

SEEDLING MORPHOLOGY OF SOME IMPORTANT TIMBER-YIELDING PLANTS AND ITS TAXONOMIC IMPLICATIONS

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Seedling morphology of five important timber-yielding plants namely *Gmelina arborea*, *Mimusops elengii*, *Polyalthia longifolia*, *Putranjiva roxburghii*, and *Terminalia arjuna* have been studied. The taxonomic implications of seedling features are discussed.

In modern era, we are loosing many important plant species due to high pressure of urbanisation, industrialisation and deforestation. So the study of seedling morphology is very important to conserve these plants permanently and for easy identification. Several workers studied the seedling characters of different species of plants. Hill (1982) illustrated and discussed briefly the variations in cotyledon morphology in *Malvastrum*. Sampath Kumar (1982) stressed the use of cotyledon morphology at the generic, specific and varietal levels in the family. Kamilya and Paria (1993) studied on seedling morphology of some members of the Polygonaceae and its taxonomic implications. In this paper, the study of the morphology of seedlings of some commonly occurring timber-yielding plant species have been studied.

MATERIALS AND METHODS

In this present investigation, seedlings of different stages were collected from different natural habitats in different places of Guwahati. They were compared and identified with the help of seedlings raised from identified seeds. At least ten specimens were studied from various localities. The seedlings were dried and made into herbarium and preserved. The morphology has been described following the terminology proposed by Burger (1972), Hickey (1973) and Vogel (1980). For morphological diagnoses of seedlings, the characters of cotyledons or paracotyledons, eophylls (first few leaves) and hypocotyl were taken into consideration.

OBSERVATION

Gmelina arborea Roxb. Corom, pl.3, t-246.1818 & Fl.Ind. 3:84.1832; C.B. Clarke in Hook-P. FBI. 4:581.1885; Kanjilal *et al.* FA 3; 466. 1939; Deb, FT 2:110.1983. Fam: Verbenaceae. Local name; Gomari (Ass.) (Plate 1).

Germination epigeal, phanerocotylar. Taproot short, 1.8 - 2.9 cm. grayish white. Hypocotyl slightly curved, 1-1.3 cm. pale green, terete. Paracotyledons two, opposite, persistent up to 8-9 leaved stage, exstipulate, petiolar, Petiole \pm 1.3 cm. bases ensheathing node and some portion of internode forming a cup-like structure, tube + 1.9 cm. in length, greenish, blade fleshy, deep green, 1.8 -2.5 cm. obovate-oblong, apex bi-lobed, base cuneate, entire, primary veins 3 - parallelly arranged, distinct, secondaries inconspicuous. Internode straight, long, terete, light green, length of first and second internodes are 6.8 & 1.8 cm respectively other shorter. First two leaves opposite, simple, petiolate, green, rhombioobovate, smooth, wavy margin, apex acuminate, base rounded, size of the first two leaves are 5.5 x 3.8cm & 4.5 x 4.3cm

respectively. Primary vein one-distinct, secondary vein 4-5 pairs, opposite or alternate, exstipulate, small, green, subsequent leaves opposite, simple stipulate other characters same as that of first two leaves.

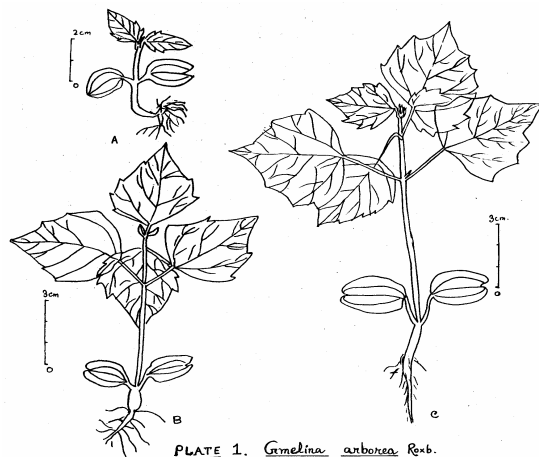


PLATE 1. *Gmelina arborea* Roxb.

Mimusops elengii L. Sp. Pl. 349. 1753; C.B. Clarke in Hook f. FBI. 3.: 548. 1882; Kanjilal *et al.* FA 3:

197.1939 Deb, FT. 1:430. 1981 *Fam*: Sapotaceae.
Local name: Bakul (Ass) (Plate 2).



PLATE 2. *Mimosaops elengii* L.

Germination epigeal, phanerocotylar. Tap root long, 5.5-7 cm creamy white. Hypocotyl slightly curved long 2.5-7.5 cm brown. Paracotyledons two, opposite, persistent up to 7-8 leaved stage, exstipulate, blade smooth, green, rounded-subcordate, 2.5-2.8 cm apex and base rounded, dorsal surface smooth, ventral surface rough, entire, primary vein one, distinct, secondary vein 2-3 pairs opposite, distinct. Internodes short, 9-1.4 cm long, straight slightly curved green. First two leaves alternate, simple, oval-elliptic, glabrous, chartaceous, shining, green, entire, acuminate, acute at base, length of the 1st & 2nd leaves are 3.5 cm & 5.4 cm respectively. petiolate, petiole short, 2-7 cm primary vein one, distinct, other veins are invisible. Subsequent leaves alternate, simple green, large, other characters same as that of first two leaves.

Polyalthia longifolia (Sonn) Thw. Enum. 398, 1864, Hook.f & Thoms. in Hook.f FBI 1:62 1872, Kanjilal *et al.* FA 1(1):31 1934. Deb, FT. 1:87, 1981. *Fam*: Annonaceae, Local name : Debbaru (As) (Plate 3.)

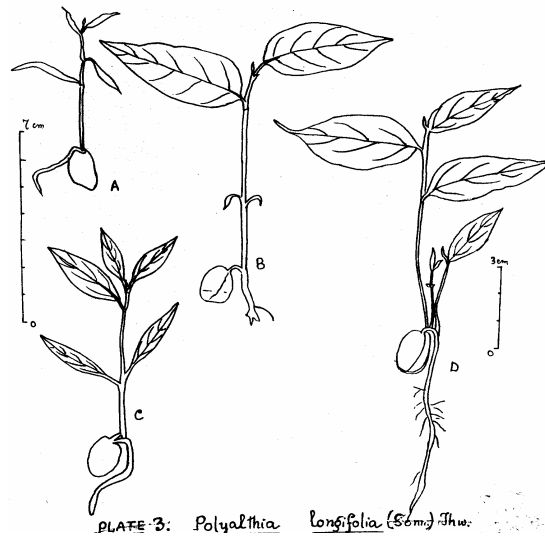


PLATE 3: *Polyalthia longifolia* (Sonn) Thw.

Germination hypogeal, phanerocotylar. Tap root long, brown, Hypocotyl curved, 1.8-2.8 cm long, grayish brown. Paracotyledones two rudimentary, 7-2.5 cm alternate or sub-opposite, lanceolate, petiolate acuminate, entire, petiole 1.5 cm greenish, acute at base, primary vein one, distinct, secondary veins invisible. Internodes long green, straight or slightly curved length of the 1st internode 2-4.5 cm 1st and 2nd internode 2.5-3.5 cm respectively, other shorter than the 1st and 2nd.

First two leaves alternate, simple, short petiolate, lanceolate, greenish, acuminate, entire or slightly wavy at margin, acute at the base, size of the first two leaves are 4.1 x 1.5cm and 5 x 1.9cm respectively, primary vein one, distinct, secondary veins 4.5 pairs alternate or sub-opposite, petiole 1.3cm subsequent leaves alternate, simple, stipulate, 2.3-3.5cm long other characters same as that of first two leaves.

Putranjiva roxburghii Wall. Tent. Fl. Nep. 61 and cat. 6814; Hook. f. FBI 5.336 1885. Kanjilal *et al.* FA. 4: 179.1940. *Fam*: Euphorbiaceae. Local name: Putranjiva (Ass.) (Plate 4).

Germination epigeal, Phanerocotylar. Tap root long, 4-5cm grayish or reddish white. Hypocotyl slightly curved, long, 5.5cm upper portion pale greenish, lower portion reddish, terete. Paracotyledons two, opposite, persistent up to 8-9 leaved stage, exstipulate; petiole \pm 3cm primary vein 3, parallelly arrange, distinct, petiolar bases ensheathing node and small portion of internode forming a short cup like structure; cup 0.4-0.5cm in length greenish, blade smooth, green, cordate, 2.3-

2.5cm apex rounded, base cordate-sub-cordate; dorsal surface smooth ventral surface rough. Internode short, 1.3-1.8cm terete green other shorter than the first. First two leaves alternate, simple, petiolate, green, ovate, lanceolate, serrate, apex & base acute; length of the first two leaves are 2.8 and 3.5 cm. respectively; primary vein distinct, other veins are invisible, stipulate or exstipulate, small, green subsequent leaves alternate, simple, other characters same as that of first two leaves.

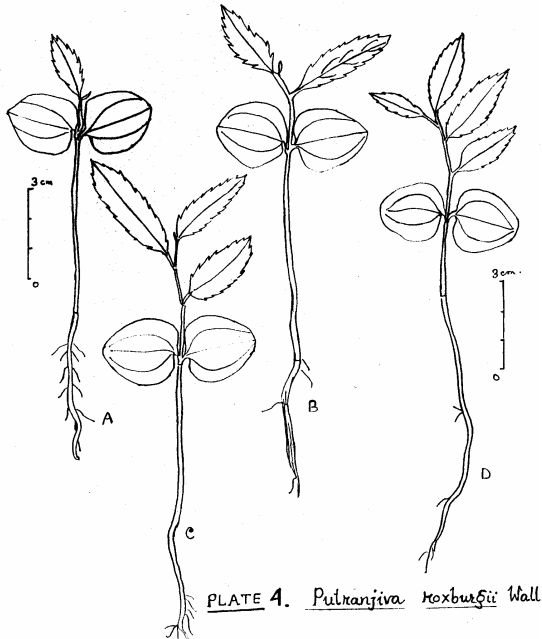


PLATE 4. *Pulranjiva Roxburghii* Wall

Terminalia arjuna (Roxb.) Wight & Arn. Prodr. 314. 1834; C.B. Clarke in Hook.f. FBI 2:447. 1878; Deb FT. 1:384. 1981. Fam : Combretaceae. Local name: Arjun (Ass) (Plate 5).

Germination epigeal, phanerocotylar. Tap root long, 1.5-6 cm. grayish. Hypocotyl curved, long 7-7.5cm lower portion yellowish white, upper portion light green. Paracotyledons two, large, opposite petiolate, persistent up to 8-9 leaved stage; petiole \pm 1.5cm petiolar bases ensheathing the internode to form a cup-like structure, cup \pm 5cm long; blade triangular, greenish, 2 x 3.5cm acute or rounded at apex, attenuated at base, entire, primary veins are, distinct, secondary veins 2-3 pairs, distinct. Internoded long, \pm 3cm greenish other internodes shorter, node swollen. Leaves clustered at the end of branches, first two leaves opposite, others alternate, simple, green, elliptic or elliptic-obovate, petiolate, coriaceous, puberulous, obtuse or apiculate at the apex, narrowed at the base, length of the first two leaves 2.5-3.5x7-9cm and length of the third leaf

4 x 1cm respectively, slightly wavy at margin; petiole \pm .5cm primary vein one, distinct; secondary veins 5-6 pairs, distinct. Subsequent leaves alternate simple, large, petiolate, other characters same as that of first two leaves.

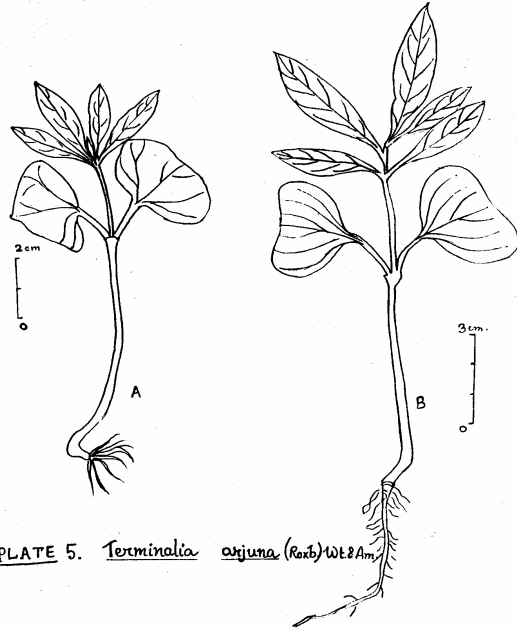


PLATE 5. *Terminalia arjuna* (Roxb) Wight & Arn.

DISCUSSION

Among the 5 plants, all species showed epigeal type of germination except *Polyalthia longifolia* which shows hypogeal type of germination. In *Polyalthia longifolia*, cotyledonary leaves are very rudimentary in comparison to others. In *Mimusops elengii*, seedling growth is very slow and it took 3 months where as *Gmelina arborea* showed very quick seedling growth. It has completed all the stages within 7 days. Hypocotyl is also very short. The area of cotyledonary leaves is large in *Terminalia arjuna*.

CONCLUSIONS

The seedling features revealed in the present study show correlation of juvenile characters with some adult characters. The data obtained in the present study help in the demarcation of families. The above mentioned five tree species of plants are very much important for timber and these timbers are very useful and utilized in different ways and also have medicinal value (Chopra, 1956; Kirtikar & Basu, 1975). With the help of seedling morphology, we can identify these plants easily and escape them from deforestation.

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