

Phyllanthus fraternus G. L. Webster, *P. niruri* L., *P. urinaria* L.

Standardized Common Name: Phyllanthus

Other Common Names: Bhumyamalaki, Chamber Bitter, Pearl Grass

Family: Euphorbiaceae

Taxonomy: As described under *Phyllanthus amarus* (cf.), *Phyllanthus* is a very large and complicated genus. *Phyllanthus urinaria* belongs to Sect. *Urinaria*, whereas *P. fraternus* and *P. niruri* belong to Sect. *Phyllanthus*; these three species do not form a natural group.

Phyllanthus urinaria and *P. niruri* are both widespread and variable species with several synonyms. A recent treatment segregated two new species (*P. nozeranii* Rossignol & Haicour, *P. embergeri* Haicour & Rossignol) from *P. urinaria*, based largely on variation in seed ornamentation and ploidy level, but the practical value of this circumscription is unclear. The name *P. niruri* has been misapplied by a number of authors to *P. amarus* and applied by others to a broad species concept that included *P. fraternus*. *Phyllanthus fraternus* in turn bears strong resemblances to two other species, *P. debilis* Klein ex Willd. and to *P. asperulatus* Hutch., and future re-examination of these three might lead to the conclusion that they should be treated as a single species. Similar taxonomic problems are likely commonplace in *Phyllanthus*, which is an extremely difficult genus.

Description: Erect annual herbs, 15–50 cm high, with narrow main stem, sometimes branched, and phyllanthoid branching: leaves on main stem at higher nodes reduced to stipule-like scales, secondary branches extending at nearly right angles, unbranched, of limited length and with regularly spaced leaves, so that secondary branches give the appearance of pinnately compound leaves with flowers borne in “leaflet axils”. Leaves 15–35 per branch, alternate, stipulate, small, oblong, green above and pale beneath. Plants monoecious; flowers tiny, unisexual; female flowers borne singly, males in few-flowered cymes. Flowers consisting of a 5- or 6-lobed, yellowish green calyx, a floral disk inside the calyx (segmented in the male), and 3 stamens or a 3-styled compound ovary. Filaments fused for most or all of length; anthers free. Fruit a capsule, 3-loculed; seeds usually 2 per locule, variously ornamented.

References:

Rossignol L, Rossignol M, Haicour R. A systematic revision of *Phyllanthus* subsection *Urinaria* (Euphorbiaceae). *Amer J Bot.* 1987;74:1853–1862.

Sarin YK. *Illustrated Manual of Herbal Drugs Used in Ayurveda*. New Delhi: Council of Scientific & Industrial Research and Indian Council of Medical Research; 1996.

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Webster GL. A monographic study of the West Indian species of *Phyllanthus*. *J Arnold Arbor.* 1956–1958;37:91–122, 217–268, 340–359; 38:51–80, 170–198, 295–373; 39:49–100, 111–212.

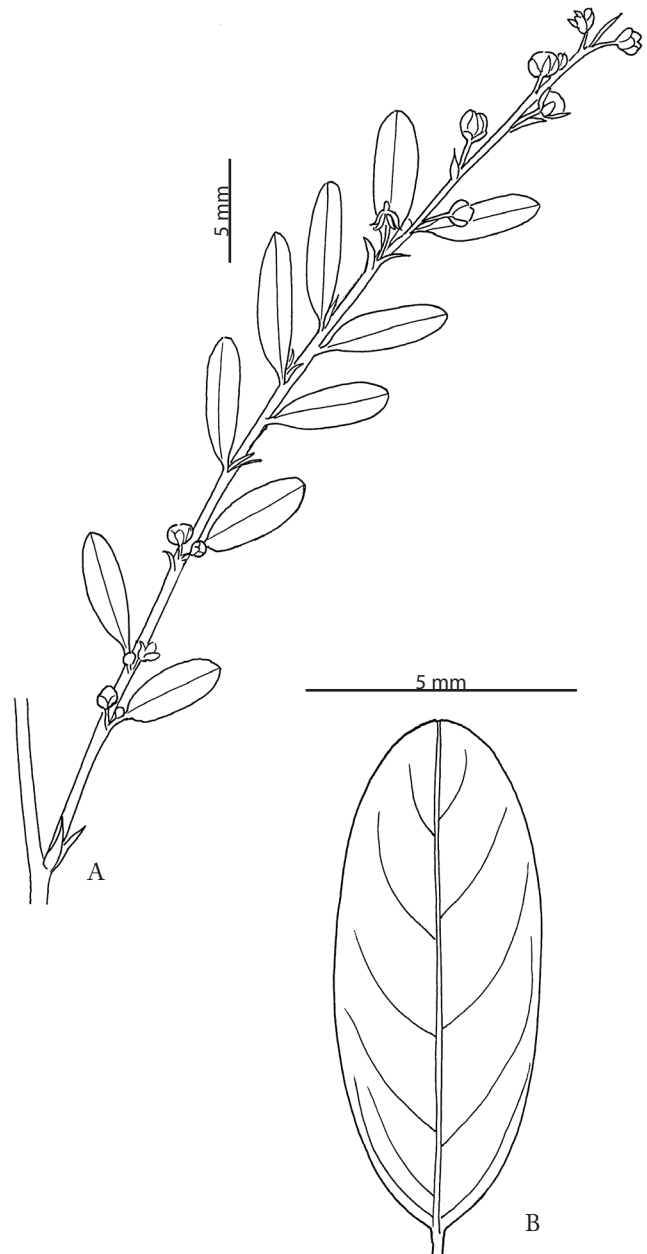


Figure 54: a–b, *Phyllanthus fraternus* branch and leaf.

Parts in Commerce: Whole herb

Identification: The following features are generally applicable to the official species:

Stems and leaves

- Main stem thin, becoming woody at the base, unbranched or branching, essentially round in cross-section; 2 species have longitudinal ridges
- Branchlets (3–)5–10 cm long, with closely spaced alternate leaves, the whole resembling pinnately compound leaves
- Most of leaves on main stem reduced to narrow, dry stipule-like structures subtending branchlets
- Stipules on main stem generally dry, thin, lanceolate; with auriculate bases in *P. urinaria*
- Foliar leaves short-petioled, elliptic to oblong
- Upper surface of leaf dark green; lower surface very pale, with prominent midrib; both surfaces usually glabrous
- Taste acidic

Flowers

- Plants monoecious, male and female flowers almost always borne on separate nodes of branchlets
- Flowers minute; female flowers solitary, male flowers in few-flowered clusters
- Pedicels usually short, never over 4 mm
- Calyx with 5 or 6 lobes, yellowish, with wide pale, dry margins particularly in female flowers
- Floral disk round or cupped in female flowers, often with 5 or more angles or lobes; of 5 or 6 segments with obscure glandular papillae in the male flower
- Stamens 3; filaments fused for most or all of their length, but anthers not fused
- Carpels 3; styles 3, with divided, recurving ends
- Fruit a flattened spherical capsule

There are also a number of characters, variable among the official species, that help to distinguish them from one another as well as from related species. Of these, the most informative and the most critical to observe are leaf shape and size, number and position of flowers of each sex, number of calyx and disk lobes or segments, and staminal and stylar configurations. The warty ovary of *P. urinaria* is also a valuable character.

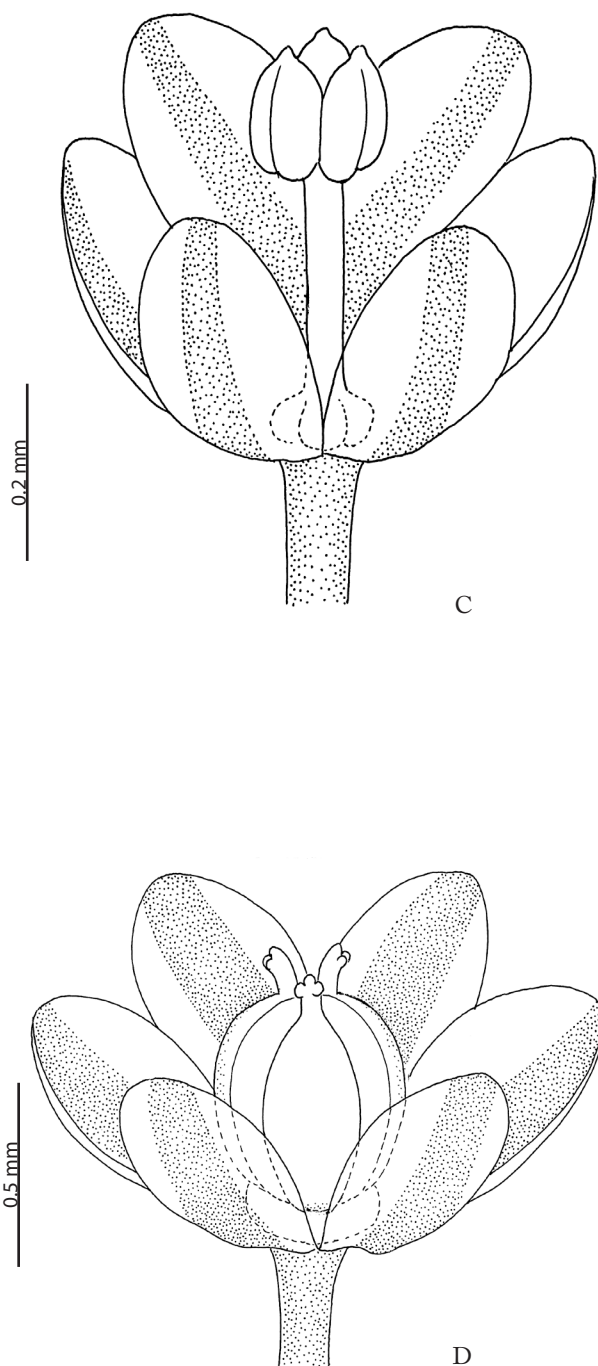


Figure 54: c–d, *P. fraternus* male flower and female flower.

	<i>P. fraternus</i>	<i>P. niruri</i>	<i>P. urinaria</i>
Branchlet stems	Round, with 2 wings, minutely roughened esp. along wings	Almost round	Winged and flattened in cross-section
Leaves per branchlet	10–30	15–30	(10–)20–35(–42)
Leaf shape	Oblong to elliptic	Oblong to elliptic	Narrowly oblong, often slightly curved
Leaf size	6–11 mm X 3–5 mm	7–15 mm X 4–8 mm	10–25 mm X 2.5–6 mm
Leaf apices	Rounded, perhaps rarely with mucron	Acute or subacute	Obtuse or acute with tiny mucron
Leaf bases	Wedge-shaped or obtuse	Oblique, with one side round	Obtuse, often asymmetrical

Leaf margins	Smooth	Smooth	Minutely roughened with single-celled papillae
Position of male and female flowers	Males on proximal nodes, females on distal nodes	First nodes sterile; males proximal, females distal	Females proximal, males distal; farthest distal nodes sterile
# of flowers in male cymes	2–3	3–7	5–7
Calyx	Lobes 6, often unequal esp. in female flower	Lobes 5 or rarely 6 in male flower; midrib ridged; membranous in male flower	Lobes 6, membranous in male flower; with few minute hairs in female flower
Female disk features	Irregular cup with 6–9 lobes	Round, slightly cupped, with 5 slight upturned angles	Round, thin, with 6 angles or slightly wavy edge
Ovary surface	Smooth	Smooth	Often warty
Styles	0.1–0.15 mm, free, erect or ascending	0.5–0.6 mm, free, arching	Flattened, bases fused into triangular plate to 0.4 mm wide
Male disk features	6 segments, somewhat lobed or angled, 0.1 mm wide	5 segments, wedge-shaped, 0.25–0.4 mm	6 segments, wedge-shaped or rounded, 0.1 mm
Filaments	Filaments united in column, 0.1–0.25 mm long	Filaments 0.6–0.9 mm long, united for most of length	Filaments united in column, 0.1–0.15 mm
Capsule	ca. 2.0–2.2 mm diameter; veins not visible	3.0 mm diameter; reticulate veins visible	2.0–2.2 mm diameter; veins not visible; wrinkled with small warts or smooth
Seed characteristics	0.95–1.1 mm long, light yellow-brown, with 6–7 longitudinal ribs and with fine lines on back	1.4–1.5 mm long, dark gray-brown, covered with dark raised points	1.1–1.2 mm long, light gray-brown, with 12–15 ridges, often with circular pits on sides

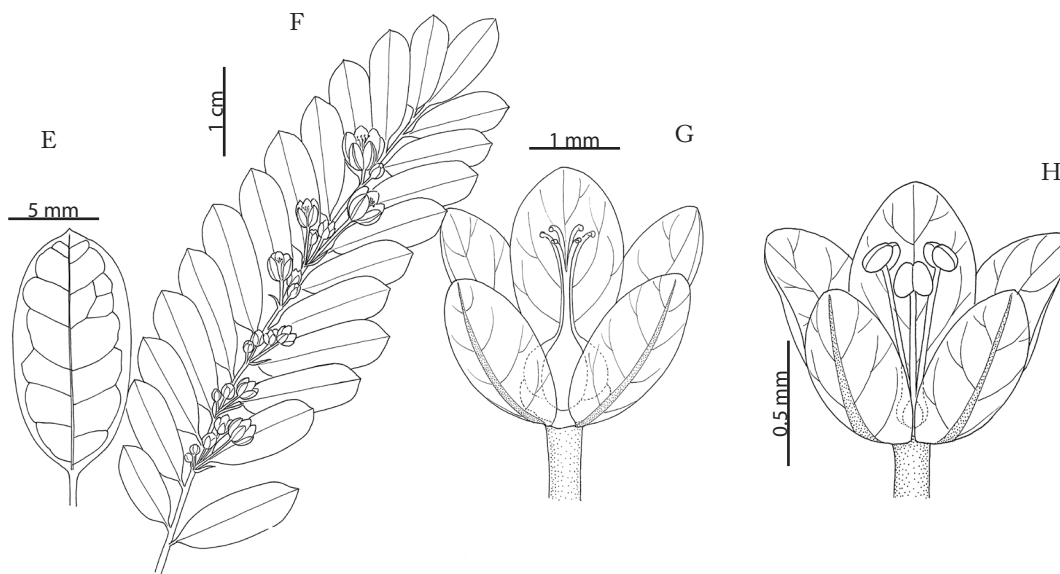


Figure 54: e–h, *P. niruri* leaf, branch, male flower, and female flower.

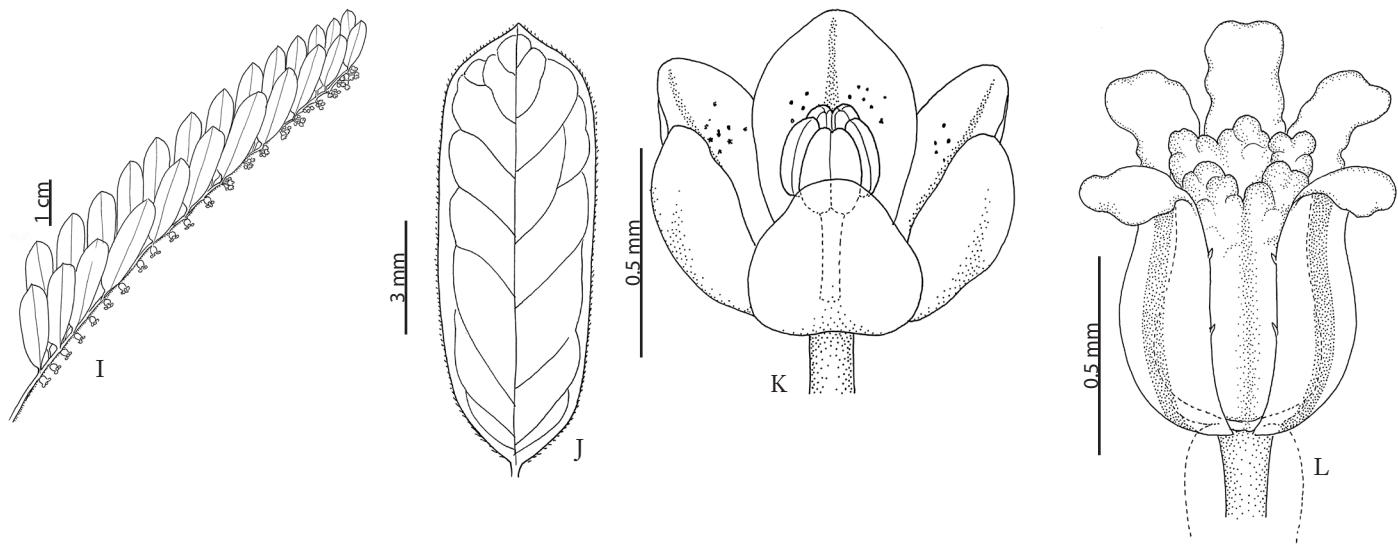


Figure 54: i-l, *P. urinaria* branch, leaf, male flower, and female flower.

Adulterants: *P. virgatus* Forst. f. (also known as *P. simplex* Retz.) and *P. maderaspatensis* L. are reported to be marketed interchangeably with *P. niruri* and *P. urinaria* in India. Several other species, such as *P. amarus*, *P. hookeri* Muell. Arg., and *P. tenellus* Roxb., also resemble the official species. Character states indicative of mistaken identity include any of the following:

- Branchlets with consistently more than 35 leaves
- Stipules on main stem dark red or black, hardened, and with auriculate bases
- Leaves on main stem (above first few nodes) not distinctly reduced
- Leaves smaller or larger than expected, or strongly ovate rather than tending towards oblong
- Most inflorescences bisexual, with 1(-2) male and 1(-2) female flowers on the same node, or male flowers solitary
- Calyx other than with 5 or 6 lobes
- Stamens not 3, or filaments separated to the base
- Floral disk absent in either sex or, if lobed, with <5 segments
- Capsule surface covered with fleshy scales
- Seed ornamentation not matching descriptions of official species

P. fraternus is only with difficulty distinguished from look-alike species *P. amarus*, *P. debilis*, and *P. asperulatus* (some of which might indeed be the same species). Most cymules of *P. amarus* have 1 male and 1 female flower. Combinations of the following characters should not be found in *P. fraternus* in the strict sense:

- Main stems angled, rather than winged but otherwise round
- Epidermis of branchlets entirely smooth
- Leaves mucronulate (may rarely occur in *P. fraternus*)
- Disk of female flower saucer-shaped, shallowly lobed but not divided into irregular lobes
- Styles spreading, pressed close to ovary

P. urinaria is equally difficult to distinguish from *P. hookeri*. The latter has fruits with fleshy scales, and its leaf margins and the midribs of female tepals are smooth or nearly so.