

2. OTTELIA Persoon, Syn. Pl. 1: 400. 1805.

海菜花属 hai cai hua shu

Boottia Wallich; *Oligolobos* Gagnepain.

Herbs, freshwater. Stems usually cormlike. Leaves all basal, petiolate, usually sheathing at base; blades submerged or sometimes floating, linear to broadly ovate, 3–11-veined. Spathe elliptic or ovate, usually 2–6-winged, apex bifid or trifid, with 1 to many flowers. Flowers bisexual or unisexual and plants dioecious. Male flowers with longer pedicel. Bisexual and female flowers shortly pedicellate or without pedicel. Sepals 3, greenish, linear, oblong, or ovate. Petals 3, colored, orbicular to broadly obovate, much longer and wider than sepals. Stamens 3–15; filaments linear, flattened; anthers laterally dehiscent; staminodes (absent or 1–)3, often present in female flowers. Ovary of 3, 6, or 9 (or more) carpels; ovules numerous; stigmas 2 per style, linear. Fruit cylindrical, fusiform, or conic. Seeds numerous, small, often hairy.

About 21 species: tropical to temperate areas; five species (two endemic) in China.

1a. Flowers bisexual.

2a. Spathe with only 1 flower; flowers without gland; leaf sheath absent 1. *O. alismoides*

2b. Spathe with many flowers; flowers with gland; leaves sheathed at base 2. *O. balansae*

1b. Flowers unisexual.

3a. Female spathe with 2–9 female flowers; styles 3; fruit triangular-cylindric to fusiform 5. *O. acuminata*

3b. Female spathe with only 1 female flower; styles more than 3; fruit oblong.

4a. Leaves dimorphic, submerged and floating; seeds smooth; male spathe with 10–30 male flowers 3. *O. cordata*

4b. Leaves not dimorphic, emerged; seeds densely hairy; male spathe with 47–60 male flowers 4. *O. emersa*

1. *Ottelia alismoides* (Linnaeus) Persoon, Syn. Pl. 1: 400. 1805.

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Stratiotes alismoides Linnaeus, Sp. Pl. 1: 535. 1753; *Damasonium alismoides* (Linnaeus) R. Brown; *D. indicum* Willdenow, nom. illeg. superfl.; *Ottelia alismoides* f. *oryztorum* Komarov; *O. condorensis* Gagnepain; *O. dioecia* S. Z. Yan; *O. indica* Planchon ex Dalzell & A. Gibson, nom. illeg. superfl.; *O. japonica* Miquel; *S. quinquealatus* Stokes, nom. illeg. superfl.

Petiole varying greatly in length according to depth of water; leaf blade wholly submerged, varying greatly in shape and size, usually broadly ovate, ovate-elliptic, suborbicular, cordate, or sometimes lanceolate, ca. 20 × 18 cm or more, membranous. Flowers bisexual or plants occasionally dioecious-polygamous. Spathe 2.5–4 × 1.5–2.5 cm, 2- or 3-lobed at apex, with 3–6 longitudinal wings. Flowers solitary, sessile. Petals white, slightly purple, or bluish. Stamens 3–9(–12); filaments glandular hairy; anthers narrowly oblong, 3–4 mm. Ovary subglobose, with 3–9(or 10) carpels; styles 6–10, deeply 2-lobed. Fruit 2–5 × 0.8–1.8 cm. Seeds fusiform, 1–2 mm, densely hairy. Fl. and fr. Apr–Oct. *2n* = 44.

Still or running water. Anhui, Fujian, Guangdong, Guangxi, Guizhou, NW Hainan, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [Cambodia, India, Indonesia, Japan (including Ryukyu Islands), Korea, Laos, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Thailand, Sri Lanka, Vietnam; Africa, Australia; introduced in North America].

2. *Ottelia balansae* (Gagnepain) Dandy, J. Bot. 72: 137. 1934.

贵州水车前 gui zhou shui che qian

Oligolobos balansae Gagnepain, Bull. Soc. Bot. France 54: 543. 1907; *Boottia sinensis* H. Lévillé & Vaniot; *Ottelia*

demersa H. Li & C. X. You; *O. sinensis* (H. Lévillé & Vaniot) H. Lévillé ex Dandy.

Leaves wholly submerged, translucent, young leaves linear or lanceolate, mature ones usually oblong or ovate, 20–40 × 6–9 cm, base truncate, rounded, or cordate, apex acute or rounded; petiole ca. 20 cm. Spathe elliptic, 3–6 × ca. 1.5 cm, with many longitudinal ribs and often with wings on lateral sides, with 3–11 flowers. Flowers bisexual. Sepals green. Petals white with yellow base, obtriangular or obovate, 2–3 × ca. 2.5 cm. Stamens 3; filaments 4–5 mm; anthers elliptic, 4–5 mm; glands 3. Ovary triangular-cylindric, with 3 carpels; styles 3, hairy; stigmas 6, hairy. Fruit narrowly elliptic, 5–9 cm × ca. 8 mm. Seeds cylindrical to fusiform, ca. 3 mm. Fl. and fr. Jun–Nov.

Ponds, rivers, lakes. Guangxi, Guizhou, Yunnan [Vietnam].

3. *Ottelia cordata* (Wallich) Dandy, J. Bot. 72: 137. 1934.

水菜花 shui cai hua

Boottia cordata Wallich, Pl. Asiat. Rar. 1: 52. 1830; *B. heterophylla* Merrill & F. P. Metcalf; *Ottelia heterophylla* (Merrill & F. P. Metcalf) T. L. Wu.

Leaves dimorphic; submerged leaves narrowly elliptic to ligulate, 30–60 × 4.5–10 cm; floating leaves broadly lanceolate or oblong-ovate, 10–20 × 4–10 cm, base cordate, apex acute to acuminate; petiole 30–120 cm. Flowers unisexual. Spathe oblong-ovate, 3.5–8 × 1.5–2 cm, with 6 longitudinal ribs, bifid at apex. Male spathe with 10–30 male flowers; sepals yellowish; petals white, obovate, 2.5–4.5 cm; stamens 12; filaments densely hairy; anthers ca. 6 mm; staminodes 3; reduced pistil 1; glands 3. Female spathe with only 1 female flower; perianths similar to male ones; ovary oblong, with 9–15 carpels; styles 9–18, papillate, bifid at apex; staminodes 3–8; glands 3. Fruit oblong, 4–4.5 × 1.6–2 cm. Seeds fusiform, ca.

1.5 mm, smooth. Fl. May. $2n = 22$.

Ponds, channels. Hainan [Cambodia, Myanmar, Thailand].

4. *Ottelia emersa* Z. C. Zhao & R. L. Luo, J. Wuhan Bot. Res. 5: 339. 1987.

出水水菜花 chu shui shui cai hua

Leaves emersed; petiole 45–90 cm; leaf blade narrowly cordate, 9–20 × 4.5–14 cm, leathery, base cordate, apex obtuse. Flowers unisexual. Spathe 5–7.5 × 3–3.5 cm, with 3 longitudinal ribs. Male spathe with 47–60 male flowers; sepals greenish; petals white with yellow base, obovate, 4–5.5 cm; stamens 12; filaments upper densely hairy; anthers 4–9 mm; staminodes 3; reduced pistil 1. Female spathe with only 1 female flower; perianth larger than male ones; ovary ovoid, with 14–16 carpels; styles 14–18, bifid and hairy at apex; staminodes 6–9. Fruit oblong, 4.5–7 × 3–5 cm. Seeds fusiform, ca. 1.6 mm, densely hairy. Fl. May, fr. Jun–Jul. $2n = 22^*$.

• Ponds. Guangxi (Guixian).

This species differs from *Ottelia cordata* by its leaves emersed and not dimorphic, male flowers in each spathe with up to 47–60 flowers, and seeds densely hairy.

5. *Ottelia acuminata* (Gagnepain) Dandy, J. Bot. 72: 137. 1934.

海菜花 hai cai hua

Leaves wholly submerged; petioles varying greatly in length according to depth of water; leaf blades varying greatly in shape and size, linear to broadly cordate, base cordate to attenuate, margin entire, undulate, or serrulate, apex obtuse. Flowers unisexual. Spathe with 2–6 longitudinal ribs. Male spathe with 40–190 male flowers; sepals green; petals white with yellow base, obcordate or obovate, 1–3.5 cm; stamens 9–12; filaments hairy; anthers ovoid-elliptic; staminodes 3. Female spathe with 2–9 female flowers; perianth similar to male ones; ovary triangular-cylindric with 3 carpels; styles 3, deeply bifid; staminodes 3. Fruit triangular-cylindric to fusiform, ca. 8 cm. Seeds narrowly elliptic, with or without hairs. Fl. May–Oct. $2n = 22^*$.

• Lakes, ponds, channels, paddy fields, rivers, streams. Guangdong, Guangxi, Guizhou, Hainan, Sichuan, Yunnan.

- 1a. Male spathe with 60–190 flowers;
female spathe with 8 or 9 flowers 5d. var. *jingxiensis*
1b. Male spathe with 40–50 flowers;
female spathe with 2 or 3 flowers.
2a. Male spathe without veins, with
bulbs within 5c. var. *lunanensis*
2b. Male spathe with several veins,
without bulbs within.
3a. Fruit triangular-conic; leaves
not ligulate 5a. var. *acuminata*
3b. Fruit slightly curved, fusiform;
leaves ligulate 5b. var. *crispa*

5a. *Ottelia acuminata* var. *acuminata*

海菜花(原变种) hai cai hua (yuan bian zhong)

Boottia acuminata Gagnepain, Bull. Soc. Bot. France 54: 538. 1907; *B. yunnanensis* Gagnepain; *Ottelia acuminata* var. *tonhaiensis* H. Li; *O. cavaleriei* Dandy; *O. yunnanensis* (Gagnepain) Dandy; *Xystrolobos yunnanensis* Gagnepain.

Leaves linear to broadly cordate, base usually cordate, margin entire or minutely serrulate. Spathe with 2–6 ribs. Male spathe with 40–50 male flowers, with several veins; male flowers with filiform staminodes. Female spathe with 2 or 3 female flowers. Fruit triangular-conic. Seeds without hairs.

• Lakes, ponds, channels, paddy fields. Guangdong, Guangxi, Guizhou, Hainan, Sichuan, Yunnan.

5b. *Ottelia acuminata* var. *crispa* (Handel-Mazzetti) H. Li, Acta Phytotax. Sin. 19: 36. 1981.

波叶海菜花 bo ye hai cai hua

Boottia crispa Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 253. 1925; *Ottelia crispa* (Handel-Mazzetti) Dandy; *Xystrolobos crispus* (Handel-Mazzetti) Dandy ex Handel-Mazzetti.

Leaves ligulate, base attenuate to subcordate, margin undulate. Male spathe with several veins. Fruit slightly curved, fusiform.

• Lakes. Yunnan (Lugu Hu).

5c. *Ottelia acuminata* var. *lunanensis* H. Li, Acta Phytotax. Sin. 19: 38. 1981.

路南海菜花 lu nan hai cai hua

Male spathe small, without veins, with bulbs within; male flowers with minute, obcordate or ligulate staminodes.

• Lakes. Yunnan (Lunan).

5d. *Ottelia acuminata* var. *jingxiensis* H. Q. Wang & S. C. Sun, J. Wuhan Bot. Res. 10(1): 12. 1992.

靖西海菜花 jing xi hai cai hua

Male spathe with 60–190 male flowers; male flowers with staminodes bifid at apex. Female spathe with 8 or 9 female flowers. Seeds sparsely hairy.

• Rivers, streams. Guangxi (Jingxi).

Fl. China 23: 95–97. 2010.