, not strongly flattened; glumes glabrous to hairy, lower 3.5–13.5 mm, 1-veined, upper 6–20 mm, 3-veined; lemma 12–25 mm, back rounded, glabrous or hairy, teeth 1.5–3 mm, awn 10–25 mm, straight.  $2n=14,28$ .

subsp. *madritensis* FOXTAIL CHESS, MADRID BROME (p. 1435) **INFL**:  $\pm$  obovoid,  $\pm$  dense, most branches visible, occ > spikelets, shortest branch on lowest node 6–24 mm, longest branch on lowest node branched 0–2  $\times$ , infl internodes reduced upwards. **SPIKELET**: sterile florets  $\leq$  3; florets not overlapping at maturity. Disturbed areas, roadsides; < 2200 m. CA-FP, D (uncommon); s OR, Baja CA; native to Eur. Apr–Jan

subsp. *rubens* (L.) Husn. (p. 1435) RED BROME **INFL**: obovoid, dense; branches (exc lowest) obscure, < spikelets, shortest branch on lowest infl node  $\leq$  6 mm, longest branch on lowest node branched 2–5  $\times$ , internodes much reduced upwards. **SPIKELET**: sterile florets 3+; florets overlapping at maturity. Disturbed areas, roadsides; < 3050 m. CA; to OR, se US, n Baja CA; native to Eur. [*B. r. l.*] Mar–Jun  $\diamond$

*B. maritimus* (Piper) Hitchc. (p. 1435) MARITIME BROME Per 22–80 cm. **LF**: sheath, blade glabrous, occ scabrous; ligule 1–6 mm; blade 3–12 mm wide. **INFL**: 45–150 cm, dense, spikelets overlapping; branches ascending to erect, < spikelets. **SPIKELET**: 20–40 mm, strongly flattened; glumes glabrous or hairy, lower 8–12 mm, 3–5-veined, upper 10–13 mm, 7–9-veined; lemma 12–14 mm, strongly keeled, hairy, awn 3.5–7 mm.  $2n=84$ . Dunes, coastal meadows; < 200 m. NCo, CCo, SnFrB, n SCo, ChI; to OR. [*B. carinatus* var. *m.* (Piper) C.L. Hitchc.] Apr–Jul

*B. orcuttianus* Vasey ORCUTT'S BROME Per 75–150 cm; st nodes 2–3(4). **LF**: st sheath hairy, basal sheath glabrous; ligule 1–3 mm; blade 7–24 cm, 3–12 mm wide, glabrous, gen prow-tipped. **INFL**: 7–13.5 cm, open; branches gen ascending to spreading,  $\leq$  90° from st axis. **SPIKELET**: 20–40 mm, not strongly flattened; glumes glabrous, scabrous, or hairy, lower 5–9 mm, 1- or 3-veined, upper 7–11 mm, 3-veined; lemma 9–13 mm, back rounded, glabrous, scabrous, or hairy, awn (4)5–7(9) mm; anthers 3–5 mm.  $2n=14$ . Dry places, meadows, scrub, open forest; 560–3500 m. NW, CaR, SN, SCoRO, TR, PR, MP; to WA, w NV, Baja CA. Jun–Jul

*B. polyanthus* Shear GREAT BASIN BROME, COLORADO BROME Per 60–120 cm. **LF**: sheath and throat glabrous; ligule 2–2.5 mm;



blade 6–12 mm wide, glabrous. **INFL**: 15–25 cm; branches erect, ascending or spreading. **SPIKELET**: 30–35 mm, strongly flattened; glumes glabrous or scabrous, upper (7.5)9–11(12.5) mm, 5–7-veined; lower (5.5)7–10(11.5) mm, 3-veined; lemma 12–15 mm, strongly keeled, 7–9-veined, awn 4–8 mm; anthers 1–5 mm;  $2n=56$ . Open slopes, meadows; 1200–3100 m. c SNH (Mariposa, Tuolumne cos.); to OR, TX. [*B. polyanthus* var. *paniculatus* Shear] Aug

**B. porteri** (J.M. Coult.) Nash (p. 1435) NODDING BROME Per 32–100 cm. **LF**: ligule 1–2 mm; blade 2–5 mm wide, glabrous or slightly hairy. **INFL**: 6–20 cm, open; branches ascending to nodding. **SPIKELET**: 12–15 mm, not strongly flattened; glumes 3-veined, hairy, sometimes glabrous, lower 5–7 mm, upper 6–10 mm; lemma 7–13 mm, back  $\pm$  rounded, hairy, awn 1.5–3(4) mm; anthers 1.5–3.5(4) mm.  $2n=14$ . Exposed slopes, open woodland; 550–3500 m. NCoRI, s SNH, SCoRI, SnBr, SNÉ; to BC, MB, TX. [*B. anomalus* E. Fourn., misappl.] Jul–Aug

**B. pseudolaevipes** Wagon WOODLAND BROME Per 60–125 cm. **LF**: sheath glabrous or hairy; ligule 0.4–1(2) mm; blade 2–9 mm wide, glabrous, hairy on margin, or hairy throughout. **INFL**: 7.5–20 cm; branches erect to spreading. **SPIKELET**: 15–35 mm, not strongly flattened; glumes scabrous or hairy, lower 4–7 mm, 3-veined, upper 6–9 mm, 5-veined, lemma 10–12.5 mm, back rounded, hairy across back or only on margin, teeth  $< 1$  mm, awn 2–5.5 mm; anthers 3.5–5.5 mm.  $2n=14$ . Shaded or semi-shaded sites in chaparral, coastal-sage scrub, open woodland; 100–900 m. NCoRI, CaRH, SnFrB, SCoRO, SW. Apr–Jul

**B. racemosus** L. (p. 1435) SMOOTH BROME Ann 25–110 cm. **LF**: lower sheaths long-hairy; ligule 1–3 mm; blade 2–5 mm wide. **INFL**: 4–14 cm; narrow, branches  $< 4$  cm, 1 spikelet per branch. **SPIKELET**: 11–18 mm, not strongly flattened, not widening substantially in fr, lemma obscuring most stalks in fr; glumes glabrous, lower 4–6 mm, 3–5-veined, upper 4–7 mm, 5–9-veined; lemma 7–9 mm, 4–5 mm wide, back rounded, glabrous, margin often smoothly curved, veins not strongly raised, teeth  $< 1$  mm, awn 5–9 mm,  $\pm$  equal, from  $< 1.5$  mm below lemma tip; anthers 1.5–3 mm; fr flat or C-shaped in  $\times$ -section.  $2n=28$ . Disturbed areas, roadsides; 60–1850 m. KR, NCoRO, NCoRI, SNF, GV, CCo, SnFrB, SnBr, MP; to BC, e US; native to Eur. May–Jul

**B. richardsonii** Link (p. 1435) RICHARDSON'S BROME Per 47–110 cm; upper st nodes gen glabrous. **LF**: basal sheath densely, short- to medium-hairy, upper sheath glabrous; ligule 1–2 mm; blade 3–9 mm wide. **INFL**: 9–22 cm, open; branches erect to nodding. **SPIKELET**: 24–35 mm, not strongly flattened; glumes glabrous or scabrous, lower 7.1–10 mm, 1(3)-veined, upper (7.8)8.9–11.3(13.2) mm, 3-veined; lemma 9–13.5 mm, margin hairy along lower 1/2 to 3/4, back rounded, sparsely to densely hairy with hairs  $> 0.1$  mm, awn 3–6 mm; anthers (1.2)1.6–2.7(3.4) mm; fr (6.9)7.7–9.7(10.5) mm.  $2n=28$ . Meadows, open woodland; 1200–3600 m. c&s SNH, SCoRO, SnBr, e PR, e DMoj; to AK, WY, w TX, Mex. [*B. ciliatus* var. *r.* (Link) B. Boivin] Jul–Sep

**B. secalinus** L. (p. 1435) RYE BROME Ann 45–100 cm. **LF**: sheath glabrous or sparsely short-hairy; ligule 1–3 mm; blade 4–12 mm wide, hairy. **INFL**: 8–17 cm,  $\pm$  open; branches spreading to ascending, nodding in fr. **SPIKELET**: 12–24 mm, not strongly flattened, widening in fr, many stalks becoming visible as lemma wraps around fr; glumes glabrous, lower 5–7 mm, 3–5-veined, upper 6–9 mm, 5–9-veined; lemma 8–11 mm, 4–5 mm wide, back rounded, glabrous or hairy, veins not strongly raised, teeth  $< 1$  mm, awn (0)3–9.5 mm, from  $< 1.5$  mm below lemma tip; anthers 1.2–2.5 mm; fr U- and V-shaped in  $\times$ -section.  $2n=14,28$ . Open, disturbed areas;  $< 1500$  m. NW, CaR, n&c SN, n SnFrB, SnBr, MP; to BC, e US; native to Eur. May–Jul

**B. sitchensis** Trin. SITKA BROME, ALASKA BROME Per 40–145 cm. **LF**: sheath glabrous; ligule 3–4 mm; blade glabrous or hairy, 1–4 mm wide. **INFL**: 19–36 cm, open; branches ascending, spreading to nodding; lower branches 10–20 cm. **SPIKELET**: 25–41 mm, strongly flattened, keeled; glumes glabrous (hairy), lower 8–11 mm, 3–5-veined, upper 10–13 mm, 5–7-veined; lemma, 12–15 mm, back  $\pm$  rounded, strongly keeled, glabrous, sometimes hairy, awn 5–10 mm; anthers to 6 mm.  $2n=42,56$ . Rocky bluffs, cliffs, meadows, forest edges, disturbed areas;  $< 1670$  m. SW; to AK. Mar–Jun

**B. squarrosus** L. (p. 1435) CORN BROME Ann 10–43 cm. **LF**: sheath hairy; ligule 0.5–2 mm; blade hairy or glabrous, 2.5–10 mm wide. **INFL**: 5–10.5 cm, open, often appearing 1-sided; spikelets 1(2) per branch; 1+ lower branches gen  $>$  spikelets,  $\pm$  wavy. **SPIKELET**: 14–35 mm, not strongly flattened; glumes glabrous, lower 4.5–7 mm, 3–5(7)-veined, upper 6–9.5 mm, 7-veined; florets 7–18; lemma 8.2–11 mm, membranous margin 0.6–0.9 mm wide, back rounded, glabrous or minutely scabrous, teeth  $< 1$  mm, awn 8–11.7 mm, from 1.5+ mm below tip; anthers 0.5–1.6 mm.  $2n=14$ . Open, disturbed areas, roadsides;  $< 1494$  m. MP; to BC, c N.Am; native to Eurasia. Jul

**B. sterilis** L. (p. 1435) POVERTY BROME Ann 25–85 cm. **LF**: sheath hairy; ligule 2–2.5 mm; blade 2–5 mm wide, hairy or glabrous. **INFL**: 10–25 cm, open; lower branches ascending to nodding, upper branches ascending, branches gen  $>$  spikelets (shorter when infl reduced to 1(3) spikelets), simple, lower branches sometimes branched 1  $\times$ ; spikelets 1(3) per branch. **SPIKELET**: 20–35 mm, not strongly flattened; glumes glabrous or scabrous, upper 7.5–21 mm, 3(5)-veined, lower 6–14 mm, 1(3)-veined; florets 6–11; lemma 13–20 mm, back rounded, glabrous to scabrous, teeth 0–22 mm, awn 15–30 mm, straight; anthers 0.5–2 mm.  $2n=42,56$ . Open, disturbed areas;  $< 1100$  m. NW, CaRF, SNF, n SNH, GV, SnFrB, SCoRO, s ChI, SCo, WTR (w Santa Susana foothills), PR (Otay Mtn); to BC, e N.Am; native to Eurasia. Mar–Jun

**B. suksdorfii** Vasey (p. 1435) SUKSDORF'S BROME Per 45–95 cm. **LF**: glabrous; ligule 0.5–2 mm; blade 4–11 mm wide. **INFL**: 6.5–13 cm,  $\leq 2$  cm wide, narrow; branches erect to ascending. **SPIKELET**: 15–30 mm, not strongly flattened; glumes glabrous or sparsely hairy, lower 7–10 mm, 1(3)-veined, upper 8–13 mm, 3-veined; lemma 10–14 mm, back rounded, glabrous to hairy, awn 2–5.5 mm; anthers 2.2–3.5 mm.  $2n=14$ . Rocky slopes, meadows, conifer forest; 1250–3300 m. KR, NCoRH, CaR, SNH, SCoRO, MP; to WA. Jun–Aug

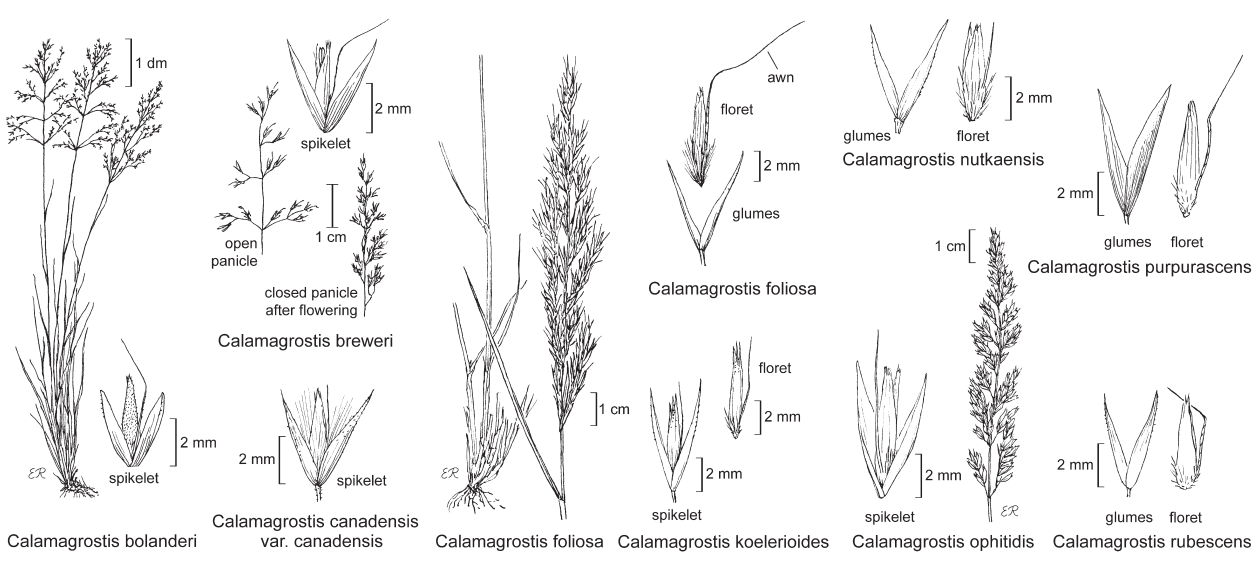
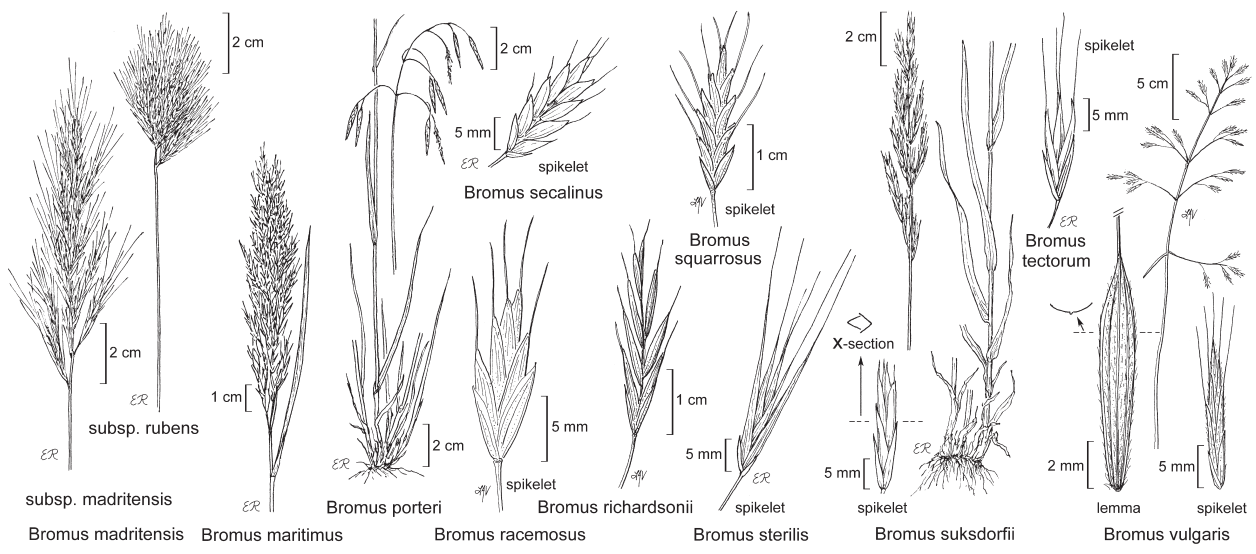
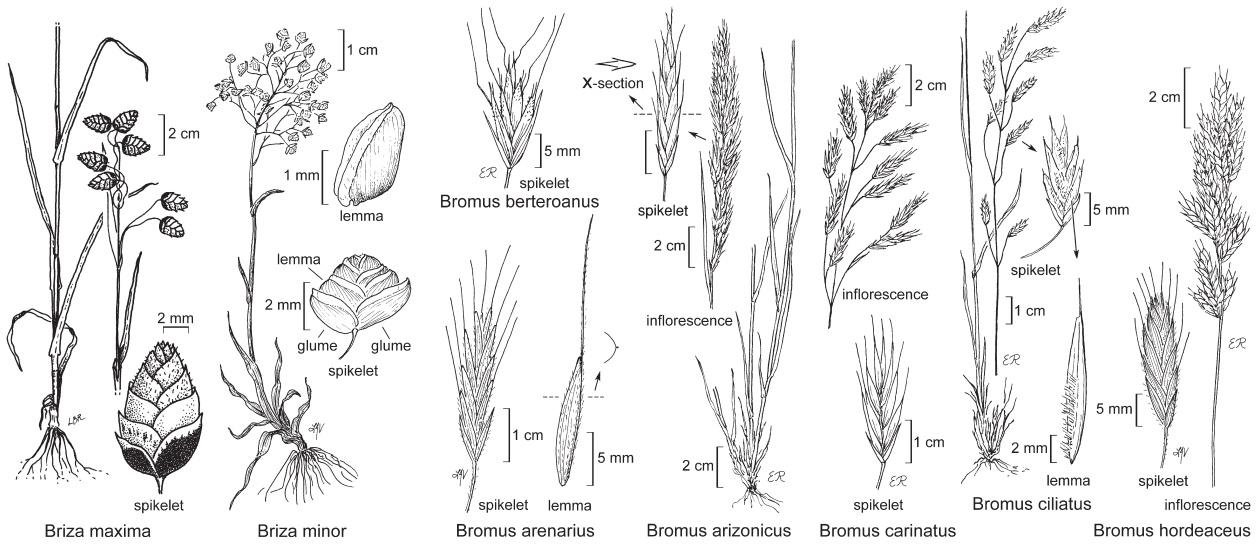
**B. tectorum** L. (p. 1435) CHEAT GRASS, DOWNY CHESS Ann 5–40 cm. **LF**: sheath hairy (sometimes glabrous); ligule 2–3 mm; blade glabrous to hairy, gen long-hairy near base, 1–5 mm wide. **INFL**: 6–22 cm; open; branches spreading to nodding; spikelets 1–14 per branch; branches  $<$  or  $>$  spikelets, 1–5  $\times$  branched. **SPIKELET**: 10–20 mm, not strongly flattened; glumes glabrous to hairy, lower 4–9 mm, 1(3)-veined, upper 7–13.5 mm, 3(5)-veined; florets 3–7; lemma 9–13 mm, back rounded, glabrous to hairy, teeth 1–3 mm, awn 8–18 mm, straight; anthers 0.5–1.3 mm.  $2n=14$ . Open, disturbed areas;  $< 3400$  m. CA; N.Am; native to Eurasia. [*B. t.* var. *glabratus* Spenn.] Invasive. May–Aug  $\diamond$

**B. vulgaris** (Hook.) Shear (p. 1435) COLUMBIA BROME Per 45–110 cm; nodes (3)4–6(7). **LF**: ligule (2)3–6(7) mm; blade 13–25(33) cm, 3–14 mm wide, gen hairy on upper surface. **INFL**: 8–22 cm,  $> 2$  cm wide, open; branches ascending to nodding, glabrous or scabrous. **SPIKELET**: 15–30 mm, not strongly flattened; glumes glabrous or hairy, lower 4–9 mm, 1(3)-veined, upper 5–10 mm, 3-veined; lemma 10–16 mm, margin hairy, back rounded, glabrous to hairy, awn (4)6–11 mm; anthers 2–3.5(4) mm.  $2n=14$ . Shady to open rocky woodland, ravines, meadows;  $< 1900$  m. NW, CaR, n&c SN, CW (exc SCoRI); to BC, MT, WY. May–Aug

## CALAMAGROSTIS REED GRASS

Paul M. Peterson & Jeffery M. Saarela

Per, gen from rhizomes. **ST**: 1–15 dm, gen not branched,  $\pm$  smooth; nodes (1)2–8. **LF**: gen basal and cauline; sheath smooth or scabrous; ligule membranous; blade flat to inrolled. **INFL**: panicle-like, open to dense; branches  $\pm$  drooping to appressed; spikelets ascending to appressed. **SPIKELET**: glumes subequal, gen lanceolate, acute to acuminate, lower gen 1-veined, upper



# The Jepson Manual

## Vascular Plants of California

SECOND EDITION



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