

82. GOLDBACHIA de Candolle, Mém. Mus. Hist. Nat. 7: 242. 1821, nom. cons.

四棱芥属 *si leng qi shu*

Herbs annual. Trichomes absent or eglandular, simple. Stems erect, branched. Basal leaves petiolate, rosulate or not, entire, dentate, or lyrate-pinnatifid. Cauline leaves sessile, auriculate or amplexicaul at base, rarely not auriculate, entire, repand, or dentate. Racemes ebracteate, elongated in fruit. Fruiting pedicels filiform, recurved or reflexed, articulate at base or both ends. Sepals ovate or oblong, suberect, base of lateral pair not saccate or subsaccate. Petals white, pink, or purplish, longer than sepals; blade spatulate, apex obtuse; claw subequaling sepals. Stamens 6, slightly tetradynamous; median filament pairs flattened at base, lateral pair filiform; anthers ovate, obtuse at apex. Nectar glands 4, minute; median glands free or confluent with laterals; lateral glands semiannular, intrastaminal. Ovules 1–3 per ovary, subapical. Fruit indehiscent nutletlike silicle, often breaking into 1-seeded units, oblong, ovoid, or ellipsoid, 1-loculed or transversely 2- or 3-loculed, terete or 4-angled, sessile, woody, often prominently veined, glabrous or papillate, smooth or torulose, sometimes verrucose-reticulate; replum rounded; septum absent; style absent, obsolete, or distinct, thickened and subconical; stigma capitate, entire. Seeds uniseriate, wingless, oblong, plump; seed coat smooth, not mucilaginous when wetted; cotyledons incumbent.

Six species: C and SW Asia, E Europe; three species in China.

- 1a. Cauline leaves widest at base, amplexicaul; sepals densely pubescent with crisped trichomes; fruit pointed upward, fruit and fruiting pedicels form a distinct angle 30–120 degrees 1. *G. laevigata*
- 1b. Cauline leaves widest at middle, auriculate or sagittate, or sessile and not auriculate; sepals glabrous or sparsely pubescent with straight trichomes; fruit pointed downward, fruit and fruiting pedicels form a straight line.
 - 2a. Cauline leaves often denticulate, sparsely ciliate; mature fruit terete or slightly 4-angled, abruptly constricted to beaklike apex 0.5–1.5 mm; fruiting pedicels (4–)6–10(–12) mm, slightly shorter or slightly longer than fruit 2. *G. pendula*
 - 2b. Cauline leaves subentire or entire, not ciliate; mature fruit distinctly 4-angled, attenuate to beaklike apex (2–)2.5–3 mm; fruiting pedicels 1.5–3(–4.5) mm, much shorter than fruit 3. *G. ikonnikovii*

1. *Goldbachia laevigata* (Marschall von Bieberstein) de Candolle, Syst. Nat. 2: 577. 1821.

四棱芥 *si leng qi*

Raphanus laevigatus Marschall von Bieberstein, Fl. Taur.-Caucas. 2: 129. 1808; *Goldbachia hispida* Blatter & Hallberg; *G. laevigata* var. *ascendens* Boissier; *G. laevigata* var. *ascendens* f. *reticulata* Kuntze; *G. reticulata* (Kuntze) Vassilczenko.

Herbs annual, (10–)15–40 cm tall. Stems branched basally and above. Basal leaves not rosulate; petiole 1–3 cm; leaf blade often oblong, 2.5–4.5 × 0.8–3 cm, margin sinuate-dentate to dentate. Middle cauline leaves sessile, amplexicaul, cordate-ovate or ovate-lanceolate, (0.8–)1.3–4.5(–5.5) cm × 2–15(–17) mm, widest at base, margin entire. Fruiting pedicels slender, 0.5–1.5 cm, reflexed, forming with fruit a distinct angle 30–120 degrees, articulate at base. Sepals oblong, 2.5–4 × ca. 1 mm, densely pubescent with crisped trichomes, base of lateral pair slightly saccate. Petals pale purplish or pink, spatulate, 5–8 × ca. 1.5 mm. Filaments 3–4 mm; anthers ovate, 0.4–0.6 mm. Fruit narrowly oblong, 0.8–1.3 cm × 3–4 mm, pointed upward, 4-angled, rugose, constricted at middle when more than 1-seeded, base subrounded, beaklike apex (1–)1.5–2(–2.5)

mm. Seeds yellow-brown, oblong, 1.6–2.4 × 0.9–1.3 mm. Fl. Apr–Jun.

Fields, roadsides, hillsides; 400–1300 m. Xinjiang [Afghanistan, ?India, Kashmir, Kazakstan, Kyrgyzstan, Mongolia, ?Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].

Records and illustrations in FRPS (3: 375. 1987), Fl. Qinghai. (1: 483. 1997), and Fl. Xinjiang. (2(2):189. 1995) of *Goldbachia laevigata* are based on misidentified plants of *G. pendula*. The former species has pedicels that form a distinct angle with the fruit and sepals densely pubescent with crisped trichomes. *Goldbachia pendula* and *G. ikonnikovii* have pedicels and fruit that form a straight line and their sepals are either glabrous or sparsely pubescent with few straight trichomes (see the above key). The occurrence of *G. laevigata* in China is here confirmed based on *Regel s.n.*, May 1877 (LE), collected from Xinjiang. Records of the species from India and Pakistan are questionable, and they are likely based on misidentified plants of *G. tetragona* Ledebour or *G. torulosa* de Candolle.

2. *Goldbachia pendula* Botschantzev, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 22: 140. 1963.

垂果四棱芥 *chui guo si leng qi*

Herbs annual, (10–)14–40(–50) cm tall. Stems branched basally and above. Basal leaves not rosulate; petiole 1–2.5 cm; leaf blade obovate or oblanceolate, (1.3–)2–5(–8) × 0.4–2(–3) cm, margin sinuate-dentate or dentate, often ciliate, apex obtuse or acute. Middle cauline

leaves sessile, auriculate, oblong, narrowly lanceolate, or oblanceolate, (0.8–)1.3–4.5(–5.5) cm × 2–15(–17) mm, widest at middle, margin denticulate, ciliate with straight trichomes to 0.3 mm. Fruiting pedicels slender, (4–)6–10(–12) mm, reflexed, forming a straight line with fruit, articulate at both ends. Sepals oblong, 1.5–2(–2.5) × 0.5–0.7 mm, glabrous or sparsely pubescent subapically with straight trichomes, base of lateral pair slightly saccate. Petals pale purple, narrowly oblanceolate, 3–4 × 0.8–1.2 mm. Filaments 1–2 mm; anthers ovate, 0.3–0.4 mm. Fruit ovoid or narrowly oblong, 5–9(–11) × 1.5–2.2(–3) mm, pointed downward, terete or slightly 4-angled, constricted at middle when more than 1-seeded, base subrounded, abruptly narrowed into a beaklike apex 0.5–1.5 mm. Seeds yellow, oblong, 1.6–2.4 × 0.9–1.3 mm. Fl. May–Jun, fr. Jun–Aug.

Deserts, high plateaus, rocky hillsides; 400–4200 m. Gansu, Nei Mongol, Ningxia, Qinghai, Xinjiang, Xizang [Kazakstan, Kyrgyzstan, Russia, Tajikistan, Turkmenistan].

Goldbachia pendula is recorded here for the first time from China.

The record from Gansu is based on *Przewalski* 282 (LE), that from Nei Mongol on *Przewalski s.n.*, 10–22 May 1879 (LE), that from Qinghai on *Boufford et al.* 26892 (A, MO) and *Ladygin* 164 (LE), that from Xinjiang on *Anonymous* 1–170 (PE 1394154), and that from Xizang on *Ladygin* 350 (LE).

3. *Goldbachia ikonnikovii* Vassilczenko, Trudy Bot. Inst. Akad. Nauk SSSR, Ser. 1, Fl. Sist. Vyssh. Rast. 1(2): 151. 1936.

短梗四棱芥 duan geng si leng qi

Goldbachia laevigata (Marschall von Bieberstein) de Candolle var. *ikonnikovii* (Vassilczenko) Kuan & Ma.

Herbs annual or biennial, 15–40 cm tall. Stems branched basally and above. Basal leaves not rosulate; petiole 1–2 cm; leaf blade oblanceolate, 2–6 × 0.8–2 cm, margin dentate, not ciliate, apex obtuse or acute. Middle cauline leaves sessile, auriculate, linear-oblong or narrowly lanceolate, 0.8–4.5 cm × 1–7(–10) mm, widest at middle, margin often entire, not ciliate. Fruiting pedicels stout, (4–)6–10(–12) mm, reflexed, forming a straight line with fruit, articulate at base. Sepals oblong, 1.2–1.6 × ca. 0.5 mm, glabrous or sparsely pubescent subapically with straight trichomes, base of lateral pair slightly saccate. Petals pale purple, narrowly oblanceolate, 2–3 × 0.4–0.6 mm. Filaments 1–1.5 mm; anthers ovate, 0.4–0.5 mm. Fruit narrowly oblong or lanceolate, (6–)7–12 × 1.2–1.8 mm, pointed downward, strongly 4-angled, constricted at middle when more than 1-seeded, cuneate at base, attenuate into a beaklike apex (2–)2.5–3 mm. Seeds yellow, oblong, 1.8–2.6 × 0.7–1 mm. Fl. May–Jun, fr. Jun–Jul.

Nei Mongol [Mongolia].

The above first record from Nei Mongol is based on *Chen s.n.* (PE 1138203) and *Licent* 7497 (BM).

Flora of China 8: 161–162. 2001.