

Table 4. ANOVA and Dunnett (two-sided) test representing the overall significant difference for different treatments of rooting and sprouting

		Sum of squares	df	Mean square	F	Sig.
Rooting * Treatment	Between (combined) groups	1499.343	3	499.781	17.992	0.001
Sprouting * Treatment	Between (combined) groups	729.837	3	243.279	6.408	0.016

Dependent variable	Treatment I	Treatment J	Mean difference (I - J)	Standard error	Sig.	95% Confidence interval	
						Lower bound	Upper bound
Dunnett t (two-sided)							
Rooting	IBA 4000 ppm	Control	18.893*	4.303	0.006	6.50	31.29
	IBA 5000 ppm	Control	31.113*	4.303	0.000	18.72	43.51
	IBA 6000 ppm	Control	20.003*	4.303	0.004	7.61	32.40
Sprouting	IBA 4000 ppm	Control	15.560*	5.031	0.037	1.07	30.05
	IBA 5000 ppm	Control	21.113*	5.031	0.008	6.63	35.60
	IBA 6000 ppm	Control	14.447	5.031	0.051	-0.04	28.93

*The mean difference is significant at 0.05 level.

Results show that vegetative propagation from leading shoot cuttings is more suitable than seed sowing because seed germination is slow. Seed germination was observed till 9 months from seed sowing, while cuttings were rooted within 3–4 months (Figure 7).

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Rediscovery of *Phyllanthus macrocalyx* Mull. Arg. (Phyllanthaceae), a rare endemic species of the Western Ghats, India

Genus *Phyllanthus* has ca. 900 species distributed all over the world¹. In India, the genus is represented by 51 species². During a recent floristic exploration trip, the present authors collected a species of *Phyllanthus* from Pooyyamkutty evergreen forest, Ernakulam District, Kerala, India. The specimen was later identified as *Phyllanthus macrocalyx*, which is a rare endemic plant of the Western Ghats belonging to the section *Eriococcus* and subsection *Macrocalyci* of family Phyllanthaceae.

P. macrocalyx was first described by Johannes Müller Argoviensis in 1863 based on the collection of Stocks from Malabar, Concan². Apart from this collection, only three other collections were made; Lawson from Bababudan hills, Mysore (1861)³, Wight from Shevagherry hills (1836) and Beddome from

Tirunelveli district, Tamil Nadu (1873)⁴. Perusal of available data^{2–5} shows that this species was not collected from anywhere after Beddome's collection in 1873. Hence, the present collection of *P. macrocalyx* from Pooyyamkutty forest is a rediscovery after a long gap of 142 years. During the studies we have observed some minor variations, especially on the pedicel length of male and female flowers. This may be due to availability of a few specimens, wherein the full range of variation is not represented.

Phyllanthus macrocalyx Mull. Arg., *Linnaea*, 32: 48. 1863 and in DC, *Prodr.* 15(2): 423. 1866; Hook. f., *Fl. Brit. India* 5: 301. 1887; Chandrab. in A. N. Henry *et al.*, *Fl. Tamil Nadu, Ser. I. Analysis* 2: 237. 1987; N. P. Balakr. and T. Chakrab., *Fam. Euphorbiaceae India* 373. 2007; N. P. Balakr *et al.*, *Fl. India*. 23:

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Erect, glabrous, sparsely branched shrub up to 2.5 m tall; branchlets resembling pinnate leaves, 22–40 cm long, green, slightly compressed towards apices. Leaves ovate or elliptic-ovate or ovate-lanceolate, 4–8.5 × 1.6–4.8 cm, rounded at base, entire at margins, acute to obtuse at apex, glabrous, membranous, glaucous beneath, dark green above; lateral nerves 6–9 pairs; petiole 2–5 mm long; stipules 4–7.5 × 1–2 mm, deltoid, broad at base, long acuminate at apex, persistent. Flowers axillary; male flowers at the proximal

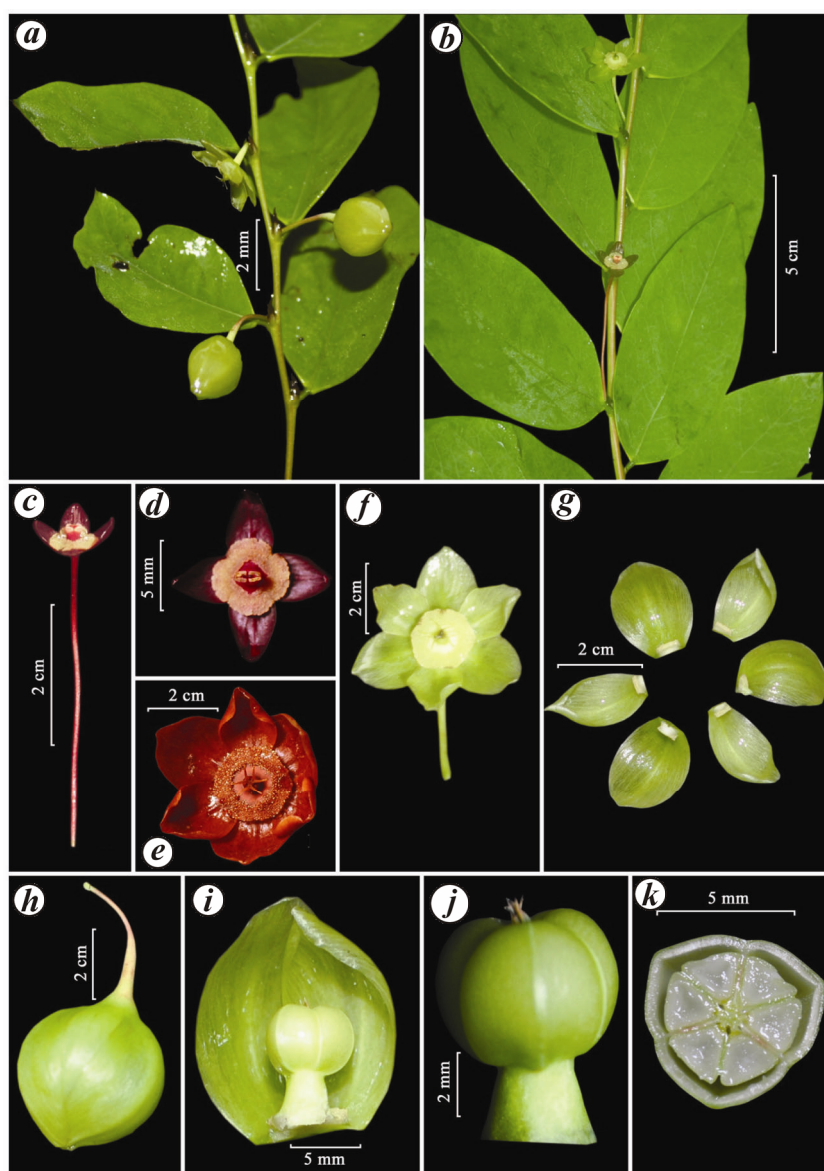


Figure 1. *Phyllanthus macrocalyx* Mull. Arg.: **a, b**, Flowering and fruiting twigs; **c, d**, Male flowers; **e, f**, Female flowers (pickled and fresh); **g**, Sepals of female flower; **h, i**, Capsule enclosed in enlarged persistent calyx; **j**, Fruit; **k**, C. S. of fruit.

axis, ca. 12 mm across, usually solitary or rarely 2–3 in fascicles; female flowers towards the tip of branchlets, 1.5–1.8 cm across, solitary; bracts lanceolate, 3–4 × 1–1.2 mm, acuminate. Male flowers: pedicels 3.5–5 cm long, slender, pendulous, reddish; sepals four, reddish-brown, imbricate, two outer and two inner, broadly ovate, 4–5.5 × 3–3.5 mm, broad at base, entire at margins, obtuse or slightly irregularly lobed, hooded at apex; disc irregularly four-lobed, fleshy, ca. 3 mm across, verrucose, creamy; stamens two, filaments united into a column around a pistillode, column 1.3–1.6 × 1.6–2 mm,

conical, reddish-brown; anther cells 0.5–1 mm long, horizontally dehiscent; pistillode minute, three-lobed, reddish-brown. Female flowers: pedicels 1.8–2.5 cm long, green, thickened towards apex; sepals six, imbricate, subequal, three outer and three inner, pale green, broadly ovate, 5.5–7.5 × 5–7 mm, cordate at base, subacute to obtuse at apex; disc ca. 3 mm across, saucer-shaped, irregularly six-lobed or undulate, verrucose towards outer half and smooth towards inner half; ovary on ca. 1 mm long stalk, 1–1.5 × 1.2–1.8 mm, glabrous, three-loculed, two ovules in each

locule; styles three, 1.2–1.6 mm long, linear, divided to two-third of its length; stigmas six, punctate. Capsule enclosed in enlarged persistent calyx, 4–4.5 × 7–8 mm, depressed globose, three-valved, six-seeded; fruiting sepals 2.3–2.7 × 1.3–1.6 cm. Fruiting stalk (gynophores) 4–5 mm long, 6–7 mm across at base, conical. Seeds black, glabrous, 3–3.5 × 1.4–1.8 mm, trigonous, rounded and transversely linate at back (Figure 1).

P. macrocalyx occurs near streams with 20–30 individuals at an altitude of ± 350 m. at Kunjippara area of Pooyamkutti forest. There is no threat status

designated to the taxon yet^{2,4,5}. Trampling by elephants frequenting the streams and possible flooding of the habitat during rainy season are observed as major threats to the species. Based on observed and available data, the species is provisionally assessed here as 'Critically Endangered' (CR B1ab(i,ii,iv); 2ab(i,ii,iv); E) following IUCN Red List Categories and Criteria⁶. Hence emergency conservation methods are recommended. During the study we have collected three plants and successfully conserved them in the Herb Garden of Arya Vaidya Sala, Kottakkal. This species flowers and fruits in May–August.

Specimens collected: India. Kerala, Ernakulam district, Kuttampuzha Forest Range, Pooyamkutty forest, Kunjippara 10°10.910'N, 76°11.092'E, ± 350 m. alt., 25 June 2015, *Sunil and Naveen Kumar 6838* (MH!); 25 June 2015, *K. M. Prabhukumar 8440* (CMPR!). Tamil Nadu: Shevagherry hills, Aug. 1836, *Wight KD 2666* (K000246589!); Tirunelveli Dist. ('Tinnevely'), 1873, *Beddome s. n.* (MH!, herb. acc. no. 46931!).

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