

TAXONOMIC REVISION OF THE FAMILY STERCULIACEAE FROM PAKISTAN

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Abstract

Ten genera and 19 species of Sterculiaceae, mostly cultivated, are discussed. Keys to the taxa and descriptions are provided. Following Hutchinson several species have been transferred to *Brachychiton*, *Ferniana* and *Pterygota* from *Sterculia*. Correct nomenclature and authority have been adopted in addition to a few new records from the area.

Introduction

The family Sterculiaceae consists of 68 genera and over 1000 species, mainly distributed in the tropical countries. In Pakistan it is represented by 10 genera and 19 species, of these only one genus and two species are indigenous to our area.

Some members of the family are important economically. Cocoa is obtained from the seeds of *Theobroma cacao* Linn. and some of the species like *Guazuma ulmifolia* Lam. and *Pterospermum acerifolium* (Linn.) Willd. etc. are reputed to have medicinal properties also. Many plants are cultivated for their aesthetic and ornamental value.

Most of the works applicable to our area, e.g., Masters (1874), Beissier (1867), Cooke (1958), Jafri (1966), Qurzishi & Khan (1971) are confined to the indigenous taxa only with the exception of Parker (1953) who has discussed some cultivated plants also. Furthermore, considerable taxonomic and nomenclatural changes have taken place over the years and a thorough revision of all the taxa found in Pakistan is called for. Hence, an attempt is made here to provide a taxonomic account of the family, including both wild and cultivated plants.

FAMILY CHARACTERS

Trees, shrubs or usually perennial herbs, sometimes climbing, generally with soft wood and stellate hairs at least on young parts. Leaves usually stipulate, petiolate, alternate or infrequently opposite, simple or digitately compound, entire, toothed or lobed. Inflorescence of various types, axillary rarely terminal, cymes, racemes or panicles, sometimes 1-flowered. Flowers bisexual, sometimes unisexual or both, actinomorphic, rarely zygomorphic, hypogynous. Sepals (3-) 5 (-7), fused or free, valvate, generally persistent. Petals 5 or absent, free or basally adnate to the staminal column, twisted, imbricate or valvate. Stamens 5-many, in 2 whorls, the outer with or without staminodes, usually monadelphous or free; anthers variously arranged, ditheous, longitudinally dehiscent. Carpels (1-) 5 (-12), syncarpous, sometimes apocarpous; ovary superior, sessile or stipitate, as many loculed as the number of carpel; ovules (1-) 2-many in each locule, anatropous, ascending or horizontal; placentation axile; style simple, lobed or free into as many branches as carpels. Fruit a capsule, a schizocarp or a follicle, very rarely baccate, dehiscent or indehiscent. Seeds usually endospermic; embryo straight or curved; cotyledons usually foliaceous, flat or folded.

I. DOMBEYA

Cav., Diss. 3: 121 tt 38-41.1787 (nom. cons.); Mast. in Oliver, Fl. Trop. Africa 1:226. 1868; Parker, For. Fl. Punj. ed. 3.46.1956; Hutch., Gen. Fl. Pl. 2:504.1967.

Trees or shrubs. Leaves usually lobed, palminerved, cordate. Inflorescence a much branched axillary or terminal, pedunculate cyme. Flowers bisexual, actinomorphic. Sepals 5, fused at the base, finally reflexed. Petals 5, imbricate, persistent. Stamens 10-20 fertile, 5 sterile strap shaped, all united below into a shallow cup or a ring; anthers extrorse, lobes parallel. Carpels 2-5, syncarpous; ovary sessile, 2-5 loculed, each 2-3 ovuled; style filiform, with 2-5, shortly radiating stigmas. Fruit a loculicidally dehiscent capsule. Seeds 1-2 in each cell, endospermic; cotyledons foliaceous and 2-parted.

A large genus with c. 350 species, mostly distributed in Africa and Madagascar. Cultivated in other countries. In Pakistan it is represented by 4 cultivated species.

KEY TO THE SPECIES

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|-----------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| 1. +Peduncle 20 cm long. Fruiting style c. 2 cm long. Stigma exserted. | 1. D. wallichii |
| —Peduncle 3-10 cm long. Fruiting style c. 1 cm long. Stigma usually included. | 2 |
| 2. +Leaf bases shallowly cordate, lower surface with prominent, rusty pubescent veins. Fruit globose. | 2. D. spectabilis |
| —Leaf bases deeply cordate, lower surface velvety, veins neither much prominent nor rusty pubescent. Fruit oblong. | 3 |
| 3. +Leaves 3-5 lobed. Inflorescence a branched cyme. Flowers commonly pinkish. Bracts ovate. | 3. D. acutangula |
| —Leaves not or obscurely lobed. Inflorescence umbellate cyme. Flowers commonly white. Bracts linear. | 4. D. mastersii |
| 1. Dombeya wallichii (Lindl.) L.H. Bailey, Stand. Cyclo. Hort. 1:1066.1947; E.A. Menninger, Fl. Tr. World 268.1962. (Fig. 1, G). | |

Astrapaca wallichii Lindl., Collec. Bot. t. 14. 1822.

A shrub or small tree. Leaves cordate, serrate. Inflorescence axillary, umbellate, drooping, 12-15 cm broad; peduncle more than 20 cm long, many flowered. Flowers pink, c.3 cm across, pedicel c. 4 cm long. Sepals c. 1.5 cm × 3 mm, with rusty, spreading hairs outside. Petals 2-2.5 × 1-1.5 cm, obloque, obovate. Stamens fused below, fertile stamens c. 1 cm and sterile c. 1.5 cm long. Carpels 5; ovary ovate-oblong, densely villous. Fruit 5 angled, ovate-oblong with dense rusty hairs and c.2 cm long persistent style; Seeds 2 in each cell.

F-5 Khairpur Dist.: Khairpur, 10 ft. tall shrub, cultivated in the garden, *S.M.H. Jafri* 1472 (KU11).

Distribution: Indigenous to Madagascar.

A beautiful shrub with showy clustered flowers, occasionally cultivated in gardens of Sind.

Fl. Per. April-May.

2. ***Dombeya spectabilis*** Bojer., Ann. Sc. Nat. Ser. 2. 18:191. 1842; Mast. in Oliver, l. c. 227; Bailey, l.c. 1065; (Fig. 1, D-F).

A small tree. Leaves rounded cordate, blade 2-7 cm in diameter, subsabrous on both the surfaces, serrate; veins prominent beneath with rusty pubescence, petiole 2-5 cm long, downy. Inflorescence axillary cyme with peduncle 3-7 cm long, downy. Flowers pinkish, 2-2.5 cm across; pedicel 1.5-2 cm, downy. Sepals 1 cm \times 2 mm, linear lanceolate, pubescent outside. Petals c. 1.5 cm long and almost equally broad, oblique, obovate, reflex. Stamens fused at the base. Carpels 5; ovary globose, 2-3 mm in diameter, villose. Fruit globose 5-angled, villose, 5 mm in diameter.

G-5 Hyderabad Dist.: Hyderabad, 28.12.1957. *Mushtaq Husain* s.n. (KUH).

Distribution: Madagascar. Occasionally cultivated in Pakistan, Malaya and U.S.A. etc.

Fl. Per. Almost round the year.

3. ***Dombeya acutangula*** Cav., Diss. 3:t. 38. f. 2. 123. 1786; Bailey, l.c. 1065; (Fig. 2, D - G).

A shrub or small tree. Leaves deeply cordate; blade 6-16 cm long and equally broad, serrate, 3-5 lobed, stellately tomentose on both surfaces, glabrescent, lobes acute-acuminate; petiole 4-18 cm long. Inflorescence axillary cyme, peduncle 5-8 cm long, tomentose. Flowers pinkish, 2-3 cm across; pedicel 1.5-2.5 cm long tomentose; bracts 3, ovate acuminate, c. 1 cm \times 5 mm, caducous. Sepals 1-1.5 cm \times 3-4 mm, narrowly lanceolate, pubescent outside, persistent. Petals free, 1.5-2 \times 1-1.5 cm, oblique, obovate. Stamens 8-10 mm long, staminodes 1-1.5 cm long; all fused below into 3-4 mm long cup. Carpels 5; ovary oblong, densely villous, 3-4 mm long; style equalling the staminodes; stigmas 5, recurved-coiled. Fruit oblong, 5 angular, 5-8 \times 3-4 mm, densely villous.

D-4 Karachi Dist.: Zool. Garden, Karachi, flowers pink, 8 ft. tall, cultivated, 20.1.1966. *Saida Qureshi* s.n. (KUH); D.J. Science College, Karachi, flowers pinkish, 2.5 m tall shrub, cultivated *Sultanul Abedin* 9804, 9805 (KUH).

Distribution: Indigenous to Mascarene Islands, cultivated in Pakistan, India and U.S.A. etc.

A beautiful ornamental shrub of the gardens. *Fl. Per.* November-January.

4. ***Dombeya mastersii*** Hook. f., Bot. Mag. t. 5639. 1867; Mast. in Oliver, l.c. 228; Parker, l.c. 47 (Fig. 1, A-C).

D. angulata auct. non Cav., Mast. in Card. Chron. 74. 1867.

A small shrub or tree; young parts tomentose with spreading hairs. Petiole 2-10 cm long, hairy; blade 5-7 cm long and broad, deeply cordate-ovate, acute or acuminate, serrate, sometimes obscurely 3-lobed, upper surface somewhat scabrous, lower velvety. Inflorescence axillary, many flowered, umbellate cyme; peduncle 2-5 cm long with dense spreading hairs. Flowers commonly white; bracts 3, linear c. 1 cm × c. 2 mm; pedicel 1.5-4 cm long with dense spreading hairs. In rest of the parts it resembles *D. acutangula* except in the size of petals which are usually smaller.

C-8 Sialkot Dist.: Cultivated, Sialkot, March 1954 *R.R. Stewart* s.n. (RAW); **D-8** Lahore Dist.: Lahore Cultivated shrub, 2 m tall, Bagh-i-Jinnah, 9.3.1973 *Rafiq Ahmad* s.n. (KUH); **G 4** Karachi Dist.: University Campus, Chemistry Dept., 6 ft. tall, Flowers light pink, 20.2.1970 *Abrar Husain* s.n. (KUH); **G 5** Dadu Dist.: Sind University Campus, 30.12.1958 *M. J. Husain* s.n. (KUH).

Distribution: Indigenous to tropical Africa; Cultivated in Pakistan and India etc. as an ornamental.

Fl. Per. December-March.

2. MELHANIA

Forssk., Fl. Aeg.-Arab. 64. 1775; Mast. in Hook. f., Fl. Brit. Ind. 1:372. 1874; Cooke, Fl. Bomb. Pres. Repr. ed. 1:141. 1958; Parker, For. Fl. Punj. ed. 3.45. 1956; Hutch. Gen. Fl. Pl. 2:550. 1967.

Herbs, undershrubs or shrubs, usually covered with stellate tomentum. Leaves simple, variable in shape, dentate-crenate. Inflorescence usually axillary, solitary, cyme or umbellate. Flowers bisexual, actinomorphic, yellow, rarely unfolding; bracts 3, cordate, reniform, ovate, lanceolate or linear, often longer than sepals. Sepals 5, basally connate. Petals 5, large, marcescent round the ovary. Stamens 5, alternating with 5 staminodes, all shortly united below; anthers extrorse, locules parallel. Carpels 5, syncarpous; ovary sessile, 5-loculed, each 1-many ovuled; style short, 5-branched above, spreading, subulate, stigmatose on the inner side. Fruit loculicidal capsule. Seeds 1-numerous, endospermic with plicate and bipartite cotyledons.

A genus of about 60 species, of Africa, Madagascar, Asia and Australia; only 3 are known from Pakistan.

1. + Bracts linear.

—Bracts ovate, cordate or reniform.

2. + Bracts cordate-reniform, broader than long, larger than sepals, glabrescent, membranous and much enlarged in fruit.

—Bracts ovate, longer than broad, smaller than sepals; tomentose, not membranous, nor much enlarged in fruit.

1. *M. ovata*

2

2. *M. denhamii*

3. *M. futteyporensis*

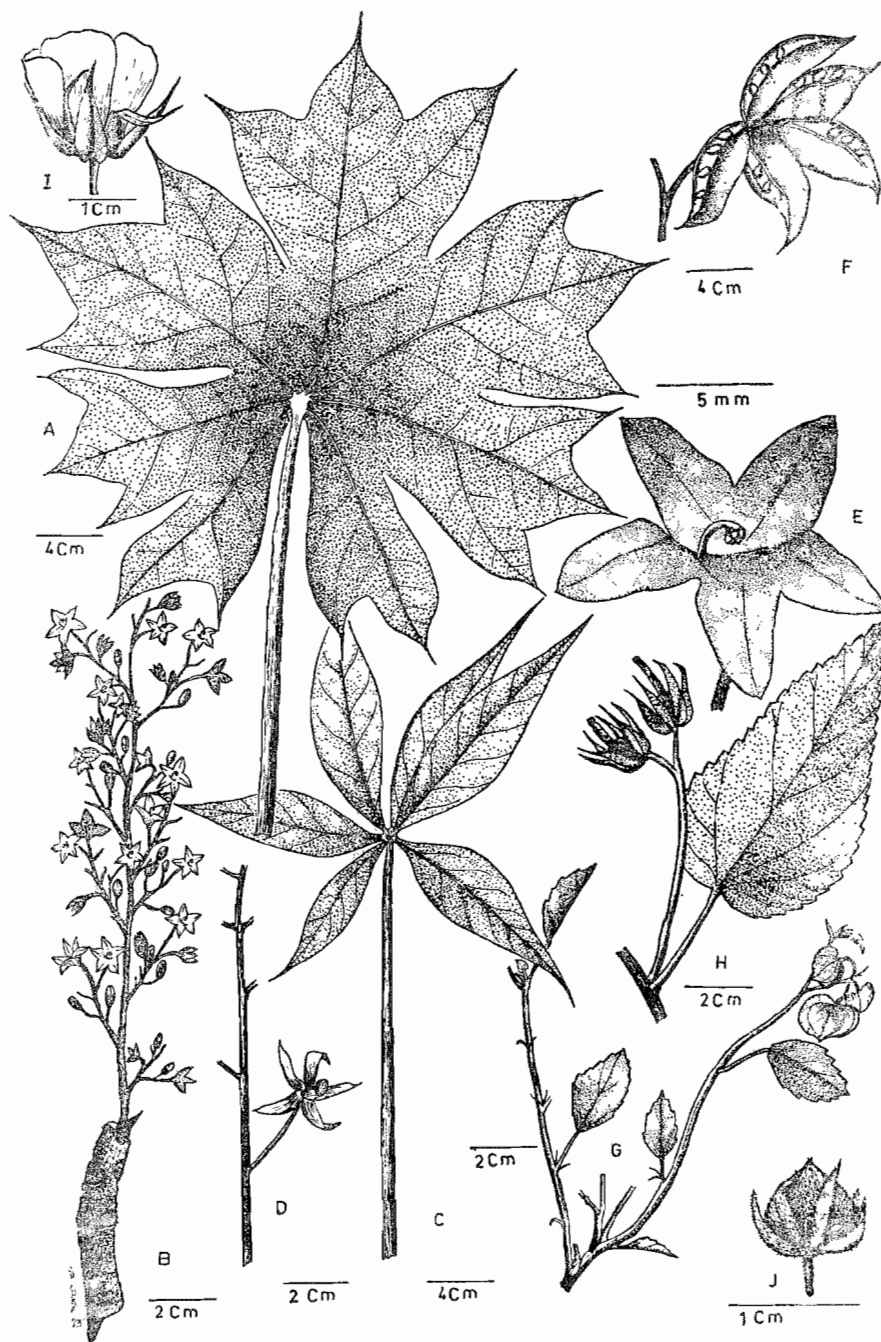


Fig. 3. *Sterculia villosa*, A, Leaf; B, Branch with inflorescence; E, Flower. *Sterculia foetida*, C, Leaf; D, Flowering twig; F, Fruit. *Melhania denhami*, G, Flowering twig. *Melhania futteyporensis*, H, Flowering Twig. *Melhania ovata*, J, Fruit with calyx and bract.

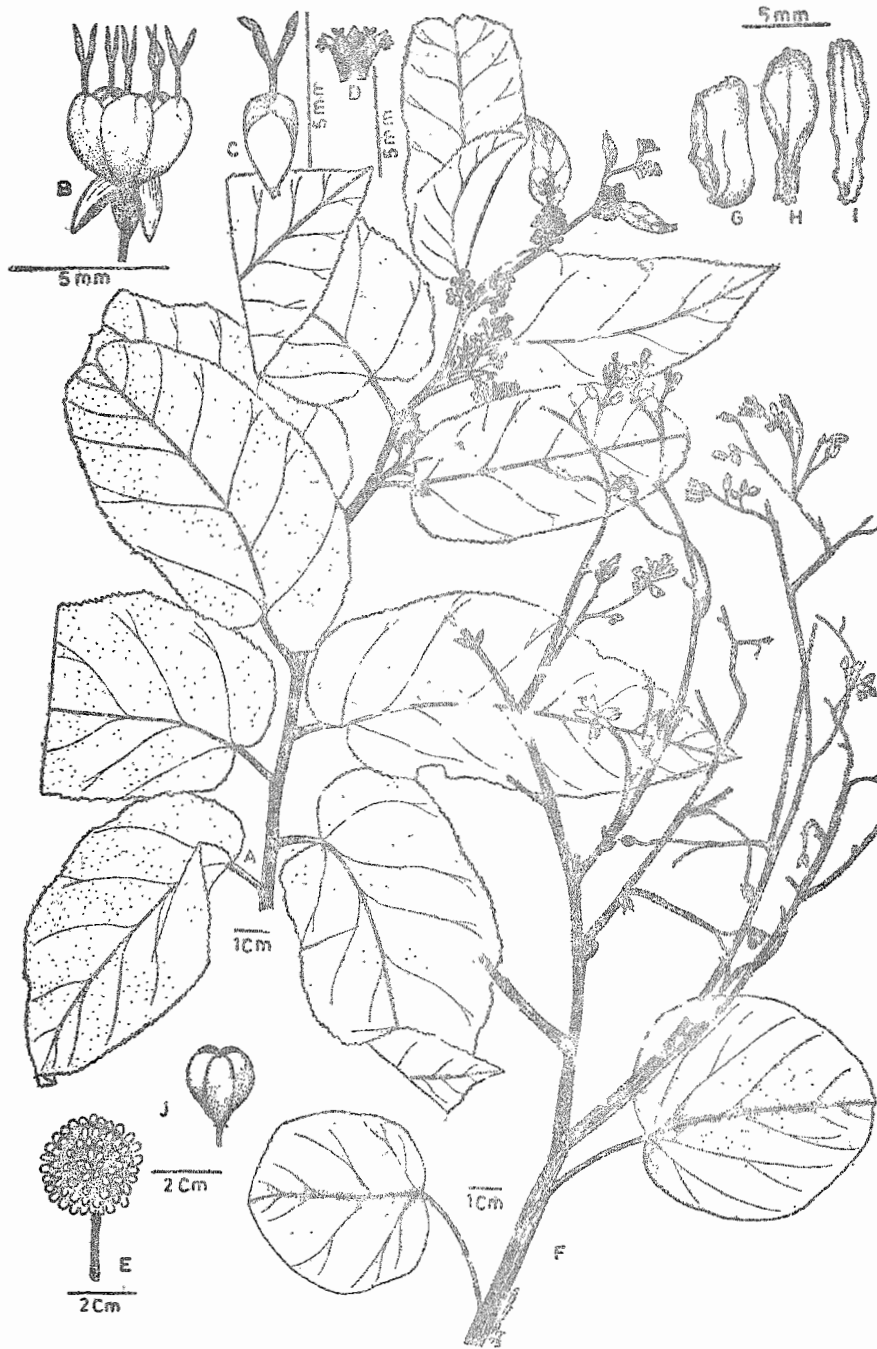


Fig. 4. *Guazuma ulmifolia*, A, Flowering twig; B, Flower; C, Pistil; D, Stamens; E, Fruit. *Kleinhovia hospita*, F, Flowering twig; G-I, Petals; I, Fruit.

divided above into 5 lobes each with 3 anthers alternating with 5 ligulate antipetalous staminodes; anthers apiculate, erect, linear, loculi parallel. Carpels 3-5, syncarpous; ovary on an androgynophore, 3-5 loculed; each locule many ovuled; style entire, clavate; stigma 3-5 lobed. Fruit a large woody or leathery loculicidal capsule, ovoid or oblong, terete or angular, 3-5-valved. Seeds numerous, in 2 rows, winged above; endosperm thin or absent; cotyledons wrinkled or folded.

About 40 species, distributed in East Himalaya, South East Asia and W. Malaysia. In Pakistan it is represented by 1 species.

Pterospermum acerifolium (Linn.) Willd., Sp. Pl. 3:729. 1801; Mast. in Hook. f. l.c. 368; Cooke, l.c. 137; Brandis, l.c. 91; Talbot, l.c. 149; Bailey, l.c. 2855. Parker, l.c. 45; Cowen, Fl. Tr. & Shr. Ind. 81. 1969. (Fig. 5, A)
Pentapetes acerifolia Linn., Sp. Pl. 698. 1753.

A large tree, up to 10 m high, with smooth, light ash-coloured bark and young parts with ferruginous tomentum. Leaves variable in shape and size, orbicular, oblong, obovate, cordate or somewhat rectangular, often peltate, entire, repand, obscurely to coarsely toothed or irregularly lobed, glabrescent and dark green above, silvery rusty brown below, coriaceous; blade 10-40 X 8-35 cm; petiole 5-15 cm, densely tomentose at the base; stipules pinnatifid, caducous. Flowers axillary, solitary or 2-3, white, fragrant, 10-15 cm across; pedicel c.2 cm long; bracts lacinate. Sepals 5, basally connate, linear-lanceolate or oblong, obtuse, 8-12 X c. 1 cm, densely rusty tomentose outside, leathery, finally reflexed, deciduous. Petals linear-oblong or obovate, somewhat obliquely cuneate, obtuse, 7-12 X 1 cm reflexed, deciduous. Fertile stamens 5-9 cm long; staminodes longer, equalling the petals; column 2-3 cm long; anthers 1-1.5 cm long yellow. Carpels 5; ovary oblong, 5-angled, 5-loculed, densely rusty tomentose. Fruit oblong, 5-valved, 5-10 cm long, rusty brown, glabrescent. Seeds compressed, obliquely oval, with large, membranous, brown wings.

B-6 Peshawar Dist.: Islamia College, Peshawar, *M. A. Kazmi* 64 (KUH); Peshawar, 25.6.1968, *Ramzan* s.n. (PFI-M); Peshawar, 15.6.1969 *Shariq* s.n. (PFII-M); D 7 Lyallpur Dist.: Agri. College, Lyallpur, 28.4.1957, *A.H. Khan* s.n. (PF-B); D-8 Lahore Dist.: Jinnah Garden, Lahore, up to 30 ft. tall, flowers yellowish white, cultivated tree, March 1967 *Saida Qureshi* s.n. (KUH); Jinnah Garden, Lahore, 20.4.1966 *Saida Qureshi*, s.n. (KUH); G 4 Karachi Dist.: Beach Luxury Hotel, Karachi, *M. Qaiser*, 5488 (KUH); Zool. Garden, Karachi, *Sultanul Abedin* 9814 (KUH).

Distribution: Probably a native of the foothills of Himalayas, Assam, Chittagong, Burma and the E. Indies. Cultivated in Pakistan and N. America.

Planted as a garden or roadside tree. The indumentum from the lower surface of leaf is said to be used to stop bleeding from wounds and as tinder. A good tonic is prepared from the flowers which is also a cure for inflammation, ulcers, tumours, blood-troubles and leprosy. The bark and leaves are used in small-pox. The flowers kept among clothes impart a pleasant perfume and keep away insects.

Fl. Per. December- July. *Vern.* "Kanack Champa", "Moo Chkund".

5. HELICTERES

Linn., Sp. Pl. 963. 1753; Gen. Pl. ed. 5.411. 1754; Mast. in Hook. f., Fl. Brit. Ind. 1: 365. 1872; Cooke, Fl. Bomb. Pres. Rep. ed. 1:135. 1958; Talbot, For. Fl. Bomb. Pres. 1:146. 1911; Hutch., Gen. Fl. Pl. 2:516. 1967.

Shrub or small tree with stellate pubescence. Leaves stipulate, the stipules caducous; alternate, simple serrate, 3-7 nerved. Inflorescence axillary, fascicled, few

flowered cyme or solitary. Flowers pedicellate, bisexual, actinomorphic or zygomorphic. Calyx tubular or bilabiate, 5-lobed, lobes erect or spreading, glandular within at the base. Petals 5, long clawed, claws sometimes auriculate, equal or sometimes bilabiate, twisted. Stamens 6, 8, 10 or numerous, monadelphous, sometimes slightly connate at the base, column adnate to the gynophore, staminodes alternating with the pair of stamens; anther 2-loculed, loculi divergent, often confluent, sessile, extrorse. Carpels 5, syncarpous; ovary supported on the androgynophore, straight or spirally twisted, 5-lobed, 5-loculed, each locule many ovuled; styles 5, free \pm united, slightly thickened and stigmatose above. Fruit a woody capsule, spirally twisted or straight, born on a long androgynophore, separating at maturity into pseudofollicle. Seeds numerous, small, tubercled, with scanty endosperm.

A genus of about 60 species distributed in tropics and warm temperate regions, most common in America. In Pakistan it is represented by 1 species.

Helicteres isora Linn., Sp. Pl. 963. 1753; Dalz. & Gibs., Bomb. Fl. 22. 1861; Roxb., Fl. Ind. ed. Carey 3:143. 1832; Mast. in Hook. f., l.c.; Cooke, l.c. 136; Talbot, l.c.; Ridley, Fl. Mal. Penin. 1:281. 1922; Parker, For. Fl. Punj. ed. 3.44. 1956; (Fig. 2, A-C).

Shrub or a small tree. Leaves irregularly toothed, often 3 angled above, shortly acuminate, oblique at the base, scabrous above, blade 5-10 X 4-8 cm, oblong, obovate or orbicular, cordate or rounded at the base; petiole, tomentose, 3-8 mm; stipule linear, tomentose 3-7 mm long. Inflorescence 2-6 flowered axillary cyme. Flowers with linear, tomentose, 3-5 mm long, bracts; pedicel 3-6 mm, tomentose. Calyx narrow, bilabiate, toothed, teeth triangular, gibbous, compressed, laterally pubescent, 1-2 cm long. Petals 2-3.5 cm long, red, later becoming lead coloured, reflexed, unequal, upper 3 longer and narrower than the lower 2, claws auriculate. Stamens 15, 10 fertile and 5 sterile, 3-4 cm long, exerted, abruptly reflexed; anthers ovate, arranged in a ring round the ovary; staminodes bifid, scale like. Ovary on a 3-4 cm long curved gynophore, tomentose, 5-grooved, ovoid or conical; style as long as ovary, curved, 5-grooved at the base. Fruit cylindrical, long beaked, 4-6 cm long, 4-7 mm in diameter, composed of 5 spirally twisted follicles, densely tomentose. Seeds angular.

B 7 Mardan Dist.: 15 m-N.E. of Mardan just-south of Machai, shrub-5l, *B.L. Burt* 1519 (KUH; PFI-B); **C 7** Rawalpindi Dist.: Saidpur, 2500', *R.R. Stewart* s.n. May 1935 (RAW); Saidpur, *Sarup Singh* s.n. 1.4.1937 (RAW); Chattar, Margala Road, a shrub with twisted pods, *M.A. Siddiqi* 1590 (RAW).

Distribution: India, Pakistan, Ceylon, Australia, Archipelago and Malay Peninsular.

It is a good source of strong fibre obtained from the bark. The fruit is said to be medicinally important in the treatment of gastric and intestinal disorders. *Fl. Per.* July-December. *Vern.* "maror phali".

6. KLEINHOVIA

Linn., Sp. Pl. ed. 2. 1365. 1763; Gen. Pl. ed. 6. 468. 1764; Mast. in Hook. f., Fl. Brit. Ind. 1:364. 1874; Cooke, Fl. Bomb. Pres. Rep. ed. 1:135. 1958; Talbot, For. Fl. Bomb. Pres. & Sind 1:145. 1911; Hutch., Gen. Fl. Pl. 2: 517. 1967.

cular at maturity; each follicle dehiscing along the ventral suture. Seeds 1-many, oblong, brown or velvety black.

About 100 species distributed in tropics and warm temperate regions. Only 2 species are known from cultivation in Pakistan.

- + Leaves digitate. Follicle boat shaped, c. 10 cm long. 1. **S. foetida**
 —Leaves lobed. Follicle not boat shaped, 4-6 cm long. 2. **S. villosa**

1. **Sterculia foetida** Linn., Sp. Pl. 1008, 1753; Roxb., Fl. Ind. ed. Carey 3:154. 1832; Mast. in Hook. f., l.c.; Cooke, l.c.; Talbot, l.c. 136; Cowen, Fl. Tr. & Shr. Ind. ed. 5.10.1969. (Fig. 3, C-D, F).

A large tree with whorls of horizontal branches. Leaves with 15-20 cm long petiole, digitate; leaflets 5-9, 6-15 X 2-5 cm, glabrescent, entire, elliptic lanceolate, acute-acuminate. Panicle 10-20 cm long. Flowers unisexual and bisexual on the same plant, 2-4 cm across, dull red, yellow or purplish with offensive smell; pedicel 1.5-2.5 cm. Sepals 5, fused below, lanceolate, acute, spreading. Staminal column c. 1 cm long, recurved, hairy at the base, with 10-15 anthers grouped into a head. Carpels 5; ovary rounded, 5-lobed, densely villous, on 4-6 mm long gynophore, 5-loculed, each locule 12-20 ovuled. Follicles 5, smooth, boat shaped, shortly beaked, each c. 10 X 7-8 cm, red at maturity. Seeds 10-15 in each follicle, hard, smooth, oblong or ovoid-oblong, black.

Distribution: Native of East Tropical Africa, India, Burma, Ceylon, Moluccas, Malaya, North Australia. Cultivated in Pakistan.

A handsome tree cultivated in the garden and along roadside for shade. The seeds are roasted and eaten like chestnuts, particularly in time of scarcity; raw seeds are not recommended because they may cause nausea and vertigo. Trunk and branches yield gum. Fibre is obtained from bark. The flowers and leaves are said to be medicinally important. (ern. Pinari, pun.
 Fl. Per. March-May.

2. **Sterculia villosa** Roxb., Hort. Beng. 50. 1814; Fl. Ind. ed. Carey 3:153. 1832; Mast. in Hook. f., l.c. 355; Cooke, l.c. 132; Talbot, l.c. 138; (Fig. 3 A,B,E)

A medium sized tree. Leaves digitately 5-7 lobed, cordate at base; lobes entire to 3-fid, acuminate-cuspidate, somewhat oblong or obovate; blade 25-40 cm long and broad, glabrescent above, stellately tomentose beneath; petiole as long as blade, with dense tomentum above, ribbed below the top; stipules lanceolate, caducous. Panicle 15-30 cm long, rusty pubescent, pendulous. Flowers unisexual (plant monoecious); males numerous; pedicel 4-8 mm long occasionally articulated in the middle; bracts filiform, caducous. Calyx campanulate, 5-partite, 6-10 mm long, 10-15 mm across, yellow with pinkish throat, nerved; lobes spreading, lanceolate, acute, 4-6 X 2-3 mm. Staminal tube 4-5 mm long, recurved, glabrous; anthers 10, grouped. Ovary globose on 2-3 mm long gynophore, strigose with stellate hairs; style recurved. Fruit of 5, sessile, 4-6 cm long, spreading, coriaceous, rusty pubescent follicles, red when ripe. Seeds many, oblong, smooth, black.

1600', cultivated, evergreen small tree, *Mir Alam* 1688 (RAW); cultivated roadside tree, St. Marys School, *Yasin Nasir* s.n. (RAW); **D-7**; Lyallpur Dist.: Lyallpur, Agri. College, April 1957. *A.H. Khan* s.n. (PFI-B).

Distribution: Indigenous to Australia; cultivated in Pakistan.

It is planted along roadside and in gardens for shade and its showy flowers. Shoots are used as fodder in times of drought. *Fl. Per.* March-May.

2. ***Brachychiton australis*** (Schott & Endl.) Teir. in Boll., Ort. Palermo 1:62. 1947 (Fig. 6, C-D, G).

Trichosiphon australe Schott & Endl., Melet. 34. 1832; *Brachychiton platanooides* R. Br. in Benn., Pl. Jav. Rar. 234. 1844; *B. trichosiphon* (Benth.) J.W. Audas, Nat. Tr. Aust. 158, 1947 *Sterculia trichosiphon* Benth. in Benth., Fl. Aust. 1: 229. 1863; Parker, For. Fl. Punj. ed. 3. 44. 1956.

A deciduous tree with a somewhat bottle-shaped trunk. Leaf blade 6-10 X 10-16 cm, glabrous on both surfaces, deeply palmately 5-7 lobed; lobes broadly lanceolate, ovate, rhomboid or somewhat rectangular, acute, acuminate or cuspidate; petiole 4.5-12 cm long. Raceme short. Flowers brownish, pubescent, becoming rusty when dry; pedicel 0.5-1 cm long, articulated. Calyx tubular campanulate, white, 1.5-2 cm long, 1-1.5 cm across, lobed half-way down; lobes lanceolate. Filaments hairy. Ovary tomentose, 2-3 mm long; styles free, cohering above. Follicles shortly stalked, oblong-triangular, 5-7.5 cm long, glabrous.

G-4 Karachi Dist.: Zool. Garden, Karachi, Flowers white with brownish hairs outside, cultivated, 6 m tall tree, *Sultanul Abedin & M. Qaiser* 9811 (KUH).

Distribution: A native of Australia cultivated in Pakistan and elsewhere.

Seeds yield red colour oil possessing high saponific value and is used for making oilcake. *Fl. Per.* February-April.

9. FIRMIANA

Marsigli, Saggi Sci. Accad. Padova 1: t. 1,2.106.1786; Corner, Wayside Tr. Mal. ed. 2.1:610. 1952; Hutch. Gen. Fl. P. 2:519. 1967.

Trees with long petiole, cordate, 3-5 lobed leaves. Inflorescence paniced. Flowers unisexual or bisexual (plants polygamous). Calyx tubular, 5 lobed; lobes sometimes free up to the base. Petals absent. Stamens usually 10 (-30); anthers sessile or on short filaments. Carpels 4-5, apocarpous; ovary 1 loculed, 2, 4 or 6 ovuled; style short. Follicles membranous stalked, opening long before maturity. Seeds few, adhering to the margins, wrinkled when dry.

About 8 species distributed in China, and most of tropical S.E. Asia, Pacific Islands (Fiji), Tropical Africa and Madagascar. Of these 3 are found cultivated in Pakistan.

1. + Sepals free, slightly basally connate, reflexed.

1. ***F. simplex***

—Sepals fused into a tube.

2

2. + Calyx c. 5 mm across, coral- red. (seeds 2). 2. **F. colorata**
 + Calyx c. 10 mm across, yellowish. (seed 1). 3. **F. pallens**
1. **Firmiana simplex** (Linn.) W.F. Wight, U.S.D.A. Bur. Pl. Indus. Bull. 142:47. 1909. (Fig. 6 A-B)

Hibiscus simplex Linn., Sp. Pl. ed. 2: 977. 1763; *Sterculia platanifolia* Linn. f., Suppl. 423. 1781; Parker, For. Fl. Punj. ed. 3:43. 1956; *F. platiniifolia* (L.f.) Schott & Endl., Melet. 32. 1832.

A medium sized tree with smooth bark. Leaves with a glabrous, more than 10 cm long petiole; leaf blade 10-25 cm long and broad, cordate orbicular, usually palmately 3-5 lobed; lobes ovate, acuminate; glabrescent above, somewhat velvety below. Panicle large, terminal. Flowers pubescent, pale yellow, appearing after the leaves; pedicel 2-4 mm, articulated. Sepals nearly free to the base, 10-12 X c. 2 mm, linear-oblong, completely reflexed. Staminal column c. 1 cm long with 10, sessile anthers. Follicles 4-5, each c. 10x3 cm elliptic-ovate, veined. Seeds 2 in each follicle, adhering to each margin, glabrous, smooth, pea like, 4-6 mm in diameter.

B-6 Peshawar Dist.: Peshawar, Cant. Garden, *S.A. Khan* s.n. April, 1973 (KUH; PFI-B), *Sher Ahmad Lodhi* 243 (RAW).

Distribution: Perhaps a native of China and Japan, introduced in Pakistan, America and elsewhere.

It is cultivated in gardens for shade. A brownish black fluid is filled in the unripe fruits which is liberated on bursting of fruits.

Fl. Per. April May.

2. **Firmiana colorata** (Roxb.) R. Br. in Benn., Pl. Jav. Rar. 235. 1844; Blatter & Millard, Beaut. Ind. Tr. ed. 2:79. 1954. (Fig. 5, B-D).

Sterculia colorata Roxb., Pl. Coast. Corom. 1:26. t. 25. 1795; Fl. Ind. ed. Carey 3:146. 1832; Mast. in Hook. f., l.c. 359; Cooke, l.c. 133; Talbot, l.c. 140; Parker, l.c.; *Erythropsis colorata* (Roxb.) Buikill in Straits, Settlements Gard. Bull. 5:231. 1931.

A tree with ash coloured bark. Leaves crowded towards the end of branches; petiole 7-25 cm long; blade, 10-20 X 12-25 cm, cordate, usually palmately 3-5 lobed; stipules lanceolate. Panicle short, terminal. Flowers covered with red or orange red coral-like-stellate pubescence, appearing before the leaves; pedicel 5-7 mm long. Calyx 2-3 cm long, broadly tubular or funnel-shaped; lobes 2-3 mm long, triangular; hairy at the base within. Staminal column red, with 10-30 sessile, yellow anthers. Styles short, recurved. Follicles lanceolate-elliptic oblong, 4-7 cm long, straw-coloured, reticulate. Seeds 2 per follicle, 1 adhering to each margin, yellow, wrinkled or smooth, ovoid, c. 1 cm long.

B-6 Peshawar Dist.: Peshawar, Bot. Garden, Forest Institute, c.4 m tall cultivated tree, *Sultanul Abedin* 9943 (KUH).

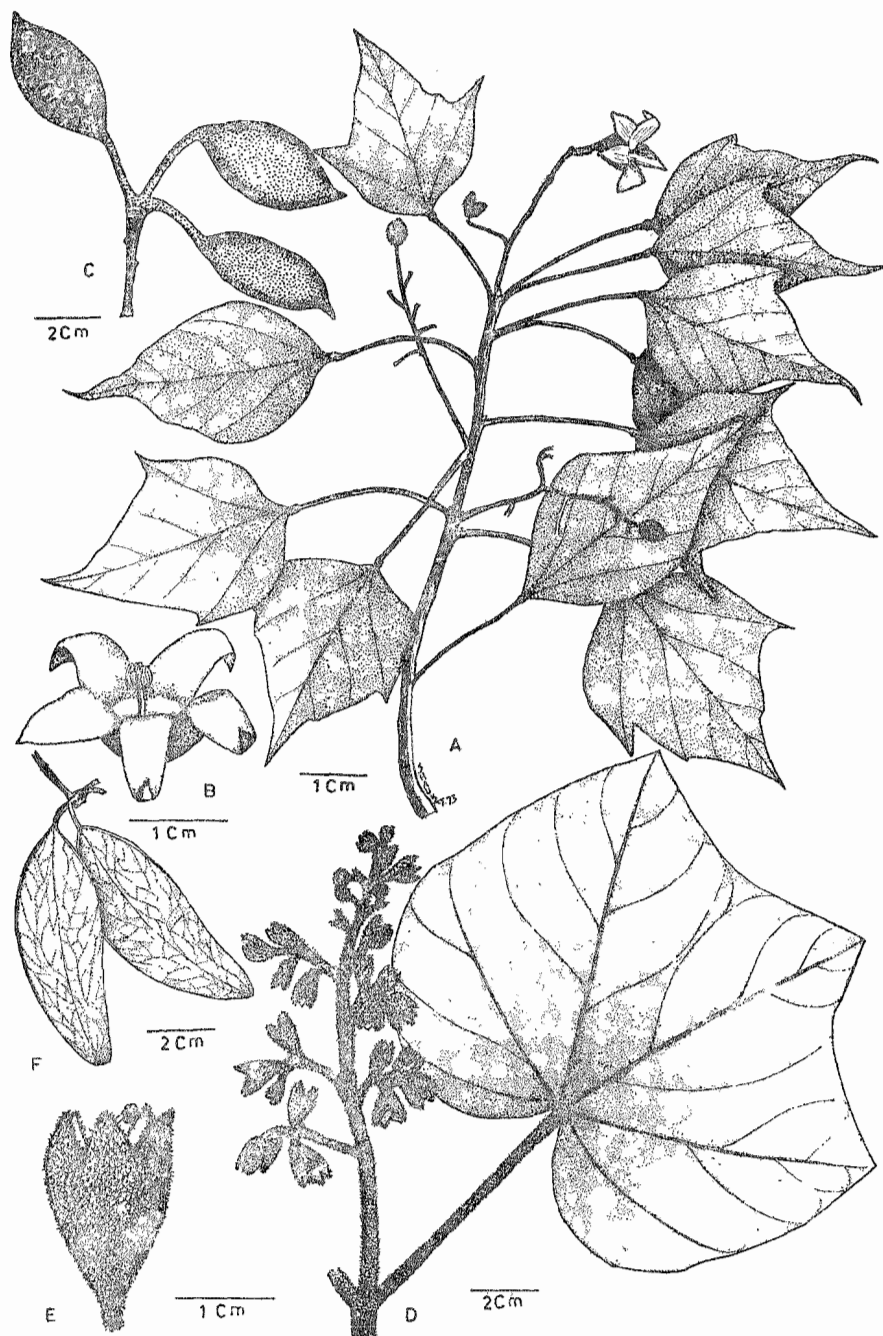


Fig. 7. *Brachychiton populneum*, A, Flowering twig; B, Male flower; C, Fruit. *Firmiana palleas*, D, Flowering twig; E, Male flower; F, Fruit.

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