

8. BOLBOSCHOENUS (Ascherson) Palla in Hallier & Brand, Syn. Deut. Schweiz. Fl., ed. 3, 3: 2531. 1905.

三棱草属 san leng cao shu

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Scirpus [unranked] *Bolboschoenus* Ascherson, Fl. Brandenburg 1: 753. 1864.

Herbs, perennial. Rhizomes often forming hard ovoid tubers. Culms many nodose, base bulbously thickened. Leaves basal and cauline; sheath tubular; ligule absent; leaf blades linear, flat. Involucral bracts leaflike, surpassing inflorescence, spreading. Inflorescence a terminal anthela or capitate with 1 to many spikelets. Spikelets with many spirally arranged deciduous glumes, each subtending a bisexual flower. Perianth bristles 3–6, shorter to longer than nutlet, deciduous with nutlet. Stamens 3. Style base not distinct, slightly thickened or not, persistent. Nutlet biconvex to 3-sided, smooth, apex beaked.

About eight species: mainly in North America and E Asia; four species in China.

A hybrid, *Scirpus* × *mariqueter* Tang & F. T. Wang (Fl. Reipubl. Popularis Sin. 11: 223. 1961), was originally described from Beijing. It was believed to be a hybrid of *Bolboschoenus planiculmis* and *Schoenoplectus triqueter*. Specimens have since been collected from Shanxi. Under current generic concepts, it is considered an intergeneric hybrid, × *Bolboschoenoplectus mariqueter* (Tang & F. T. Wang) Tatanov (Novosti Sist. Vyssh. Rast. 39: 154. 2007).

- 1a. Nutlet 3-sided; stigmas 3; perianth bristles almost as long as nutlet; inflorescence a simple anthela 1. *B. yagara*
- 1b. Nutlet biconvex; stigmas 2; perianth bristles ca. 1/2 as long as nutlet; inflorescences capitate and rarely with short rays or reduced to a single spikelet.
- 2a. Glumes pale yellow; anthers ca. 1 mm; nutlet 2–2.5 mm 3. *B. affinis*
- 2b. Glumes bright orangish brown, brown, or dark brown; anthers 2–4 mm; nutlet 2.5–3.5 mm.
- 3a. Glumes brown to dark brown; nutlet 3–3.5 mm 2. *B. planiculmis*
- 3b. Glumes bright orangish brown; nutlet ca. 2.5 mm 4. *B. maritimus*

1. *Bolboschoenus yagara* (Ohwi) Y. C. Yang & M. Zhan, Acta Biol. Plateau Sin. 7: 14. 1988.

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Scirpus yagara Ohwi, Mem. Coll. Sci. Kyoto Imp. Univ., Ser. B, Biol. 18: 110. 1943; *S. fluviatilis* (Torrey) A. Gray var. *yagara* (Ohwi) T. Koyama.

Rhizomes long creeping, blackish brown, 3–6 mm thick, terminated by a tuber; tuber globose to depressed obovoid, 2–3 × 3–4 cm, woody, covered with blackish to purplish brown membranous broad scales. Culms solitary from a tuber, 0.6–1.5 m tall, sharply 3-angled, smooth. Leaves as long as or overtopping culm; sheath 5–20 cm, front with veins nearly to summit (i.e., lacking veinless area); blade broadly linear, 5–10 mm wide, ± stiff, margin scabrous. Involucral bracts 3 or 4, leaflike, usually longer than inflorescence. Inflorescence a simple anthela; rays 3–8, unequal, to 7 mm, smooth, each terminated by a single spikelet or a cluster of 2 or 3(or 4) spikelets. Spikelets rust-colored brown, ovoid to oblong, 1–2 × 0.5–0.8(–1) cm, many flowered. Glumes rust-colored brown, densely imbricate, oblong, ca. 7 mm, membranous, abaxially minutely pubescent, 1-veined costa projected beyond apex forming a recurved 2–3 mm scabrous awn, apex 2-cleft and lacerate. Perianth bristles 6, almost as long as nutlet, retrorsely scabrous. Stamens 3; anthers linear, ca. 4 mm. Style slender; stigmas 3. Nutlet grayish brown, obovoid, 3-sided, base cuneate-attenuate, apex contracted to a conic short beak. Fl. and fr. May–Jul.

Lake margins, shallow water, marshes, wet places; near sea level to 200 m. Anhui, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jilin, Liaoning, NE Nei Mongol, Shandong, Xinjiang, Yunnan,

Zhejiang [India, Japan, Kazakhstan, Korea, Russia, Vietnam; Europe].

2. *Bolboschoenus planiculmis* (F. Schmidt) T. V. Egorova in Grubov, Rast. Tsentral. Azii 3: 20. 1967.

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Scirpus planiculmis F. Schmidt, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 12(2) [Reis. Amur-Land., Bot.]: 190. 1868.

Rhizomes creeping, terminated in a globose tuber. Culms solitary from a tuber, 60–100 cm tall, usually ± slender, 3-angled, smooth. Leaves basal, shorter to slightly overtopping inflorescence; sheath brownish, 5–16 cm; leaf blade linear, 2–5 mm wide, flat, apex acuminate. Involucral bracts 1–3, leaflike, often surpassing inflorescence, margin scabrous. Inflorescences of 1–6 spikelets, capitate or simple paniculate; rays 1 to few, short, each terminated by 1 to few spikelets. Spikelets rust-colored brown, ovoid to oblong-ovoid, 10–16 × 4–8 mm, many flowered. Glumes brown to dark brown, oblong to elliptic, 6–8 mm, membranous, abaxially sparsely pubescent, 1-veined costa projected beyond apex forming an awn, apex lacerate. Perianth bristles 4–6, 1/2–2/3 as long as nutlet, retrorsely scabrous. Stamens 3; anthers linear, 3–4 mm; connective apex ca. 0.5 mm. Style slender; stigmas 2. Nutlet broadly obovoid to obovoid, 3–3.5 mm. Fl. May–Jan, fr. Jul–Sep. *2n* = 50, 52, 56, 108.

Wet places by lakes and riverbanks, swampy areas; near sea level to 2900 m. Anhui, Gansu, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Taiwan, Xinjiang, Yunnan, Zhejiang [India, Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Papua New Guinea, Philippines, Russia, Tajikistan; SW Asia, Europe].

3. *Bolboschoenus affinis* (Roth) Drobow, Trudy Bot. Muz. Imp. Akad. Nauk 16: 139. 1916.

球穗三稜草 qiu sui san leng cao

Scirpus affinis Roth in Roemer & Schultes, Syst. Veg. 2: 140. 1817; *Bolboschoenus popovii* T. V. Egorova; *B. strobilinus* (Roxburgh) V. I. Kreczetowicz; *S. maritimus* Linnaeus subsp. *affinis* (Roth) T. Koyama; *S. maritimus* var. *affinis* (Roth) C. B. Clarke; *S. strobilinus* Roxburgh.

Rhizomes creeping, terminated by a small ovoid tuber. Culms 10–50 cm tall, 3-angled, smooth. Leaf blade linear, 1–4 mm wide, flat, ± stiff, apical ones longer than or as long as culm. Involucral bracts 2 or 3, leaflike, overtopping inflorescence. Inflorescences of 1–10 spikelets, capitate, rarely with short rays. Spikelets ovoid, 10–16 × 3.5–7 mm, many flowered. Glumes pale yellow, oblong-ovate, 5–6 mm, membranous, abaxially ± pubescent, 1-veined costa excurrent into an awn, apex lacerate. Perianth bristles 6, ca. 1/2 as long as nutlet, retrorsely scabrous. Stamens 3; anthers linear-oblong, ca. 1 mm; connective apex conic, ca. 0.5 mm. Style slender; stigmas 2. Nutlet yellowish white but becoming dark brown at maturity, broadly obovoid, ca. 2.5 mm, biconvex, shiny. Fl. and fr. Jun–Sep.

Lake margins, swampy places (often alkaline), wood margins; 1000–2900 m. Gansu, W Nei Mongol, Ningxia, Qinghai, Xinjiang [Afghanistan, Cambodia, India, Japan, Kazakhstan, Laos, Mongolia, Pakistan, Russia, Thailand, Turkmenistan, Uzbekistan, Vietnam; SW Asia, Europe].

This taxon is part of an inadequately studied worldwide complex centered around *Bolboschoenus maritimus*.

4. *Bolboschoenus maritimus* (Linnaeus) Palla in Hallier & Brand, Syn. Deut. Schweiz. Fl., ed. 3, 3: 2531. 1905.

海滨三稜草 hai bin san leng cao

Scirpus maritimus Linnaeus, Sp. Pl. 1: 51. 1753; *Schoenoplectus maritimus* (Linnaeus) Lye.

Rhizomes creeping, terminated by a small ovoid tuber. Culms 25–50[–150] cm tall, 3-angled, smooth. Leaf sheath fronts with veinless triangular to rhombic area at summit; leaf

blade linear, 2–6[–12] mm wide, flat, ± stiff, apical ones longer than or as long as culm. Involucral bracts 2 or 3, leaflike, overtopping inflorescence. Inflorescences of 1–10 spikelets, capitate [rarely with short rays]. Spikelets ovoid to narrowly ovoid, 10–16 × 3.5–7 mm, many flowered. Glumes bright orangish brown to stramineous, oblong-ovate, 5–8 mm, membranous, abaxially ± pubescent, 1-veined costa excurrent into a 1–3 mm awn, apex 2-cleft. Perianth bristles 6, ca. 1/2 as long as nutlet, retrorsely scabrous, usually not persistent on nutlet. Stamens 3; anthers linear-oblong, 2–4 mm; connective apex conic, ca. 0.5 mm. Style slender; stigmas 2, ± as long as style. Nutlet dark brown, broadly obovoid, ca. 2.5 mm, biconvex [compressed 3-sided], shiny, apex rounded to truncate. Fl. and fr. Jun–Sep. $2n = 64, 104, 112$.

Coastal marshes; near sea level. Taiwan, Xinjiang [Afghanistan, India, Japan, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Turkmenistan, Uzbekistan; Africa, SW Asia, Atlantic Ocean islands, Europe, North and South America, Pacific islands].

This species is known in Taiwan from a single collection: Taiwan: “Takow,” *A. Henry 1818* (MO).

