

COSTACEAE

闭鞘姜科 *bi qiao jiang ke*

Wu Delin (吴德邻 *Wu Te-lin*)¹; Kai Larsen²

Herbs perennial, terrestrial, not aromatic, with ± fleshy rhizomes. Stems usually simple, often long, terete, sometimes spirally contorted, leafy; secondary branches (if present) breaking through leaf sheaths. Leaves spirally arranged, simple, those toward base of stem usually bladeless; leaf sheath tubular, closed; ligule present; petiole short; leaf blade narrowly to broadly elliptic, rolled longitudinally in bud, glabrous or hairy, margin entire. Inflorescence a conelike spike, terminal on leafy shoots or on separate, short, leafless shoots arising from rhizomes; bracts imbricate, with linear, nectariferous callus below apex, 1- or 2-flowered; bracteoles tubular or folded. Flowers bisexual, epigynous, zygomorphic. Calyx tubular, 2- or 3-lobed or -toothed. Corolla proximally tubular, distally 3-lobed; lobes unequal, imbricate in bud. Stamines 5, united into a labellum equaling or much longer than corolla, often ± 3-lobed with crisped margin, never deeply lobed. Fertile stamen 1; filament broad; anther borne below apex of filament or at apex with a connective crest, introrse, dehiscing by longitudinal slits. Ovary inferior, 2- or 3-loculed; ovules many per locule; placentation axile. Developed style 1, filiform, usually enclosed between anther locules; stigma with or without abaxial appendage. Stylodes 2, reduced to septal, hollow nectaries at apex of ovary, or absent. Fruit a capsule, 2- or 3-valved and dehiscing loculicidally, or indehiscent and breaking up irregularly, apex with persistent calyx. Seeds numerous, black, arillate.

Four genera and ca. 120 species: pantropical with center of diversity in America; one genus and five species (two endemic) in China.

Tsai Hsi-tao & Tong Shao-quan. 1981. Zingiberaceae subfam. Costoideae. *In*: Wu Te-lin, ed., *Fl. Reipubl. Popularis Sin.* 16(2): 148–152.

1. *COSTUS* Linnaeus, *Sp. Pl.* 1: 2. 1753.

闭鞘姜属 *bi qiao jiang shu*

Rhizomes horizontal, tuberous. Stems sometimes branched, usually spirally twisted, leafy, rarely plants stemless. Leaf blade oblong to lanceolate. Inflorescences terminal or lateral on separate, short, leafless shoots arising from rhizomes, conical, densely many flowered; bracts imbricate, 1- or 2-flowered. Calyx 3-lobed or -toothed at apex. Corolla tube equaling or longer than calyx. Labellum obovate, large, margin incurved. Stamen petaloid; anther locules linear. Ovary 3-loculed; ovules many per locule, superposed. Style filiform; stigma funnelform. Stylodes absent. Capsule subglobose or ovoid, woody. Seeds many, black; aril lacerate.

About 90 species: tropical and subtropical regions; five species (two endemic) in China.

- 1a. Inflorescences arising from rhizomes near base of leafy shoots; peduncle 4–13 cm; leaf blade glabrescent on both surfaces 1. *C. tonkinensis*
- 1b. Inflorescences borne at apex of leafy shoots; leaf blade densely hairy abaxially.
 - 2a. Leaf blade densely villous or hirsute abaxially; apex of bracts not sharply pointed, breaking into fibers when old.
 - 3a. Labellum white; bracts oblong; bracteoles narrowly oblong; calyx teeth acute at apex; stamen elliptic, apex not convex 2. *C. oblongus*
 - 3b. Labellum pink; bracts ovate or broadly so; bracteoles ovate; calyx teeth rounded at apex; stamen oblong, apex convex 3. *C. lacerus*
 - 2b. Leaf blade densely sericeous abaxially; apex of bracts sharply pointed, not breaking into fibers when old.
 - 4a. Labellum white; bracts red; stamen urceolate; calyx red, apex with a reddish black, rigid, densely sericeous point 4. *C. speciosus*
 - 4b. Labellum pink; bracts green; stamen oblong; calyx green, apex with a golden, rigid, glabrescent point 5. *C. viridis*

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1. *Costus tonkinensis* Gagnepain, Bull. Soc. Bot. France 49: 248. 1902.

光叶闭鞘姜 *guang ye bi qiao jiang*

Stems 2–4 m. Branchlets spirally twisted. Leaf blade obovate-oblong, 12–20 × 4–8 cm, glabrescent, base attenuate or subrounded, apex acute. Inflorescences arising from rhizomes, globose or ovoid, ca. 8 cm in diam.; peduncle 4–13 cm; bracts imbricate, oblong, 2.5–4.5 cm, apex sharply pointed; bracteoles 1–1.4 cm, apex sharply pointed. Flowers yellow. Calyx ca. 3 cm, apex slightly widened, 3-toothed; teeth acute at apex. Corolla longer than calyx; lobes linear-lanceolate, subequal, ca. 3.2 cm. Labellum trumpet-shaped, 5–6 cm, base slightly narrowed, margin crisped. Stamen yellowish, petaloid, apex emarginate. Ovary 3-angled. Capsule globose, ca. 1 cm in diam. Seeds black. Fl. Jul–Aug, fr. Sep–Nov. $2n = 18^*$.

Forest floors. Guangdong, Guangxi, Yunnan [Vietnam].

Medicinal.

2. *Costus oblongus* S. Q. Tong, Acta Phytotax. Sin. 27: 291. 1989.

长圆闭鞘姜 *chang yuan bi qiao jiang*

Stems 1.8–3 m. Leaf sheaths green, apex densely white pubescent and white long ciliate; leaf blade subsessile, elliptic or lanceolate-elliptic, 18–33 × 6–14 cm, adaxially glabrous, abaxially densely villous, base rounded or cuneate, apex acuminate. Inflorescences terminal, ovoid or broadly so, 4–13 × 3–9 cm; bracts bright red, oblong, 2.8–4 × 1.2–1.6 cm, densely villous, apex breaking into fibers when old; bracteoles pink, narrowly oblong, plicate, ca. 3.2 cm. Calyx pink, ca. 2 cm, densely pubescent, apex 3-toothed; teeth acute and ciliate at apex. Corolla tube white, ca. 1 cm; lobes subequal, central one elliptic, ca. 4.5 × 2.2 cm, apex red spotted. Labellum white, trumpet-shaped, 5–6 cm in diam., margin crisped. Stamen elliptic, ca. 4.5 × 1.5 cm; anther narrowly elliptic, inserted distally on stamen. Ovary red, densely white hairy. Fl. Aug.

• Forest margins; ca. 1200 m. S Xizang, W Yunnan.

3. *Costus lacerus* Gagnepain, Bull. Soc. Bot. France 50: 261. 1903.

莒筭花 *wo sun hua*

Costus chinensis T. L. Wu & S. J. Chen.

Stems 1–2 m. Leaf sheaths hirsute when young, glabrescent when old, apex ciliate; leaf blade subsessile, elliptic or lanceolate-oblong, 25–35 × 7–13 cm, adaxially glabrescent, abaxially hirsute, base attenuate, apex acute. Inflorescences terminal, ovoid, 6–11 × 4.5–7.5 cm; bracts ovate or broadly so, 3–5 × 1.5–2 cm, hirsute, breaking into fibers when old; bracteoles ovate. Flowers pink. Calyx oblong, ca. 3 cm, split to base on 1 side, apex 3-toothed; teeth ca. 1.5 × 1 cm, yellow, rounded, and hirsute at apex. Corolla tube ca. 1.5 cm; lobes oblong, 3.5–5 × 2.5–3 cm. Labellum pink, trumpet-shaped, ca. 9 × 6–7 cm, margin crisped. Stamen petaloid, oblong, ca. 5 × 1.2 cm, apex convex. Capsule ellipsoid, ca. 2.5 cm, hirsute, dehiscing loculicidally, apex with persistent calyx. Seeds black. Fl. May–Jul, fr. Sep–Nov. $2n = 18^*$.

Moist places in forests; 1100–2200 m. Guangxi, Xizang, Yunnan [Bhutan, N India, Sikkim, N Thailand].

4. *Costus speciosus* (J. König) Smith, Trans. Linn. Soc. London 1: 249. 1791.

闭鞘姜 *bi qiao jiang*

Banksea speciosa J. König in Retzius, Observ. Bot. 3: 75. 1783; *Costus formosanus* Nakai.

Stems 1–3 m, base slightly woody, apex branched and spirally twisted when old. Petiole 5–7 mm; leaf blade oblong or lanceolate, 15–20 × 6–10 cm, abaxially densely sericeous, base subrounded, apex acuminate or caudate-acuminate. Inflorescences terminal, ellipsoid or ovoid, 5–15 cm; bracts bright red, ovate, ca. 2 cm, leathery, pubescent, apex sharply pointed; bracteoles pale red, 1.2–1.5 cm. Calyx red, 1.8–2 cm, leathery, apex 3-lobed; lobes reddish black, rigid, and densely sericeous at apex. Corolla tube ca. 1 cm; lobes oblong-elliptic, ca. 5 cm, apex white or red. Labellum white, trumpet-shaped, 6.5–9 cm, apex toothed and crisped, with edges overlapping. Stamen petaloid, white with orange-yellow base, urceolate, ca. 4.5 × 1.3 cm, pubescent. Capsule red, globose, ca. 1.5 cm, slightly woody. Seeds black, glossy, ca. 3 mm. Fl. Jul–Sep, fr. Sep–Nov. $2n = 18, 27^*$, 36.

Forest margins, moist places in valleys, roadsides; near sea level to 1700 m. Guangdong, Guangxi, Taiwan, Yunnan [Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam; Australia].

Medicinal.

5. *Costus viridis* S. Q. Tong, Acta Phytotax. Sin. 27: 289. 1989.

绿苞闭鞘姜 *lu bao bi qiao jiang*

Stems 2–3 m. Leaf sheaths green, white sericeous; leaf blade subsessile, ovate or elliptic, 24–30 × 6–9 cm, adaxially glabrescent, abaxially densely sericeous, base cuneate or rounded, apex shortly acuminate. Inflorescences terminal, broadly ovoid, ca. 6 × 5 cm; bracts imbricate, green, ovate or broadly so, 3.5–4 × 1.8–2.4 cm, leathery, margin membranous, apex brown, sharply pointed; bracteoles ovate, ca. 2.5 cm. Calyx green, ca. 2 cm, leathery, apex 3-lobed; lobes deltoid, golden, rigid, and glabrescent at apex. Corolla tube white, ca. 1 cm; lobes pink, central one elliptic, ca. 6 × 3.2 cm, lateral one ovate. Labellum pink, trumpet-shaped, 5–5.5 cm in diam., margin crisped. Stamen oblong, ca. 5 × 1.8 cm, glabrescent with pubescent abaxial part. Ovary green, glabrescent. Fl. Jun.

• Moist places in forests; ca. 1000 m. W Yunnan (Wanding Zhen).

