

11. PHEDIMUS Rafinesque, Amer. Monthly Mag. & Crit. Rev. 1: 438. 1817.

费菜属 fei cai shu

Herbs perennial. Rootstock thick. Stems arising from rootstock or persistent basal part of flowering stems, simple, glabrous, rarely pubescent. Leaves alternate or opposite, petiolate or sessile; leaf blade flat, margin serrate or crenate. Inflorescences terminal, cymose with 3 main branches, bractless, many flowered. Flowers sessile or nearly so, bisexual, mostly 5-merous. Sepals basally connate, fleshy, spurless. Petals spreading at anthesis, nearly free, bright yellow. Stamens 2 × as many as petals, in 2 series. Nectar scales entire or apex emarginate. Ovaries and follicles with adaxial outgrowth. Styles short, oblique or spreading at flowering. Follicles many seeded. Seeds striate.

About 20 species: Asia, Europe; eight species (two endemic) in China.

A record of *Phedimus stevenianus* (Rouy & E. G. Camus) 't Hart (*Sedum stevenianum* Rouy & E. G. Camus, based on *S. roseum* Steven (1812), not (Linnaeus) Scopoli (1771)) from China by H. Léveillé (Cat. Pl. Yun-Nan, 62. 1916, as *S. hametianum* H. Léveillé, also based on *S. roseum* Steven) is based on a misidentification. True *P. stevenianus* occurs in the Caucasus region and has never been collected in China.

1a. Plants densely grayish pubescent 1. *P. selskianus*

1b. Plants glabrous.

2a. Rootstock tuberous, roots carrot-shaped, robust; stems few, erect.

3a. Carpels 5 2. *P. aizoon*

3b. Carpels 8(or 12 or 20) 3. *P. hsinganicus*

2b. Rootstock not tuberous, roots not carrot-shaped or absent; stems numerous, ascending or decumbent (sometimes erect in *P. middendorffianus*).

4a. Leaves linear-spatulate, 0.3–0.5 cm wide 4. *P. middendorffianus*

4b. Leaves not linear-spatulate, 0.5–3 cm wide.

5a. Stems many branched; sepals linear to oblanceolate 5. *P. floriferus*

5b. Stem simple or few branched; sepals lanceolate, triangular-linear, or suboblong (sometimes linear

in *P. hybridus*).

6a. Stems branched, decumbent; sepals linear to suboblong; follicles initially suberect, stellately

divergent at maturity 8. *P. hybridus*

6b. Stems simple, ascending; sepals lanceolate to triangular-linear; follicles stellately horizontally spreading.

7a. Leaves sessile, oblanceolate, spatulate, or obovate 6. *P. kamtschaticus*

7b. Leaves pseudopetiolate, oblong, elliptic, or ovate 7. *P. odontophyllus*

1. *Phedimus selskianus* (Regel & Maack) 't Hart in 't Hart & Egli, *Evol. & Syst. Crassulac.* 169. 1995.

灰毛费菜 hui mao fei cai

Sedum selskianum Regel & Maack, *Mém. Acad. Imp. Sci. Saint Pétersbourg*, Sér. 7, 4(4): 66. 1861; *Aizopsis selskiana* (Regel & Maack) Grulich; *S. aizoon* Linnaeus subsp. *selskianum* (Regel & Maack) Fröderström.

Herbs perennial, densely grayish pubescent. Stems numerous, simple or branched, erect or ascending, 25–40 cm, woody. Leaves alternate; leaf blade linear-lanceolate, 3–6 × 0.5–1 cm, base connate, margin serrate in apical 1/2. Inflorescence corymbiform, 4–8 cm in diam., many flowered. Flowers unequally 5-merous. Sepals linear-lanceolate, 2–4 × ca. 1 mm, base subconnate, apex obtuse and acuminate. Petals golden-yellow, lanceolate, 4–7 mm, apex acuminate. Stamens 10, slightly shorter than petals; antepetalous ones inserted near petal base; anthers orange. Nectar scales transversely wide to subquadrangular, ca. 0.3 mm. Carpels horizontally spreading, narrowly oblong, 5–6 mm; apical beak ca. 1 mm. Seeds brown, oblong, ca. 0.8 mm. Fl. Jul–Aug, fr. Sep.

Rocks on slopes. E Heilongjiang, E Jilin, Liaoning [Korea, Russia].

2. *Phedimus aizoon* (Linnaeus) 't Hart in 't Hart & Egli, *Evol. & Syst. Crassulac.* 168. 1995.

费菜 fei cai

Herbs perennial. Roots tuberous, carrot-shaped to narrowly conical. Rootstock short, robust. Stems 1–3, simple, erect, 20–50 cm. Leaves alternate; leaf blade narrowly lanceolate, elliptic-lanceolate, elliptic, ovate-oblanceolate, ovate, broadly ovate, or orbicular, 3.5–8 × 0.5–3 cm, base cuneate, margin irregularly serrate, apex obtuse-rounded or acuminate. Inflorescence horizontally branched, many flowered; bracts leaflike. Flowers unequally 5-merous. Sepals linear, unequal, 3–5 mm, apex obtuse. Petals yellow, oblong to elliptic-lanceolate, 6–10 mm, apex mucronate. Stamens 10, shorter than petals. Nectar scales subquadrangular, ca. 0.3 mm. Carpels ovoid-oblong, adaxially convex, base connate. Styles narrowly subulate. Follicles stellate, ca. 7 mm. Seeds ellipsoid, ca. 1 mm. Fl. Jun–Jul, fr. Aug–Sep.

Scrub, ravine edges in valleys, grasslands on rocky slopes, sandy, sunny, and grassy places on mountains, shady places on slopes, field banks, rock crevices; 1000–3100 m. Anhui, Gansu, Hebei, Heilong-

jiang, Henan, Hubei, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Zhejiang [Korea, Japan, Mongolia, Russia].

1a. Plants minutely roughly papillate . 2c. var. *scabrus*

1b. Plants smooth.

2a. Leaf blade less than 0.5 cm wide

..... 2d. var. *yamatutae*

2b. Leaf blade 1.2–3 cm wide.

3a. Leaf blade narrowly lanceolate, elliptic-lanceolate, or ovate-oblongate,

1.2–2 cm wide, apex acute 2a. var. *aizoon*

3b. Leaf blade elliptic, ovate, broadly obovate, or sometimes orbicular, to 3 cm wide, apex obtuse-rounded

2b. var. *latifolius*

2a. *Phedimus aizoon* var. *aizoon*

费菜(原变种) fei cai (yuan bian zhong)

Sedum aizoon Linnaeus, Sp. Pl. 1: 430. 1753; *Aizopsis aizoon* (Linnaeus) Grulich; *Sedum aizoon* var. *floribundum* Nakai; *S. aizoon* var. *glabrifolium* (Kitagawa) Kitagawa; *S. pseudoaizoon* Debeaux; *S. selskianum* Regel & Maack var. *glaberrimum* Kitagawa; *S. selskianum* var. *glabrifolium* Kitagawa; *S. yantaiense* Debeaux.

Plants smooth. Leaves leaf blade narrowly lanceolate, elliptic-lanceolate, or ovate-oblongate, 1.2–2 cm wide, apex acute. Fl. Jun–Jul, fr. Aug–Sep.

Scrub, ravine edges in valleys, field banks, rock crevices; 2500–3100 m. Anhui, Gansu, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Zhejiang [Korea, Japan, Mongolia, Russia].

The plants are used medicinally.

2b. *Phedimus aizoon* var. *latifolius* (Maximowicz) H. Ohba et al., Novon 10: 401. 2000.

宽叶费菜 kuan ye fei cai

Sedum aizoon var. *latifolium* Maximowicz, Mém. Acad. Imp. Sci. St.-Petersbourg Divers Savans 9: 115. 1859; *S. aizoon* var. *austromanshuricum* (Nakai & Kitagawa) Kitagawa; *S. austromanshuricum* Nakai & Kitagawa.

Plants smooth. Leaves leaf blade elliptic, ovate, broadly obovate, or sometimes orbicular, to 3 cm wide, apex obtuse-rounded. Fl. Jul.

Sandy, sunny, and grassy places on mountains; 1000–1800 m. Hebei, Heilongjiang, Jilin, Liaoning, Shandong [Korea, Russia].

2c. *Phedimus aizoon* var. *scabrus* (Maximowicz) H. Ohba et al., Novon 10: 401. 2000.

乳毛费菜 ru mao fei cai

Sedum aizoon var. *scabrum* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg, Sér. 3, 29: 144. 1834.

Plants minutely roughly papillate. Fl. Jun–Jul, fr. Aug.

• Grasslands on rocky slopes; 1500–3100 m. Gansu, Hebei, Nei Mongol, S Ningxia, E Qinghai, Shanxi.

2d. *Phedimus aizoon* var. *yamatutae* (Kitagawa) H. Ohba et al., Novon 10: 401. 2000.

狭叶费菜 xia ye fei cai

Sedum aizoon var. *yamatutae* Kitagawa, Lin. Fl.

Manshur. 247. 1939; *S. aizoon* Linnaeus var.

angustifolium (Franchet) Chu; *S. aizoon* Linnaeus f.

angustifolium Franchet.

Plants smooth. Leaf less than 0.5 cm wide.

Shady places on slopes; 1300–1400 m. Gansu, Hebei, Heilongjiang, Jilin, Nei Mongol, Shaanxi, Shandong [Russia].

3. *Phedimus hsinganicus* (Y. C. Chu ex S. H. Fu & Y. H. Huang) H. Ohba et al., Novon 10: 402. 2000.

兴安费菜 xing an fei cai

Sedum hsinganicum Y. C. Chu ex S. H. Fu & Y. H.

Huang in Liou, Fl. Pl. Herb. Chin. Bor.-Orient. 4: 230. 1980.

Herbs perennial. Roots tuberous, carrot-shaped to narrowly conical. Rootstock short. Stems 3–5, 20–30 cm; remains of stems from previous year few, basally branched, terete, more than 25 cm. Leaves subopposite or alternate; leaf blade obovate-oblong, 4–7 × 1.5–3 cm, veinlets anastomosing near margin, base attenuate, margin sparsely serrate to subentire, apex obtuse-rounded. Inflorescences terminal and axillary, densely flowered, bracteate; peduncle long. Flowers numerous, unequally 8(or 12 or 20)-merous. Sepals triangular-lanceolate, subequal, 0.5–1.8 mm, apex acuminate. Petals yellow, oblong-lanceolate, ca. 5.2 × 1.5 mm, apex acuminate and mucronate. Stamens 16; antesepalous ones ca. 4.8 mm; antepetalous ones ca. 3 mm, inserted ca. 1 mm from petal base. Nectar scales subquadrangular, ca. 0.9 mm, apex subtruncate. Carpels lanceolate, ca. 5.5 mm, base connate for ca. 1 mm, apex divergent. Styles ca. 1.5 mm. Seeds few, brown, oblong, ca. 0.8 mm. Fl. Aug.

• Stony slopes; 700–800 m. N Nei Mongol (Hulun Buir Meng).

4. *Phedimus middendorffianus* (Maximowicz) 't Hart in 't Hart & Egli, Evol. & Syst. Crassulac. 169. 1995.

吉林费菜 ji lin fei cai

Sedum middendorffianum Maximowicz, Mém. Acad.

Imp. Sci. St.-Petersbourg Divers Savans 9: 116. 1859;

Aizopsis middendorffiana (Maximowicz) Grulich;

Sedum aizoon Linnaeus subsp. *middendorffianum*

(Maximowicz) Fröderström; *S. middendorffianum* var.

diffusum Praeger.

Herbs perennial. Rootstock branched, creeping, woody.

Stems numerous, tufted, basally branched, erect or

ascending, 10–30 cm, usually persistent. Leaves

alternate; leaf blade linear-spatulate, 1.2–2.5 × 0.3–0.5

cm, base cuneate, margin apically serrate, apex obtuse.

Inflorescence often with divergent branches, many

flowered. Flowers unequally 5-merous. Sepals linear,

2–3 × 0.6–0.8 mm, apex obtuse. Petals yellow,

lanceolate to linear-lanceolate, 5–11 × 1.8–3 mm,

apex acuminate and mucronate. Stamens 10, shorter

than petals; filaments yellow; anthers purple. Nectar scales minute, margin subentire. Carpels lanceolate, ca. 6 mm, base connate for ca. 2 mm. Styles ca. 1 mm. Follicles stellately subhorizontal, apex shortly beaked. Seeds ovoid, minute. Fl. Jun–Aug, fr. Aug–Sep.

Among rocks in forests in mountainous areas; 300–1000 m. Jilin, Liaoning [Japan, Korea, Russia].

5. *Pheidimus floriferus* (Praeger) 't Hart in 't Hart & Egli, *Evol. & Syst. Crassulac.* 168. 1995.

多花费菜 duo hua fei cai

Sedum floriferum Praeger, *J. Bot.* 56: 149. 1918.

Herbs perennial. Rootstock branched, short, woody. Stems ascending, 15–30 cm, apically sparsely papillate. Leaves alternate; leaf blade spatulate, 2.5–4.5 × 8–13 mm, base cuneate, margin apically sparsely serrate, apex obtuse-rounded. Flowering stems apically with numerous short axillary branches. Inflorescences terminal and axillary, densely many flowered. Flowers unequally 5-merous. Sepals linear to oblanceolate, unequal, 2–4 mm, apex obtuse. Petals yellow, lanceolate, 4–5 × 1.5–2 mm. Stamens 10, slightly shorter than petals. Nectar scales minute, subquadrangular, margin entire. Carpels initially erect, later ± curved, equaling or slightly shorter than petals. Styles slender. Fl. Jun–Jul.

• Low mountainous areas; below 1000 m. E Shandong (Weihai Shi, Yantai Shi).

6. *Pheidimus kamschaticus* (Fischer) 't Hart in 't Hart & Egli, *Evol. & Syst. Crassulac.* 168. 1995.

堪察加费菜 kan cha jia fei cai

Sedum kamschaticum Fischer & C. A. Meyer, *Index Sem. Hort. Petrop.* 7: 54. 1840; *Aizopsis kamschatica* (Fischer) Grulich; *Sedum aizoon* Linnaeus subsp. *kamschaticum* (Fischer) Fröderström.

Herbs perennial. Rootstock branched, thickened, woody. Stems mostly simple, ascending, 15–40 cm, sometimes papillate. Leaves alternate or opposite, rarely 3-verticillate; leaf blade oblanceolate, spatulate, or obovate, 2.5–7 × 0.5–3 cm, base narrowly cuneate, margin apically sparsely serrate to crenate, apex obtuse-rounded. Inflorescence terminal. Flowers unequally 5-merous. Sepals lanceolate, 3–4 mm, base broad, apex obtuse. Petals yellow, lanceolate, 6–8 mm, abaxially keeled, apex acuminate and mucronate. Stamens 10, slightly shorter than petals; anthers orange. Nectar scales subquadrangular, minute. Carpels erect, equaling or slightly shorter than petals, adaxially gibbous, base connate for ca. 2 mm. Follicles stellately horizontal. Seeds brown, obovoid, minute. Fl. Jun–Jul, fr. Aug–Sep.

Rocky slopes; 600–1800 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol [Japan, Korea, Russia].

7. *Pheidimus odontophyllus* (Fröderström) 't Hart in 't Hart & Egli, *Evol. & Syst. Crassulac.* 169. 1995.

齿叶费菜 chi ye fei cai

Sedum odontophyllum Fröderström, *Acta Horti Gothob.* 7: 117. 1932; *Aizopsis odontophylla* (Fröderström) Grulich.

Herbs perennial, creeping when young, glabrous. Roots long, fibrous. Sterile shoots ascending, 5–10 cm, apically often leafy. Flowering stems rooting at base, ascending, 10–30 cm. Leaves alternate, opposite, or 3-verticillate; pseudopetiole 1.1–1.8 cm; leaf blade ovate, elliptic, or oblong, 2–5 × 1.2–2.8 cm, base abruptly tapered, margin sparsely and irregularly dentate, apex obtuse to subacute. Inflorescence branches scorpioid. Flowers sessile, 5- or 6-merous. Sepals triangular-linear, 2–2.5 mm, base dilated and spurless, apex obtuse. Petals yellow, lanceolate-oblong to subovate, 5–7 × 1.7–2 mm, base slightly narrowed, apex long mucronate. Stamens 10–12; antepetalous ones 3–4.5 mm, inserted near petal base. Nectar scales subquadrangular, ca. 0.5 × 0.4–0.6 mm, apex slightly dilated and emarginate. Carpels suberect, ovoid-oblong, 3–4 mm, adaxially slightly gibbous, base connate for 0.5–0.7 mm. Follicles stellately horizontal, ca. 5 mm, base connate for ca. 1 mm. Seeds numerous. Fl. Apr–Jun, fr. Jun.

Moist shady rocks on mountain slopes; 300–1300 m. W Hubei, SE Sichuan [Nepal].

This species is used medicinally.

8. *Pheidimus hybridus* (Linnaeus) 't Hart in 't Hart & Egli, *Evol. & Syst. Crassulac.* 168. 1995.

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Sedum hybridum Linnaeus, *Sp. Pl.* 1: 431. 1753;

Aizopsis hybrida (Linnaeus) Grulich.

Herbs perennial. Rootstock branched, prostrate, cordlike, long, woody. Stems branched, creeping, decumbent; sterile shoots short, densely leafy. Flowering stems to 30 cm. Leaves alternate; leaf blade spatulate-elliptic to obovate, 1.5–3 × 1–2 cm, base cuneate, margin obtusely serrate, apex obtuse. Inflorescence terminal, 3–5 cm in diam. Flowers unequally 5-merous. Sepals often subequal, linear to suboblong, 4–8 mm. Petals yellow, lanceolate, 8–10 × ca. 4 mm. Stamens 10; anthers orange. Nectar scales small, transversely wide. Carpels divergent, yellowish green. Styles slender. Follicles initially suberect, stellately divergent at maturity, ellipsoid, 8–10 mm, base connate for ca. 2 mm. Seeds ellipsoid, less than 1 mm. Fl. Jun–Jul, fr. Aug–Oct.

Rock crevices on forested slopes; 1400–2500 m. NW Xinjiang [Mongolia, Russia].

