

#### 4. AMARANTHUS Linnaeus, Sp. Pl. 2: 989. 1753.

苋属 xian shu

Herbs annual. Stem erect or decumbent. Leaves alternate, petiolate, margin entire. Flowers unisexual, on same plant or not, sessile, clustered at axils and at apex, in solitary or complex thyrsoid structures; each flower with 1 bract and 2 bracteoles, scarious. Tepals 5, rarely 1-4, erect or obliquely spreading, sometimes indurate at base after anthesis, green, equal or subequal, membranous. Stamens 5, rarely 1-4; filaments free, filiform, pseudostaminodes absent; anthers 2-loculed. Ovary with 1 erect ovule; style short or absent; stigmas 2 or 3, persistent, subulate or linear. Utricles globose or ovoid, laterally compressed, membranous, dehiscent by lid, dehiscing irregularly or falling off together with perianth and indehiscent. Seeds black or brown, globose or lenticular, without aril.

About 40 species: worldwide; 14 species (one endemic, at least eight introduced) in China.

- 1a. Tepals 3, rarely 2 or 4; stamens 3; utricles indehiscent.
  - 2a. Fruit indehiscent.
    - 3a. Stem erect, somewhat branched; utricles very rugose ..... 13. *A. viridis*
    - 3b. Stem ascending, much branched (frequently at base); utricles smooth or slightly rugose ..... 14. *A. blitum*
  - 2b. Fruit circumscissile.
    - 4a. Tepals 4, rarely 5 ..... 12. *A. blitoides*
    - 4b. Tepals 3, rarely 2.
      - 5a. Tepals conspicuously longer than fruit ..... 9. *A. tricolor*
      - 5b. Tepals ca. as long as or shorter than fruit.
        - 6a. Stamens longer than perianth; bracts conspicuously longer than perianth ..... 10. *A. albus*
        - 6b. Stamens shorter than perianth; bracts ca. as long as or shorter than perianth ..... 11. *A. roxburghianus*
- 1b. Tepals 5; stamens 5, rarely 2 or 3; utricles usually dehiscent by lid.
  - 7a. Stamens 2, rarely 3 ..... 8. *A. taishanensis*
  - 7b. Stamens 5.
    - 8a. Armed at leaf axils; bract often becoming 2 spines, rarely 1 ..... 7. *A. spinosus*
    - 8b. Unarmed at leaf axils; bract not becoming spiny.
      - 9a. Plants hairy.
        - 10a. Fruit enveloped in persistent perianth ..... 5. *A. retroflexus*
        - 10b. Fruit longer than perianth ..... 6. *A. hybridus*
      - 9b. Plants glabrous or nearly so.
        - 11a. Complex thyrsoid structures pendulous; bracts and bracteoles inconspicuously pointed at apex ..... 1. *A. caudatus*
        - 11b. Complex thyrsoid structures erect; bracts and bracteoles conspicuously pointed at apex.
          - 12a. Herbs high, to 2 m tall; leaf blade paler and pubescent on abaxial veins ..... 2. *A. patulus*
          - 12b. Herbs short, 0.1-0.8 m tall; leaf blade not pale, glabrous.
            - 13a. Tepals ca. as long as or longer than fruit; bracts ca. 2 × as long as perianth ..... 3. *A. hypochondriacus*
            - 13b. Tepals distinctly shorter than fruit; bracts ca. 1.5 × as long as perianth ..... 4. *A. cruentus*

##### 1. *Amaranthus caudatus* Linnaeus, Sp. Pl. 2: 990. 1753.

老枪谷 lao qiang gu

Stem erect, green, ca. 1.5 m tall, strong, angular, slightly branched or not, glabrous when mature. Petiole green, 1-15 cm, pilose; leaf blade green or red, rhombic-ovate or rhombic-lanceolate, 4-15 × 2-8 cm, both surfaces glabrous, base cuneate, margin entire or undulate, apex acuminate or obtuse. Complex thyrsoid structures terminal, pendulous, much branched, composed of many spikes. Bracts red, lanceolate, ca. 3 mm, transparent, with a midvein abaxially, apex apiculate. Tepals red, shorter than fruit, 2-2.5 mm, transparent, overlapping at margins, with a midvein; male segments oblong; female segments oblong-lanceolate. Stamens 5; stigmas 3, shorter than 1 mm. Utricles red above, subglobose, ca. 3 mm in diam., longer than perianth, circumscissile. Seeds light yellowish brown, subglobose. Fl. Jul-Aug, fr. Sep-Oct.  $2n = 32^*$ , 64.

Widely cultivated in China [native to neotropics; cultivated worldwide].

##### 2. *Amaranthus patulus* Bertoloni, Comm. Neap. 171. 1837.

台湾苋 tai wan xian

Stem to 2 m tall, glabrous or somewhat soft pubescent. Petiole 3-8 cm; leaf blade ovate to rhombic-ovate, 6-12 × 4-7 cm, pale and soft pubescent on abaxial veins, adaxially glabrous, base cuneate, margin entire or slightly undulate, apex acute to subobtuse. Complex thyrsoid structures terminal and in apical axils, greenish, the terminal to 25 cm, much branched, composed of many lateral spikes. Bracts green, 2-4 mm, membranous near base, long pointed. Tepals 5, oblong-lanceolate, slightly shorter than utricle, 1.5-2 mm, apex obtuse or slightly mucronulate. Stamens 5. Utricles compressed, circumscissile. Seeds black, shiny, ca. 1 mm in diam.

Waste places, roadsides. Taiwan [native to tropical America].

One of us (Clemants) prefers to treat this as a synonym of *Amaranthus cruentus*.

**3. *Amaranthus hypochondriacus*** Linnaeus, Sp. Pl. 2: 991. 1753.

千穗谷 qian sui gu

*Amaranthus hybridus* Linnaeus var. *hypochondriacus* (Linnaeus) Robinson; *A. hybridus* subsp. *hypochondriacus* (Linnaeus) Thellung.

Stem green or purple, 10–80 cm tall, branched, glabrous or slightly pilose. Petiole 1–7.5 cm, glabrous; leaf blade rhombic-ovate or oblong-lanceolate, 3–10 × 1.5–3.5 cm, glabrous, base cuneate, margin entire or undulate, apex acute or acuminate. Complex thyrsoid structures terminal, erect, cylindrical, ca. 25 cm, 1–2.5 cm in diam., branched or not, composed of many spikes; lateral spikes short, ca. 6 cm. Bracts green or purple, ovate, subulate, 4–5 mm, ca. 2 × as long as perianth, apex distinctly long pointed. Tepals green or purple, with a dark midvein, oblong, ca. as long as or longer than fruit, apex acute or acuminate. Stigmas 2 or 3. Utricles exceeding perianth, green, tinged purple above, rhomboid-ovoid, 3–4 mm, circumscissile. Seeds white, subglobose, ca. 1 mm in diam. Fl. Jul–Aug, fr. Aug–Sep.  $2n = 32$ .

Cultivated. Hebei, Jilin, Nei Mongol, Sichuan, Xinjiang, Yunnan [native to North America].

**4. *Amaranthus cruentus*** Linnaeus, Syst. Nat., ed. 10, 2: 1269. 1759.

老鸦谷 lao ya gu

*Amaranthus paniculatus* Linnaeus; *A. hybridus* Linnaeus subsp. *cruentus* (Linnaeus) Thellung; *A. hybridus* var. *paniculatus* (Linnaeus) Thellung.

Stem erect, green, glabrous. Petiole green; leaf blade rhombic-ovate or oblong-lanceolate, glabrous, base cuneate, margin entire or undulate, apex acuminate or acute. Complex thyrsoid structures erect; bracts and tepals distinctly long pointed at apex; bracts of female flowers ca. 1.5 × as long as segments; tepals conspicuously shorter than fruit. Utricles 3–4 mm in diam., circumscissile. Seeds subglobose. Fl. Jun–Jul, fr. Sep–Oct.  $2n = 30^*$ ,  $32^*$ ,  $34^*$ .

Widely cultivated in China [cosmopolitan].

**5. *Amaranthus retroflexus*** Linnaeus, Sp. Pl. 2: 991. 1753.

反枝苋 fan zhi xian

Stem erect, light green, 20–80 cm tall, stout, branched or not, slightly obtusely angulate, densely pubescent. Petiole light green, 1.5–5.5 cm, hairy; leaf blade ovate-rhombic or elliptic, 5–12 × 2–5 cm, both surfaces shortly hairy, but densely hairy abaxially, base cuneate, margin entire and undulate, apex acute or notched, with a mucro. Complex thyrsoid structures terminal and axillary, erect, 2–4 cm in diam., including many spikes; terminal spikes longer than lateral ones. Bracts and bracteoles white, subulate, 4–6 mm, apex slenderly long pointed. Tepals white, oblong or oblong-obovate, 2–2.5 mm, membranous, with a green midvein, apex acute or notched, with a mucro. Stamens

slightly longer than perianth. Stigmas 3, rarely 2. Utricles light green, ovoid, compressed, shorter than perianth, circumscissile. Seeds brown or black, subglobose, ca. 1 mm in diam., obtuse at margin. Fl. Jul–Aug, fr. Aug–Sep.  $2n = 32^*$ ,  $34^*$ ,  $102^*$ .

Waste places, field margins, roadsides. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Xinjiang, Zhejiang [native origin uncertain; now cosmopolitan].

One of us (Clemants) does not recognize the following varieties.

- 1a. Stem thick, obtusely angulate, densely pubescent; bracts long, 4–6 mm, apex long pointed ..... 5a. var. *retroflexus*
- 1b. Stem slender, less angulate, less hairy; bracts shorter, 3–4 mm, apex slightly obtuse ..... 5b. var. *delilei*

**5a. *Amaranthus retroflexus* var. *retroflexus***

反枝苋(原变种) fan zhi xian (yuan bian zhong)

Stem erect, stout, obtusely angulate, densely pubescent. Leaves ovate-rhombic or elliptic. Bracts white, 4–6 mm, apex long pointed.

Field margins, roadsides. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Xinjiang, Zhejiang [native origin uncertain; now cosmopolitan].

**5b. *Amaranthus retroflexus* var. *delilei*** (Richter & Loret) Thellung, Vierteljahres Nat. Ges. Zürich 52: 442. 1907.

短苞反枝苋 duan bao fan zhi xian

*Amaranthus delilei* Richter & Loret, Bull. Soc. Bot. France 13: 316. 1866; *A. retroflexus* subsp. *delilei* (Richter & Loret) Tzvelev.

Stem slender, less angulate, pilose. Leaves narrowing to petiole at base. Bracts 3–4 mm, slightly longer than perianth, apex obtuse.

Waste places. Hebei [probably native to North America; naturalized in S Africa, N Asia, and Europe].

**6. *Amaranthus hybridus*** Linnaeus, Sp. Pl. 2: 990. 1753.

绿穗苋 lü sui xian

Stem 30–50 cm tall, branched, pubescent. Petiole 1–2.5 cm, hairy; leaf blade ovate or ovate-rhombic, 3–4.5 × 1.5–2.5 cm, abaxially pilose, adaxially nearly glabrous, base cuneate, margin undulate, apex acute or notched, with a mucro. Complex thyrsoid structures terminal, slender, somewhat drooping at apex and in spikes. Bracts and bracteoles subulate, lanceolate, 3.5–4 mm, distinctly long pointed, longer than perianth. Tepals oblong-lanceolate, ca. 2 mm, apex acute, with a mucro. Stamens nearly as long as or slightly longer than perianth; stigmas 3. Utricles ovoid, longer than perianth, ca. 2 mm, circumscissile. Seeds black, subglobose, ca. 1 mm in diam. Fl. Jul–Aug, fr. Sep–Oct.  $2n = 24$ ,  $32^*$ ,  $33$ ,  $34$ .

Farms, waste places, hillsides. Anhui, Fujian, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Zhejiang [Bhutan, Japan, Laos, Nepal, Sikkim, Vietnam; Europe, North and South Ameri-

ca].

**7. *Amaranthus spinosus*** Linnaeus, Sp. Pl. 2: 991. 1753.

刺苋 ci xian

Stem erect, green or somewhat tinged purple, 30–100 cm tall, terete or obtusely angulate, much branched, glabrous or slightly pubescent. Petiole 1–8 cm, glabrous, 2-armed at base; leaf blade ovate-rhombic or ovate-lanceolate, 3–12 × 1–6 cm, glabrous or slightly pubescent along veins when young, base cuneate, margin entire, apex obtuse, with a mucro. Complex thyrsoid structures terminal or axillary, 8–25 cm; terminal spike usually with all male flowers at or toward apex. Bracts becoming very sharply spiny in proximal part of spike. Tepals green, transparent at margin and with green or purple median band, apex acute, with a mucro; male flowers oblong, 2–2.5 mm; female flowers oblong-spatulate, ca. 1.5 mm. Filaments nearly as long as or slightly shorter than perianth. Stigmas 3 (or 2). Utricles included in perianth, oblong, 1–1.2 mm, circumscissile slightly below middle. Seeds brownish black, subglobose, ca. 1 mm in diam. Fl. and fr. Jul–Nov.  $2n = 34, 68$ .

Waste places, gardens. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shanxi, Sichuan, Taiwan, Yunnan, Zhejiang [probably native to neotropics, now cosmopolitan in warm-temperate and tropical regions].

**8. *Amaranthus taishanensis*** F. Z. Li & C. K. Ni, Acta Phytotax. Sin. 19: 116. 1981.

泰山苋 tai shan xian

Stem erect or decumbent, light green, sometimes light purple below, 10–30 cm tall, much branched, pubescent or nearly glabrous. Petiole 2–15 mm; leaf blade ovate-rhombic or elliptic, 0.5–3 cm × 3–15 mm, glabrous, abaxially greenish white, adaxially green, base cuneate, margin entire or slightly undulate, apex notched, with a mucro. Flowers unisexual, clustered at leaf axils. Bracts and bracteoles subulate, 1.2–1.5 mm, slightly longer than perianth. Tepals 5, membranous. Stamens 2, rarely 3, slightly longer than perianth; stigmas 3. Utricles oblong, 2–2.5 mm, nearly as long as perianth, ?indehiscent. Seeds reddish brown, ca. 1 mm.

- Roadsides, waste places, hillsides. Anhui, Shandong.

Li et al. (Acta Phytotax. Sin. 40: 383–384. 2002) believed this species to be conspecific with *Amaranthus polygonoides* Linnaeus, a North American species. However, one of us (Clemants) notes that further study might ally *A. taishanensis* with *A. blitum*, from which it seems to differ only by having five sepals. Wu Zhengyi (editor's note) agrees with Clemants.

**9. *Amaranthus tricolor*** Linnaeus, Sp. Pl. 2: 989. 1753.

苋 xian

*Amaranthus gangeticus* Linnaeus; *A. gangeticus* var. *angustior* Bailey; *A. mangostanus* Linnaeus.

Stem green or red, 80–150 cm tall, stout, often branched. Petiole green or red, 2–6 cm; leaf blade green, red, purple, or yellow, ovate, ovate-rhombic, or lanceolate, 4–10 × 2–7 cm, glabrous, base cuneate, margin entire or undulate, apex obtuse

or notched, with a mucro. Flowers in dense clusters at leaf axils or in spike at apex; male and female flowers in same inflorescences. Bracts and bracteoles ovate-lanceolate, 2.5–3 mm, transparent, apex long pointed. Stamens 3. Stigmas 3. Utricles included in perianth, ovate-oblong, 2–2.5 mm, circumscissile. Seeds brownish black, subglobose or obovoid, ca. 1 mm in diam. Fl. May–Aug, fr. Jul–Sep.  $2n = 34^*, 68, 85^*$ .

Widely cultivated in China [probably native to tropical Asia; cultivated and naturalized throughout that region].

**10. *Amaranthus albus*** Linnaeus, Syst. Nat., ed. 10, 2: 1268. 1759.

白苋 bai xian

*Amaranthus gracilentus* H. W. Kung.

Stem erect or ascending, greenish white, 30–50 cm tall, branched from base, glabrous or strigose. Petiole 3–5 mm, glabrous; leaf blade obovate or spatulate, 0.5–2 cm, glabrous, base narrowing to petiole, margin slightly undulate, apex obtuse or notched, with a mucro. Flowers in axillary clusters or short terminal spikes. Bracts and bracteoles subulate, 2–2.5 mm, slightly rigid, apex acute. Tepals ca. 1 mm, shorter than bracts, membranous; male flowers oblong, apex acuminate; female ones oblong or subulate, apex short acuminate. Stamens longer than perianth; stigmas 3. Utricles brownish black, obovate, 1.2–1.5 mm, rugose, circumscissile. Seeds black to brownish black, subglobose, ca. 1 mm in diam. Fl. Jul–Aug, fr. Sep.  $2n = 32$ .

Roadsides, waste places, near houses. Hebei, Heilongjiang, Nei Mongol, Xinjiang [Japan, Russia; Europe, North America].

**11. *Amaranthus roxburghianus*** H. W. Kung, Fl. Illust. N. China 4: 19. 1935.

腋花苋 ye hua xian

Stem erect, light green, 30–65 cm, much branched, glabrous. Petiole 1–2.5 cm, slender; leaf blade ovate-rhombic, obovate, or oblong, 2–5 × 1–2.5 cm, base cuneate, margin undulate, apex notched, with a mucro. Flowers few, sparsely clustered at axils. Bracts and bracteoles subulate, ca. 2 mm, abaxially with a distinct midvein, apex long pointed. Tepals lanceolate, ca. 2.5 mm, apex acuminate, long pointed. Stamens shorter than perianth; stigmas 3. Utricles ovoid, subequal to perianth, ca. 3 mm, circumscissile. Seeds brownish black, subglobose, ca. 1 mm in diam. Fl. Jul–Aug, fr. Aug–Sep.

Field margins, waste places. Hebei, Henan, Gansu, Ningxia, Shaanxi, Shanxi, Sichuan, Xinjiang [India, Sri Lanka].

The names *Amaranthus gracilis* Desfontaines and *A. viridis* Desfontaines have been misapplied to this species. Further study is necessary to compare *A. roxburghianus* with *A. graecizans* Linnaeus.

**12. *Amaranthus blitoides*** S. Watson, Proc. Amer. Acad. Arts 12: 273. 1877.

北美苋 bei mei xian

Stem greenish white, 15–50 cm tall, divaricately branched from base, glabrous. Leaves dense; petiole 0.5–1.5 cm; leaf blade obovate or spatulate to oblong-oblong-lanceolate, 0.5–2.5 cm × 3–10 mm, base cuneate, margin entire, apex obtuse or acute,

with a mucro. Flowers clustered at axils, shorter than petioles. Bracts and bracteoles lanceolate, ca. 3 mm, apex acute. Tepals 4(or 5), green, ovate-lanceolate to oblong-lanceolate, 1–2.5 mm, apex acuminate and pointed. Stigmas 3. Utricles ellipsoid, longer than longest perianth segment, ca. 2 mm, circumscissile. Seeds black, slightly shiny, ovoid, ca. 1.5 mm in diam. Fl. Aug–Sep, fr. Sep–Oct.  $2n = 32$ .

Fields, roadsides. Beijing, Liaoning, Nei Mongol [native to North America].

**13. *Amaranthus viridis*** Linnaeus, Sp. Pl., ed. 2, 2: 1405. 1763.

皱果苋 zhou guo xian

*Euxolus viridis* (Linnaeus) Moquin-Tandon.

Stem erect, green or somewhat tinged purple, 40–80 cm tall, conspicuously angulate, slightly branched, glabrous. Petiole 3–6 cm, green or somewhat tinged purple; leaf blade ovate, ovate-oblong, or ovate-elliptic,  $3-9 \times 2.5-6$  cm, base broadly cuneate or subtruncate, margin entire or slightly undulate, apex notched or rounded, with a pointed mucro. Complex thyrsoid structures terminal,  $6-12 \times 1.5-3$  cm, branched, composed of spikes; spikes erect, slender, terminal ones longer than lateral ones; rachis 2–2.5 cm. Bracts and bracteoles lanceolate, shorter than 1 mm, apex pointed. Tepals oblong or broadly oblanceolate, 1.2–1.5 mm, apex acute. Stamens shorter than perianth; stigmas 3 or 2. Utricles green, longer than perianth, globose, slightly compressed, ca. 2 mm in diam., very rugose, indehiscent. Seeds black or brownish black, subglobose, ca. 1 mm in diam. Fl. Jun–Aug, fr. Aug–Oct.  $2n = 34$ .

Fields, waste places. All provinces except for NW China and Xizang [pantropical].

**14. *Amaranthus blitum*** Linnaeus, Sp. Pl. 1: 990. 1753.

凹头苋 ao tou xian

*Amaranthus ascendens* Loiseleur-Deslongchamps; *A. lividus* Linnaeus; *A. lividus* var. *ascendens* (Lois) Thellung-Blom; *Euxolus ascendens* (Loiseleur-Deslongchamps) H. Hara.

Stem ascending, light green or purple, 10–30 cm tall, branched from base, glabrous. Petiole 1–3.5 cm; leaf blade ovate or ovate-rhombic,  $1.5-4.5 \times 1-3$  cm, base cuneate, margin entire or slightly undulate, apex notched, with a mucro.

Flower clusters axillary, those of terminal clusters erect spikes or complex thyrsoid structures. Bracts and bracteoles oblong, shorter than 1 mm. Tepals light green, oblong or lanceolate, 1.2–1.5 mm, with a midvein adaxially, apex acute. Stamens slightly shorter than perianth; stigmas 3 or 2, falling off when utricles ripen. Utricles exceeding perianth, compressed-ovoid, ca. 3 mm, indehiscent, slightly rugose to nearly smooth. Seeds black to brownish black, circular, ca. 1.2 cm in diam. Fl. Jul–Aug, fr. Aug–Sep.  $2n = 34$ .

Fields, waste places. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Yunnan, Zhejiang [Japan, Laos, Nepal, Sikkim, Vietnam; N Africa, Europe, South America].

