Chapter 4
RESULTS AND OBSERVATION

Morphology

Taxonomic treatment of the genus


Habit with both deciduous and evergreen trees, shrubs, climbers, straglers, rheophytes, lithophytes or sometimes woody epiphytes with latex. Leaves usually alternate (rarely opposite), entire, lobed, serrate or toothed, stipules often enclosing the bud, deciduous in most species, leaving annular scars. Monoecious and gynodioecious species in which three types of flowers i.e. female, male and gall flowers are arranged. In monoecious species, female, male and gall (sterile female) flowers are present in the same plant. In gynodioecious species, two fig types each on separate plants are present i.e. seed figs with only female flowers and gall figs with gall and male flowers. Inflorescence is known as hypanthodia, flowers are arranged in three cymes which unite to form a hollow cup-shaped common receptacular structure enclosing completely the flowers within, accessible only by a tightly bract-filled opening or ostiole. The ostiole is closed by ostiolar bracts which are aligned in parallel direction while the wall bracts are reflexed with their apex directing towards the center of the hypanthodia. Flowers minute, together with numerous thin bracteoles covering the inner surface of a hollow globose or pear-shaped receptacle which sometimes lengthens out into a stalk, sessile or pedunculate, supported by 3 or 4 basal bracts. Male flowers: perianth 2-6, stamens 1 or 2 (rarely 3-6), erect in bud. Female flowers: perianth as in male or imperfect, ovules pendulous; style excentric; stigma entire or 2-armed. Gall flowers: perianth as in female flowers, style short and ovary contains the pupa of a hymenopterous insect. An enlarged hollow receptacle called syconus is the fruit, the inner wall of which is crowded with crustaceous or fleshy achenes. Pollination is extraordinary, Hymenopterous insects (Blastophaga-wasp) are adopted to *Ficus* flower. The gravid female enters a fig inflorescence and lays eggs in the gall flowers (cannot lay their eggs in the ovaries of fertile female flower as they are covered by hairs) and as the perfect insects emerge they carry the pollen to other receptacles and thus fertilize the female flowers.
Floral morphology is so diversified that the genus has been divided into a number of sections or subgenera but generally they are never used. King (1888) subdivided the genera into seven sections i.e. Palaeomorphe, Urostigma, Synoecia, Sycidium, Covellia, Eusyce and Neomorphe. Corner (1960a;1960b; 1965) divided Asian and African species into four subgenera and lower groups. Berg divided the genus into six subgenera based on the modification of subgeneric classification of Corner by giving more importance to vegetative characters. Wu et al. (2003). The same system was adopted for this account.

**Key to the sub-genera**

1a. Plants monoecious; flowers without or with bracts; shrubs or trees, often epiphytic; adventitious roots absent.

2a. Plants epiphytic or epilithic at first with long aerial roots; main trunk usually not well-defined.................................................................1. *Urostigma*

2b. Plants never epiphytic; trees with main trunk well-defined; less often shrubs

3a. Leaves entire or blunt and lobed; male flowers pedicillate; flowers bracts present.................................................................2. *Pharmacosycea*

3b. Leaves toothed; male flowers sessile; flower bracts absent

1b. Plants gynodioecious; flowers without bracts; shrubs, climbers, less often trees, rarely epiphytic; adventitious roots short........................................4

4a. Plants root climbers; leaves distichous....................................4. *Synoecia*

4b. Plants trees or shrubs; leaves similar........................................5

5a. Leaf often asymmetric; pistillode present in male flower

5b. Leaf symmetric; pistillode often absent in male flower......6

6a. Figs often cauliflorous or on leafless branches; lateral bracts present; male flowers near apical pore........................................3. *Sycomorus*

6b. Figs axillary on leafy branches; lateral bracts absent; male flowers scattered.................................................................6. *Ficus*

**Enumeration of the species according to subgenus**

Trees or shrubs, epiphytic or epilithic, monoecious. Amplexicaul stipules. Branches with long aerial adventitious roots. Leaf blade symmetric, unlobed, entire margin with single wax gland. Hypanthodia axillary on leafy stems, rarely on stem or trunk, interfloral bracts present, sometimes internal bristles present, apical pore circular with interlocking bracts, slit-shaped or 3-radiate aperture; peduncle collar have 3 basal bracts; generally lateral bracts absent. Male flowers present near the around apical pore; 1 or 2 stamen; pistillode absent. Female flowers with simple stigma, filiform, mostly papillate. Fruit achene or drupaceous. *Ficus* subgen. Urostigma are pollinated by about 12 genera of fig wasps.

**Key to the species**

1a. Leaf apex acute, acuminate or attenuate........................................2

2a. Hypanthodia pedunculate..............................................................3

3a. Hypanthodia in clusters ...............................................................4

  4a. Hypanthodia 6-9 mm, red with white spot when mature, peduncle 4-5 mm
    ........................................ 4. *F. caulocarpa*

  4b. Hypanthodia 3-5 mm, without any spot, peduncle 0.4mm
    ........................................ 5. *F. concinna*

3b. Hypanthodia single.................................................................7. *F. glaberrima*

2b. Hypanthodia sessile.................................................................5

  5a. Leaves 3.9-9.5 x 1.3-5 cm ..................................................3. *F. benjamina*

  5b. Leaves 11-16.5 x 7-10.5 cm ................................................6

    6a. Leaf apex caudate and base cordate.....................8. *F. religiosa*

    6b. Leaf apex acuminate and base truncate or rounded

    .......................................................9. *F. rumphii*

1b. Leaf apex mucronate or obtuse................................................7

  7a. Hypanthodia covered by calyptriform bracts.....................1. *F. altissima*

  7b. Hypanthodia without calyptriform bracts......................8

    8a. Leaves ovate, apex mucronate, base rounded, lateral nerves 4-8 on
    either sides.................................................................2. *F. benghalensis*

    8b. Leaves obovate, apex obtuse, base cuneate, lateral nerves 6-11 on either
    sides..............................................................................6. *F. curtipes*
Enumeration of the species


**Local name:** Gadgobar

A large tree, epiphytic when young with very few aerial roots. Stipules lanceolate. Petiole 1.8-2.6 cm. Leaves 10-20 x 5-12 cm, ovate, apex mucronate, base rounded, margin entire, coriaceous, 4-8 no. of secondary veins on one side. Hypanthodia 1.5-2 cm dia, axillary, in pairs, sessile, covered by early deciduous calyptriform bracts, smooth, yellowish when mature. Basal bracts 3, short. Male flower absent. Female flowers sessile or pedicillate 4mm; tepal 3, lanceolate; style elongate, lateral.

**Flowering & fruiting:** April-May

**Uses:** Bark yields a red dye (Kanjilal *et al.*, 1940)

**Distribution—World:** Bangladesh, Bhutan, China, India, Indonesia, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam; **India:** Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Deccan Peninsula, Mizoram, Meghalaya, Sikkim, W. Bengal; **Northeast:** Arunachal Pradesh, Assam, Mizoram, Meghalaya, Sikkim; **Assam:** Throughout the state.

**Note:** *F. benghalensis* is similar to *F. altissima* while differs from the latter in having calyptriform bracts covering the hypanthodia which are deciduous in early stage.

**Specimen Examined:** Assam, Kamrup, Birkuchi, P. Dhungana, 20 Apr 12, 11

Plate 1: *F. altissima* Blume (A) Habitat (B) A twig showing the pattern of leaf arrangement (C) Hypanthodia covered by calyptriform bracts (D) An enlarged view of calyptriform bracts (E) Female flower (20X) (F) An enlarged view of the stigma (50X)
Plate 2: *F. benghalensis* L. (A) Habitat (B) Branches with mature hypanthodia (C) L/S through the ostiole (10X) (D) Female flower (20X) (E) Achene (20X)

**Local name:** Bor

A large tree, epiphytic when young. Evergreen with prop aerial roots from trunk and branches. Stipules triangular, apex acute, coriaceous. Petiole (1.25-5cm), stout. Leaves (10-19 x 5-12 cm) ovate, apex mucronate, base rounded, margin entire, coriaceous, 4-8 no. of secondary veins on one side. Hypanthodia 1-1.7 x 1.3-2.1 cm, axillary, in pairs, sessile, reddish when mature. Basal bracts 3. Male flower absent. Female flowers 3-5mm, sessile or pedicillate, tepals 4, style elongated. Gall flowers 4-5mm, tepals 4 with short style.

**Flowering & fruiting:** February-July

**Uses:** *F. benghalensis* is considered highly sacred to Hindu as well as to the Buddhists and worshiped in different ways at various occasions. Therefore, universally planted in all parts of India including Assam. Besides religious importance, *F. benghalensis* is also reported to cure many diseases ethnomedicinally such as leucorrhoea, anti-emetic, cuts and wounds, joint pains. Bark powder is use for curing leucorrhoea. The hanging roots are anti-emetic. The paste prepared from the bark is applied in cuts and wounds and joint pains. Latex of aerial roots is applied during paronychia (Kalita and Deb, 2004). In Buldhana District of Maharashtra, aerial roots are boiled in water and the decoction is applied on head as hair tonic (Dushing and Patil, 2010). *F. benghalensis* is among some of the common minor hosts in lac cultivation (Krishnaswami, 1960).

**Distribution- World:** India, Bangladesh, Malaysia, Nepal, Pakistan, Sri Lanka; **India:** Subhimalayan forests and on the lower slopes of the Deccan hills, Andaman Islands; **Northeast:** Throughout the region; **Assam:** Throughout the state.

**Note:** NIL

**Specimen Examined:** Assam, Sibsagar, Amguri, P. Dhungana, 15 May 11, 08


A large tree, branches drooping, epiphytic in early stage. Stipules lanceolate, caducous. Petiole 1-2 cm. Leaves 3.9-9.5 X 1.3-5 cm, ovate or ovate-elliptic, rhomboid, entire, coriaceous, shining above, base rounded to cuneate, apex acuminate. Secondary
Plate 3: *F. benjamina* L. var. *benjamina* (A) Habitat (B) Arrangement of hypanthodia (C) A single leaf (D) L/S through the ostiole (10X) (E) Male flower (20X) (F) Gall flower with insect inside (20X)
Plate 4: *F. benjamina* L. var. *nuda* (Miq.) Barrett (A) Habitat (B) Hypanthodia (C) Sunken ostiole showing the apical bracts (D) L/S through the ostiole (10X). (E) L/S showing the arrangement of flowers on the inner wall of the hypanthodium (10X). (F) Female flower (20X)
veins 7-12 on each side. Hypanthodia (0.7-2.1 cm) axillary, paired or solitary, globose or ovoid or sometimes pear shaped, sessile. Basal bracts 3. Male, gall and female flowers within the same hypanthodia.

**Key to the varieties:**

1a. Hypanthodia 0.7-1.2 cm in diam, leaves 4-7.5 X 2-5.8 cm

................................. 3 (a) *F. benjamina* var. *benjamina*

1b. Hypanthodia 1.5-2.1 cm in diam, leaves 7-10 X 3-6 cm

................................. 3 (b) *F. benjamina* var. *nuda*

3(a) *F. benjamina* var. *benjamina*

*F. nitida* Thunb., *Ficus* 5. 10–11. 15. 1786.  
*Urostigma haematocarpum* (Blume ex Decne.) Miq., London J. Bot. 6: 584, f. 568. 1847.  

**Local name:** Silubor, jori

Tree, often epiphytic. Leaves 4-7.5 X 2-5.8 cm, ovate or rhomboid, apex acute or obtuse. Hypanthodia 0.7-1.2 cm in diam., sessile, depressed globose or sometimes pear-shaped.

**Fls. & Frt.:** Nov-April

**Uses:** Young twigs are eaten by wild animals especially *Hoolock gibbon*.

**Distribution- World:** India, Malaysia, Myanmar; **India:** Assam, Meghalaya, Uttar Pradesh; **Northeast:** Assam, Meghalaya; **Assam:** Jorhat, Lakhimpur, Nagaon, Kamrup, Goalpara, Cachar.

**Note:** Kanjilal *et al.* (1940) placed the variety under the name *F. retusa* Linn. var. *nitida*. Chaudhary *et al.* (2012) reported that *F. retusa* var. *nitida* (Thunb.) Miq. is similar to *F. talbotii* King.

**Specimen examined:** Assam, Jorhat, Gibbon Wildlife Sanctuary, P. Dhungana 25 Nov 13, 29
Plate 5: *F. caulocarpa* (Miq.) Miq. (A) Habitat (B) A twig (C) Arrangement of hypanthodia on twigs (D) Apical bracts (10X) (E) L/S through the ostiole (10X) (F) L/S showing the arrangement of flowers on the inner wall of the hypanthodium (10X) (G) Male flower (20X) (H) Gall flower (20X)
Local name: Bor-nahori, bor-jori, jori

A large tree with drooping branches, epiphytic in early stage. Leaves 7-10 X 3-6 cm, ovate or elliptic, apex acuminate. Hypanthidia 1.5-2.1 cm in diam, globose or ovoid.

Uses: Used in religious ceremony by the tea tribes of Upper Assam.

Distribution- World: India, Bangladesh, Bhutan, China, Myanmar, Nepal, New Guinea, Philippines, Thailand, Vietnam; India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Bihar, Jharkhand, Madhya Pradesh, Orissa, Sikkim, South provinces, Uttar Pradesh; Northeast: Arunachal Pradesh, Assam, Sikkim; Assam: Throughout the state.

Note: Kanjilal et al. (1940) placed this variety under the name F. benjamina var. comosa Kurz. Chaudhary et al. (2012) have treated this taxon at the subspecies level as F. benjamina L. subsp. comosa (Roxb.) Panigrahi & Murti.

Specimen Examined: Assam, Dibrugarh, Dibru Saikhowa National Park, P. Dhungana 9 Apr 13, 17


Local name: Jori

Epiphytic, large tree when mature. Stipules lanceolate. Petiole slender. Leaves 6-9 X 4-6 cm, elliptic, coriaceous, apex acuminate, base obtuse, marginentire, secondary veins 6-9 on each side of midvein. Hypanthodia 6-9 mm diam., axillary in cluster on leafy
Plate 6: *F. concinna* (Miq.) Miq. (A) A twig (B) Hypanthodia (C) L/S through the ostiole (10X) (D) Apical bracts (10X) (E) Hyaline tepals (20X) (F) Female flower (20X)
branchlets, red with white spot when mature; peduncle 4-5 mm; Apical and basal bracts 3 and cup-like. Male flowers 1-2 mm, few near apical pore, sessile, tepals 3, stamen 2; filament very short or absent. Gall flowers: sessile; tepals 2; short and subapical style; dilated stigma.

**Flowering & fruiting:** March-August
**Uses:** Ripen fruits are eaten by *Hoolock gibbon.*

**Distribution- World:** Burma, China, Japan, Malesia, Myanmar, Phillipines, Sri Lanka, Thailand, Taiwan; **India:** Kerala, Madhya Pradesh; **Northeast:** Assam; **Assam:** Jorhat

**Note:** Wu et al. (2003) reported male, gall, and female flowers within same fig but in the present study female flowers are absent.

**Specimen Examined:** Assam, Jorhat, Gibbon Wildlife Sanctuary, P. Dhungana, 11 May 13, 18


**Local name:** Jori

Tree, sometimes epiphytic. Bark grey in colour. Stipules glabrous and lanceolate. Petiole 1-1.8 cm. Leaves 7-12 x 3-6 cm, ovate-lanceolate, apex acuminate, base cuneate, margin entire, texture glabrous, lateral nerves 5-9 on either sides. Hypanthodia 3-5 mm, peduncle 0.4 mm, axillary, in clusters, spherical. Basal bracts minute and apical bracts caducous. Male flowers 0.7-1 mm very few near the apical pore, tepals 3, hyaline, stamen 1. Gall and female flowers similar 0.9-1 mm, sub-sessile, tepals 4, hyalinae, style lateral, short, stigma round.

**Flowering & fruiting:** September
Plate 7: *F. curtipes* Corner (A) Habitat (B) A twig (C) Apical bract (D) L/S through the ostiole (10X) (E) Gall flower (20X) (F) Male flower (20X)
Uses: NIL

**Distribution - World:** Bangladesh, Bhutan, Burma, China, India, Laos, Philippines, Thailand, Vietnam, Myanmar and Malaysia; **India:** Andaman Islands, Assam, Bihar, Jharkhand, Madhya Pradesh, Meghalaya, Orissa, Sikkim; **Northeast:** Assam, Meghalaya, Sikkim; **Assam:** Tinsukia

**Specimen Examined:** Assam/Tinsukia/Kakopathar/P.Dhungana26/23sep13


**Local name:** Kothalua-jari, Kathal-patia-bor.

A tree and epiphytic in young stage. Bark grey in colour. Stipules ovate-lanceolate, apex acuminate. Petiole 1-2 cm. Leaves 10-14 x 4-5 cm, obovate, apex obtuse, base cuneate, margin entire, texture coriaceous, lateral nerves 6-11 on either sides. Hypanthodia 1cm diam., sessile, axillary, globose, apex depressed. Basal and apical bracts 3 respectively. Male flowers many 2-3 mm, scattered, stamen 1. Gall flowers 2-3 mm, sessile, white ovary, style sub-terminal, elongate.

**Flowering & fruting:** Sept-Nov

Uses: NIL

**Distribution - World:** Bangladesh, Bhutan, Burma, China, India, Nepal, Thailand, Malaysia, Myanmar and Vietnam; **India:** Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Manipur, Meghalaya, Sikkim, Tripura and West Bengal; **Northeast:** Meghalaya, Assam, Tripura, Sikkim and Arunachal Pradesh; **Assam:** Tinsukia, Golaghat, Sibsagar, Karbi-Anglong, Lakhimpur, Cachar.

Note: NIL

**Specimen Examined:** Assam,Tinsukia,Lekhapani,P.Dhungana, 7sep13,25
Plate 8: *F. glaberrima* Blume (A) Habitat (B) A twig (C) Apical bracts (D) L/S through the ostiole (10X) (E) L/S showing the arrangement of flowers on the inner wall of the hypanthodium (10X) (F) Male flower with tepals (20X) (G) Anther (20X) (H) Gall flower (20X)

**Local name:** Dimoru

Tree, epiphytic when young. Bark grey in colour. Stipules glabrous, lanceolate. Petiole 1-2.8 cm. Leaves 9-19 x 3-6 cm, elliptic, apex acuminate, base rounded or cuneate, margin entire, lateral nerves 7-11 on either sides. Hypanthodia 6-9mm, penducle 0.8-1 cm, axillary, globose. Basal bracts 3 and apical bracts 4. Male flowers few, scattered, tepals 3, filament thick, stamen 1. Gall flower many, pedicel thick and short, tepals 3, style lateral, curved.

**Flowering & fruiting:** September

**Uses:** NIL

**Distribution- World:** Bangladesh, Bhutan, China, India, Malaysia, Myanmar, Nepal, Thailand, Vietnam; **India:** Andaman and Nicobar Islands, Arunachal Pradesh, Assam, Arunachal Pradesh, Meghalaya; **Assam:** Tinsukia and Cachar.

**Note:** Chaudhary et al. (2012) described this species as *F. rigida* Jacq., but the correct name for the species according to www.tropicos.org is *F. glaberrima* Blume.

**Specimen Examined:** Assam,Tinsukia,Kakopathar,P.Dhungana , 23sep13,27


**Local name:** Ahot

A large tree, epiphytic when young. Stem irregularly shaped, bark greyish. Stipules minute, ovate, apex acute, Petiole 5-10 cm, slender. Leaves 10-16.5 x 6-10.5 cm, aspen-
Plate 9: *F. religiosa* L.(A) Habitat (B) L/S through the ostiole (10X) (C) Arrangement of flowers inside hypanthodium (10X) (D) Male flower (20X) (E) Female flower (20X) (F) Gall flower with insect inside the hollow cavity of ovary (20X)
like, apex caudate, base caudate, margin entire or undulated, coriaceous, 6-8 no. of secondary veins on one side. Hypanthodia (1cm dia) axillary, in pairs, sessile, smooth, depressed apex, deep purple when mature. Apical bracts and basal bracts 3 each. Male flowers absent. Female flowers 2-3 mm, sessile or pedicillate; tepal 3; style lateral; stigma round. Gall flowers 1.5-2 mm, numerous than female flowers, sessile or pedicillate; tepal tepal 3; style, lateral; stigma round.

FIs & Frts: Throughout the year

Uses: F. religiosa is considered highly sacred to Hindu as well as to the Buddhists and worshiped in different ways at various occasions. Therefore, universally planted in all parts of India including Assam. Besides religious importance, F. religiosa is reported to cure many diseases ethno-medicinally such as carious tooth, gonorrhea, liver disorders, boils and joint pains and wounds. Bark decoction with a pinch of rock-salt is given to women after childbirth to relieve pain (Borah et al., 2012). Dried bark ash with coconut oil is applied on wounds (Chutia et al., 2012) and bark is also used in carious tooth, gonorrhoea, liver disorders and boils. Roots are also used in carious tooth. In Meghalaya, ripe purple fruits are eaten and newly sprouted twigs with leaves heavily lopped for fodder (Chhetri, 2010). F. religiosa is among some of the common minor hosts in lac cultivation (Krishnaswami, 1960).

Distribution- World: India, Bangladesh, China, Myanmar, Nepal, Pakistan, Sri Lanka; India: Wild in subhimalayan regions; Northeast: Entire Northeast; Assam: Throughout the state.

Note: Although monoecious, male flower is found to be absent during the study. It is evident from the literature that staminate flowers are relative less in number than pistillate flowers and even absent in many (King, 1888; Berg, 1989). F. religiosa is allied to F. rumphii, but has dissimilarity in leaf apex and attachment of fig in the twig. 4 Basal bracts in two rows are attached to the fig as recorded by Kumar (2011) which is different from King (1888) where the basal bracts are spreading.

Specimen Examined: Assam,Kamrup,Basistha,P.Dhungana, 29may11,07

Plate 10: *F. rumphi* Blume (A) Epiphytic nature of *F. rumphi* (B) L/S through the ostiole (10 X) (C) Male flower (20 X) (D) Female flower (20 X) (E) Gall flower (20 X)
Local name: Jori

A large tree, epiphytic when young. Stem solid. Stipules ovate, apex acute. Petiole 5-9 cm, slender. Leaves 11-15 cm x 7-10 cm, ovate, apex acuminate, base, margin entire, coriaceous, 5-7 no. of secondary veins on one side. Hypanthodia 7-1 x 8-1.2 cm, axillary, in pairs, sessile, smooth, nearly black when mature. Apical bracts and basal bracts 3 each. Male flowers 2-3 mm, very few near the apical pore, tepal 3, spatulate, free, stamen 1, filament long. Female flowers 2-4 mm, throughout the receptacle, sessile or pedicillate; tepal 3; style, sub-terminal or lateral; stigma simple with hairs in upper position. Gall flowers 2-3 mm, tepals 3, style short.

Flowering & fruiting: April-June

Uses: Ethnomedicinally, the species is used for the treatment of eczema, ring worm, asthma and joint pains. Dried bark ash with coconut oil is applied in affected area in eczema and ring worm (Chutia et al., 2012). Fruits are used in asthma. F.rumphii is among some of the common minor hosts of lac cultivation in Assam (Krishnaswami, 1960).

Distribution- World: Bhutan, China, Indochina, Malaysia, Myanmar, Nepal, Thailand; India: Throughout; Northeast: Throughout; Assam: Throughout

Note: F.rumphii is very much similar to F. religiosa, with only difference in respect of having acuminate apex in F.rumphii and abruptly caudate in F.religiosa while undepressed globose figs and depressed globose in F.rumphii and F. religiosa respectively.

Specimen Examined: Assam, Jorhat, Sotai, P. Dhungana, 2 Apr 11, 06


Trees, rarely shrubs, adventitious roots rare, monoecious. Fully amplexicaul stipules. Leaf entire except juvenile plants; wax glands in axils of main basal veins or absent. Figs axillary, rarely cauliflorous, mostly paired, interfloral bracts present, mostly internal bristles absent, apical pore with interlocking bracts, peduncle with 3 basal
Plate 11: *F. nervosa* Heyne ex Roth (A) Habitat of (B) Hypanthodia arranged in a twig (C) L/S through the ostiole (10X) (D) L/S showing the arrangement of flowers on the inner wall of the hypanthodium (20X) (E) Male flower with tepals (20X) (F) Seed (20X)
bracts, generally lateral bracts absent. Male flowers scattered with female flowers, generally pedicellate, stamen 1-3, filaments free, pistillode present. Ovary of female flowers white or reddish at base, stigma 2- parted, subulate and not clearly papillate. Fruit an achene, smooth.


**Local name**: Khari-pati-dimoru

Trees. Stipule pubescent. Leaves 9-20 × 5-9 cm, obovate, petiolate, coriaceous, glabrous, abaxially brown when dry, apex acute, base acute, margin entire, secondary veins 8-10 on each side of midvein. Hypanthodia 0.8-1.1 cm diam, axillary, solitary or paired, globose, base attenuate into an stalk. Basal bracts on the base of the stalk and apical bracts slightly sunken. Male flowers 3mm, pedicellate; tepals 4, spatulate, stamen 1. Gall flowers 3-4mm, sessile or pedicellate; tepals 4. Achene.

**Flowering & fruiting**: Jan-Aug.

**Uses**: NIL

**Distribution- World**: Bangladesh, Bhutan, China, Indochina, Malaya Peninsula, Nepal, Sri Lanka; **India**: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Bihar, Jharkhand, Meghalaya, Peninsular region, Sikkim; **Northeast**: Assam, Arunachal Pradesh, Meghalaya, Sikkim; **Assam**: Sibsagar, Nagaon, Kamrup, Goalpara, Golaghat, Karbi-Anglong.

**Note**: NIL

**Specimen Examined**: Assam, Karbi Anglong, Nambor Reserved Forest, P.Dhungana, 21Dec13, 31

Medium to large trees, buttressed frequently, monoecious or dioecious. Adventitious roots on creeping stems. Fully amplexicaul stipules. Leaf margin entire or toothed, asymmetric or symmetric; axils of main basal veins, other vein axils or nodes contains wax glands. Hypanthodia frequently cauliflorous on leafless branches, less below leaves, interfloral bracts are absent whereas internal bristles are present. Many upper bracts visible in large apical pore; collar of peduncle have 3 basal bracts. Joined perianth lobes. Male flowers with 2 bracteoles present near the apical pore and sessile; 1 or 2 stamens, filaments joined at base; mucronate anthers; pistillode absent generally. Female flowers have dark red colour ovary with simple stigma, truncate. Fruit is an achene and smooth or keeled slightly. *Ficus* subgen. *Sycomorus* are pollinated by fig wasps of the genus *Ceratosolen*.

**Key to the species**

1a. Leaves opposite
   2a. Hypanthodia without lateral bracts.................................13. *F. hispida*
   2b. Hypanthodia with lateral bracts..................................16. *F. squamosa*

1b. Leaves alternate
   3a. Hypanthodia with longitudinal ridges .............................11. *F. auriculata*
   3b. Hypanthodia without longitudinal ridges..........................4
      4a. Tree medium sized, leaf margin crenate........................5
          5a. Leaf base symmetrical, hypanthodia on clusters on trunk
               .........................................................................12. *F. fistulosa*
          5b. Leaf base asymmetrical, hypanthodia on leafless branches
               drooping often from tree base or from branches reaching
               underground....................................................................15. *F. semicordata*
      4b. Tree large, leaf margin entire.................................14. *F. racemosa*
          6a. Leaf base acute......................................................17. *F. variegata*
          6b. Leaf base cordate or rounded.................................17. *F. variegata*

**Enumeration of species**

Plate 12: *F. auriculata* Lour. (A) Habitat (B) Hypanthodia arranged on the trunk. (C) An enlargement of hypanthodia with the fistules. (D) Apical bracts (E) Female flower with hairs on style (20X) (F) Female flower with long style (20X) (G) Female flower with dilated ovary (20X) (H) Seed (40X)

**Local name:** Mou-dimoru, Aatha-dimoru

Medium sized tree, spreaded crown. Dioecious. Bark grey in colour, rough. Stipules lanceolate, pubescent. Petiole 4-6 cm. Leaves 14-40 x 13-32 cm, ovate, apex acuminate, base cordate, margin serrate, lateral nerves 4-5 on either sides. Hypanthodia 4-8 cm diam., peduncle 3-7 cm, in fascicles on leafless brachlets or trunk, pubescent, globose, longitudinal ridges present. Basal bracts 3, triangular and apical bracts in rows of 4 or more like a rosulate. Female flower 0.8-10 mm, sessile or pedicillate, tepals 3, style lateral, long, dilated stigma. Achene minute, oval shaped.

**Flowering & fruiting:** February-May

**Uses:** Ripe fruits are edible.

**Distribution- World:** Bangladesh, Malesia, Myanmar, Pakistan to S. China, Thailand, cultivated in Taiwan; **India:** Outer Himalaya ascending up to 2,000 m, Arunachal Pradesh, Assam, Bihar, Jammu & Kashmir, Jharkhand, Maharashtra, Manipur, Meghalaya, Mizoram, Orissa, Sikkim, South India, W. Bengal; **Northeast:** Assam, Manipur, Meghalaya and Mizoram; **Assam:** Throughout the state

**Note:** NIL

**Specimen Examined:** Assam, Morigaon, Amsoi Reserve Forest, P. Dhunana, 16feb12, 10

Plate 13: *F. fistulosa* Reinw.ex Blume (A) Habitat (B) A twig (C) Hypanthodia arranged on the trunk (D) An enlargement of hypanthodia showing the fistules. (E) Apical bracts (10X) (F) L/S through the ostiole (10X) (G) L/S showing the arrangement of flowers on the inner wall of the hypanthodium (10X) (H) Gall flower (20X) (I) Female flower (20X)
**Local name:** Thupuki dimoru, kotia dimoru

Medium sized tree, crown spreading. Dioecious. Bark brownish-grey. Stipules ovate-lanceolate. Petiole 1-3 cm. Leaves 11-22 x 5.5-10 cm, obovate, apex acuminate, base acute, margin cuneate, coriaceous texture, lateral nerves 5-10 on either sides. Hypanthodia 1-1.5 x 1-2.8 cm, short fascicles in clusters on trunk and branches, globose or sub-pyriform, bright green when young, peduncle 1-5 cm long. Basal bracts 3 and apical bracts in 2 or 3 rows. Male flower absent. Female flower 2-3 mm sessile or pedicillate, style lateral 1-2 mm (straight and long, pointing laterally from the ovary), stigma cylindrical and pointed. Gall flower 2-3 mm, sessile or shortly pedicillate, style short, sub-terminal, stigma funnel-shaped.

**Flowering & fruiting:** March-May

**Uses:** NIL

**Distribution- World:** Bangladesh, Indochina, Malesia, Myanmar, S. China, Thailand; India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Bengal, Jharkand, Meghalaya, Mizoram, Tripura; Northeast: Assam, Meghalaya, Mizoram and Tripura; Assam: Jorhat, Sibsagar, Lakhimpur, Golaghat, Karbi-Anglong, Lakhimpur.

**Note:** NIL

**Specimen Examined:** Assam, Jorhat, Gibbon Wildlife Sanctuary, P. Dhungana, 17 Mar 2011

Plate 14: *F. hispida* L. (A) Habitat (B) Twigs in habitat (C) Hypanthodia in pairs. (D) Hypanthodium showing the apical bracts. (E) L/S through the ostiolar bracts (10X) (F) Arrangement of the flowers on the inner wall of the hypanthodium (13X) (G) Gall flower (20X) (H) Female flower (20X) (I) Seed (25X)

**Local name:** Khohota dimoru.

Shrub to small tree. Present in moist or dampy area along roadside or in open spaces. All parts hispid. Bark green in colour when young and brown when mature, warty with horizontal wrinkles, shoots hollow. Stipule triangular, apex acute to acuminate. Petiole 1.5-5.2 cm. Leaves 10.5-32 x 6-11 cm, decussately opposite, elliptic, apex acuminate, base rounded, texture chartaceous, margin serrate or dentate, lateral nerves 6-9 on either half. Hypanthodia 1.2-3 x 1.3-2.2 cm, in pairs or clusters on old branches at nodes with stalk, subsherial or pyriform, greenish yellow when mature. Basal bracts 3, triangular or elliptic, obtuse at apex. Apical bracts numerous and arranged in a rim. Male flower absent. Female flowers 2-7mm, style long, lateral, hairy, stigma tubular. Gall flowers 2-7mm, style minute, subterminal, stigma simple.

**Flowering & fruiting:** Throughout the year

**Uses:** Ethno-medicinally, fruits, leaves and sticky latex are used for the treatment of lever ailments, urinary diseases and inflammatory conditions in Assam and Manipur (Hazarika et al., 2012). In diabetes root exudates is taken while for curing jaundice, curry prepared from leaf is taken (Borah et al., 2012). Young shoots, leaves and green fruits are eaten as vegetable and even the ripe receptacle is also eaten which is considered as food for liver (Dutta, 2012). In Meghalaya, fruits are eaten cooked or pickled, leaves are used for making dishes and twigs are lopped for fodder (Chhetri, 2010).

**Distribution- World:** Bhutan, China, Indochina, Malesia, Nepal, Queensland in Australia, Sri Lanka; **India:** Throughout up to 3,500 m; **Northeast:** Throughout; **Assam:** Throughout

**Note:** Morphology of leaves and fruiting branches varies a lot but can be identified by its opposite leaves and hollow leafy twigs.

**Specimen Examined:** Assam, Jorhat, Sotai, P. Dhungana, 5 Apr 10, 01

[Plate 15]

**Local name:** Jayagh dimoru

Tree profusely branched. Stem brownish grey. Petiole 1.6-2.3 cm long. Stipules deciduous, apex acute. Leaves 7-16 x 3.5-8.4 cm, ovate, apex acuminate, base acute, margin entire, texture coriaceous, lateral nerves 4-9 on either sides. Hypantheridia 30-40 mm dia, pedunculate, in a cluster of fascicles on trunk and branches, globose, subglobose, reddish when mature, ostiole slightly sunken or flat. Basal bracts 3 and 5-6 apical bracts arranged in rows. Male flower absent. Female flowers 3-5 mm, sessile or sometimes minutely stalked, tepals 3, style long, ovary red spotted, subterminal. Gall flowers 3-5 mm, numerous than female flower and distributed all over on hypantheridia, stalked, tepals 4, style short, stigma clavate.

**Flowering & fruiting:** March-July

**Uses:** Fruits edible when ripe. Ethno-medicinally, boiled fruits are given in diabetes (Buragohain, 2011). In addition for the treatment of diabetes, fruits and leaves of *F. racemosa* is also used in liver disorders, respiratory, urinary diseases and inflammatory conditions in Assam and Manipur (Hazarika et al., 2012). Gum of the species is used in the affected area during mums (Chutia et al., 2012). The latex is used for piles and diarrhoea; Powdered dry leaves are mixed with honey and given in bilious affections; the tender leaves are given in Ajenge Dues. In all religious festivals of Mising people the leaves are used as the primary curry item (Sharma and Pegu, 2011).

**Distribution- World:** Australia, Bangladesh, China, Indochina, Malaysia, Myanmar, Nepal, Pakistan, Sri Lanka; **India:** Almost throughout; **Northeast:** Throughout; **Assam:** Throughout
Plate 15: *F. racemosa* L. (A) Habitat (B) A leaf twig showing the arrangement of leaves (C) Hypanthodia on trunk and branches (D) A single fascicle from the main trunk showing hypanthodia arranged in a cyme (E) Inside of the hypanthodium showing the compact arrangement of flowers on its inner wall (10X) (F) Gall flower with tepals (20X) (G) A single tepal (23X) (H) Female flower with curved style (20X) (I) Female flower (3-5 mm long) with straight style (20X)
**Note:** King (1888) has identified 4 varieties in *F. glomerata* i.e. var. *chittagonga* (Imq.) King, var. *miquelli* King, var. *mollis* (Miq.) King, and var. *elongate* King, on the basis of shape and pubescence nature of leaves.

**Specimen Examined:** Assam, Nagaon, Maidamgaon, P. Dhungana, 8Jun11, 09


**Local name:** Dimoru

Medium sized tree. Bark dark grey. Stipules lanceolate. Petiole 4-8 cm. Leaves 14-30x 6-14 cm, alternate, asymmetric, oblong, apex acuminate or acute, base cordate, margin serrate, pubescent or scabrid, lateral nerves 9-13 on either sides. Hypanthodia 0.8-1.8 cm, in pairs or in clusters, on leafless branches drooping often from tree base or from branches reaching underground, globose, reddish-brown with white outgrowths on the surface of hypanthodia, peduncle 4-9 mm. Apical bracts with a verrucose central aperture. Female flower 1mm, shortly stalked, tepals 2, style lateral, long, stigma large.

**Flowering & fruiting:** May

**Uses:** Young leaves and shoots are eaten cooked as vegetable; ripe fruit with beautiful aroma is eaten (Dutta, 2012).

**Distribution- World:** Bangladesh, Bhutan, China, Malaysia, Myanmar, Nepal, Pakistan, Thailand, Vietnam; **India:** Throughout; **Northeast:** Throughout; **Assam:**
Plate 16: *F. semicordata* Buch.-Ham.ex J. E. Sm (A) Habitat (B) Hypanthodia on aerial roots (C) Asymmetric leaf. (D) Hypanthodia on underground roots. (E) Hypanthodia. (F) Apical bractes (10X) (G) L/S through the ostiole (10X)(H) Female flower (20X) (I) Seed (23X)
Karbi-Anglong, Jorhat, Lakhimpur, Cachar.

Note: Wu et al. (2003) placed this species under subgenus *Sycidium*, but the character of hypanthodia on leafless branches drooping often from tree base or from branches reaching underground (geocarpic) suggests that *F. semicordata* should be placed under subgenus *Sycomorus* as placed by Chaudhary et al. (2012).

**Specimen Examined:** Assam, Jorhat, Gibbon Wildlife Sanctuary, P.Dhungana, 11 May 13. 1916.


**Local name:** Dimoru

Medium sized tree. Stem hollow. Petiole 1.8-8 cm. Leaves 11-25 x 6.6-15 cm, opposite, apex acuminate or mucronate, base rounded or obtuse, margin serrate or crenate, lateral nerves 5-8 on either sides. Hypanthodia 2-4 cm, from the older parts of the stem & main branches on panicles, spherical, brownish hairs present, peduncle 1-1.8 cm. 3 basal and apical bracts. 3-4 lateral bracts present on fig body, inverted triangle. Female flowers 3 mm, pedicellate, tepals attached with the ovary, style sub-terminal or lateral, hairy; stigma slightly bifurcated, brown.

**Flowering & fruiting:** March-May

**Uses:** NIL

**Distribution- World:** Bhutan, China, Myanmar, Nepal, Thailand; **India:** Arunachal Pradesh, Assam, Bihar, Meghalaya, Orissa, Tripura, Uttarakhand, W. Bengal; **Northeast:** Arunachal Pradesh, Assam, Meghalaya; **Assam:** Kamrup, Jorhat, Cachar, Karbi-Anglong.

**Note:** *F. squamosa* is similar to *F. hispida* but differs in having lateral bracts in the hypanthodia.

**Specimen Examined:** Assam, Jorhat, Gibbon Wildlife Sanctuary, P.Dhungana, 01 Sep 13, 28
Plate 17: *F. squamosa* Roxb. (A) Habitat (B) A twig and hypanthodia on a panicle. (C) Hypanthodia (D) Apical bracts (E) T/S showing the arrangement of bracts from inner side ostiole (10X) (F) Seed (20X) (G) L/S showing the arrangement of flowers on the inner wall of the hypanthodium (10X) (H) Female flower (20X)

A large tree. Stipules lanceolate. Petiole 3-7 cm. Leaves 13-18 x 7-11 cm, alternate, ovate and elliptic, coriaceous, apex acuminate or acute, base cordate or rounded, margin entire, secondary veins 5-7 on each side of midvein. Hypanthodia 2-5 cm diam, clustered on shortly tuberculate branchlets from trunk or old stem, globose or slightly pyriform, slightly depressed apical pore, peduncle 2-5 cm. Basal bracts 3 and apical bracts overlapping and slightly depressed. Female flowers 3-4 mm, sessile or pedicillate, tepals 4, style lateral and long, stigma cylindrical.

**Note:** Wu et al. (2003), www.tropicos.org have placed all the varieties as synonym of *F. variegata* but in the present study the two plant materials have given the rank of variety owning to their difference in characters.

**Key to the varieties**

1a. Hypanthodia without spot; fig cavity star shaped; fig 4-5 cm diam.

................................................. 17 (a) *F. variegata* var. *chlorocarpa*

1b. Hypanthodia with white spot; fig cavity round; fig 2-3 cm diam.

................................................. 17 (b) *F. variegata* var. *garciae*


**Local name:** Gash dimoru

Hypanthodia 4-5 cm diam., without white spot, globose, peduncle 2-3 cm, cavity is star-shaped.

**Flowering & fruiting:** May-July

**Uses:** Ripen fruits are eaten by birds and insects.
Plate 18: *F. variegata* Blume var. *chlorocarpa* (Benth.) Benth. ex King (A) Habitat (B) Hypanthodia arranged on the trunk (C) Hypanthodia (D) Apical bracts (10X) (E) L/S showing the arrangement of flowers on the inner wall of the hypanthodium (10X) (F) L/S through the ostiole (10X) (G) Star-shaped cavity of hypanthodium (H) Female flower (20X)
Plate 19: *F. variegata* Blume var. *garciae* (Elmer) Corner (A) Habitat (B) Hypanthodia arranged on the trunk. (C) Hypanthodia with white spot. (D) Apical brats (10X). (E) L/S through the ostiole (10 X). (F) Round-shaped cavity of hypanthodium. (G) Female flower with tepals (20X) (H) Sessile female flower (20 X)
**Distribution- World:** Australia, Bangladesh, China, Indochina, Japan, Malesia, Myanmar, Solomon Islands, Thailand; **India:** Andaman & Nicobar Islands, Assam, Bihar, Meghalaya; **Northeast:** Assam and Meghalaya; **Assam:** Sonitpur, Golaghat and Jorhat.

**Specimen Examined:** Assam, Golaghat, Kaziranga National Park, P.Dhungana, 07 Jun 12, 13


[Plate 19]

**Local name:** Dimoru

Hypanthodia 2-3 cm diam., with white spot, globose or slightly pyriform, peduncle 3-5 cm, cavity is round in shape.

**Flowering & fruiting:** May-July

**Uses:** Ripen fruits are eaten by birds and insects.

**Distribution- World:** Australia, Bangladesh, China, Indochina, Japan, Malesia, Myanmar, Solomon Islands, Thailand; **India:** Andaman & Nicobar Islands, Assam, Bihar, Meghalaya; **Northeast:** Assam and Meghalaya; **Assam:** Jorhat and Golaghat.

**Specimen Examined:** Assam, Golaghat, Kaziranga National Park, P.Dhungana, 25 May 13, 20

4. **Subgenus Ficus**

Trees, shrubs, climbers, rarely epiphytic. Dioecious. Adventitious roots on creeping branches. Amplexicaul or semiamplexicaul stipules. Spirally arranged leaves; toothed leaf margin. Hypanthodia solitary or paired, axillary on leafy stems or below leaves, interfloral bracts lacking, internal bristles present, large apical pore with 3 or more visible upper bracts; involucral bracts present. Joined or free Perianth lobes, rarely absent, hairy. Male flowers present near apical pore, sessile or pedicellate; 1-4 stamens; pistillode absent. Gall flowers simple with funnel-shaped stigma. Stigma in female flowers 2-parted, subulate. Fruit achene. *Ficus* subgen. *Ficus* are pollinated by fig wasps of the genus *Blastophaga*.

**Key to the species**

1a. Hypanthodia sessile ................................................................. 2

2a. Leaves unlobed and base cordate ........................................... 20. *F. esquiroliana*

2b. Leaves 3-5 lobed and base lobate ......................................... 22. *F. hirta*
1b. Hypanthodia peduncled.................................................................3

3a. Leaves lobed in juvenial stage..................................................24. F. schefferiana
3b. Leaves simple...........................................................................4

4a. Shrub.......................................................................................21. F. gasparriniana
4b. Tree.........................................................................................5

5a. Stigma cylindrical and little hairy...............................23. F. lamponga
5b. Stigma non-hairy.................................................................6

6a. Leaves 8-15 x 4-9 cm, membranous

......................................................18. F. chartacea

6b. Leaves 5-8 x 2.5-4 cm, coriaceous

......................................................19. F. erecta

**Enumeration of the species**


**Local name:** Dimoru

Tree. Stipules, lanceolate, red, acuminate apex. Petiole covered with hairs. Leaves 8-15 x 4-9 cm, elliptic, membranous, apex acuminate, base acute or obtuse, margin entire, secondary veins 3-4 on each side of midvein. Hypanthodia 0.6-1 cm diam, axillary, solitary or paired, globose, pedunculate. Apical bracts 4. Male flowers 2-3mm, near apical pore, pedicellate or sessile; tepals 3, hyaline, stamen 2, ellipsoid anthers. Gall flowers 2-3mm, tepals 4, style lateral and smooth ovary.

**Flowering & fruiting:** May-July

**Uses:** NIL

**Distribution—World:** Indochina, Malesia, Myanmar, S. China, Thailand; **India:** Central Nicobars in Andaman & Nicobar Islands; **Northeast:** Assam; **Assam:** Jorhat, Tinsukia and Sibsagar.
Plate 20: *F. chartacea* (Wall.ex.Kurz) Wall.ex King (A) Habitat (B) Branch (C) L/S through the ostiole (10X) (D) Apical bracts (10X) (E) Gall flower (20X) (F) Male flower (20X) (G) Anther (23X)
Note: NIL

Specimen Examined: Assam, Sibsagar, Amguri, P. Dhungana, 10 Jul 12, 14


Local name: Dimoru

Trees. Stipules ovate or lanceolate. Petiole slender and pubescent. Leaves 5-8 x 2.5-4 cm, ovate or elliptic, coriaceous, apex acute, base obtuse to rounded, margin entire, secondary veins 4-6 on each side of midvein. Hypanthodia 1-2 cm diam, solitary, axillary, globose, peduncle 1-1.5 cm. Basal bracts and apical bracts 3. Female flower 2-3 mm, tepals 4, spatulate, ovary smooth, style lateral, branched stigma.

Flowering & fruiting: June-September

Uses: NIL

Distribution- World: India, China, Japan, S. Korea, Taiwan and Vietnam; India: Assam, Sikkim and Meghalaya; Northeast: Assam, Sikkim and Meghalaya; Assam: Tinsukia

Note: NIL

Specimen examined: Assam, Tinsukia, Kakopathar, P. Dhungana, 23 Sep 13, 24


Local name: Dimoru
**Plate 21:** *F. erecta* Thunb. (A) Habitat (B) A twig (C) L/S through the ostiole (10X) (D) L/S showing the arrangement of flowers on the inner wall of the hypanthodium (10X) (E) Apical bracte (10X) (F) Female flower with tepals (20X) (G) Female flower (20X)
Plate 22: *F. esquiroliana* H.Lev. (A) Habitat (B) Hypanthodia arranged on a twig (C) L/S showing the arrangement of male flowers on the inner wall of the hypanthodium (10X) (D) Male flower (20X) (E) Gall flower (20 X)
Shrub. Bark grey in colour. Branches hirsute with brownish-yellow hairs. Stipules lanceolate and caducous. Petiole 3-5 cm, hirsute. Leaves 13-22 x 11-16 cm, alternate, oblong, apex acuminate, base cordate, margin serrate, often 3-5 lobed when juvenile, yellow hairs on veins abaxially, lateral nerves 3-5 on either sides. Hypanthodia 1.5-3 cm, axillary on the scars of the upper portion of normal leafy shoots, solitary or in pairs, ovoid with longitudinal ridges, brownish hirsute, navel-like apical pore, sessile. Basal bracts 4. Male flowers 3-5 mm, present near the apical pore, pedicellate, tepals 3-4, stamens 2. Gall flowers 3-5 mm, shortly pedicillate, tepal 4, style lateral, stigma funnel-shaped.

**Flowering & fruiting:** Nov-June

**Uses:** NIL

**Distribution- World:** Bhutan, China, Laos, Thailand, Vietnam, Nepal, Malesia, Myanmar; **India:** Assam, Arunachal Pradesh, Meghalaya, Punjab, Sikkim; **Northeast:** Assam, Arunachal Pradesh, Meghalaya, Sikkim; **Assam:** Jorhat, Golaghat and Karbi-Anglong.

**Note:** This species is described under the name *F. triloba* Buch.-Ham. ex Voigt subsp. *triloba* by Berg (2007a). Most recently, a new combination *F. hirta* Vahl subsp. *triloba* (Buch.-Ham. ex Voigt) Chaudhary is proposed by Chaudhary et al. (2012) for the species but the correct name for the species is *F. esquirliana* H. Leveille.

**Specimen Examined:** Assam, Karbi Anglong, Nambor Reserve Forest, P. Dhungana, 21 Dec 13.


**Local name:** Dimoru

Erect shrub. Stipules lanceolate. Petiole 0.8-1.2 cm. Leaves 7-16 x 3-9 cm, obovate or elliptic, apex acuminate, base cordate, leaf margin toothed irregularly in the upper portion near the apex, chartaceous, lateral nerves 4-8 on either sides. Hypanthodia 0.7-1.2 x 0.7-1 cm, axillary, solitary or in pairs, purplish-red with white spots when mature, globose or ovoid, peduncle 0.3-0.7 mm. Basal bracts 3 and navel-like apical pore. Female flower 1-2 mm, sessile, tepal 5, style lateral, curved hook-like, stigma pointed.
Plate 23: *F. gasparriniana* Miq.var. *laceratifolia* (H.Lev. & Vaniot) Corner (A) Habitat (B) Hypanthodium (C) Apical bracts (10X) (D) L/S through the ostiole (10X) (E) Female flower (20X) (F) Hook-like stigma (50X) (G) Gall flower (20X)
**Flowering & fruiting:** September-March

**Uses:** In Meghalaya, fruits are eaten raw, leaves are lopped for fodder (Chhetri, 2010).

**Distribution- World:** Bhutan, China, Myanmar, India; **India:** Arunachal Pradesh, Assam; **Northeast:** Arunachal Pradesh, Assam; **Assam:** Jorhat

**Note:** NIL

**Specimen Examined:** Assam, Jorhat, Sotai, P. Dhungana, 03Sept12,15


**Local name:** Khogal dimoru

A small sized tree or shrub. Branchlets leafless in middle, golden yellow or brown hirsute. Stipules lanceolate, pubescent. Leaves 10-26 x 6-16 cm, alternate; petiole brown in colour, hirsute; leaves 3-5 lobed, 8.25 cm, glabrous or golden yellow hirsute, base cuneate, rounded, or shallowly cordate, margin with small serrations, apex acute to acuminate; secondary veins 4-7 on either half. Hypanthodia 0.7-3 cm diam., axillary, paired, globose, with long stiff spreading golden yellow or brown hairs and also pubescent, sometimes subglabrous, apical pore navellike when young, sessile; basal bracts caducous or persistent, ovate-lanceolate, with bent hairs, apex acute. Male and gall flowers sessile or shortly pedicellate. Male flowers 3-6 mm, tepals 4, red, lanceolate; stamens 2 or 3; anthers ellipsoid, longer than filaments. Gall flowers 3-6 mm tepals 4; ovary globose or ovoid-globose, smooth; style lateral, short; stigma funnelform Female flowers 3-6 mm sessile or pedicellate; tepals 4; style persistent, long, thin, attached on one side, slightly concave; stigma clavate. Four types of flowers are present according to the association of different flowers i.e. (1) Staminate flower with a pistillode (2) Gall flower with funnel-shaped stigma (3) Pistillate flower (4) Staminate flower. Achenes ellipsoid-globose, smooth.

**Flowering & fruiting:** Nov-June

**Uses:** In Meghalaya, ripe fruits are eaten raw, long shoots with leaves are heavily lopped for palatable fodder (Chhetri, 2010).
Plate 24: *F. hirta* Vahl (A) Habitat (B) A twig showing the arrangement of leaves (C) Position of axillary hypanthodia (D) L/S through the ostiolar region (10X) (E) Arrangement of gall flowers on the inner wall of hypanthodium (10X) (F) Staminate floret with a pistillode (20X) (G) Gall flower (20X) (H) Female flower (20X) (I) Male flower (20X)
**Distribution- World:** Bhutan, Indochina, Malesia, Myanmar, Nepal, China; **India:** Arunachal Pradesh, Assam, Bihar, Meghalaya, Nagaland, Sikkim, Tripura, W. Bengal; **Northeast:** Arunachal Pradesh, Assam, Meghalaya, Nagaland, Sikkim, Tripura; **Assam:** Jorhat, Golaghat and Sonitpur.

**Note:** NIL

**Specimen Examined:** Assam, Sonitpur, Nameli National Park, P. Dhungana, 27Jun10, 03


**Local name:** Dimoru

Medium sized tree. Bark brownish-grey. Stipules lanceolate. Petiole 6-8 cm. Leaves 10-19 x 5-10 cm, elliptic, apex acuminate, base acute, margin entire, chartaceous, secondary veins 6-10 on either sides. Hypanthodia 2-2.5 cm diam., axillary, in pairs or solitary, globose or sub-pyriform, peduncle 0.5-1 cm, reddish-orange when mature. Basal bracts 3 and apical bracts 4. Female flower sessile or pedicillate, tepals 4-5, style sub terminal, stigma cylindrical and little hairy.

**Flowering & fruiting:** April

**Uses:** In Meghalaya, fruits are eaten, short twigs with leaves are loped for fodder, fibers extracted from the bark (Chhetri, 2010). Woods are used to make furnitures (http://india biodiversity.org/species/show/266746).

**Distribution- World:** Bangladesh, Bhutan, Indochina, Myanmar, Malesia, Thailand; **India:** Andaman Islands, Arunachal Pradesh, Assam, Manipur, Meghalaya, W. Bengal; **Northeast:** Assam and Meghalaya; **Assam:** Jorhat, Sibsagar, Lakhimpur and Cachar.

**Note:** Sometimes **F. lamponga** Miq. var. **martabanica** (King) Basu is treated separately (Basu, 1994).
Plate 25: *F. lamponga* Miq. (A) Habitat (B) A twig showing the arrangement of leaves (C) Arrangement of hypanthodia (D) Apical bracts (10X) (E) L/S through the ostiolar bracts (10X) (F) Female flower (20X) (G) Gall flower (20X)
Specimen Examined: Assam, Lakhimpur, Bordoibam, P. Dhungana, 19 Apr 10, 02


Local name: Dimoru

Shrub or small size tree. Stipules ovate. Petiole 10-15 cm. Leaves 13-30 x 6-17 cm, inserted on the sub-terminal portion of the branches; lamina lobed when juvenile, becomes entire when mature, serrate and irregular, caudate-acuminate, base shortly cordate in juvenile to cuneate or attenuate in adult form, chartaceous, lateral nerves 6-9 on either sides. Hypanthodia 2-3 cm diam., axillary, in pairs, globose, sessile, hirsute when young. Basal bracts 3 and apical bracts 4. Male flower 1-2 mm, near the apical pore, sessile, tepals 4, anther 2. Female flower 1-3 mm, pedicellate, tepals 4, ovary smooth, style short.

Flowering & fruiting: March

Uses: NIL

Distribution- World: Sumatra; **India**: Assam; **Northeast**: Assam; **Assam**: Jorhat (New report).

Note: *F. schefferiana* is a new distributional report from Assam and India as well.

Specimen Examined: Assam, Jorhat, Sotai, P. Dhungana, 13 Mar 11, 05


Trees, shrubs, or climbers, epiphytic initially or terrestrial; dioecious. Adventitious roots on creeping branches. Semiamplexicaul to lateral stipules, rarely fully amplexicaul. Spirally arranged leaves, opposite or distichous; generally asymmetric leaf blade, margin dentate or at times lobed. Hypanthodia axillary cauliflorous or below leaves, interfloral bracts not present, internal bristles present, many visible upper bracts in apical pore; scattered bracts on peduncle; lateral bracts present. Male flowers present near apical pore; stamen 1-2; pistillode present. Female flowers with simple stigma and truncate. Fruit drupelet orachene. *Ficus* subgen. *Sycidium* are pollinated by fig wasps of the genera *Kradibia* and *Liporrapalum.*

**Key to the species**

1 a. Shrub, scandent, creeping and even erect sometimes; leaf base symmetrical

.................................................................25. *F. heteropleura*
Plate 26: *F. schefferiana* King (A) Habitat (B) A twig showing lobes juvenile leaves (C) Axillary hypanthodia (D) Apical bracts (E) L/S through the ostiole (10X) (F) L/S showing the arrangement of flowers on the inner wall of the hypanthodium (13X) (G) Male flower with tepal (20X) (H) Anther (20X) (I) Gall flower (20X)
1b. Tree, leaf base asymmetrical........................................................26. *F. tinctoria*

**Enumeration of the species**


[Plate 27]

**Local name:** Dimoru

Shrub, scandent, creeping and even erect sometimes. Bark brownish-grey. Stipules small, lanceolate. Petiole 4-6cm. Leaves 9-13 x 5-6 cm, obovate or elliptic, apex acuminate-caudate, base obtuse, margin entire, lateral nerves 3-5 on either sides. Hypanthodia 7-9 mm, globose, axillary, solitary or in pairs, peduncle short, short hairs present, reddish-orange when mature. Basal bracts 3 on peduncle and apical bracts 3. Female flower 3-4mm, sessile, tepals 3, lanceolate, style sub-terminal, stigma cylindrical.

**Flowering & fruiting:** February-June

**Uses:** Fruits are eaten by *Hoolock gibbon.*

**Distribution- World:** India, Bangladesh, Bhutan, China, Indochina, Malesia, Myanmar, Taiwan; **India:** Andaman & Nicobar islands, Arunachal Pradesh, Assam, Bengal, Tripura; **Northeast:** Arunachal Pradesh, Assam, Tripura; **Assam:** Kamrup, Jorhat, Lakhimpur, Sibsagar and Nagaon.

**Note:** Variations in habit such as shrub, scandent, creeping and even erect sometimes have been observed during the study.

**Specimen Examined:** Assam,Kamrup,Kamakhya, P.Dhungana, 27Apr12,12

Plate 27: *F. heteropleura* Blume (A) Habitat (B) A twig showing the arrangement of hypanthodia (C) L/S through the ostiolar region (10X) (D) Compact arrangement of flowers on the inner wall of hypanthodium (10X) (E) Gall flower with transparent sepals (20X) (F) Female flower (20X)

Local name: Dimoru

Trees. Petiole long. Leaves 10-22 x 6-10cm, obovate, apex attenuate, base cuneate, margin entire, secondary veins 6-10 on each side of midvein. Hypanthodia 2-9 mm diam, axillary, pyriform. Basal bracts on the base of the peduncle. Apical bracts not clear. Male flower 2-3mm, tepals 4, fleshy, stamen 1, filament short. Female flower 3-4mm, tepals 2, hyaline, apex acuminate, style long, slightly lateral, stigma slightly branched.

Flowering & fruiting: June-August

Uses: NIL

Distribution- World: Bhutan, India, Indonesia, Malaysia, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam, China, Philippines, Sri Lanka, Taiwan, Timor; India: Andaman & Nicobar Islands, Bihar, Kerala, Madhya Pradesh, Meghalaya, Orissa, Tamil Nadu, Uttar Pradesh; Northeast: Assam; Assam: Golaghat.

Note:NIL
Plate 28: *F. tinctoria* G. Forst. *subsp. gibbosa* (Blume) Corner (A) Habitat (B) A twig with hypanthodia (C) A leaf (D) Apical bracts (10X) (E) Basal bracts (10X) (F) L/S through the ostiole (10X) (G) Male flower with tepals (20X) (H) Female flower (20 X)
Specimen Examined: Assam,Golaghat,Kaziranga National Park,P.Dhungana, 04 Jul13,21


Climbers, generally epiphytic or epilithic, climbing by short adventitious roots, when mature occasionally a freestanding tree, dioecious. Leaves distichous, seldom spiral, asymmetric on climbing stems, different from that of on non-climbing stems, entire margin. Hypanthodia axillary on leafy stems, rarely cauliflorous, interfloral bracts absent, internal bristles present, apical pore small with 3 visible upper bracts; peduncle collar with 3 basal bracts. Perianth lobes glabrous or seldom hairy. Male flowers present near apical pore or scattered; stamen 1, 2 or 3; pistillode absent. Stigma of female flowers 2-parted, subulate. Fruit achene. *Ficus* subgen. *Synoecia* are pollinated by fig wasps of the genus *Wiebesia*.

**Key to the Species**

1a. Leaves dimorphic............................................ 29. *F. pumila*
1b. Leaves similar in shape....................................2
   2a. Aerial roots at nodes................................. 27. *F. hederacea*
   2b. Aerial roots absent................................. 28. *F. pubigera*

**Enumeration of the species**


**Local name:** Lata dimoru

Scandent shrub or climber. Aerial roots at nodes. Bark rough, blackish. Dioecious. Stipules ovate. Petiole 2cm. Leaves 5-10 x 3-5 cm, thick, alternate, elliptic or ovate, apex acute, base obtuse, margin entire, texture coriaceous, lateral nerves 3-4 on either sides. Hypanthodia 0.5-1.5 cm, axillary, solitary or in pairs, globose, hairy, greenish-yellow when mature, peduncle 0.8-1 cm. Basal bracts 3 and apical pore navel-
Plate 29: *F. hederacea* Roxb. (A) Habitat (B) A twig (C) Apical bract (10X) (D) L/S through the ostiole (10X) (E) Compact arrangement of flowers on the inner wall of hypanthodium (10X) (F) Female flower (20X)
like with 5-7 overlapping apical bracts. Female flower 1mm, sessile or pedicillate, tepals 3, style subapical.

**Flowering & fruiting:** April-August

**Uses:** NIL

**Distribution- World:** India, Bangladesh, Bhutan, China, Laos, Myanmar, Nepal, Thailand; **India:** Andaman Islands, Arunachal Pradesh, Assam, Bengal, Bihar, Himachal Pradesh, Jharkhand, Madhya Pradesh, Meghalaya, Orissa, Sikkim, Tripura, Uttarakhand; **Northeast:** Arunachal Pradesh, Assam, Meghalaya, Sikkim, Tripura;

**Assam:** Sibsagar

**Note:** NIL

**Specimen Examined:** Assam, Sibsagar, Sonari Reserve Forest, P.Dhungana, 29Sep13,23


**Local name:** Dimoru

Scandent or shrubs. Stipules lanceolate. Petiole 3-4cm. Leaves 9-21 x 4-9 cm, oblong or elliptic, glabrous, apex acuminate, base acute, margin entire, secondary veins 9-12 on each side of midvein. Hypanthodia 1-2cm diam., globose, tuberculat e surface, glabrous. Basal bracts 3 and apical bracts 5. Male flowers 1-2mm, scattered near apical pore, sessile, tepals 3, lanceolate, filaments short, stamens 2. Gall flower 1.5-2 mm, pedicellate, tepals 4, style subterminal.

**Flowering & fruiting:** April – September

**Uses:** NIL

**Distribution- World:** India, Bhutan, China and Myanmar; **India:** Arunachal Pradesh, Assam, Meghalaya and Sikkim; **Northeast:** Arunachal Pradesh, Assam, Meghalaya and Sikkim; **Assam:** Tinsukia

**Note:** NIL

**Specimen Examined:** Assam, Tinsukia, Kakopathar, P.Dhungana, 23Sep13,22
Plate 30: *F. pubigera* (Wall. ex Miq.) Kurz var. *maliformis* (King) Corner (A) A twig (B) Apical bracts (C) L/S through the ostiole (10X) (D) Gall flower (20X) (E) Male flower (20X)

**Local name:** Dimoru

Climbers or scandent. Stipules lanceolate. Leaves 3-8 x 1-5 cm, dimorphic, leaves on fertile branches and sterile branches different in size, ovate, apex acute, base cordate or rounded, margin entire, secondary veins 5-7 on each side of midvein. Hypanthodia 5-7 cm long, solitary, pear-shaped, axillary, base attenuate into a stalk, acuminate apical pore; peduncle to 1-2 cm. Basal bracts very minute on the base of the peduncle and apical bracts not clear. Male flowers 3 mm - 1.6 cm, many near apical pore, tepals 3, stamens 2. Gall flowers 3-4 mm, tepals 4, style lateral, curved and short.

**Flowering & fruiting:** Nov-Jan

**Uses:** Ornamental use against walls mostly.

**Distribution- World:** India, China, Japan, Korea, Malesia, Taiwan, Vietnam; **India:** Assam; **Northeast:** Assam; **Assam:** Kamrup

**Note:** Although in India *F. pumila* is regarded as a cultivated species but during this study, it was found in the forest area of Basistha, Guwahati.

**Specimen Examined:** Assam, Kamrup, Basistha, P. Dhungana, 09 Nov 12, 16

**Anatomy**

**Foliar epidermal features with artificial key**

In the present study, all the *Ficus* species are found to be hypostomatic. Epidermal cells in the coastal area are rectangular and narrow in shape and are arranged in rows in all the species. A ring-like structure surrounding the stomata and lithocysts are present in the subgenus *Urostigma* only.

**Key to the subgenus *Urostigma***

1a. Upper epidermal cell shape irregular.................................................................2

2a. Upper epidermal cell margin quadrigonal, pentagonal and hexagonal

.................................................................................................................................*F. altissima*

2b. Upper epidermal cell margin trigonal, quadrigonal, pentagonal and hexagonal

.................................................................................................................................*F. curtipes*

1b. Upper epidermal cell shape regular.................................................................3
Plate 31: *F. pumila* L. (A) Habitat as climber (B) Twigs with numerous hypandhodia (C) An enlarged view of hypanthodium (D) L/S of the hypanthodium (E) L/S through the ostiole (10X) (F) Male flower (20X) (G) Anther (40X) (H) Variation in size of male flower (I) Gall flower (20 X)
3a. Lower epidermal cell shape irregular................................. F. concinna
3b. Lower epidermal cell shape regular................................. 4
4a. Stomata encyclocytic....................................................... F. caulocarpa
4b. Stomata anomocytic, paracytic, tetracytic, staurocytic........ 5
   5a. Stomata anomocytic, tetracytic and staurocytic.............. 6
   6a. Stomata anomocytic.................................................... 7
7a. Upper epidermal cell margin hexagonal............................. F. benghalensis
7b. Upper epidermal cell margin pentagonal, hexagonal............ 8
   8a. Lower epidermal cell margin quadrigonal and pentagonal... F. glaberrima
8b. Lower epidermal cell margin pentagonal and hexagonal.......... F. rumphii
   6b. Stomata anomocytic, tetracytic and staurocytic........... F. religiosa
   5b. Stomata paracytic........................................................ 9
9a. Stomatal index 46.04 µm................................. F. benjamina var. benjamina
9b. Stomatal index 36.32 µm................................. F. benjamina var. nuda

**F. altissima** [Plate 32A, 33B, 38A]

The stomata are anomocytic type. The numbers of subsidiary cells are more than 5 in number. The cell shape of lower epidermis and upper epidermis are regular and irregular respectively whereas the cell margin is pentagonal, hexagonal (lower epidermis) and quadrigonal, pentagonal, hexagonal (upper epidermis).

**F. benghalensis** [Plate 32C, 33D, 38B]

The stomata are anomocytic type. The numbers of subsidiary cells are 4-5 in numbers. The cell shape is regular for both lower epidermis and upper epidermis. Similarly, the cell margin is hexagonal for both lower epidermis and upper epidermis.

**F. benjamina var. benjamina** [Plate 32E, 32F, 37A, 38C]
Plate 32: Anatomy of lower epidermis of the subgenus *Urostigma* (A) Stomata and surrounding cells of *F. altissima* (400X) (B) An enlarged view of stomata of *F. altissima* (1000X) (C) Stomata and surrounding cells of *F. benghalensis* (400X) (D) An enlarged view of stomata of *F. benghalensis* (1000X) (E) Stomata and surrounding cells of *F. benjamina* var. *benjamina* (400X) (F) An enlarged view of stomata of *F. benjamina* var. *benjamina* (1000X) (G) Stomata and surrounding cells of *F. benjamina* var. *nuda* (400X) (H) An enlarged view of stomata of *F. benjamina* var. *nuda* (1000X) (I) Stomata and surrounding cells of *F. caulocarpa* (4000X) (J) An enlarged view of stomata of *F. caulocarpa* (1000X) (K) Stomata and surrounding cells of *F. concinna* (800X) (L) An enlarged view of stomata of *F. concinna* (1000X).
The stomata are paracytic type. The number of subsidiary cells is 2. The cell shape is regular and cell margin are pentagonal and hexagonal for both lower epidermis and upper epidermis. Lithocyst is present.

**F. benjamina var. nuda** [Plate 32G, 32H, 38D]

The stomata are an encycloxytic type. The numbers of subsidiary cells are 8-9. The cell shape is regular and cell margin are pentagonal and hexagonal for both lower epidermis and upper epidermis. Lithocyst is present.

**F. connecina** [Plate 32K, 32L, 37C, 38F]

The stomata are paracytic type. The number of subsidiary cells is 2. The cell shape is regular and cell margin are pentagonal and hexagonal for both lower epidermis and upper epidermis.

**F. caulocarpa** [Plate 32I, 32J, 37B, 38E]

The stomata are anomocytic and tetracytic type. The numbers of subsidiary cells are 4-6. The cell shape of lower epidermis and upper epidermis are irregular and regular respectively whereas the cell margin of lower epidermis and upper epidermis are pentagonal, hexagonal and pentagonal, hexagonal, heptagonal respectively. Lithocyst is present.

**F. curtipes** [Plate 33A, 33B, 37D, 38G]

The stomata are anomocytic type. The numbers of subsidiary cells are 4-5. The cell shape of lower epidermis and upper epidermis is regular whereas the cell margin are pentagonal and hexagonal on lower epidermis while trigonal, quadrigonal, pentagonal, hexagonal on upper epidermis. Lithocyst is present.

**F. glaberrima** [Plate 33C, 38H]

The stomata are anomocytic type. The numbers of subsidiary cells are 4. The cell shape of both the lower epidermis and upper epidermis is regular whereas the cell margin of lower epidermis and upper epidermis are quadrigonal, pentagonal and pentagonal, hexagonal respectively.

**F. religiosa** [Plate 33D, 33E, 38I]

The stomata are staurocytic, tetracytic and anomocytic type. The number of subsidiary cells are 4-5 in numbers. The cell shape is regular and cell margin are pentagonal and hexagonal for both lower epidermis and upper epidermis.
Plate 33: Anatomy of lower epidermis of the subgenus *Urostigma* (A) Stomata and surrounding cells of *F. curtipes* (400X) (B) A single stoma of *F. curtipes* (1000X) (C) An enlarged view of stomata of *F. glaberrima* (1000X) (D) Stomata and surrounding cells of *F. religiosa* (400X) (E) An enlarged view of stomata of *F. religiosa* (1000X) (F) Stomata and surrounding cells of *F. rumphii* (800X) (G) An enlarged view of stomata of *F. rumphii* (1000X). Subgenus *Pharmacosycea* (H) Stomata and surrounding cells of *F. nervosa* (400X)
**F. rumphii** [Plate 33F, 33G, 38J]

The stomata are anomocytic type. The numbers of subsidiary cells are 5. The cell shape is regular and cell margin are pentagonal and hexagonal for both lower epidermis and upper epidermis.

**Subgenus Pharmacosycea**

**F. nervosa** [Plate 33H, 38K]

The stomata are paracytic type. The number of subsidiary cells are 2. The cell shape of both the lower epidermis and upper epidermis is irregular whereas the cell margin of lower epidermis and upper epidermis are undulate and quadrigonal, pentagonal, hexagonal respectively.

**Key to the subgenus Sycomorus**

1a. Stomata paracytic..........................................................*F. hispida*
1b. Stomata anomocytic, tetracytic, staurocytic, stephenocytic........2

2a. Stomata anomocytic...........................................................3
   3a. Cell shape of upper epidermis regular..............................4
      4a. Stomatal index 26.19µm.............................................*F. auriculata*
      4b. Stomatal index 28.07µm.............................................*F. squamosa*
   3b. Cell shape of upper epidermis irregular............................5
      5a. Stomatal index 23.81µm.............................................*F. racemosa*
      5b. Stomatal index 33.33µm
           ..................................................*F. variegata var. chlorocarpa*

2b. Stomata tetracytic, staurocytic, stephenocytic......................6
   6a. Stomata stephenocytic...............................................*F. semicordata*
   6b. Stomata tetracytic or staurocytic...................................7
      7a. Upper epidermis cell shape regular and cell margin quadrigonal, pentagonal and hexagonal; stomata staurocytic and tetracytic
           ..................................................*F. fistulosa*
      7b. Upper epidermis cell shape irregular and cell margin slightly undulate; stomata tetracytic
           ..................................................*F. variegata var. garciae*
Plate 34: Anatomy of lower epidermis of the subgenus Sycomorus (A) Stomata and surrounding cells of *F. auriculata* (1000X) (B) Stomata and surrounding cells of *F. fistulosa* (1000X) (C) An enlarged view of stomata of *F. fistulosa* (1000X) (D) Stomata of *F. hispida* (400X) (E) Stomata and surrounding cells of *F. racemosa* (400X) (F) Stomata of *F. semicordata* (500X) (G) Stomata and surrounding cells of *F. squamosa* (400X) (H) Stomata and surrounding cells of *F. variegata* var. *chlorocarpa* (400X) (I) An enlarged view of stomata of *F. variegata* var. *chlorocarpa* (1000X) (J) Stomata and surrounding cells of *F. variegata* var. *garciae* (500X)
**F. auriculata** [Plate 34A, 39A]

The stomata are anomocytic type. The numbers of subsidiary cells are 4-5. The cell shape of lower epidermis and upper epidermis are irregular and regular respectively whereas the cell margin of lower epidermis and upper epidermis are undulate and pentagonal or hexagonal respectively.

**F. hispida** [Plate 34D, 39C]

The stomata are paracytic type. The numbers of subsidiary cells are 2. The cell shape is regular and cell margin are pentagonal and hexagonal for both lower epidermis and upper epidermis.

**F. fistulosa** [Plate 34B, 34C, 39B]

The stomata are staurocytic and tetracytic type. The numbers of subsidiary cells are 4. The cell shape of both the lower epidermis and upper epidermis is regular whereas the cell margin of lower epidermis and upper epidermis are pentagonal, hexagonal and quadrigonal, pentagonal, hexagonal respectively.

**F. racemosa** [Plate 34E, 39D]

The stomata are anomocytic type. The numbers of subsidiary cells are 5. The cell shape of both the lower epidermis and upper epidermis is irregular whereas the cell margin of lower epidermis and upper epidermis are wavy and slightly undulate respectively.

**F. semicordata** [Plate 34F, 39E]

The stomata are stephanocytic type. The numbers of subsidiary cells are 4-5. The cell shape of lower epidermis and upper epidermis are irregular and regular respectively whereas the cell margin of lower epidermis and upper epidermis are undulate and pentagonal, hexagonal respectively.

**F. squamosa** [Plate 34G, 39F]

The stomata are anomocytic type. The numbers of subsidiary cells are 5. The cell shape of lower epidermis and upper epidermis are irregular and regular respectively whereas the cell margin of lower epidermis and upper epidermis are undulate and pentagonal, hexagonal respectively.
Plate 35: Anatomy of lower epidermis of the subgenus *Ficus* (A) Stomata and surrounding cells of *F. chartacea* (400X) (B) An enlarged view of stomata of *F. chartacea* (800X) (C) Stomata and surrounding cells of *F. erecta* (400X) (D) An enlarged view of stomata of *F. esquiroliana* (1000X) (E) Stomata and surrounding cells of *F. gasparriniana* var. *laceratifolia* (400X) (F) Stomata and surrounding cells of *F. hirta* (G) An enlarged view of stomata of *F. hirta* (1000X) (H) Stomata and surrounding cells of *F. lamponga* (400X) (I) An enlarged view of stomata of *F. lamponga* (1000X) (J) A single stoma of *F. schefferiana* (1000X)
**F. variegata var. chlorocarpa** [Plate 34H, 34I, 39G]

The stomata are anomocytic type. The numbers of subsidiary cells are 5. The cell shape is irregular and cell margin is undulated for both lower epidermis and upper epidermis.

**F. variegata var. garciae** [Plate 34J, Pl 39H]

The stomata are tetracytic type. The number of subsidiary cells is 4. The cell shape of lower epidermis and upper epidermis are regular and irregular respectively whereas the cell margin of lower epidermis and upper epidermis are pentagonal and slightly undulate respectively.

**Key to the Subgenus Ficus**

1a. Stomatal type stephanocytic..........................................................**F. gasparriniana**

1b. Stomatal type anomocytic.................................................................2

2a. Cell shape of lower epidermis regular........................................3

3a. Stomatal index 40.32µm.....................................................**F. esquiroliana**

3b. Stomatal index less than 40.32µm...........................................4

4a. Stomatal index 34.01µm....................................................**F. hirta**

4b. Stomatal index 37.25µm..................................................**F. schefferiana**

2b. Cell shape of lower epidermis irregular.................................5

5a. Cell margin of upper epidermis hexagonal only.............**F. chartacea**

5b. Cell margin of upper epidermis are pentagonal and hexagonal

.........................................................6

6a. Cell margin of lower epidermis wavy.............**F. erecta**

6b. Cell margin of lower epidermis slightly sinuous

.........................................................**F. lamponga**

**F. chartacea** [Plate 35A, 35B, 40A]

The stomata are anomocytic type. The numbers of subsidiary cells are 5. The cell shape in both the lower epidermis and upper epidermis is regular whereas the cell margin of lower epidermis and upper epidermis are slightly sinuous and hexagonal respectively.

**F. erecta** [Plate 35C, 40B]

The stomata are anomocytic type. The numbers of subsidiary cells are 5. The cell shape of lower epidermis and upper epidermis are irregular and regular respectively.
Plate 36: Anatomy of lower epidermis of the subgenus *Sycidium* (A) A group of stomata of *F. heteropluer* (5000X) (B) An enlarged view of stomata of *F. heteropluer* (1000X) (C) Stomata and surrounding cells of *F. tinctoria* subsp. *gibbosa* (1000X). Subgenus *Synoecia* (D) Stomata of *F. hederacea* (1000X) (E) Stomata and surrounding cells of *F. pubigera* (400X) (F) An enlarged view of stomata of *F. pubigera* var. *maliformis* (1000X) (G) Stomata and surrounding cells of *F. pumila* (400X)
Plate 37: Lithocyst in the lower epidermis of the subgenus *Urostigma* (A) Arrow showing the lithocyst in *F. benjamina* var. *benjamina* (500X) (B) A single lithocyst of *F. caulocarpa* (1000X) (C) A widely open lithocyst of *F. concinna* (400X) (D) A single lithocyst of *F. curtipes* (1000X)
whereas the cell margin of lower epidermis and upper epidermis are wavy and pentagonal, hexagonal respectively.

**F. esquiroliana** [Plate 35D, 40C]

The stomata are anomocytic type. The numbers of subsidiary cells are 5. The cell shape is regular and cell margin are pentagonal and hexagonal for both lower epidermis and upper epidermis.

**F. gasparriniana** var. *lacerifolia* [Plate 35E, 40D]

The stomata are stephanocytic type. The number of subsidiary cells are 5. The cell shape of lower epidermis and upper epidermis is regular whereas the cell margin is hexagonal on lower epidermis while pentagonal and hexagonal on upper epidermis.

**F. hirta** [Plate 35F, 35G, 40E]

The stomata are anomocytic type. The numbers of subsidiary cells are 5. The cell shape is regular and cell margin are pentagonal and hexagonal for both lower epidermis and upper epidermis.

**F. lamponga** [Plate 35H, 35I, 40F]

The stomata are anomocytic type. The number of subsidiary cells is 5 in numbers. The cell shape of lower epidermis and upper epidermis are irregular and regular respectively whereas the cell margin is slightly sinuous on lower epidermis while pentagonal, hexagonal on upper epidermis.

**F. schefferiana** [Plate 35J, 40G]

The stomata are anomocytic type. The number of subsidiary cells are more than 5. The cell shape is regular and cell margin are pentagonal and hexagonal for both lower epidermis and upper epidermis.

**Key to the subgenus Sycidium**

1a. Stomatal type paracytic......................................................**F. heteropleura**

1b. Stomatal type anomocytic and stephanocytic....................**F. tinctoria** subsp. *gibbosa*

**F. heteropleura** [Plate 36A, 36B, 41A]

The stomata are paracytic type. The numbers of subsidiary cells are 2. The cell shape is regular and cell margin are pentagonal and hexagonal for both lower epidermis and upper epidermis.
Plate 38: Anatomy of upper epidermis of subgenus Urostigma and subgenus Pharmacosycea (A) Irregular epidermal cell shape of F. altissima (400X) (B) Epidermal cell of F. benghalensis (400X) (C) Regular epidermal cell of F. benjamina var. benjamina (400X) (D) Regular epidermal cell of F. benjamina var. nuda (400X) (E) Regular epidermal cell of F. caulocarpa (400X) (F) Thick wall epidermal cell of F. concinna (400X) (G) Irregular epidermal cell shape of F. curtipes (400X) (H) Regular epidermal cell of F. glaberrima (400X) (I) F. religiosa (400X) (J) F. rumphii (400X) (K) Multiple layer epidermis of F. nervosa (400X)
Plate 39: Anatomy of upper epidermis of subgenus *Sycomorus* (A) Pentagonal and hexagonal cell margin of *F. auriculata* (400X) (B) Regular cell shape of *F. fistulosa* (400X) (C) Regular cell shape of *F. hispida* (400X) (D) Irregular cell shape and undulated cell margin of *F. racemosa* (400X) (E) Pentagonal and hexagonal cell margin of *F. semicordata* (400X) (F) Pentagonal and hexagonal cell margin of *F. squamosa* (400X) (G) Undulated cell margin of *F. variegata var. chlorocarpa* (400X) (H) Slightly undulated cell margin of *F. variegata var. garciae* (400X)
**F. tinctoria** subsp. **gibbosa** [Plate 36C, 41B]

The stomata are anomocytic and stephanocytic type. The numbers of subsidiary cells are 5. The cell shape is regular and cell margin are pentagonal and hexagonal for both lower epidermis and upper epidermis.

**Key to the Subgenus Synoecia**

1a. Stomatal type staurocytic........................................**F. pumila**

1b. Stomatal type anomocytic........................................2

2a. Cell shape of both upper and lower epidermis is irregular

.......................................................**F. hederacea**

2b. Cell shape of both upper and lower epidermis is regular

.......................................................**F. pubigera**

**F. hederacea** [Plate 36D, 41C]

The numbers of subsidiary cells are 5. The cell shape of both the lower epidermis and upper epidermis are irregular and the cell margin of both the lower epidermis and upper epidermis are pentagonal and hexagonal.

**F. pubigera** var. **maliformis** [Plate 36E, 36F, 41D]

The stomata are anomocytic type. The numbers of subsidiary cells are 5. The cell shape of both the lower epidermis and upper epidermis are regular and the cell margin of both the lower epidermis and upper epidermis are pentagonal or hexagonal.

**F. pumila** [Plate 36G, 41E]

The stomata are staurocytic type. The numbers of subsidiary cells are 4. The cell shape is regular and cell margin are pentagonal and hexagonal for both lower epidermis and upper epidermis.

**Leaf architectural features with artificial key**

**Key to the Subgenus Urostigma**

1a. Pattern of tertiary vein reticulate..............................................................2

2a. Pattern of tertiary vein random reticulate.............................................**F. concinna**

2b. Pattern of tertiary vein orthogonal reticulate........................................3

3a. Quarternary vein course randomly oriented

.......................................................**F. religiosa**
Plate 40: Anatomy of upper epidermis of subgenus Ficus (A) Hexagonal cell margin of *F. chartacea* (400X) (B) Pentagonal and hexagonal cell margin of *F. erecta* (400X) (C) Regular cell shape of *F. esquiroliana* (400X) (D) Regular cell shape of *F. gasparriniana* var. *laceratifolia* (400X) (E) Regular cell shape of *F. hirta* (400X) (F) Pentagonal and hexagonal cell margin of *F. lamponga* (400X) (G) Pentagonal and hexagonal cell margin of *F. schefferiana*
Plate 41: Anatomy of upper epidermis of subgenus *Sycidium* (A) Regular cell shape of *F. heteropleura* (400X) (B) Pentagonal and hexagonal cell margin of *F. tinctoria* subsp. *gibbosa* (400X). Subgenus *Synoeicia* (C) Irregular cell shape of *F. hederacea* (400X) (D) Pentagonal and hexagonal cell margin of *F. pubigera* var. *maliformis* (400X) (E) Epidermal cell of *F. pumila* (400X)
3b. Quarternary vein course orthogonal.................................4

4a. Areoles development imperfect.................................F. benghalensis
4b. Areoles well developed............................................5

5a. Marginal ultimate venation fimbriate

..................................................F. curtipes

5b. Marginal ultimate venation looped..............6

6a. Primary vein course stout

..................................................F. caulocarpa

6b. Primary vein course moderate........7

7a. Predominant 3°angle AR and RO

..................................................F. rumphii

7b. Predominant 3°angle RR

..................................................F. glaberrima

1b. Pattern of tertiary vein percurrent fork....................................................8

8a. Primary vein size stout..................................................F. altissima

8b. Primary vein size moderate...................................................9

9a. Midvein on the adaxial side grooved; quarternary vein size thin

..................................................F. benjamina var. benjamina

9b. Midvein on the adaxial side flat; quarternary vein size thick

..................................................F. benjamina var. nuda

**F. altissima** [Plate 42A, 42B]

Mid vein on the adaxial side is elevated and the venation type is pinnate-camptodromous (brochidodromous). Primary vein is straight-unbranched and stout in size. Secondary vein course is curved abruptly, intersecary veins is composite. Tertiary veins which is percurrent fork. Predominant 3°angle are-AA. Quarternary vein size and vein course are thick and orthogonal respectively. Marginal ultimate venation is looped, while veinlet ending is branched 2 or more times. Well developed areoles present.

**F. benghalensis** [Plate 42C, 42D]

Mid vein on the adaxial side is elevated and the venation type is pinnate-camptodromous. Primary vein which is straight-unbranched and massive in size. Secondary vein course is curved abruptly, intersecary veins is composite. Tertiary veins which is orthogonal reticulate. Predominant 3°angle AA. Quarternary vein size
Plate 42: Leaf architecture of the subgenus *Urostigma* (A) *F. altissima* (8X) (B) *F. altissima* (10X) (C) *F. benghalensis* (10X) (D) A single vein-islet of *F. benghalensis* (14X) (E) *F. benjamina* var. *benjamina* (10X) (F) Looping marginal ultimate venation of *F. benjamina* var. *benjamina* (12X) (G) Tip of *F. benjamina* var. *nuda* (8X) (H) Looping marginal ultimate venation of *F. benjamina* var. *nuda* (8X) (I) Middle portion of leaf of *F. benjamina* var. *nuda* (10X); [inserted pic: a single vein-islet (14X)]
and vein course are thick and orthogonal respectively. Marginal ultimate venation is looped, while veinlet ending is branched 2 times. Development of areoles is imperfect.

**F. benjamina var. benjamina** [Plate 42E, 42F]

Mid vein on the adaxial side is grooved and the venation type is pinnate-camptodromous (brochiodromous). Primary vein is straight-unbranched and moderate in size. Secondary vein course is curved abruptly, intersecondary veins is composite. Tertiary veins percurrent fork. Predominant 3°angle is RR. Quarternary vein size and vein course are thin and orthogonal respectively. Marginal ultimate venation is looped, while veinlet ending is branched 2 or 3 times. Well developed areoles.

**F. benjamina var. nuda** [Plate 42G, 42H, 42I]

Mid vein on the adaxial side is flat and the venation type is pinnate-camptodromous (brochiodromous). Primary vein which is straight-unbranched and moderate in size. Secondary vein course is curved abruptly, intersecondary veins is composite. Tertiary veins percurrent fork. Predominant 3°angle is RR. Quarternary vein size and vein course are thick and orthogonal respectively. Marginal ultimate venation is looped, while veinlet ending is branched more than 3 times. Well developed areoles.

**F. caulocarpa** [Plate 43A, 43B]

Mid vein on the adaxial side is elevated and the venation type is pinnate-camptodromous. Primary vein which is straight-unbranched and stout in size. Secondary vein course is curved abruptly, intersecondary veins is composite. Tertiary veins which is orthogonal reticulate. Predominant 3°angle OA. Quarternary vein size and vein course are thick and orthogonal respectively. Marginal ultimate venation is looped, while veinlet ending is branched 2 or 3 times. Well developed areoles.

**F. concinna** [Plate 43C]

Mid vein on the adaxial side is elevated and the venation type is pinnate-camptodromous (brochiodromous). Primary vein straight-unbranched and moderate in size. Secondary vein course is curved abruptly, intersecondary veins composite. Predominant 3°angle are RR and AR. Random reticulate pattern of tertiary veins. Quarternary vein size and vein course are thick and randomly oriented respectively. Marginal ultimate venation fimbriate. Veinlet ending is branched 2 times. Areoles development imperfect.
Plate 43: Leaf architecture of the subgenus *Urostigma* (A) Middle portion of leaf of *F. caulocarpa* (10X) (B) Magnified view of vein-islet of *F. caulocarpa* (14X) (C) Fimbriate marginal ultimate venation of *F. concinna* (14X) (D) Middle portion of leaf of *F. curtipes* (8X) (E) Vien-islet of *F. curtipes* (14X) (F) Middle portion of leaf of *F. glaberrima* (10X) (G) Vein termination in *F. glaberrima* (12X) (H) Middle portion of leaf of *F. religiosa* (8X) (I) Vein islet of *F. rumphii* (12X)
**F. curtipes** [Plate 43D, 43E]

Mid vein on the adaxial side is elevated and the venation type is pinnate-camptodromous (brochidodromous). Primary vein course straight-unbranched and moderate in size. Secondary vein course is curved abruptly, intersecondary veins composite. Predominant 3° angle are RR and AA. Pattern of tertiary veins orthogonal reticulate. Quaternary vein size and vein course are thick and orthogonal respectively. Marginal ultimate venation frimbriate. Veinlet ending is branched 3 or more times. Well developed areoles present.

**F. glaberrima** [Plate 43F, 43G]

Mid vein on the adaxial side is elevated and the venation type is pinnate-camptodromous (brochidodromous). Primary vein course straight-unbranched and moderate in size. Secondary vein course is curved abruptly, intersecondary veins composite. Predominant 3° angle RR. Pattern of tertiary veins orthogonal reticulate. Quaternary vein size and vein course are thick and orthogonal respectively. Marginal ultimate venation looped. Veinlet ending is branched 2 times. Well developed areoles present.

**F. religiosa** [Plate 43H]

Mid vein on the adaxial side is elevated and the venation type is pinnate-camptodromous (brochidodromous). Primary vein which is straight-unbranched and stout in size. Secondary vein course is curved abruptly, intersecondary veins is composite. Tertiary veins orthogonal reticulate. Predominant 3° angle are-AA. Quaternary vein size and vein course are thin and randomly oriented respectively. Marginal ultimate venation is looped. Veinlet ending is branched 3 times. Well developed areoles present.

**F. rumphii** [Plate 43I]

Mid vein on the adaxial side is elevated and the venation type is pinnate-camptodromous (brochidodromous). Primary vein course straight-unbranched and moderate in size. Secondary vein course is curved abruptly, intersecondary veins composite. Predominant 3° angle are AA and RO. Pattern of tertiary veins orthogonal reticulate. Quaternary vein size and vein course are thick and orthogonal respectively. Marginal ultimate venation looped. Veinlet ending is branched 3 or more times. Well developed areoles present.
Subgenus Pharmacosycea

*F. nervosa* [Plate 44A, 44B, 44C]

Mid vein on the adaxial side is elevated and the venation type is pinnate-camptodromous (brochidodromous). Primary vein is straight-unbranched and moderate in size. Secondary vein course is curved abruptly, intersecondary veins is composite. Tertiary veins percurrent fork. Predominant 3° angle are AR and RR. Quarternary vein size and vein course are thin and orthogonal respectively. Marginal ultimate venation is looped, while veinlet ending is branched 2 or more times. Well developed areoles.

**Key to the subgenus Sycomorus**

1a. Secondary vein course provided with outer secondary veins

............................................................ *F. hispida*

1b. Secondary vein course curved abruptly.................................................. 2

2a. Pattern of tertiary vein orthogonal reticulate................................. *F. racemosa*

2b. Pattern of tertiary vein percurrent.................................................... 3

3a. Tertiary vein percurrent fork............................................................ 4

4a. Areoles well developed................................................................. *F. fistulosa*

4b. Areoles development imperfect........................................................ 5

............................................................ *F. variegata var. garciae*

3b. Tertiary vein percurrent straight or sinuous................................. 5

5a. Tertiary vein percurrent straight.................................................... 6

6a. Marginal ultimate venation fimbriate; areoles well developed...................... *F. auriculata*

6b. Marginal ultimate venation looped; areoles development imperfect........... *F. variegata var. chlorocarpa*

5b. Tertiary vein percurrent sinuous.................................................... 7

7a. Quarternary vein course orthogonal; marginal ultimate venation

fimbriate; areoles well developed.............. *F. squamosa*

7b. Quarternary vein course randomly oriented; marginal ultimate

venation looped; areoles development imperfect

............................................................ *F. semicordata*
Plate 44: Leaf architecture of the subgenus *Pharmacosycea* (A) Brochidodromous primary venation in *F. nervosa* (B) Middle portion of leaf of *F. nervosa* (8X) (C) Ultimate marginal venation of *F. nervosa* (8X)
**F. auriculata** [Plate 45A, 45B]

Mid vein on the adaxial side is elevated and the venation type is pinnate-camptodromous (brochidodromous). Primary vein is straight-unbranched and moderate in size. Secondary vein course is curved abruptly, intersecdary veins is composite. Tertiary veins percurrent straight. Predominant 3°angle are RR and OA. Quarternary vein size and vein course are thick and orthogonal respectively. Marginal ultimate venation is fimbriate, while veinlet ending is branched 2 or 3 times. Well developed areoles.

**F. fistulosa** [Plate 45C]

Mid vein on the adaxial side is grooved and the venation type is pinnate-camptodromous (brochidodromous). Primary vein straight-unbranched and moderate in size. Secondary vein course is curved abruptly, intersecdary veins is composite. Predominant 3°angle are - RR and RO, percurrent fork pattern of tertiary veins. Quarternary vein size and vein course are thick and orthogonal respectively. Marginal ultimate venation looped. Veinlet ending is branched. Well developed areoles.

**F. hispida** [Plate 45D]

Mid-vein on the adaxial side is grooved and the venation type is pinnate-camptodromous. Primary vein straight-unbranched and moderate in size. Secondary vein course is provided with outer secondary veins, intersecdary veins is absent. Predominant 3°angle are- AA and RR.Pecurrent with straight pattern of tertiary veins. Quarternary vein size and vein course are thin and randomly oriently respectively. Marginal ultimate venation is incomplete.Veinlet ending is branched 2 or more times. Well developed areoles.

**F. racemosa** [Plate 45E]

Mid vein on the adaxial side is flat and the venation type is pinnate-camptodromous. Primary vein straight-unbranched and weak in size. Secondary vein course is abruptly curved,intersecdary veins is composite.Tertiary veins orthogonal reticulate. Predominant 3°angle are-AA and AR. Quarternary vein size and vein course are thin and orthogonal respectively. Marginal ultimate venation is looped. Veinlet ending is simple. Well developed areoles present.
Plate 45: Leaf architecture of the subgenus *Sycomorus* (A) Middle portion of leaf of *F. auriculata* (8X) (B) Magnified view of vein-islet of *F. auriculata* (12X) (C) vein-islet with branched vein termination *F. fistulosa* (12X) (D) Middle portion of leaf of *F. hispida* (8X) (E) Middle portion of leaf of *F. racemosa* (10X) (F) Tertiary venation pattern of *F. semicordata* (8X) (G) Middle portion of leaf of *F. squamosa* (8X) (H) Middle portion of leaf with quarternay venation pattern of *F. variegate* var. *chloracarpa* (12X) (I) Vein-islet of *F. variegate* var. *garciae* (14X)
**F. semicordata** [Plate 45F]

Mid vein on the adaxial side is elevated and the venation type is pinnate-camptodromous. Primary vein which is straight-unbranched and moderate in size. Secondary vein course is curved abruptly, intersecondary veins is composite. Tertiary veins which is percurrent sinous. Predominant 3°angle are-RR, RA are RO. Quarternary vein size and vein course are thin and relatively randomly oriented respectively. Marginal ultimate venation is loped, while veinlet ending is branched 2 times. Development of areoles is imperfect.

**F. squamosa** [Plate 45G]

Mid vein on the adaxial side is elevated and the venation type is pinnate camptodromous. Primary vein straight-unbranched and moderate in size. Secondary vein course is provided with outer secondary veins, intersecondary veins composite. Predominant 3°angle AO, percurrent sinuous pattern of tertiary veins. Quarternary vein size and vein course are thick and orthogonal respectively. Marginal ultimate venation fimbriate. Veinlet ending is branched. Well developed areoles present.

**F. variegata var. chlorocarpa** [Plate 45H]

Mid vein on the adaxial side is elevated and the venation type is pinnate-camptodromous. Primary vein which is straight-unbranched and moderate in size. Secondary vein course is curved abruptly, intersecondary veins is composite. Tertiary veins are percurrent fork and percurrent straight. Predominant 3°angle RR. Quarternary vein size and vein course are thick and orthogonal respectively. Marginal ultimate venation is looped, while veinlet ending is branched 2 or 3 times. Areoles development is imperfect.

**F. variegata var. garciae** [Plate 45I]

Mid vein on the adaxial side is elevated and the venation type is pinnate-camptodromous. Primary vein straight-unbranched and moderate in size. Secondary vein course is curved abruptly, intersecondary veins composite. Predominant 3°angle are RR and AO, percurrent fork pattern of tertiary veins. Quarternary vein size and vein course are thick and orthogonal respectively. Marginal ultimate venation looped. Veinlet ending is branched 2 times. Areoles development is imperfect.
Key to the subgenus Ficus

1a. Leaves dimorphic ............................................................................................... F. schefferiana
1b. Leaves simple........................................................................................................ 2

2a. Venation type actinodromous-basal (reticulate)........................................... F. hirta
2b. Venation type pinnate-camptodromous (brochidodromous)................... 3

3a. Pattern of tertiary orthogonal reticulate......................................................... F. erecta
3b. Pattern of tertiary vein percurrent................................................................. 4

4a. Pattern of tertiary vein percurrent sinuous.............................................. 5

5a. Areoles well developed

........................................ F. chartacea

5b. Areoles development imperfect

........................................ F. lamponga

4b. Pattern of tertiary vein percurrent fork................................................. 6

6a. Quaternary vein course orthogonal............................................................... F. esquirioliana

........................................ F. gasparriniana

F. chartacea [Plate 46A]

Mid vein on the adaxial side is grooved and the venation type is pinnate-camptodromous (brochidodromous). Primary vein straight-unbranched and moderate in size. Secondary vein course is curved abruptly, intersecondary veins composite. Predominant 3° angle RR, percurrent sinuous pattern of tertiary veins. Quaternary vein size and vein course are thin and orthogonal respectively. Marginal ultimate venation is looped. Veinlet ending is branched 2 or 3 times. Well developed areoles present.

F. erecta [Plate 46B]

Mid vein on the adaxial side is grooved and the venation type is pinnate-camptodromous (brochidodromous). Primary vein straight and stout in size. Secondary vein course is curved abruptly, intersecondary veins composite. Predominant 3° angle are RR and AO. Orthogonal reticulate pattern of tertiary veins. Quaternary vein size and vein course are thick and orthogonal respectively. Marginal ultimate venation fimbriate. Veinlet ending is branched 2 times. Well developed areoles present.
Plate 46: Leaf architecture of the subgenus Ficus (A) Middle portion of leaf of *F. chartacea* (10X) (B) Branched vein termination of *F. erecta* (10X) (C) Middle portion of leaf of *F. esquiroliana* (8X) (D) Middle portion of leaf of *F. gasparriniana* var. *laceratifolia* (10X) (E) Dense view of veins of *F. hirta* (8X) (F) Vein-islet of *F. hirta* (14X) (G) Branched vein termination of *F. lamponga* (14X) (H) Middle portion of leaf of *F. schefferiana* (10X)
**F. esquiloiiana** [Plate 46C]

Mid vein on the adaxial side is flat and the venation type is actinodromous. Primary vein straight-branched and stout in size. Secondary vein course is curved abruptly, intersecondary veins is composite. Predominant 3° angle are - RR and RA, percurrent fork pattern of tertiary veins. Quarternary vein size and vein course are thick and orthogonal respectively. Marginal ultimate venation looped. Veinlet ending is branched 2 times. Areoles development imperfect.

**F. gasparriniana var. laceratifolia** [Plate 46D]

Mid vein on the adaxial side is grooved and the venation type is pinnate-camptodromous (brochidodromous). Primary vein which is straight-unbranched and moderate in size. Secondary vein course is curved abruptly, intersecondary veins is composite. Tertiary veins percurrent fork. Predominant 3° angle are - AA, RR and OR. Quarternary vein size and vein course are thin and random respectively. Marginal ultimate venation is looped, while veinlet ending is branched 1 or 2 times. Imperfect areoles.

**F. hirta** [Plate 46E, 46F]

Mid vein on the adaxial side is grooved and the venation type is actinodromous-basal-reticulate. Primary vein is straight which is branched with moderate in size. Secondary vein is abruptly curved, intersecondary veins are composite. Predominant 3° angle are – RR and AO. Pecurrent sinuous pattern of tertiary veins. Quarternary vein size and vein course are thick and orthogonal respectively. Marginal ultimate venation looped. Veinlet ending is branched 2 or 3 times. Areoles development is imperfect.

**F. lamponga** [Plate 46G]

Mid vein on the adaxial side is grooved and the venation type is pinnate-camptodromous (brochidodromous). Primary vein which is straight-unbranched and moderate in size. Secondary vein course is curved abruptly, intersecondary veins is composite. Predominant 3° angle are - OA and AR. Pecurrent with sinuous pattern of tertiary veins. Quarternary vein size and vein course are thin and orthogonal respectively. Marginal ultimate venation looped. Veinlet ending is branched 2 or more times. Imperfect areoles.

**F. schefferiana** [Plate 46H]

Mid vein on the adaxial side is flat and the venation type is pinnate-camptodromous. Primary vein straight-unbranched and moderate in size. Secondary
vein course is provided with outer secondary veins, intersecondary veins is composite. Predominant 3° angle are – RR, RA and OA, percurrent sinuous pattern of tertiary veins. Quarternary vein size and vein course are thick and orthogonal respectively. Marginal ultimate venation fimbriate. Veinlet ending is branched 2 times. Areoles development is imperfect.

**Key to the subgenus *Sycidium***

1a. Areoles well developed................................................................. *F. heteropleura*

1b. Areoles development imperfect................................................... *F. tinctoria* subsp. *gibbosa*

**F. heteropleura** [Plate 47A, 47B]

Mid vein on the adaxial side is flat and the venation type is pinnate-camptodromous (brochidodromous). Primary vein which is straight-unbranched and moderate in size. Secondary vein course is curved abruptly, intersecondary veins is composite. Tertiary veins random reticulate. Predominant 3° angle are- AA. Quarternary vein size and vein course are thick and orthogonal respectively. Marginal ultimate venation is fimbriate, while veinlet ending is branched 3 or more times. Well developed areoles present.

**F. tinctoria** subsp. *gibbosa* [Plate 47C, 47D]

Mid vein on the adaxial side is elevated and the venation type is pinnate-camptodromous (brochidodromous). Primary vein is straight-unbranched and moderate in size. Secondary vein course is curved abruptly, intersecondary veins composite. Predominant 3° angle is RR, random reticulate pattern of tertiary veins. Quarternary vein size and vein course are thick and orthogonal respectively. Marginal ultimate venation is fimbriate. Veinlet ending is branched 3 times. Areoles development is imperfect.

**Key to the Subgenus *Synoecia***

1a. Intersecondary veins absent............................................................ *F. pumila*

1b. Intersecondary veins composite......................................................2

2a. Quarternary vein course orthogonal; marginal ultimate venation looped and areoles well developed......................................................... *F. hederacea*

2b. Quarternary vein course randomly oriented; marginal ultimate venation fimbriate and areoles development imperfect.......................... *F. pubigera*
Plate 47: Leaf architecture of the subgenus Sycidium (A) Middle portion of leaf of *F. heteropleura* (8X) (B) An enlarged view of veins of *F. heteropleura* (14X) (C) Middle portion of leaf of *F. tinctoria* subsp. *gibbosa* (8X) (D) An enlarged view of veins of *F. tinctoria* (14X). Subgenus Synoecia (E) A single vein-islet of *F. hederacea* (16X) (F) A single vein-islet of *F. pubigera* var. *maliformis* (14X) (G) Tip of *F. pumila* (8X) (H) Middle portion of leaf of *F. pumila* (12X)
**F. hedaracea** [Plate 47E]

Mid vein on the adaxial side is flat and the venation type is pinnate-camptodromous. Primary vein is straight-unbranched and weak in size. Secondary vein course is curved abruptly, intersecondary veins is composite. Tertiary veins which is percurrent fork. Predominant 3\(^\circ\) angle is AA. Quartenary vein size and vein course are thick and orthogonal respectively. Marginal ultimate venation is fimbriate, while veinlet ending is branched 2 times. Well developed areoles.

**F. pubigera** var. *maliformis* [Plate 47F]

Mid vein on the adaxial side is elevated and the venation type is pinnate-camptodromous (brochidodromous). Primary vein straight and stout in size. Secondary vein course is curved abruptly, intersecondary veins composite. Predominant 3\(^\circ\) angle are AR and RR, percurrent fork pattern of tertiary veins. Quartenary vein size and vein course are thick and relatively ramdomly oriented respectively. Marginal ultimate venation fimbriate. Veinlet ending is branched 2 or 3 times. Areoles development is imperfect.

**F. pumila** [Plate 47G, 47H]

Mid vein on the adaxial side is flat and the venation type is pinnate-camptodromous. Primary vein straight and moderate in size. Secondary vein course is curved abruptly, intersecondary veins absent. Predominant 3\(^\circ\) angle AA, orthogonal reticulate pattern of tertiary veins. Quartenary vein size and vein course are thick and orthogonal respectively. Marginal ultimate venation looped. Veinlet ending is branched 2 times. Well developed areoles.