

## 12. CRATAEGUS Linnaeus, Sp. Pl. 1: 475. 1753.

山楂属 shan zha shu

Gu Cuizhi (谷粹芝 Ku Tsue-chih); Stephen A. Spongberg

Shrubs, subshrubs, or small trees, deciduous, rarely evergreen, armed, rarely unarmed; buds ovoid or subglobose. Leaves simple, stipulate, venation craspedodromous, margin serrate and lobed or partite, rarely entire. Inflorescences corymbose, sometimes flowers solitary. Hypanthium campanulate. Sepals 5. Petals 5, white, rarely pinkish. Stamens 5–25; carpels 1–5, connate, but free apically. Ovary inferior or semi-inferior, with 2 ovules per locule, but one rudimentary. Fruit a pome, with persistent sepals at apex; carpels bony when mature, each locule with 1 seed; seed erect, cotyledons plano-convex.

At least 1000 species: N temperate regions, especially abundant in North America; 18 species (ten endemic) in China.

*Crataegus biloba* H. Léveillé, described from Guizhou, is *Symplocos paniculata* (Thunberg) Miquel in the Symplocaceae (see Fl. China 15: 252. 1996), under which it has been recognized as f. *biloba* (H. Léveillé) Rehder. *Crataegus lvi* H. Léveillé (Fl. Kouy-Tcheou, 347. 1915), also described from Guizhou, is the same species.

- 1a. Leaves deeply pinnatifid to more than 1/2 width of blade, some lateral veins extending to apices of lobes, some to sinus between lobes.
  - 2a. Fruit yellow or red, pyrenes (nutlets) with concave scars on 2 inner sides.
    - 3a. Fruit golden-yellow, 8–10 mm in diam., pyrenes 4 or 5; leaves glabrous or slightly pubescent ..... 15. *C. altaica*
    - 3b. Fruit red, 4–8 mm in diam., pyrenes 3–5; leaves glabrous ..... 16. *C. remotiloba*
  - 2b. Fruit red or black, pyrenes smooth on 2 inner sides.
    - 4a. Leaves cuneate, rarely broadly cuneate, with 2 or 3 pairs of lobes, subglabrous on both surfaces; fruit black, pyrenes 2 or 3 ..... 18. *C. songarica*
    - 4b. Leaves truncate or broadly cuneate, with 3–5 pairs of lobes, pubescent along midvein and lateral veins; fruit red, pyrenes 3–5 ..... 1. *C. pinnatifida*
- 1b. Leaves lobed or not divided, lateral veins extending to apices of lobes or teeth only.
  - 5a. Fruit black; inflorescence glabrous or nearly so.
    - 6a. Pulp green; pyrenes 4 or 5, with concave scars on 2 inner sides; leaf blade triangular-ovate to broadly ovate, base broadly cuneate to subrounded, with 3–5 pairs of lobes, pubescent on both surfaces ..... 17. *C. chlorosarca*
    - 6b. Pulp yellow; pyrenes 2 or 3, smooth on 2 inner sides; leaf blade rhomboidal to broadly ovate, base cuneate, sometimes broadly cuneate, with 2 or 3 pairs of lobes, subglabrous on both surfaces ..... 18. *C. songarica*
  - 5b. Fruit red, rarely yellow; inflorescence pubescent or glabrous.
    - 7a. Branches usually unarmed; leaf margin crenate-serrate or obtusely serrate, often not lobed, rarely 3–5-lobed on sterile branches ..... 2. *C. scabrifolia*
    - 7b. Branches armed, leaf blade lobed.
      - 8a. Leaf margin crenate-serrate, with 2–4 pairs of lobes in apical part.
        - 9a. Hypanthium and sepals abaxially glabrous; sepals entire ..... 3. *C. hupehensis*
        - 9b. Hypanthium and sepals abaxially densely pubescent; sepals 2–4-crenulate-serrate ..... 4. *C. shensiensis*
      - 8b. Leaf margin sharply serrate, often with 2–4 pairs of lobes in apical part, rarely only 3-lobed near apex.
        - 10a. Pedicel and peduncle pubescent or tomentose.
          - 11a. Leaf basally cuneate, margin apically incised or 3(–7)-lobed; pyrenes smooth on both inner sides.
            - 12a. Simple corymb 2–2.5 cm in diam., 5–7-flowered; petiole 4–5 mm ..... 5. *C. cuneata*
            - 12b. Compound corymb ca. 8 cm in diam.; 7–18-flowered; petiole 1.5–4 cm ..... 6. *C. shandongensis*
          - 11b. Leaf basally broadly cuneate to rounded, margin with 3–7 pairs of lobes; pyrenes with concave scars on both inner sides.
            - 13a. Leaves adaxially subglabrous, abaxially sparsely pubescent.
              - 14a. Thorns 6–10 mm; leaf petiole pilose or subglabrous, blade margin sharply serrate; fruit ellipsoid, glabrous ..... 7. *C. wilsonii*
              - 14b. Thorns 10–25 mm; leaf petiole glabrescent, blade margin doubly serrate; fruit subglobose, sparsely pubescent ..... 8. *C. oresbia*
            - 13b. Leaves pubescent on both surfaces.
              - 15a. Leaf basally cuneate or broadly cuneate, occasionally truncate; fruit globose, red or purplish brown ..... 9. *C. maximowiczii*
              - 15b. Leaf basally rounded, truncate, or broadly cuneate; fruit subglobose, orangish red ..... 10. *C. aurantia*
        - 10b. Pedicel and peduncle glabrous.
          - 16a. Leaf basally cuneate; fruit red, ca. 1 cm in diam. .... 11. *C. sanguinea*

- 16b. Leaf basally truncate or broadly cuneate; fruit yellow, orange, red, or black, not more than 1 cm in diam.
  - 17a. Ovary apically glabrous.
    - 18a. Leaf blade rhombic-ovate or elliptic-ovate, with 3–5 pairs of lobes, apex acuminate; fruit subglobose or oblong, orangish red ..... 12. *C. dahurica*
    - 18b. Leaf blade broadly ovate, with 2–4 pairs of lobes, apex obtuse; fruit ellipsoid, red ..... 13. *C. chungtienensis*
  - 17b. Ovary apically pubescent.
    - 19a. Leaf blade with 5–7 pairs of lobes, margin densely serrate ..... 14. *C. kansuensis*
    - 19b. Leaf blade with 2–4 pairs of lobes, margin remotely serrate.
      - 20a. Thorns usually absent; corymbs 3–4 cm in diam.; fruit yellow, 8–10 mm in diam. .... 15. *C. altaica*
      - 20b. Thorns usually present; corymbs 6–7 cm in diam.; fruit red, 4–8 mm in diam. .... 16. *C. remotilobata*

**1. *Crataegus pinnatifida*** Bunge, Mem. Acad. Imp. Sci. St.-Petersbourg Divers Savans 2: 11. 1835.

山楂 shan zha

Trees deciduous, to 6 m tall, with thorns 1–2 cm or sometimes unarmed. Branchlets purplish brown when young, grayish brown when old, terete, subglabrous or glabrous when young; buds purplish red, triangular-ovoid, glabrous. Stipules falcate, ca. 8 mm, herbaceous, margin serrate, apex acuminate; petiole 2–6 cm, glabrous; leaf blade dark green adaxially, broadly ovate or triangular-ovate, rarely rhomboidal-ovate, 5–10 × 4–7.5 cm, lateral veins 6–10 pairs, usually extending to apices of lobes and to sinuses between lobes, abaxially sparsely pubescent along veins, adaxially lustrous, base truncate or broadly cuneate, with 3–5 pairs of lobes, margin sharply irregularly doubly serrate, apex shortly acuminate. Corymb 4–6 cm in diam., many flowered; peduncle initially pubescent, glabrate, bracts caducous, linear-lanceolate, membranous, apex acuminate. Pedicel 4–7 mm, initially pubescent, glabrescent. Flowers ca. 1.5 cm in diam. Hypanthium campanulate, abaxially grayish white pubescent. Sepals triangular-ovate to lanceolate, 4–5 mm, both surfaces glabrous, apex shortly acuminate. Petals white, obovate or suborbicular, 7–8 × 5–6 mm. Stamens 20. Ovary 5-loculed, with 2 ovules per locule; styles 3–5, pubescent basally. Pome dark red, subglobose or pyriform, 1–2.5 cm in diam., glabrous; sepals persistent; pyrenes 3–5. Fl. May–Jun, fr. Aug–Sep.  $2n = 34^*$ ,  $102^*$ .

Among shrubs, slopes, also cultivated; 100–2000 m. Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Xinjiang, Zhejiang [Korea].

- 1a. Pedicel and peduncle glabrous ..... 1c. var. *psilosa*
- 1b. Pedicel and peduncle pubescent.
  - 2a. Fruit small, 1–1.5 cm in diam. .... 1a. var. *pinnatifida*
  - 2b. Fruit larger, ca. 2.5 cm in diam. .... 1b. var. *major*

**1a. *Crataegus pinnatifida* var. *pinnatifida***

山楂(原变种) shan zha (yuan bian zhong)

*Crataegus oxyacantha* Linnaeus var. *pinnatifida* Regel; ?*C. pinnatifida* f. *gehovensis* (C. K. Schneider) M. Kitagawa; ?*C. pinnatifida* var. *gehovensis* C. K. Schneider; *C. pinnatifida* var. *songarica* Dippel; *Mespilus pinnatifida* K. Koch; *M. pin-*

*natifida* var. *songarica* (Dippel) Ascherson & Graebner.

Pedicel and peduncle pubescent. Fruit small, 1–1.5 cm.

Among shrubs, slopes; 100–1500 m. Hebei, Heilongjiang, Henan, Jiangsu, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Zhejiang [Korea].

**1b. *Crataegus pinnatifida* var. *major*** N. E. Brown, Gard. Chron., n.s., 26: 621. 1886.

山里红 shan li hong

*Crataegus pinnatifida* var. *korolkowii* (Ascherson & Graebner) Yabe; *Mespilus korolkowii* Ascherson & Graebner.

Pedicel and peduncle pubescent, glabrate. Fruit relatively large, ca. 2.5 cm in diam.

Cultivated in N, NE, and NW China [of cultivated origin].

This taxon has been long cultivated as an important fruit tree.

**1c. *Crataegus pinnatifida* var. *psilosa*** C. K. Schneider, Ill. Handb. Laubholz. 1: 769. 1906.

无毛山楂 wu mao shan zha

*Crataegus coreana* H. Léveillé; *C. pinnatifida* f. *psilosa* (C. K. Schneider) M. Kitagawa.

Pedicel and peduncle glabrous.  $2n = 34^*$ .

Heilongjiang, Jilin, Liaoning [Korea].

**2. *Crataegus scabrifolia*** (Franchet) Rehder, J. Arnold Arbor. 12: 71. 1931.

云南山楂 yun nan shan zha

*Pyrus scabrifolia* Franchet, Pl. Delavay. 229. 1890; *Crataegus bodinieri* H. Léveillé; *C. henryi* Dunn.

Trees deciduous, to 10 m tall; branches usually unarmed. Branchlets purplish brown when young, grayish brown when old, terete, initially glabrous or subglabrous; buds purplish red, triangular-ovoid, glabrous. Stipules caducous, linear-lanceolate, ca. 8 mm, membranous, glabrous, margin glandular serrate, apex acuminate; petiole 1.5–4 cm, glabrous; leaf blade ovate-lanceolate to ovate-elliptic or rhombic-ovate, 4–3 × 2.5–4.5 cm, abaxially villous only along midvein and lateral veins, pilose or subglabrous, adaxially slightly pubescent when young, glabrescent, base cuneate, margin sparsely irregularly and doubly

obtusely serrate, usually not lobed or those of sterile shoots sparsely irregularly 3–5-lobed apically, apex acute. Corymb or compound corymb, 4–5 cm in diam., many flowered; peduncle glabrous; bracts caducous, linear-lanceolate, membranous. Pedicel 5–10 mm, glabrous. Flowers ca. 1.5 cm in diam. Hypanthium campanulate, abaxially glabrous. Sepals triangular-ovate or triangular-lanceolate, 3–4 mm, abaxially glabrous. Petals white, suborbicular or obovate, ca. 8 × 6 mm. Stamens 20. Ovary grayish white tomentose apically; styles 3–5. Pome yellow or reddish, depressed-globose, 1.5–2.5 cm in diam., glabrous; sepals persistent; pyrenes 5, smooth on both inner sides. Fl. Apr–Jun, fr. Aug–Oct. 2n = 34\*.

• Margins of *Pinus* forests, among shrubs, mixed river side forests; 1500–3000 m. Guangxi, Guizhou, Sichuan, Yunnan.

**3. *Crataegus hupehensis*** Sargent, Pl. Wilson. 1: 178. 1912.

湖北山楂 hu bei shan zha

*Crataegus hupehensis* var. *flavida* S. Y. Wang.

Trees or shrubs, 3–5 m tall; branches sparsely thorny, sometimes unarmed. Branchlets purplish brown when young, grayish brown when old, terete, glabrous; buds purple, triangular-ovoid to ovoid, glabrous. Stipules caducous, lanceolate or falcate, 5–8 mm, herbaceous, margin glandular serrate, apex acuminate; petiole 3.5–5 cm, glabrous; leaf blade ovate or ovate-oblong, 4–9 × 4–7 cm, glabrous or only abaxially barbate in axils, base broadly cuneate or subrounded, margin crenate-serrate, with 2–4 pairs of shallow lobes at apical part; lobes ovate, apex shortly acuminate. Corymb 3–4 cm in diam., 7–9-flowered; peduncle glabrous; bracts caducous, linear-lanceolate, membranous. Pedicel 4–5 mm, glabrous. Flowers ca. 1 cm in diam. Hypanthium campanulate, glabrous. Sepals triangular-ovate, 3–4 mm, margin entire, glabrous. Petals white, ovate, ca. 8 × 6 mm. Stamens 20. Ovary 5-loculed, with 2 ovules per locule; styles 5, white tomentose basally. Pome red, subglobose, ca. 2.5 cm in diam., punctate, glabrous; sepals persistent, reflexed; pyrenes 5, smooth on both inner sides. Fl. May–Jun, fr. Aug–Sep. 2n = 34\*.

• Thickets on slopes; 500–2000 m. Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shanxi, Sichuan, Zhejiang.

**4. *Crataegus shensiensis*** Pojarkova, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 13: 78. 1950.

陕西山楂 shaan xi shan zha

Shrubs. Branchlets reddish brown when young, dark brown when old, terete, glabrous; buds and stipules not seen. Petiole 1.5–2.5 cm, glabrous; leaves proximally on branches obovate or suborbicular, distal ones broadly ovate or oblong-ovate, 6–9 × 2.5–7.7 cm, abaxially barbate in axils, adaxially only with few hairs along veins, base cuneate or subrounded, margin irregularly crenate-serrate, with 1 pair of lobes broadly ovate or oblong-ovate, apex acute or acuminate. Compound corymb ca. 4 cm in diam., several flowered; peduncle glabrous; bracts not seen. Pedicel 4.5–11 mm, glabrous. Flowers not seen. Hypanthium campanulate, glabrous. Sepals triangular or lanceolate, adaxially pubescent, after anthesis revolute, margin entire or 2–4-crenulate at apical part, apex acuminate. Petals or

bicular or broadly ovate, 5–7 mm. Stamens 20. Ovary pubescent apically, 5-loculed, with 2 ovules per locule; styles 5, pubescent basally. Pome not seen. 2n = 34\*.

• Shaanxi.

Further study is necessary to document the characters of flowers and fruit.

**5. *Crataegus cuneata*** Siebold & Zuccarini, Abh. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. 4(2): 130. 1843.

野山楂 ye shan zha

Shrubs deciduous, to 15 m tall, usually with slender thorns 5–8 mm. Branchlets purplish brown when young, grayish brown when old, terete, initially pubescent, glabrous when old; buds purplish brown, triangular-ovoid, glabrous, apex obtuse. Stipules falcate, large, 5–8 mm, herbaceous, glabrous, margin serrate, apex acute; petiole 4–5 mm, narrowly winged or not, glabrous; leaf blade broadly obovate to obovate-oblong or obovate-elliptic, 2–6 × 1–4.5 cm, abaxially sparsely pubescent, densely so along veins, glabrescent, with conspicuous veins, adaxially glabrous, base cuneate or attenuate, margin irregularly doubly serrate or serrate, 3-lobed, rarely 5-lobed in apical part or not lobed, apex acute. Corymb 2–2.5 cm in diam., 5–7-flowered, peduncle pubescent; bracts caducous, lanceolate, herbaceous. Pedicel ca. 1 cm, pubescent. Flowers ca. 1 cm in diam. Hypanthium campanulate, abaxially pubescent. Sepals triangular-ovate, ca. 4 mm, both surfaces villous. Petals white, suborbicular or obovate, 6–7 mm. Stamens 20. Ovary pubescent apically, 5-loculed, with 2 ovules per locule; styles 4 or 5, tomentose basally. Pome red or yellow, subglobose or depressed-globose, 1–2 cm in diam., glabrous; sepals often persistent, reflexed; pyrenes 4 or 5, smooth on both inner sides. Fl. May–Jun, fr. Sep–Nov. 2n = 34\*.

Valleys, thickets; 200–2000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, S Shaanxi, Yunnan, Zhejiang [Japan].

- 1a. Leaf blade broadly obovate to obovate-oblong, larger, 2–6 × 1–1.4 cm, abaxially sparsely pubescent, densely so along veins, base cuneate, margin irregularly doubly serrate, 3-lobed, rarely 5-lobed in apical part ..... 5a. var. *cuneata*
- 1b. Leaf blade obovate-elliptic, smaller, 2–3(–4) × 1.5(–2) cm, both surfaces glabrous, base attenuate, margin serrate in apical part, not lobed ..... 5b. var. *tangchungchangii*

**5a. *Crataegus cuneata* var. *cuneata***

野山楂(原变种) ye shan zha (yuan bian zhong)

*Crataegus argyi* H. Léveillé & Vaniot; *C. chantcha* H. Léveillé; *C. cuneata* f. *pleniflora* S. X. Qian; *C. cuneata* var. *shangananensis* L. Mao & T. C. Cui; *C. kulingensis* Sargent; *C. stephanostyla* H. Léveillé & Vaniot.

Leaf blade broadly obovate to obovate-oblong, 2–6 × 1–1.4 cm, abaxially sparsely pubescent, densely so along veins,

base cuneate, margin irregularly doubly serrate, 3-lobed, rarely 5-lobed in apical part.

Valleys, thickets; 200–2000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, S Shaanxi (Qin Ling), Yunnan, Zhejiang [Japan].

**5b. *Crataegus cuneata* var. *tangchungchangii*** (F. P. Metcalf) T. C. Ku & Spongberg, **comb. et stat. nov.**

小叶野山楂 xiao ye ye shan zha

Basionym: *Crataegus tangchungchangii* F. P. Metcalf, Lingnan Sci. J. 11(1): 13. 1932; *C. cuneata* f. *tangchungchangii* (F. P. Metcalf) Y. T. Chang.

Leaf blade obovate-elliptic, 2–3(–4) × 1–1.5(–2) cm, both surfaces glabrous, base attenuate, margin serrate in apical part, not lobed.

• Thickets; 200–1500 m. Fujian (Changluo, Fuqing Xian, Fuzhou Shi).

**6. *Crataegus shandongensis*** F. Z. Li & W. D. Peng, Bull. Bot. Res., Harbin 6(4): 149. 1986.

山东山楂 shan dong shan zha

Shrubs deciduous, to 5 m tall, usually thorny; thorns robust, 5–10 cm. Branchlets reddish brown when young, grayish brown when old, terete, initially sparsely pubescent, glabrous when old, with sparse lenticels; buds not seen. Stipules caducous, falcate, herbaceous, subglabrous, glandular serrate at margin, apex acute to acuminate; petiole 1.5–4 cm, glabrous; leaf blade obovate or narrowly elliptic 4–8 × 2–4 cm, abaxially sparsely pubescent, densely so along veins, adaxially sparsely white pilose only along midvein, base cuneate, margin irregularly serrate, usually 3–5-lobed, sometimes not divided in apical part, apex acuminate. Compound corymb ca. 8 cm in diam., 7- or 8(–18)-flowered; peduncle white pubescent; bracts caducous, linear-lanceolate, membranous. Pedicel 1–1.5 cm, white pubescent. Flowers ca. 2 cm in diam. Hypanthium campanulate, abaxially white pubescent. Sepals triangular, 4–6 mm, adaxially white pubescent. Petals white, suborbicular or obovate-orbicular, ca. 5 × 4 mm. Ovary 5-loculed, with 2 ovules per locule; styles 5, white pubescent basally. Pome red, globose, 1–1.5 cm in diam., glabrous; sepals persistent; pyrenes 5, smooth on both inner sides. Fl. May–Jun, fr. Sep–Nov.

• Slopes; 500–800 m. C Shandong (Tai Shan).

**7. *Crataegus wilsonii*** Sargent, Pl. Wilson. 1: 180. 1912.

少毛山楂 shao mao shan zha

Shrubs deciduous, to 7 m tall; usually thorny; thorns 1–2.5 cm, stout. Branchlets dark yellowish brown when young, grayish brown or dark brown when old, terete, initially white pubescent, glabrous or subglabrous when old; buds purplish brown, triangular-ovoid, glabrous. Stipules falcate or oblong, 8–10 mm, herbaceous, subglabrous; petiole 2–2.5 cm, sparsely pilose or subglabrous; leaf blade ovate or obovate, rarely triangular-ovate, 4–6.5 × 3.5–5.5 cm, abaxially slightly pubescent along midvein and veins, adaxially sparsely pubescent when young, base cuneate, rounded, or cordate, margin sharply ser-

rate (teeth aristate toward apex) and usually with (2 or)3–5 pairs of shallow lobes in apical part, apex acute or obtuse. Corymb 3–4 cm in diam., many flowered; peduncle white tomentose; bracts caducous, lanceolate, herbaceous to membranous. Pedicel 4–7 mm, white tomentose. Flowers 3–4 cm in diam. Hypanthium campanulate, abaxially white tomentose or glabrous. Sepals ovate or triangular-ovate, 3–4 mm, abaxially pubescent. Petals white, suborbicular, 6–7 × 5–6. Stamens 20. Ovary 2- or 3-loculed, with 2 ovules per locule; styles 2 or 3, white tomentose basally. Pome red or purplish red, ellipsoid, 6–7 mm in diam., glabrous; sepals persistent, reflexed; pyrenes 1–3, with deep concave scars on both inner sides. Fl. May, fr. Aug–Sep.  $2n = 34^*$ .

• Shaded dense forests on slopes, thickets; 1000–2500 m. Gansu, Henan, Hubei, Shaanxi, Sichuan, Yunnan, Zhejiang.

**8. *Crataegus oresbia*** W. W. Smith, Notes. Roy. Bot. Gard. Edinburgh 10: 26. 1917.

滇西山楂 dian xi shan zha

Shrubs ca. 6 m tall, thorny; thorns 6–10 mm. Branchlets grayish brown, terete, white tomentose when young, soon glabrescent; buds purplish brown, ovate-triangular, glabrous. Stipules caducous, ovate-lanceolate or falcate, 6–10 mm, membranous, subglabrous, margin glandular serrate, apex acute-acuminate; petiole 1.8–2.8 cm, initially pubescent, soon glabrescent; leaf blade broadly ovate, 4.5–6 × 3–5.5 cm, abaxially sparsely pubescent, densely so along veins, adaxially sparsely pubescent, base cuneate or broadly cuneate, margin remotely doubly serrate and with (2 or)3–5 pairs of lobes, apex obtuse or acute. Corymb 3.6–6 cm in diam., many flowered; peduncle white tomentose; bracts caducous, linear-lanceolate, membranous. Pedicel 4–12 mm, white villous. Flowers ca. 1 cm in diam. Hypanthium campanulate, adaxially white villous. Sepals triangular-ovate, slightly shorter than hypanthium, 2–3 mm, both surfaces white pubescent. Petals white, suborbicular, ca. 8 × 6 mm. Stamens 20. Styles 2, rarely 3, pubescent basally. Pome reddish yellow, subglobose, ca. 6 mm in diam., white pubescent, rarely subglabrous; sepals persistent, reflexed; pyrenes 2 or 3, with concave scars on both inner sides. Fl. May, fr. Aug–Sep.

• On shrub-covered slopes; 2500–3300 m. NW Yunnan.

**9. *Crataegus maximowiczii*** C. K. Schneider, Ill. Handb. Laubholz. 1: 771. 1906.

毛山楂 mao shan zha

*Crataegus altaica* (Loudon) Lange var. *villosa* (Ruprecht) Lange; *C. beipiaoensis* S. L. Tung & X. J. Tian; *C. maximowiczii* var. *ninganensis* S. Q. Nie & B. J. Jen; *C. sanguinea* Pallas var. *villosa* Ruprecht.

Shrubs or small trees, to 7 m tall, unarmed or armed; thorns 1.5–3.5 cm. Branchlets purplish brown, terete, initially densely white pubescent, glabrescent; buds purplish brown, ovoid, glabrous. Stipules caducous, falcate, 5–8 mm, membranous, subglabrous, margin glandular serrate, apex acute or acuminate; petiole 1.5–2.5 cm, sparsely villous; leaf blade broadly ovate or rhombic-ovate, 4–6 × 3.5 cm, abaxially dense-

ly whitish villous, adaxially sparsely pubescent, base cuneate or broadly cuneate, occasionally truncate, margin remotely doubly serrate and with 3–5 pairs of lobes, apex acute. Compound corymb 4–5 cm in diam., many flowered; peduncle whitish villous; bracts caducous, linear-lanceolate, membranous. Pedicel 3–8 mm, whitish villous. Flowers ca. 1.2 cm in diam. Hypanthium campanulate, abaxially white pubescent. Sepals triangular-ovate or triangular-lanceolate, 3–4 mm, abaxially white pubescent. Petals white, suborbicular, ca. 5 mm. Stamens 20. Styles (2 or)3–5, pubescent basally. Pome purplish brown or red, globose, ca. 8 mm in diam., initially pubescent, later glabrous; fruiting pedicel 4–9 mm, initially densely white villous, glabrate when mature; sepals persistent, reflexed; pyrenes 3–5, with concave scars on both inner sides. Fl. May–Jun, fr. Aug–Sep.  $2n = 32, 34^*, 51^*$ .

Near or in mixed forests, roadsides, river sides; 200–1000 m. Heilongjiang, Jilin, Liaoning, Nei Mongol [Japan, Korea, Mongolia, Russia (E Siberia)].

**10. *Crataegus aurantia*** Pojarkova, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 13: 82. 1950.

橘红山楂 ju hong shan zha

Shrubs or small trees, deciduous, 3–5 m tall, unarmed or armed; thorns 1–2 cm. Branchlets dark purple when young, grayish brown when old, initially pubescent; buds not seen. Stipules not seen; petiole 1.5–2.5 cm, densely pubescent; leaf blade dark green adaxially, broadly ovate, 4–7 × 3–7 cm, abaxially pubescent, densely so along midvein and veins, adaxially sparsely pubescent, base rounded, truncate, or broadly cuneate, margin sharply and irregularly serrate, with 2 or 3 pairs of shallow lobes; lobes broadly ovate to suborbicular, apex acute. Compound corymb 3–4 cm in diam., many flowered; peduncle densely pubescent; bracts not seen. Pedicel 5–8 mm, densely pubescent. Flowers ca. 1 cm in diam. Hypanthium campanulate, abaxially pubescent. Sepals broadly triangular, 4–6 mm, abaxially pubescent. Petals white, suborbicular, ca. 5–6 mm. Stamens 18–20. Ovary 2- or 3-loculed, with 2 ovules per locule; styles 2 or 3 rarely 4, pubescent basally. Pome orangish red when dried, oblong-ovoid when young, subglobose when mature, ca. 1 cm in diam., glabrous; sepals persistent, reflexed; pyrenes 2 or 3, abaxially convex, adaxially with concave scars. Fl. May–Jun, fr. Aug–Sep.

• Mixed forests on slopes; 1000–1800 m. Gansu, Hebei, Shaanxi, Shanxi.

**11. *Crataegus sanguinea*** Pallas, Fl. Ross. 1(1): 25. 1784.

辽宁山楂 liao ling shan zha

*Mespilus purpurea* Poir.; *M. sanguinea* Spach.

Shrubs or rarely small trees, deciduous, 2–4 m tall, usually thorny; thorns ca. 1 cm, sometimes absent. Branchlets purplish brown when young, grayish brown when old, terete, sparsely pubescent when young, soon glabrous; buds purplish brown, triangular-ovoid, glabrous. Stipules falcate or irregularly cordate, 5–7 mm, herbaceous, glabrous, margin serrate, apex acute; petiole 1.5–2 cm, subglabrous; leaf blade broadly ovate or rhombic-ovate, 5–6 × 3.5–4.5 cm, abaxially sparsely pubescent along veins, adaxially pubescent, base cuneate, margin doubly

serrate, with (2 or)3–5 pairs of shallow lobes, apex acute. Corymb 2–3 cm in diam., many flowered; peduncle glabrous, subglabrous; bracts caducous, linear, membranous. Pedicel 5–6 mm, glabrous or subglabrous. Flowers ca. 8 mm in diam. Hypanthium campanulate, glabrous. Sepals triangular-ovate, ca. 4 mm, abaxially sparsely pubescent. Petals white, oblong, 5–6 mm. Stamens 20. Ovary pubescent apically, 3–5-loculed, with 2 ovules per locule; styles 3(–5). Pome red, subglobose, ca. 1 cm in diam., glabrous; sepals persistent, reflexed; pyrenes 3, rarely 5, with concave scars on both inner sides. Fl. May–Jun, fr. Jul–Aug.  $2n = 51^*, 68^*$ .

Slopes, mixed river side forests; 900–3000 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Xinjiang [N Mongolia, Russia (Siberia)].

**12. *Crataegus dahurica*** Koehne ex C. K. Schneider, Ill. Handb. Laubholzk. 1: 773. 1906.

光叶山楂 guang ye shan zha

Shrubs or small trees, deciduous, 2–6 m tall; thorns 1–2.5 cm, slender, sometimes absent. Branchlets purplish brown when young, dark brown when old, wilted, glabrous, with sparse, oblong lenticels; buds purple, suborbicular or triangular, glabrous. Stipules lanceolate or ovate-lanceolate, 6–8 mm, herbaceous, glabrous, margin serrate, apex acuminate; petiole 7–10 mm, glabrous; leaf blade rhombic-ovate, rarely elliptic-ovate to obovate, 3–5 × 2.5–4 cm, both surfaces glabrous, base cuneate or broadly cuneate, margin sharply doubly serrate, entire near base, with (2 or)3–5 pairs of lobes at apical 2/3 of margin; lobes ovate, apex acuminate. Compound corymb 3–5 cm in diam., many flowered; peduncle glabrous; bracts caducous, linear-lanceolate, membranous. Pedicel 8–10 mm, glabrous. Flowers ca. 1 cm in diam. Hypanthium campanulate, abaxially glabrous. Sepals linear-lanceolate, ca. 3 mm, margin entire or with 1 or 2 pairs of teeth, both surfaces glabrous. Petals white, suborbicular or obovate, 4–5 × 3–4 mm. Stamens 20. Styles 2–4, glabrous. Pome orangish red or orangish yellow, subglobose or oblong, 6–8 mm in diam., glabrous; sepals persistent, reflexed; pyrenes 2–4, with concave scars on both inner sides. Fl. May, fr. Aug.  $2n = 34^*$ .

Grassy places on river banks in forests, sandy slopes, thickets; 500–1500 m. N Hebei, Heilongjiang, Nei Mongol [N Mongolia, Russia (E Siberia)].

- 1a. Petiole and leaf blade abaxially glabrous ..... 12a. var. *dahurica*
- 1b. Petiole and leaf blade abaxially pubescent ..... 12b. var. *laevicalyx*

**12a. *Crataegus dahurica* var. *dahurica***

光叶山楂(原变种) guang ye shan zha (yuan bian zhong)

*Crataegus chitaensis* Sargent; *C. purpurea* J. A. Bosc ex Candolle; *C. sanguinea* Pallas var. *glabra* Maximowicz.

Petiole and leaf blade abaxially glabrous.

Grassy places on river banks in forests, sandy slopes; 500–1000 m. Heilongjiang, Nei Mongol [N Mongolia, Russia (E Siberia)].

**12b. *Crataegus dahurica* var. *laevicalyx*** (J. X. Huang et al.)

T. C. Ku & Spongberg, **comb. et stat. nov.**

光萼山楂 *guang e shan zha*

Basionym: *Crataegus laevicalyx* J. X. Huang et al., Bull. Bot. Res., Harbin 11(1): 25. 1991.

Petiole and leaf blade abaxially densely pubescent.

- Sandy slopes, thickets; ca. 1500 m. N Hebei (Weichang Xian).

**13. *Crataegus chungtienensis*** W. W. Smith, Notes Roy Bot. Gard. Edinburgh 10: 26. 1917.

中甸山楂 *zhong dian shan zha*

Shrubs to 6 m tall. Branchlets grayish brown, terete, glabrous or subglabrous, with sparse, oblong lenticels; buds purplish brown, ovoid, glabrous. Stipules ovate-lanceolate, ca. 8 mm, membranous, glabrous, margin glandular serrate, apex acuminate; petiole 1–1.2, rarely to 3 cm, glabrous; leaf blade broadly ovate, 4–7 × 3.5–5 cm, abaxially sparsely pubescent, densely so along veins, adaxially subglabrous, base rounded to broadly cuneate, margin sharply doubly serrate, with 2 or 3 (or 4) pairs of lobes, rarely parted near base, apex obtuse. Corymb 3–4 cm in diam., many flowered; peduncle glabrous or subglabrous; bracts caducous, linear-lanceolate, membranous. Pedicel 4–6 mm, glabrous or subglabrous. Flowers ca. 1 cm in diam. Hypanthium campanulate, abaxially glabrous. Sepals triangular-ovate, ca. 1 mm, both surfaces glabrous. Petals white, broadly obovate, ca. 6 × 5 mm. Stamens 20, slightly longer than petals. Styles (1 or) 2 or 3, glabrous. Pome red, ellipsoid, ca. 6 mm in diam., glabrous; sepals persistent, reflexed; pyrenes 1–3, with concave scars on both inner sides. Fl. May, fr. Sep.

- Mixed stream side forests, among shrubs; 2500–3500 m. NW Yunnan (Zhongdian Xian).

**14. *Crataegus kansuensis*** E. H. Wilson, J. Arnold Arbor. 9: 58. 1928.

甘肃山楂 *gan su shan zha*

Shrubs or small trees, 2.5–8 m tall, usually thorny; thorns many, ca. 0.7–1.5 cm. Branchlets greenish red, terete, slender, glabrous; buds purplish brown, suborbicular, glabrous. Stipules caducous, ovate-lanceolate, ca. 8 mm, membranous, subglabrous, margin glandular serrate, apex acute-acuminate; petiole 1.8–2.5 cm, glabrous; leaf blade broadly ovate, 4–6 × 3–4 cm, abaxially pubescent along veins and barbate in vein axils, later subglabrescent, adaxially sparsely pubescent, base truncate or broadly cuneate, margin sharply and doubly serrate, with 5–7 pairs of shallow lobes; lobes triangular-ovate, apex acute. Corymb 3–4 cm in diam., 8–18-flowered; peduncle glabrous; bracts caducous, lanceolate, membranous. Pedicel 5–6 mm, glabrous. Flowers 8–10 mm in diam. Hypanthium campanulate, abaxially glabrous. Sepals triangular, 2–3 mm, both surfaces glabrous. Petals white, suborbicular, 5–6 × 3–4 mm. Stamens 15–20. Ovary tomentose apically, 2- or 3-loculed, with 2 ovules per locule; styles 2 or 3. Pome red or orangish yellow, subglobose, 8–10 mm in diam., glabrous; sepals persistent; pyrenes 2 or 3, with concave scars on both inner lateral sides. Fl. May, fr. Jul–Sep.  $2n = 34^*$ .

- Mixed forests, shaded slopes, stream sides; 1000–3000 m.

Gansu, Guizhou, Hebei, Shaanxi, Shanxi, Sichuan.

**15. *Crataegus altaica*** (Loudon) Lange, Rev. Sp. Gen. Crataeg. 42. 1897.

阿尔泰山楂 *a er tai shan zha*

*Crataegus purpurea* var. *altaica* Loudon, Arb. Brit. 2: 825. 1838; *C. sanguinea* Pallas var. *incisa* Regel; *C. sanguinea* var. *inermis* Karelina & Kirilov; *C. wattiana* Hemsley & Lace var. *incisa* (Regel) C. K. Schneider.

Trees medium-sized, 3–6 m tall, unarmed, rarely with few 2–4 cm thorns. Branchlets purplish brown or reddish brown when young, grayish brown when old, terete, stout, glabrous; buds purplish brown, suborbicular, glabrous, apex acute. Stipules falcate or cordate, ca. 1 cm, herbaceous, glabrous, margin glandular serrate, apex acute; petiole 2–3.4 cm, glabrous; leaf blade broadly ovate or triangular-ovate, 5–9 × 4–7 cm, veins conspicuous, lateral veins extending to apices of lobes, abaxially barbate in vein axils, adaxially sparsely pubescent, base truncate or broadly cuneate, rarely subcordate, margin irregularly and sharply serrate, usually with 2–4 pairs of lobes, often parted near base, apex acute or obtuse. Compound corymb 3–4 cm in diam., many flowered; peduncle glabrous; bracts caducous, lanceolate, membranous. Pedicel 5–7 mm, glabrous. Flowers 1.2–1.5 cm in diam. Hypanthium campanulate, abaxially glabrous. Sepals triangular-ovate, or triangular-lanceolate, 2–4 mm, both surfaces glabrous, apex caudate-acuminate. Petals white, suborbicular, ca. 5 mm in diam. Stamens 20. Ovary sparsely pubescent apically, 4- or 5-loculed, with 2 ovules per locule; styles 4 or 5. Pome yellow, subglobose, 8–10 mm in diam., glabrous; sepals persistent, reflexed; pyrenes 4 or 5, with concave scars on both inner sides. Fl. May–Jun, fr. Aug–Sep.  $2n = 68^*$ .

Slopes, forest understories, stream sides; 400–1900 m. C and N Xinjiang [Russia (SE European part, Siberia)].

**16. *Crataegus remotilobata*** Raikova ex Popov, Bull. Appl. Bot., Leningrad 22: 438. 1929.

裂叶山楂 *lie ye shan zha*

Trees small, 5–6 m tall, usually thorny; thorns 0.6–2.5 cm, slender. Branchlets purplish brown when young, dark purple when old, terete, stout, glabrous or slightly glaucous; buds purplish brown, suborbicular, glabrous. Stipules caducous, falcate or cordate, ca. 8 mm, herbaceous, glabrous, margin thickened serrate, apex acute-acuminate; petiole 1.5–2.5 cm, glabrous; leaf blade broadly ovate, 4–6 × 3–4.5 cm, both surfaces glabrous or only abaxially pubescent in vein axils, base cuneate or broadly cuneate, margin remotely and sharply serrate, and with 2–4 pairs of lobes near base, often nearly divided to midvein; lobes ovate or ovate-lanceolate, apex acute or shortly acuminate. Corymb 6–7 cm in diam., many flowered; peduncle glabrous, slightly glaucous; bracts caducous, linear, membranous. Pedicel 5–6 mm, glabrous, glaucous. Flowers ca. 1.2 cm in diam. Hypanthium campanulate, abaxially glabrous, glaucous. Sepals triangular, 2–3 mm, both surfaces glabrous. Petals white, broadly obovate, ca. 5–6 × 3–4 mm. Stamens 20. Ovary densely pubescent apically, 4- or 5-loculed, with 2 ovules per locule;

styles 4 or 5. Pome red, globose, 4–8 mm in diam., glabrous; sepals persistent, reflexed; pyrenes 3–5, with deep concave scars on both inner sides. Fl. May–Jun, fr. Jul–Aug.

- Slopes, stream sides, roadsides. C and W Xinjiang.

**17. *Crataegus chlorosarca*** Maximowicz, Bull. Soc. Imp. Naturalistes Moscou 54(1): 20. 1879.

绿肉山楂 *lu rou shan zha*

Trees small, to 6 m tall; usually with few 1–1.5 cm thorns. Branchlets purplish brown when young, yellowish brown when old, terete, glabrous; buds purplish brown, triangular-ovoid, glabrous. Stipules falcate, 5–8 mm, membranous, glabrous, margin glandular serrate, apex acute; petiole 1.5–2 cm, pubescent; leaf blade triangular-ovate to broadly ovate, 5–9 × 3–5 cm, both surfaces sparsely pubescent, sometimes abaxially barbate in vein axils, base broadly cuneate or subrounded, margin sharply serrate, usually with 3–5 pairs of irregular lobes, apex acute or shortly acuminate. Corymb 2–3.5 cm in diam., several flowered; peduncle glabrous; bracts caducous, lanceolate, membranous. Pedicel 2–6 mm, glabrous. Flowers 1–1.2 cm in diam. Hypanthium campanulate, abaxially glabrous. Sepals triangular-lanceolate, 2–3 mm, both surfaces glabrous. Petals white, suborbicular, 5–7 × 4–5 mm. Stamens 20. Ovary pubescent apically; styles 5. Pome red when immature, black when mature with green pulp, subglobose, glabrous; sepals persistent; pyrenes 4 or 5, with concave scars on both inner sides. Fl. Jun–Jul, fr. Aug–Sep.

Cultivated. Liaoning [native to Japan and Russia (Kamchatka, Sakhalin)].

**18. *Crataegus songarica*** K. Koch, Verh. Vereins Beförd. Gartenbaues Königl. Preuss. Staaten, n.s., 1(2): 287. 1853.

准噶尔山楂 *zhun ge er shan zha*

*Crataegus fischeri* C. K. Schneider.

Shrubs or small trees, 4–5 m tall, armed or unarmed; thorns 0.8–1.5 cm, stout. Branchlets purplish brown when young, grayish brown when old, initially sparsely pubescent, soon glabrate, terete; buds reddish brown, ovoid, glabrous. Stipules falcate or lanceolate, ca. 8 mm, herbaceous, glabrous, margin serrate, apex acuminate; petiole 2–2.5 cm, glabrous or subglabrous; leaf blade rhomboidal-ovate to broadly ovate, 3.5–6.5 × 2.5–5.5 cm, both surfaces pubescent when young, glabrescent, base cuneate, rarely broadly cuneate, margin remotely serrate and with 2 or 3 pairs of deep lobes, or apically shallowly lobed; lobes oblong, apex acute. Corymb 3–5 cm in diam., many flowered; peduncle glabrous or slightly pubescent when young; bracts caducous, linear, membranous. Pedicel 0.5–1.5 cm, slightly pubescent when young. Hypanthium campanulate, initially pubescent, soon glabrous. Sepals triangular-ovate or broadly lanceolate, ca. 3 mm, abaxially initially pubescent, glabrescent. Petals not seen. Stamens 15–20. Ovary pubescent apically, 2- or 3-loculed, with 2 ovules per locule; styles 2 or 3. Pome reddish black with yellow pulp, sparsely punctate, globose, rarely ellipsoid, 1.2–1.6 cm in diam., glabrous; sepals persistent, reflexed; pyrenes 2 or 3, smooth on both inner sides. Fl. May, fr. Jul.  $2n = 68^*$ .

Valleys, thickets; 500–2000 m. Xinjiang (Huocheng Xian, Ili Xian) [Afghanistan, Kazakhstan; SW Asia (Iran)].

*Crataegus dsungarica* Zabel ex Lange (Rev. Spec. Gen. Crataegi, 43. 1897), described from Shandong, may be a hybrid between *C. alt-aica* and *C. songarica*, but no specimens were seen by the present authors.

