THAI FOR. BULL. 15 : 15–21. 1985.

2. ZYGOPHYLLACEAE

Kongkanda Chayamarit*

A family of annual to perennial herbs or shrubs, rarely trees, with opposite, stipulate leaves; solitary, regular flowers; and drupaceous or schizocarpous fruits.

About 20 genera and 250 species, widely distributed in the tropical and warm temperate zones of both hemispheres, often in desert or saline region.

Only 2 species of the genus *Tribulus* occur in Thailand and one introduced species, *Guaiacum officinale* Linn.

KEY TO THE GENERA

Trees with blue or purple flowers; fruit a drupe	**1. Guaiacum**
Herbs with yellow flowers; fruit a spiny coccus	**2. Tribulus**

1. GUAIACUM

Guaiacum officinale Linn., Sp. Pl. : 381. 1753; Stone, Micronesica 6 : 349. 1970. Figure 7.

Small tree, about 5 m high. *Leaves* opposite, paripinnate; leaflets 2-4 pairs, obovate, rounded at apex, obtuse or cuneate at base, coriaceous, glossy above, 1–5 cm long, 1–2.5 cm wide. *Petiole* short. *Flowers* clustered, blue. *Sepals* 5, pubescent. *Petals* 5, spreading, about 1 cm long. *Fruit* yellow, broad, heart-shaped, compressed, with two wing-like angles, 2-celled, each cell with one seed.

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* Forest Herbarium (BKF), Royal Forest Department, Bangkok, Thailand, 10900.



Figure 7. แก้วเจ้าจอม *Guaiacum officinale* Linn.

Thailand.—CENTRAL : Krung Thep (Bangkok). Introduced by King Chulalongkon (Rama V) from Calcutta.

Ecology.—Cultivated. Flowers in February. Fruits in April.

Vernacular.—Kaeo chaochom แก้วเจ้าจอม (Krung Thep).

Uses.—Resin is extracted for medicine. Wood is used in making pulleys, bowling balls, mallets and furnitures. The tree itself is cultivated as ornamental with blue flowers and glossy leaves.

2. TRIBULUS

Linn., Sp. Pl. : 386. 1753; Edgeworth & Hook. in Fl. Br. Ind. 1 : 423. 1875; Gamble, Fl. Madras : 129. 1915; van Steenis in Fl. Males. I. : 4 : 64. 1949; Back. & Bakh. f., Fl. Java 1 : 242. 1963.

Annual or perennial procumbent herbs, with very long tap root, usually silky. *Leaves* stipulate, opposite, paripinnate. *Flowers* solitary, pseudo-axillary, white or yellow. *Sepals* 5, free, imbricate, persistent. *Petals* 5, free, imbricate, patent, caducous. *Disk* annular, 10-lobed. *Stamens* 10, unequal. *Ovary* sessile, hairy, 5-celled; style short, stigma 5. *Fruit 5* cocci, depressed, spinous or tuberculate.

KEY TO THE SPECIES

Perennial procumbent herb. Flowers 2.5-4 cm in diam. Fruits with two spines in each coccus **1. T. cistoides**

Annual or biennial procumbent herb. Flowers up to 1.5 cm in diam. Fruits with two long and two short spines in each coccus **2. T. terrestris**

1. **Tribulus cistoides** Linn., Sp. Pl. 1 : 387. 1753; Edgeworth & Hook. in Fl. Br. Ind. 1 : 423. 1875; Merr., Fl. Manila : 267. 1912; Craib in Fl. Siam. En. 1 : 205. 1931; van Steenis in Fl. Males. I. 4 : 64. 1949; Back. & Bakh. f., Fl. Java 1 : 242. 1963. Figure 8.



Figure 8. โคกกระสุน *Tribulus cistoides* Linn.

Perennial procumbent herb, sparingly hirsute, 30-145 cm long. *Leaves* 2-8 cm long; leaflets subsessile, 7-8 pairs, oblong, usually mucronate, base oblique, entire, grey tomentose beneath, 6-22 mm long, 2.5–9 mm wide. *Stipules* lanceolate, acuminate, persistent, 4–7 mm long. *Flowers* yellow, 2.5–4 cm in diam., peduncles slender, ascending, 2-4 cm long. *Sepals* lanceolate, 10 mm long, silky. *Petals* obovate, 1–2 cm long, 1-1.5 cm wide. *Fruit* subglobose, 1 cm in diam., 4-5 cocci, hairy, greenish-yellow, with two sharp, stout spines in each coccus.

T h a i l a n d.— SOUTH-EASTERN : Chon Buri; Prachin Buri; SOUTH-WESTERN : Kanchanaburi; PENINSULAR : Surat Thani.

D i s t r i b u t i o n.— Throughout the tropics.

E c o l o g y.— Common along sandy beaches, or strand dunes up to 3 m. alt. Flowering most of the year. July–August.

V e r n a c u l a r.— Khok krasun โคกกระสุน (Central).

2. **Tribulus terrestris** Linn., Sp. Pl. 1 : 387. 1753; Edgeworth & Hook. in Fl. Br. Ind. 1 : 423. 1874; Gamble, Fl. Madras 1 : 130. 1915; Craib in Fl. Siam. En. 1 : 205. 1931; Maheswari, Fl. Delhi : 91. 1963; Huang in Fl. Taiwan 3 : 435. 1977. Figure 9.

Annual or biennial procumbent herb, up to 1 m long, coarsely hairy. *Leaves* 4–8 cm long; leaflets 5–7 pairs, oblong, mucronate, base oblique, densely pubescent on the lower surface, 5–15 mm long, 3-8 mm wide. *Stipules* lanceolate, 4 mm long. *Flowers* up to 1.5 cm in diam., peduncle 10–15 mm long. *Sepals* lanceolate, 5 mm long. *Petals* obovate, 4 mm long. *Fruit* hairy, 6-10 mm long, usually rugose, with 2 long divergent spines near the summit and 2 shorter ones near the base. *Seeds* 2–4 in each coccus.

T h a i l a n d.— NORTHERN : Tak, Nakhon Sawan; SOUTH-WESTERN: Kanchanaburi; PENINSULAR : Prachaup Khiri Khan.

D i s t r i b u t i o n.— Widely distributed in the tropics and subtropics.



Figure 9. หนามกระสุน *Tribulus terrestris* Linn.

E c o l o g y.—Waste places and sandy soil, altitude 0-150 m. Flowering : April-July. Fruiting : July-November.

V e r n a c u l a r.—Khok krasun โคกกระสุน (Central); naam krasun หนามกระสุน (Lampang); naam din หนามดิน (Tak).

U s e.—Fruits used in painful micturition, calculus affections, urinary discharges, impotence; diuretic in gout, kidney diseases and gravel. Seeds and fruits are powdered and used in backache.

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