***Mallotus phillipensis* (Lam.) Müll.Arg.**

* **Overview:** *Mallotus philippensis* belongs to the Euphorbiaceae family, sometimes known as the spurge family. The tree is commonly referred to as the kamala tree, red kamala, or kumkum tree because of its fruit covering, which yields a crimson dye (Stewart and Brandis, 1874; Rao and Seshadri, 1947).
* **Local name:**

*Sanskrit:* Kampilyaka (काम्पिल्यका)

*Hindi:* Kamala (कमला), Sindhuri (सिंधुरी), Raini (रैनी)

*Chhattisgarhi:* Sinduri (सिंदूरी)

*English:* Red Kamala, Kumkum Tree, Kamala Tree

* **APG IV Classification:**

*Kingdom:* Plantae

*Clade:* Tracheophytes

*Clade:* Angiosperms

*Clade:* Eudicots

*Clade:* Rosids

*Order:* Malpighiales

*Family:* Euphorbiadeae

*Genus: Mallotus*

*Species: M. philippensis*

* **Synonyms:**

*Aconceveibum trinerve* Miq. in Fl. Ned. Ind. 1(2): 389 (1859)

*Copianthus indicus* Hill in Dec. Cur. Pl.: t. 1 (1773)

*Copianthus trinerve* Miq. in Fl. Ned. Ind. 1(2): 389 (1859)

*Croton coccineus* Vahl in Symb. Bot. 2: 97 (1791)

*Croton montanus* Willd. in Sp. Pl., ed. 4. 4: 545 (1805)

*Croton philippensis* Lam. in Encycl. 2: 206 (1786)

*Croton punctatus* Retz. in Observ. Bot. 5: 30 (1789), nom. illeg.

*Echinus philipensis* (Lam.) Baill. in Adansonia 6: 314 (1866)

*Euonymus hypoleucus* H.Lev. in Repert.Spec. Nov. Regni Veg. 13: 260 (1914)

*Macaranga stricta* (Rchb.f. & Zoll.) Müll.Arg. in A.P.de Candolle, Prodr. 15(2): 1004 (1866)

*Mallotus bicarpellatus* T.Kuros. in Edinburgh J. Bot. 61: 31 (2004 publ. 2005)

*Mallotus philippensis* var. *microphyllus* Müll.Arg. in A.P.de Candolle, Prodr. 15(2): 981 (1866)

*Mallotus philippensis* var. *reticulatus* (Dunn) F.P.Metcalf in J. Arnold Arbor. 22: 207 (1941)

*Mallotus philippensis* var. tomentosus Gamble in Fl. Madras: 1322 (1925)

*Mallotus reticulatus* Dunn in J. Linn. Soc., Bot. 38: 365 (1908)

*Mappa stricta* Rchb.f. & Zoll. In Acta Soc. Regiae Sci. Indo-Neêrl. 1: 31 (1856)

*Rottlera afffinis* Hassk. in Flora 25(2 Beibl.): 41 (1842)

*Rottlera aurantiaca* Hook. & Arn. in Bot. Beechey Voy.: 270 (1838)

*Rottlera philippensis* (Lam.) Scheff. in Ann. Mus. Bot. Lugduno-Batavi 4: 124 (1869)

*Rottlera tinctoria* Roxb. in Pl. Coromandel 2: 36 (1802)

*Rottlera tinctorial* var. *monstruosa* Ham. ex Dillwyn in Rev. Hortus Malab.: 22 (1839)

*Tanarius strictus* (Rchb.f. & Zoll.) Kuntze in Revis. Gen. Pl. 2: 619 (1891)

* **Geographical distribution:** Widespread in the sub-Himalayan region, reaching almost to the Indus River and reaching an elevation of 4500ft. Also found often in Oudh, Bengal, Central-South-India, and Burma. The regions mentioned include Ceylon, the Indian Archipelago, Formosa, Loo Choo islands, and North Australia (Stewart and Brandis, 1874).
* **Distribution in Chhattisgarh:** Throughout in Chhattisgarh.
* **Description:**

***(i) Stem:*** The tree typically reaches a height of 20-30 feet and has branches that originate from the base. Occasionally, it may have an upright but short trunk, which is usually fluted and irregularly shaped, with a circumference of 3-4 feet. The bark is 1cm thick and has a dense, fibrous inner composition. It is reddish brown and may be seen at the bottom of many shallow, net-like longitudinal wrinkles. The surface between the wrinkles is either light or dark grey, and sometimes almost black (Stewart and Brandis, 1874).

***(ii) Leaf:*** The leaves are arranged alternately, simple and have an oblong or ovate-lanceolate shape. The stipules are located laterally and fall off. They have glabrous on the upper surface, while the undersurface is covered with a white, woolly layer or pubescent beneath and little red glands. The leaf blade is 12-15 cm long, and the petiole (leaf stalk) is 4-5 cm long and swollen at the base. The base of the lamina is either acute or round, while the apex is acuminate or acute. The margin of the lamina is either entirely smooth or sparsely serrated. There are two sunken glands at the base of the leaf. The leaf has three main veins originating from the base, and the midrib is surrounded by several parallel veins that intersect at right angles (Stewart and Brandis, 1874).

***(iii) Flower:*** The flowers are arranged in axillary and terminal paniculate bracteate spikes. The flowers are unisexual and have a brick red colour that are covered in rusty puberulous. They are dioicous and subsessile. The male flowers are 4.5 mm in diameter and have 4 lanceolate tepals and many stamens. The female flowers are 4 mm in diameter and have 3 or 4 thicker tepals compared to the male flowers. The ovary is pubescent, superior and has three cells and contains one ovule in each cell. It is also adorned with red glands. There are three styles, each measuring 1cm in length, and they are covered in many papillae (Stewart and Brandis, 1874).

***(iv) Fruit:*** The fruit is a capsule that is 3-lobed, 3-celled, and 3-valved, with a diameter of 1-2 cm. It opens up along the partitions, and is coated with a dense layer of brilliant red powder. This powder is made up of tiny star-shaped hairs and fine grains of a red resinous material that may dissolve in alcohol and ether (Stewart and Brandis, 1874).

* ***Flowering season:*** November-January
* ***Fruiting season:*** March-May
* **Importance of the tree**

***(a) Medicinal values:*** The therapeutic virtues of *Mallotus philippensis* are mentioned in ancient Indian texts such as ***“Charaka Samhita,” “Sushruta Samhita,” “Indian Materia Medica,” and “Indusyunic Medicine”*** (Nadkarni, 1976; Usmanghani *et al.,* 1997; Khare, 2008). Ancient therapeutic platforms, such as Ayurveda and Yunani, also support its use as a remedy for various purposes, including prevention of toxins, treatment for worms, appetite stimulation, bitterness, relief from gas, cooling effects, cleansing properties, wound healing, and stopping bleeding (Kirtikar and Basu, 1935; Ahmad *et al.,* 2009; Gupta, 2015). Several therapeutic characteristics of this species have been converted into readily available commercial medicine formulations, such as ***Krimighatni Bati*** and ***Krimikuthar Rasa*** for treating worms in the gastrointestinal tract, and ***Roghan Kameela*** and ***Zimad Jarb*** for dermatological problems (Haque *et al.,* 2015). The Tharu, Magar, Chhetri, Newaris, and Raute people of Nepal have traditionally utilised bark juice to cure a range of ailments and ailments, such as diarrhoea and dysentery, caused by bacterial, fungal, or viral infections (Taylor *et al.,* 1996). Various elements of the tree are utilised for the treatment of skin ailments as well as infections (Hemachandran *et al.,* 2018). Certain individuals in the local community utilise powdered leaves and seeds as a means of alleviating symptoms of rheumatism and the accompanying discomfort in the joints (Daikonya *et al.,* 2002; Gangwar *et al.,* 2016). According to Indian tradition, kamala fruits can be used to alleviate kidney stones (Gillespie and Stapleton, 2004). The ***Vidangadi churna***, a classic Ayurvedic prior to has Kamala as one of its primary components. This formulation has been said to have anti-urolithiatic action (Mohandas *et al.,* 2015).

***(b) Ethnobotanical values:*** Regional and countryside populations heavily rely on natural dyes for their sustenance. For instance, in Bhutan, individuals residing in rural areas engage in the cultivation of plants that produce dyes, process the dyes, and generate income by retailing them (Tshering, 1996). The mature fruits of this tree produce glands that contain a dye known as Kamala dye, which ranges in hue from yellow to orange-red (Rao and Seshadri, 1947; Sierra *et al.,* 2005; Panda *et al.,* 2018). The crimson pigment derived from the tree is commonly employed in the production of conventional Bhutanese textiles and the dyeing of silk garments (Tshering, 1996). Silk and wool are dyed using this dye, which is also used in conjunction with a mordant (alum) (Rao and Seshadri, 1947; Siva, 2007). It is also possible to utilise the powdered kamala as a colouring agent in meals like juice, various other drinks (Rao and Seshadri, 1947; Caius, 1986; Gaur, 2008). In addition to providing colourants for soaps, oils, and ice creams (Rao and Seshadri, 1947). Additionally, it is utilised as an antioxidant for the production of ghee and vegetable oils (Rao and Seshadri, 1947; Siva, 2007). There is a significant demand for the powdered dye in the perfume, leather, and textile industries. In particular, the ***Bokshas,*** who are an indigenous people located in the western portion of the Himalayas, use the dyestuff for the purpose of embellishing wooden crafts and paintings (Gaur, 2008). For the purpose of body ornamentation, the dye is used in chromotherapy (Gaur, 2008). Furthermore, the seed oil has applications in the realm of painting and varnishing (Caius, 1986). The oil is utilised as a replacement for Tung oil (*Vernicia* Lour., Euphorbiaceae) in the composition of fast-drying paints, varnishes, hair fixers, and ointments (Sierra *et al.,* 2005). Therefore, the tree possesses other significant non-medicinal applications as well, which hold considerable ethnobotanical significance (Kumar *et al.,* 2020).

***(c) Cultural values:*** There might be some regional or cultural customs related to the plant that are included into religious rites or rituals, however we presently lack detailed information about these rituals.

***(d) Ethical values:*** Excessive harvesting for profit-driven reasons has the potential to endanger the plant's population and disturb ecosystems. Adopting sustainable harvesting procedures is crucial for the preservation of biodiversity. Advocating for sustainable sourcing techniques contributes to the preservation of the environment and the well-being of local populations. It is important to show reverence and preserve traditional knowledge associated with the plant. It is crucial to ensure a just and impartial distribution of benefits obtained from the use of the plant. By adhering to these ethical standards, the utilisation and advancement of goods obtained from *Mallotus philippensis* may be carried out in a conscientious and enduring way, resulting in advantages for both humans and the environment.

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