**1. ZYGOPHYLLUM** Linnaeus, Sp. Pl. 1: 385. 1753.

**霸王属** ba wang shu

*Sarcozygium* Bunge.

Shrubs, perennial herbs, or rarely annuals. Leaves opposite, even-pinnate or rarely simple; petiole herbaceous or membranous; leaflet blades plane or sticklike, fleshy. Flowers axillary, solitary or paired. Sepals 4 or 5, sometimes caducous. Petals as many as sepals, orangish red, white, or yellow, sometimes with an orange claw or pale along margin, rarely apetalous. Stamens 8–10, abaxially with scale-form appendages. Ovary 3–5-locular. Capsule winged or not, dehiscent or indehiscent, with 1 to several seeds per carpel.

More than 100 species: arid and semiarid regions of N Africa, C, N, and W Asia, Australia, S Europe; 19 species (two endemic) in China.

1a. Fruit conspicuously winged.

2a. Shrubs; sepals and petals 4.

3a. Capsule nearly spherical, 1.8–4 cm ................................................................. 2. *Z. xanthoxylon*

3b. Capsule narrowly ovoid to ovoid, 1–1.6 cm .......................................................... 3. *Z. kaschgaricum*

2b. Herbs; sepals and petals 5.

4a. Leaflets 1 pair; capsule spherical, ca. 1 cm .......................................................... 14. *Z. fabagoides*

4b. Leaflets 1–5 pairs; capsule not spherical, or if spherical larger than 1 cm.

5a. Capsule spherical, width of wings more than 5 mm.

6a. Leaves with 2 or 4 leaflets; leaflet blades 1–2.5 × 0.5–2 cm ...................................... 15. *Z. potaninii*

6b. Leaves with 6–10 leaflets; leaflet blades 0.5–1.2 × 0.2–0.8 mm ................................. 16. *Z. macropterum*

5b. Capsule not spherical, width of wings less than 3 mm.

7a. Stamens ca. 2 × as long as petals; leaflet blades ovate to rotund ............................. 17. *Z. iliense*

7b. Stamens shorter than petals; leaflet blades linear, linear-oblong, or lanceolate.

8a. Capsule lanceolate, base cuneate, apex acuminate ................................................... 18. *Z. oxyccarpum*

8b. Capsule oblong-ovoid to ovoid, both ends obtuse .................................................. 19. *Z. pterocarpum*

1b. Fruit sometimes ridged but not conspicuously winged.

9a. Fruit not more than 2 × as long as wide, indehiscent ................................................. 1. *Z. gobicum*

9b. Fruit more than 2 × as long as wide, dehiscent.

10a. Leaves with more than 2 leaflets at least for majority of leaves.

11a. Plants prostrate to ascending; leaflet blades 1–3 mm wide .................................... 13. *Z. mucronatum*

11b. Plants erect or spreading; leaflet blades 3–15 mm wide.

12a. Perennial herbs; leaflet blades 3–5 mm wide; sepals 7–8 mm; capsule 2.5–4 cm,
falcately curved ........................................................................................................... 11. *Z. jaxarticum*

12b. Annual or biennial herbs; leaflet blades 4–15 mm wide; sepals 5–6 mm; capsule

1.6–2.5 cm, straight or slightly curved but not falcate .................................................. 12. *Z. loczyi*

10b. Leaves with only 2 leaflets.

13a. Stamens shorter than petals.

14a. Plants 7–15 cm tall; petiole scabrous; pedicel 1–3 mm ............................................. 4. *Z. kansuense*

14b. Plants 30–80 cm tall; petiole not scabrous; pedicel 10–18 mm .................................. 5. *Z. obliquum*

13b. Stamens longer than petals.

15a. Plants 10–20 cm tall; capsule apex acuminate .......................................................... 10. *Z. roswii*

15b. Plants 20–60(–100) cm tall; capsule apex not acuminate.

16a. Capsule more than 6 mm in diam.; leaflet blades 1.5–3 cm wide.

17a. Capsule cylindric, both ends not slender, 0.7–1 cm in diam.; seed surface smooth, margin entire; plants 40–80 cm tall ......................................................... 6. *Z. macropodum*

17b. Capsule oblanceolate to oblanceolate, 1–1.5 cm in diam.; seed surface with pores, margin irregular; plants 20–25 cm tall .................................................. 7. *Z. sinkiangense*

16b. Capsule less than 5 mm in diam.; leaflet blades 0.7–1 cm wide.

18a. Leaflet blades oblangeolate; plants erect ................................................................. 8. *Z. brachypterum*

18b. Leaflet blades obovate to oblong-ovate; plants spreading or prostrate .................... 9. *Z. fabago*


戈壁霸王 ge bi ba wang

Herbs, perennial, glaucous, reddish in autumn. Stems much branched, prostrate, 10–20 cm. Stipules distinct, ovate, 2–7 mm. Leaves with 2 leaflets; petiole 2–7 mm; leaflet blades obliquely ovate, 5–20 × 3–8 mm, larger basally on stem. Flowers paired. Pedicel 2–3 mm. Sepals 5, green or orange, elliptic to oblanceolate, 4–6 mm. Petals pale green or orange, smaller than sepals. Stamens 6–8 mm, longer than petals. Capsule ellipsoid, 8–14 × 6–7 mm, pendulous, indehiscent, both ends

霸王

*Zygophyllum xanthoxylum* Bunge, Linnaea 17: 7. 1843; *Zygophyllum ferganense* (Drobow) Borissova.

Herbs, perennial, 7–15 cm tall. Roots numerous, thick. Stems much branched, tender. Leaves with 2 leaflets; petiole 0.8–1.8 cm, margin membranous. Leaves with 2 leaflets; petiole 0.8–2.5 cm; leaflet blades long spatulate, linear-oblong, or linear, 8–24 × 2–5 mm, apex obtuse. Flowers axillary on old branches. Sepals 4, green, obovate, 4–7 mm. Petals 4, light yellow, obovate to nearly rotund, 8–11 mm. Stamens 8, longer than petals; appendages on middle part of filaments. Capsule oblanceolate to oblong, 2.5–4 cm, 3-valved, wings 2–3 mm wide, 2 ovate. Seeds 6–7 × ca. 2.5 mm. Fl. May, fr. Jul–Sep. 2n = 22.

Sandy gravel terraces, hilly slopes, gravel dunes, pediments in desert and semidesert areas; 1600–2600 m. W Gansu, Hebei, W Nei Mongol, W Ningxia, Qinghai, Xinjiang [Mongolia].


喀什霸王

*Zygophyllum kaschgaricum* (Borissova) Y. X. Liou.

Herbs, perennial, 20–25 cm tall. Roots thick, woody. Stems ribbed. Leaves with 2 leaflets; petiole with angular wings; leaflet blades obliquely ovate to oblong, 2–4 × 1.5–3 cm, apex slightly rounded. Flowers axillary, paired. Pedicel 12 mm. Sepals 5, ca. 8 mm, 3 broadly ovate and ca. 5 mm wide, 2 ovate. Stamens 10, 5 longer than others; scales as long as half of filament or longer. Capsule cylindric, 2.5–3.8 × 0.7–1 cm, erect, 5-angular, both ends obtuse. Seeds numerous, black, ovoid, ca. 3 × 2.5 mm, surface and margin smooth. Fl. May, fr. Jul–Sep.

Wastelands, farmland margins, saline sandy areas. Xinjiang [Kazakhstan].


长梗霸王 chang geng ba wang

Herbs, perennial, 30–80 cm tall. Roots numerous, thick. Branches ascending to spreading. Stipules connate on basal stems, distinct on apical stems. Leaves with 2 leaflets; petiole winged; leaflet blades obliquely ovate, 1–2 × 0.7–1 cm, glaucous, base cuneate, apex acute. Flowers axillary, solitary or paired. Pedicel 1–1.8 cm. Sepals 5, ovate to oblong, 5–8 mm. Petals orange at base, 6–10 mm. Stamens shorter than petals; appendages oblong, half as long as stamens. Capsule cylindric, ca. 3 cm × 5–8 mm, both ends obtuse. Seeds ovoid, 5-angular. Fl. Jun–Aug, fr. Jul–Sep.

Hillsides, sandy gravel beach, valleys. Gansu, Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan].


大叶霸王 da ye ba wang

Herbs, perennial, 40–80 cm tall. Roots thick, woody. Stems ribbed. Leaves with 2 leaflets; petiole with angular wings; leaflet blades obliquely ovate to oblong, 2–4 × 1.5–3 cm, apex slightly rounded. Flowers axillary, paired. Pedicel 5–12 mm. Sepals 5, ca. 8 mm, 3 broadly ovate and ca. 5 mm wide, 2 ovate. Stamens 10, 5 longer than others; scales as long as half of filament or longer. Capsule cylindric, 2.5–3.8 × 0.7–1 cm, erect, 5-angular, both ends obtuse. Seeds numerous, black, ovoid, ca. 3 × 2.5 mm, surface and margin smooth. Fl. May, fr. Jul–Sep.

Wastelands, farmland margins, saline sandy areas. Xinjiang [Kazakhstan].


新疆霸王 xin jiang ba wang

Herbs, perennial, 20–25 cm tall. Roots thick, woody. Stems thick, internodes to 4 cm. Stipules distinct, triangular, margin membranous. Leaves with 2 leaflets; petiole 0.8–1.8 cm, connected; leaflet blades obovate to nearly rotund, 2–4 × 1.5–3 cm, slightly fleshy, flat, apex rounded. Flowers axillary, paired. Pedicel ca. 5 mm. Sepals obovate. Petals slightly angular. Stamens longer than petals; appendages on middle part of filaments. Capsule oblong to oblong, 2.5–4 × 1–1.5 cm, slightly ridged, dehiscent. Seeds 4 or 5 per carpel, ovoid, bony, margin irregular. Fl. May–Jun, fr. Jul.

Hillsides, valleys. Xinjiang.


细茎霸王 xi jing ba wang

*Zygophyllum fabago* Linnaeus subsp. *brachypterum* (Karelin & Kirilov) Popov.

Herbs, perennial, 15–20 cm tall. Roots numerous, thick, woody. Stems much branched, tender. Leaves with 2 leaflets;
petiole equal to or shorter than leaflets, with linear wings; leaflet blades oblong to obovate, 1.5–2.5 cm × 5–6 mm, thin, apex obtuse. Flowers axillary, solitary or paired. Pedicel 1–1.5 cm. Sepals 5, unequal, 0.7–1.5 cm. Petals 5, ovate, 4–5 mm. Stamens 1–1.2 cm, obviously longer than petals; appendages dissected. Capsule cylindric to oblong, 10–16 × ca. 5 mm, with 5 ridges, apex obtuse. Seeds reniform, ca. 3 × 1.5–2 mm. Fl. May–Jun, fr. Jul.

Slopes, valleys in deserts. W Gansu, Xinjiang [Kazakhstan, Mongolia].


豆状霸王 dou xing ba wang

_Zygophyllum fabago_ subsp. _dolichocarpum_ Popov; _Z. fabago_ subsp. _orientale_ Borissova.

Herbs, perennial, 30–80 cm tall. Roots thick. Stems much branched, woody at basal parts, spreading to prostrate, smooth. Stipules ovate, elliptic, or lanceolate, 4–10 mm, connate on basal stems, distinct and smaller on apical stems. Leaves with 2 leaflets; petiole shorter than leaflets; leaflet blades obovate to oblong-obovate, 1.5–3.3 × 0.6–2 cm, thick, apex rounded. Flower axillary. Pedicel 4–10 mm. Sepals ovate to elliptic, 6–8 × 3–4 mm, margin white and membranous, apex obtuse. Petals basally orangish red and apically white, obovate, as long as sepals. Stamens longer than petals, 1.1–1.2 cm; appendages oblong, half as long as anthers. Capsule oblong to cylindric, 2–3.5 × 0.4–0.5 cm, pendulous, with 5 ridges. Seeds numerous, ca. 3 × 2 mm, surface with dots. Fl. May–Jun, fr. Jul–Sep. 2n = 22, 28.

Alluvial plains, oases, wet sand, wastelands. NW Gansu, W Nei Mongolia, Qinghai, Xinjiang [Afghanistan, Kazakhstan, Pakistan, Russia, Turkmenistan; N Africa, W Asia, SE Europe].

10. _Zygophyllum rosowii_ Bunge, Linnaea 17: 5. 1845.

石生霸王 shi sheng ba wang

Herbs, perennial, 10–20 cm tall. Roots to 3 cm thick, woody. Stems much branched, spreading or prostrate. Stipules distinctly ovate, 2–3 mm, white membranous. Leaves with 2 leaflets; petiole 2–7 mm; leaflet blades ovate, rotund, or oblong, 0.8–2.5 × 0.5–0.8 cm, apex acuminate to obtuse. Flowers axillary, solitary or paired. Pedicel 5–6 mm. Sepals elliptic to obovate-oblong, 5–8 × 2–3 mm, margin membranous. Petals 5 white but orange at base, obovate, nearly same size as sepals. Stamens longer than petals; appendages oblong, apex toothed or entire. Capsule linear-lanceolate, 1.8–5 × 0.5–0.7 cm, pendulous, slightly curved or falcate, apex acuminate. Seeds grayish blue, oblong-ovoid. Fl. Mar–Jun, fr. Jun–Jul.

Gravel hills, alluvial gravel slopes, rocky steep slopes, rocky areas with gravel and sand; 400–1000 m. Gansu, Nei Mongol, Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Tajikistan].

1a. Leaflets ovate, 0.8–1.8 cm; capsule 1.8–2.5 cm; fr. 10a. var. _rosowii_

1b. Leaflets rotund to oblong, 1.5–2.5 cm; capsule 3–5 cm; fr. 10b. var. _latifolium_

10a. _Zygophyllum rosowii_ var. _rosowii_

蝎虎霸王  xie hu ba wang

Herbs, perennial, 15–25 cm tall. Roots woody. Stems numerous, tender, much branched, prostrate or spreading, with ribs. Stipules minute, triangular, margin membranous and fringed. Leaves with 4 or 6 leaflets; petiole and rachis with flat wings sometimes as wide as leaflets; leaflet blades linear to linear-oblong, 8–10 × 1–3 mm, base obtuse, apex rounded and mucronate. Flowers axillary, solitary or paired. Pedicel 2–5 mm. Sepals 5, narrowly obovate to oblong, 5–8 × 3–4 mm. Petals 5, orangish red at base and white at apex, obovate, slightly longer than sepals. Stamens longer than petals; anthers orange, oblong-spherical; appendages ca. 1/2 as long as filament. Capsule lanceolate to cylindrical, pendulous, with ridges, 5-locular, with 1–4 seeds per locule, apex acuminate to acute. Seeds yellowish brown, ellipsoid to ovoid, surface with dense cavities. Fl. Jun–Aug, fr. Jul–Sep.

Hilly slopes, plains, alluvial fans, terraces, sandy soil, loess hills; 800–3500 m. Gansu, W Nei Mongol, Ningxia, Qinghai, Xinjiang [Mongolia].


拟豆叶霸王  ni dou ye ba wang

Herbs, perennial, 20–40 cm tall. Root woody. Basal stems yellow, woody, with ribs; apical stem bright green; internodes 6–7 cm. Stipules herbaceous, connate basally on stems, semi-rotund and 2–3 mm, distinct apically on stems, triangular-ovate and 1–2 mm. Leaves with 2 leaflets; petiole 0.8–2 cm; leaflet blades, obliquely oblong to ovate, 1–2.5 cm × 6–10 mm, apex obtuse. Flowers axillary, paired. Pedicel 6–10 mm, slender. Sepals 5, unequal in size, smaller one 6–8 × ca. 5 mm, larger one ca. 5 × 4 mm, ovate. Petals white but orange at base. Stamens 1–1.2 cm; appendages narrowly oblong, 3–4 mm. Capsule nearly globose, ca. 1 cm, pendulous, narrowly winged. Fl. May–Jul, fr. Aug.

Moving sands, sandy areas, riverbanks in desert zones. Gansu, Xinjiang [Kazakhstan].


大花霸王  da hua ba wang

Herbs, perennial, 10–25 cm tall. Stems thick, erect or spreading, basally much branched. Stipules connate, ca. 3 mm, herbaceous. Leaves with 2 or 4 leaflets; petiole 3–8 mm, winged; leaflet blades obliquely obovate, elliptic, or rotund, 1–2.5 × 0.5–2 mm, thick. Flowers axillary, paired or in threes, pendulous. Pedicel shorter than sepals, elongating after anthesis. Sepals yellowish, obovate, 6–11 × 4–5 mm. Petals white but orange at base, spatulate-obovate, shorter than sepals. Stamens longer than sepals; appendages linear-elliptic, half as long as filaments. Capsule ovoid-globose to globose, 1.5–2.5 × 1.5–2.6 cm, pendulous, 5-locular, with 5 wings, wings 5–7 mm, 4 or 5 seeds per locule. Seeds obliquely ovoid, ca. 5 × 3 mm. Fl. May–Jun, fr. Jun–Sep.

Deserts, gravel hills. Gansu, W Nei Mongol, Xinjiang [Kazakhstan, Mongolia].


大翅霸王  da chi ba wang

Herbs, perennial, 5–25 cm tall. Root thick, woody. Stems spreading to erect, scabrous. Stipules white, distinct, ovate to lanceolate, membranous, margin serrate or fringed. Leaves with 6–10 leaflets; petiole 1–2 cm; leaflet blades oblong to oblong, 5–12 × 2–8 mm. Flowers axillary, 1 or 2. Pedicel 2–7 mm, erect at anthesis but later pendulous. Sepals elliptic, 5–6 × 4–5 mm, apical obtuse to acute. Petals orange, obovate, longer than sepals, apical obtuse to emarginate. Stamens 10, 5 equal to petal length, 5 shorter than petal length; appendages oblong. Capsule globose to ovoid-globose, 2.4–5 × 2–4 cm, wings 5–12 mm wide and membranous. Seeds yellow to grayish green, obliquely lanceolate, 5–9 × 2–3 mm, slightly compressed. Fl. Apr–May, fr. May–Aug.

Hills, river terraces. Xinjiang [Kazakhstan, Kyrgyzstan, Russia, Tajikistan, Turkmenistan, Uzbekistan; W Asia].


伊犁霸王  yi li ba wang

Herbs, perennial, 5–20 cm tall. Roots thick, woody. Stems much branched, herbaceous. Stipules distinct, ovate-triangular on basal stems, lanceolate on apical stems, membranous, margin serrate. Leaves with 2–6 leaflets; leaflet blades ovate to rotund, 10–12 × 5–7 mm. Flowers axillary, solitary or paired. Pedicel 5–7 mm. Sepals oblong, 5–6 mm, apex obtuse. Petals orange at base, obovate to oblong, as long as sepals, apex obtuse to rounded. Stamens ca. 2 × petal length; appendages shorter than filaments. Capsule cylindrical, oblong, or oblong-globose, ca. 2 × 0.6 cm, both ends obtuse, wings narrow; styles persistent. Seeds ovoid to reniform, ca. 3 mm. Fl. May, fr. Jul–Aug.

Dry rocky mountain slopes. Gansu, W Nei Mongol, E and N Xinjiang [Kazakhstan].


尖果霸王  jian guo ba wang

Herbs, perennial, 10–15 cm tall. Roots thick, woody. Stems much branched, spreading. Stipules rotond to lanceolate, membranous to herbaceous, margin serrate. Leaves with 4 or 6 leaflets; petiole 1–2 cm; leaflet blades linear-oblong, 5–20 × 1–3
mm, base cuneate, apex obtuse. Flowers axillary. Pedicel short. Sepals oblong-ovate, 3–5 × 2–3 mm, apex obtuse. Petals obovate, shorter or nearly equal to sepal length, base narrowly cuneate, apex obtuse. Stamens shorter than or as long as petals; appendages 1/4–1/3 as long as stamens, linear, with obtuse teeth at margin. Capsule lanceolate, 2–3 × 0.7–1 cm, membranous, with 5 narrow wings, apex gradually narrowed. Seeds obliquely ovoid, 3.5–4 × 1.5–2 mm, compressed on both sides, base slightly rounded, apex acuminate. Fl. Apr–Jan, fr. May–Jul.

Gravel areas, stony hills. Xinjiang [Kazakhstan].


翼果霸王 yi guo ba wang

Zygophyllum pterocarpum var. microcarpum Y. X. Liou.

Herbs, perennial, 10–20 cm tall. Roots thick, woody. Stems tender, much branched, spreading. Stipules ovate to lanceolate, 1–2 mm. Leaves with 4 or 6 leaflets; petiole 4–6 mm, flat, winged; leaflet blades linear-oblong to lanceolate, 5–15 × 2–5 mm, glaucous, apex acute to obtuse. Flowers axillary, solitary or paired. Pedicel 4–8 mm, elongated after anthesis. Sepals oblong, 5–7 × ca. 4 mm, apex obtuse. Petals basally orange and apically white, oblong-ovate, 7–8 mm, base cuneate, apex obtuse. Stamens shorter than petals; appendages 1/3 as long as filaments. Capsule oblong-ovoid to ovoid, 1–2 × 0.6–1.5 cm, with narrow wings to 2–3 mm, both ends obtuse. Fl. May–Jun, fr. Jun–Sep.

Gravel hills, alluvial fans, saline soil, under Haloxylon ammodendron. Gansu, W Nei Mongol, Xinjiang [Kazakhstan, Mongolia, Russia (Siberia)].