

RECENT REPORTS ON THE DISTRIBUTION AND MORPHOLOGY OF AN INDIAN ENDEMIC SPECIES, *GYMNEMA MOHANRAMII* Karthik. & Moorthy (APOCYANACEAE: ASCLEPIADOIDEA) IN SOUTHERN WESTERN GHATS OF KERALA

Satheesh Karakkunnath*[@], Konickal Mambetta Prabhu Kumar*, Indira Balachandran* and Nadesapanicker Anilkumar**

*Centre for Medicinal Plants Research (CMPR), Arya Vaidya Sala, Kottakkal, Malappuram, Kerala, India – 676 503

**M.S. Swaminathan Research Foundation (MSSRF), Kalpetta, Wayanadu, Kerala, India – 673 121

([@]Correspondence E-mail: satheeshkolayampurath@gmail.com)

ABSTRACT

To study the present distributional status, biotic association and variation on morphology of *Gymnema mohanramii* in southern Western Ghats of Kerala, several exploration trips were conducted and live plants successfully conserved at the Herb Garden of Arya Vaidya Sala, Kottakkal for further studies and observations during 2006-2012. From the present study 11 new distributional records for Kerala have been reported. During the studies, an unusual red coloured flower variant of *Gymnema mohanramii* is collected from Wayanadu districts of Kerala. The recent nomenclature changes of *G. mohanramii* (syn: *G. hirsutum*) has also been discussed.

KEYWORDS: *Apocyanaceae*, *Asclepiadoidea*, *Endemic*, *Gymnema*, *G. mohanramii*, *G. hirsutum*, *Kerala*.

INTRODUCTION

Gymnema mohanramii Karthik. & Moorthy (*G. hirsutum* Wight & Arn.), a species endemic to India, is mainly distributed in Central, East and South India. The genus *Gymnema* was postulated by Robert Brown (1810) on the type specimens of *G. lactiferum* (L.) R. Br. (*Asclepias lactifera* L.). The genus comprises about 49 species distributed in India and continental Southeast Asia with one species extending to Africa. In India, the genus is represented by 14 species and 2 varieties, among this 7 are distributed in Kerala parts of Southern Western Ghats viz. *G. cuspidatum* (Thunb.) Kuntze; *G. elegans* Wight and Arn.; *G. indicum* (M. A. Rahman and Wilcock) Karthik. & Moorthy; *G. khandalense* Santapau; *G. mohanramii* Karthik. and Moorthy var. *mohanramii*; *G. monataum* (Roxb.) Hook.f; *G. sylvestre* (Retz.) R.Br. ex Schult. (Karthikayan *et al.*, 2009; Sasidharan, 2012).

Apocynaceae is commonly called Dogbane family, distributed mostly in tropical and subtropical regions with a few species in temperate region. Robert Brown (1810) described more than 40 genera in the family, the great majority of which are still valid today. In Brown's time only 53 genera and some 170 species were known in the Apocynaceae and Asclepiadaceae combined. Today, nearly 200 years later, the Apocynaceae has grown to 392 genera and 5140 species (Middleton, 2009).

The Asclepiadaceae, as traditionally defined, has repeatedly been shown to be an apomorphic derivative of the Apocynaceae. It has often been recommended that the Asclepiadaceae be subsumed within the Apocynaceae in order to make the latter monophyletic. Although Brown's classification has been universally accepted and implemented, controversy over the delimitation of the two families has never been put to rest. They are clearly more similar to each other than to the rest of the Gentianales, and in a number of characters there is a graduation from the Apocynaceae to the Asclepiadaceae and presently Asclepiadaceae is treated as a subfamily under Apocyanaceae (Stevens, 1976; Thorne, 1992; Judd *et al.*, 1994; Struwe *et al.*, 1994; Takhtajan, 1997; Sennblad *et al.*, 1998; Potgieter, 1999).

MATERIALS AND METHOD

Several exploration trips were conducted to study the present distribution, biotic association and variation on morphology of *Gymnema mohanramii* in southern Western Ghats of Kerala. The live plants were collected and successfully conserved at the Herb Garden of Arya Vaidya Sala, Kottakkal for further studies and observations. The study was conducted during 2006-2012 in the Centre of Medicinal Plants Research (CMPR), Arya Vaidya Sala, Kottakkal. Reproductive structures such as flowers, fruits etc. were preserved in Poly Vinyl Chloride (PVC) bottles with Formalin-Acetic acid-Alcohol (FAA) for further studies. The materials collected were brought to laboratory for detailed study of micro characters. Photographs of floral parts were also taken using Nikon Digital Camera D80 and Canon DS126171. Measurements of fully matured leaves, length of the lamina and petiole were taken. Observations were made using a dissecting microscope MOTIC SMZ-168. The voucher specimens were prepared following wet method and deposited at CMPR herbaria for future reference (De Vogel, 1987 and Forman & Bridson, 1998).

During the present study, herbariums deposited in CAL, MH, KFRI, MSSRF and TBGT were examined. [CAL- Calicut University Herbarium, Kerala; MH- Madras Herbarium, Coimbatore; KFRI- Kerala Forest Research Institute, Peechi; MSSH-MS Swaminathan Herbarium, Kalpetta; TBGT- Tropical Botanic Garden Trivandrum, Kerala].

RESULTS AND DISCUSSION

From the present study, it is observed that *G. mohanramii* shows a wide range of variation on its morphology mainly by means of size and colour. The specimen collected from Wayanadu shows an unusual red colour on the corolla lobes (CMPR 0135, 0136, 0137). It is a first report of red coloured flower in the genus. Apart from this, 11 new district records to Kerala were also reported. A local conservation status of the species was updated based on our survey and observations.

Gymnema mohanramii Karthik. & Moorthy, Fl. Pl. Ind.

Type: *Gymnema hirsutum* Wight and Arn. In Wight, Contrib. 44.1834 non. wall., 1826, Wight, Icon. Pl. Ind. Orient. t. 1272. 1848.

Gymnema hirsutum Wight and Arn. in Wight, Contrib. 44. 1834 et. Ic. t. 1272. 1848; Hook. f. Fl. Brit. India 4: 29. 1883; Gamble, Fl. Press. Madras 2: 590. 1957 (Repr. Ed.); Duthie, Fl. Upp. Gang. Pl. 1: 503. 1960 (Repr. Ed.); Prain, Bengal Pl. 2: 514. 1963 (Repr. Ed.); Sharma et al. Fl. Karnataka 167. 1984; Henry et al. Fl. Tamil Nadu Analysis 2: 85. 1987. Antony, Syst. Stud. Fl. Kottayam Dist. 247. 1989; Fasc. Fl. India 84. 1999. Mohanan and Sivad., Fl. Agasthyamala 450. 2002. Wight Ic. pl. t. 1271. 1848 and Ill. Wight, Ic. 1271-72. 1848; Fyson, Fl. Nilgiri and Pulney Hills 2: 190. 1974. Type: Indian, Tamil Nadu, Mont-Nilgiri-Kurg J.D. Hooker s.n. (CAL, Acc. 295077!) Illus.: Wight, Ic. 1271-72. 1848; Fyson, Fl. Nilgiri and Pulney Hills 2: 190. 1974.

Local names: PeriyaSarkarakolli (Tamil).

Twining Shrubs, stems branched; internodes 0.9 - 3.4 cm long and 1 - 3.5 mm in diameter, rusty pubescent. Leaves opposite, decussate, lamina 2.5 - 6.5 x 1 - 3.5 cm long, broadly ovate, acute or acuminate at apex, rounded or cordate at base, ciliate along margin, densely rusty, tomentose on both sides, lateral veins 3 - 4 pairs, petioles terete, 0.5 - 1 cm long and 1 - 1.5 mm in diam. Flowers usually seen in yellow, creamy and rarely red (Fig. 02), axillary, sub sessile, 2 - many flowered; peduncles terete, 2 - 5 mm long, 1 - 1.5 mm in diam., densely pubescent; bracts ca. 1 x 0.5 mm, ovate, apex acute, margin hairy, densely pubescent without; pedicels terete, 1 - 3 mm long, ca. 0.5 mm in diam., densely pubescent. Calyx 5 lobed, divided up to base, lobes ca. 2 x 1 mm, elliptic - lanceolate, apex acute or obtuse, margin ciliate, pubescent without. Corolla campanulate, ca. 4 mm long; corolla-tube ca. 2 x 1 mm long, hairy within at the base; lobes five, ca. 2 x 1.5 mm, ovate, apex acute, glabrous. Corona coralline, uniseriate, five-lobed, processes ca. 1.5 x 1 mm, ridged, adnate to corolla-tube, alternating with lobes, the ridges of corona protruding out of the mouth of corolla-tube, apical portion fleshy, villous from inner side. Stamens five, pollen masses solitary in each anther cell, yellow, waxy. Gynostegium ca. 2.5 mm long, follicles single, ca. 5 x 0.7 cm, long, linear-lanceolate apex acute, glabrous; seeds many, ca. 6 x 3 mm, ovate-oblong, base rounded, brown with light-brown margin ca. 0.5 mm wide; coma silky - white, 1-2 cm long.

Phenology: May - March.

Distribution

Endemic to India (Kerala, Tamil Nadu, Karnataka, Andhra Pradesh, Orissa, Madhya Pradesh, Uttar Pradesh, Bihar, West Bengal).

In Kerala: Thiruvananthapuram, Kollam, Pathanamthitta, Kottayam, Idukki, Ernakulam, Thrissur, Palakkad, Malappuram, Kozhikode, Wayanad, Kannur and Kasaragod.

Habitat and Ecology

Usually seen in the evergreen forests. State of Kerala is situated between 8° 18' and 12° 48' N latitude and 74° 52' and 77° 22' E longitude. The State has an area of 38,863 km², which is about 1.18 percent of the total area of the country and is administratively divided into 14 districts. One of the smallest States in the extreme south west of the Indian subcontinent, bordered by the State of Karnataka on the North, Tamil Nadu in the East and South, and washed by the Arabian Sea on the West (Sasidharan, 2004).

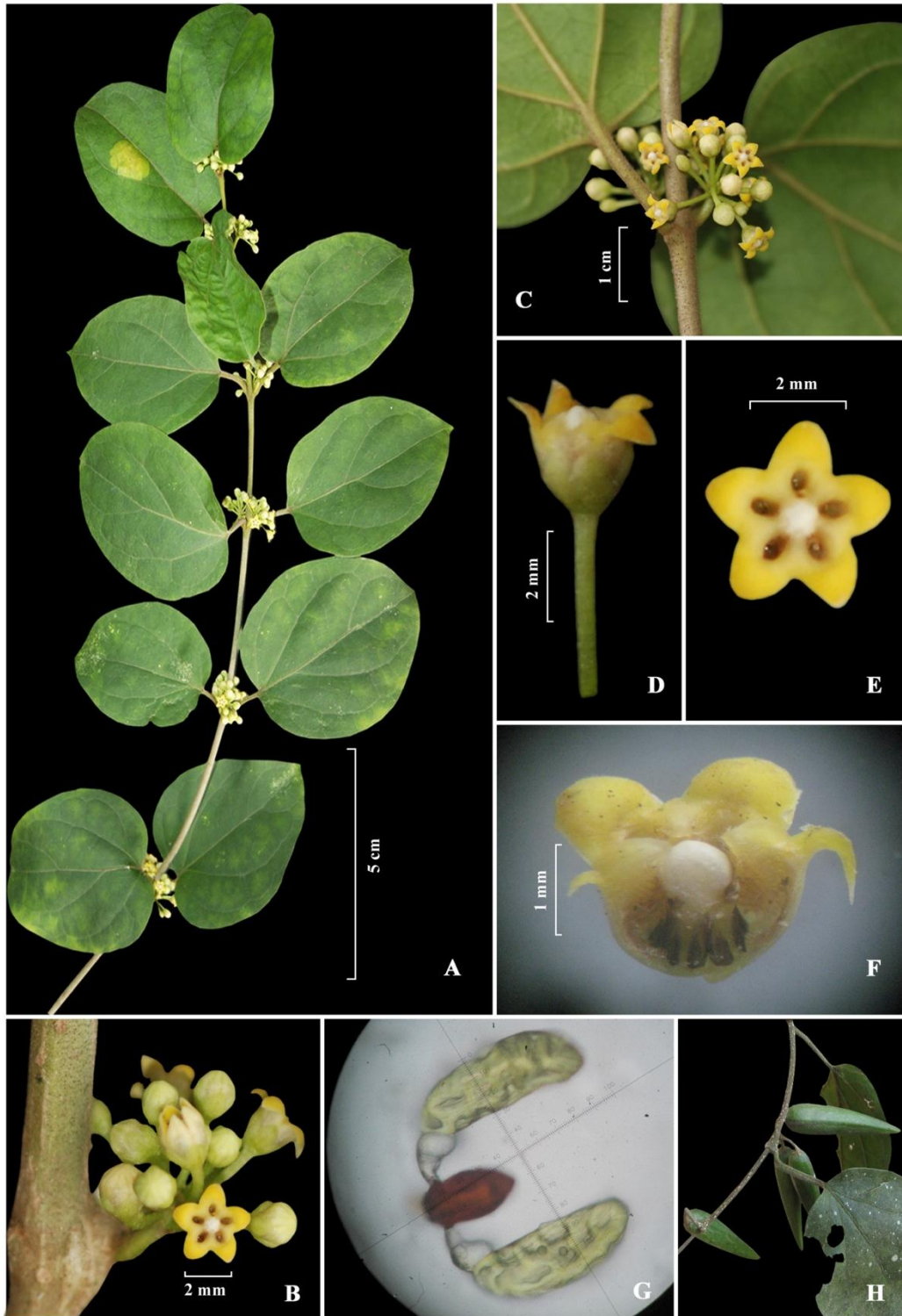


Plate 01. *Gymnema mohanramii* Karthik. and Moorthy. A. Flowering twig; B and C. Inflorescence; D. Single flower; E. Corona-surface view; F. Corona-C.S. of flower; G. Pollinium; H. Fruit.

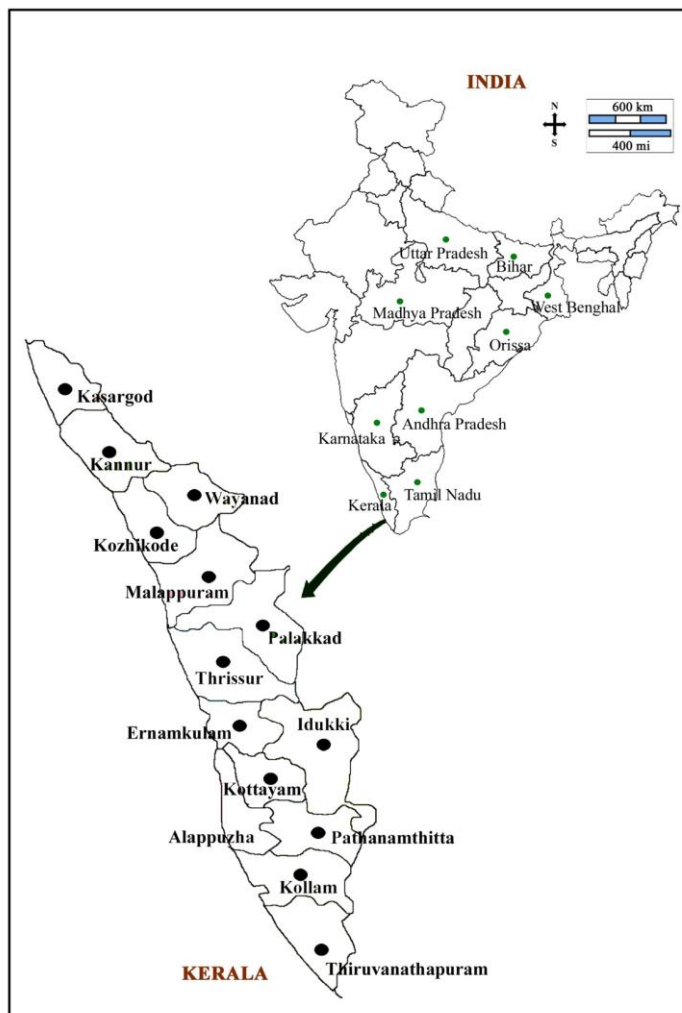


Plate 02. Distribution map of *Gymnema mohanramii* Karthik. & Moorthy in India and Kerala.

Table 1. The distributional status of *G. mohanramii* in Kerala

Sl. No.	District	Distribution reports
1	Trivandrum	Mohan and Sivadasan (2002)
2	Kollam	Present study
3	Pathanamthitta	Present study
4	Kottayam	Antony (1989)
5	Idukki	Present study
6	Ernakulam	Present study
7	Thrissur	Present study
8	Palakkad	Present study
9	Malappuram	Present study
10	Kozhikode	Present study
11	Kannur	Present study
12	Wayanad	Present study
13	Kasargode	Present study

Etymology

The specific epithet is in honour of Prof. H. Y. Mohanram, Delhi University, in recognition of his valuable contribution to Indian Botany (Karthikayan *et al.*, 2009).

Biotic Association

Gymnema mohanramii is commonly growing in association with *Solenocarpus indicus* Wight & Arn., *Ancistrocladus heyneanus* Wall. ex Graham, *Diploclisia glaucescens* (Blume)Diels, *Strobilanthes ciliatus* Nees, *Smilax aspera* L., *Persicaria chinensis* (L.) Gross., *Derris benthamii* (Thw.) Thw., *Thottea siliquosa* (Lam.) Ding Hou, *Aporosa cardiosperma* (Gaertn.) Merr., *Xanthophyllum arnotianum* Wight, *Maesa indica* (Roxb.) DC., *Grewia umbellifera* Bedd., *Nothopegia monadelphina* (Roxb.) Forman, *Cinnamomum malabratrum* (Burm. f.) Blume, *Persea macrantha* (Nees) Kosterm., *Elaeocarpus munronii* (Wight) Mast., *Toddalia asiatica* (L.) Lam., *Connarus paniculatus* Roxb., *Gluta travancorica* Bedd., *Poeciloneuron indicum* Bedd., *Actinodaphne bourdillonii* Gamble, *Humboldtia decurrens* Bedd. ex Oliver, *Pandanus foetidus* Roxb., *Litsea oleoides* (Meisner) Hook. f., *Arenga wightii* Griff in Kerala.

Local conservation status

Apart from *G. elegans* and *G. khandalense*, *G. mohanramii* shows a wide range of distribution in Kerala. From the literature based on previous studies, the distribution of the species in Kerala was limited to the Kottayam (Antony, 1989) and Thiruvananthapuram districts (Mohanram and Sivadasan, 2002). From the present studies, shows the availability of the species in all the districts except Alappuzha. Based on this wider distribution and abundance, the local conservation status in Kerala has been stated here as 'Common'. A detailed field studies throughout India are required to confirm its conservation status.

Notes: *Gymnema hirsutum* was first described by Wallich. in 1826 and later Wight again assigned the same name to another plant and hence the latter became a later homonym. Thus it has been renamed as *G. mohanramii* (Karthikayan *et al.*, 2009).

Specimens examined

India, Kerala, Thiruvananthapuram: Kallar, 23 February 2007, Satheesh K *CMPR-MSSH* 0126; Bonecaud, 23 May 2008, Satheesh K *CMPR-MSSH* 0169. Kollam: Thenmala, 3 January 2007 Satheesh K *CMPR-MSSH* 0125; Chemunchi, 17 May 2008, Satheesh K *CMPR-MSSH* 0167; Pandimotta, Satheesh K *CMPR-MSSH* 0168. Pathanamthitta: Kakki Hills, Satheesh K *CMPR-MSSH* 0148. Kottayam: Peringulam, 25 August 2007, Satheesh K *CMPR-MSSH*0149 ;Kaippally, 7 July 2008, Satheesh K *CMPR-MSSH* 0183; Idukki: Adimali, 28July 2007, Satheesh K *CMPR-MSSH* 0150. Ernakulam: Nariyamangalam, 29 August 2007, Satheesh K *CMPR-MSSH* 0151. Thrissur, Poringal, 30 August 2007, Satheesh K *CMPR-MSSH* 0152; Sholayar RF, 13 July 2008 Satheesh K *CMPR-MSSH* 0184. Palakkad: Cherunaripeetty, 13 May 2008, Satheesh K *CMPR-MSSH*0165 ;Karimalagapuram, 15 May 2008, Satheesh K *CMPR-MSSH* 0166. Malappuram: Nilambur, 15 September, 2008, Satheesh K *CMPR-MSSH* 0194. Kozhikode: Kakkayam, 22 March 2008, Satheesh K *CMPR-MSSH* 0163 (CMPR), Vellarimala, 15 July 2008, Satheesh K *CMPR-MSSH*0185; Anakampoyil, 24 September 2008, Satheesh K *CMPR-MSSH* 0198. Wayanad: Pookote, 6 January 2007, Satheesh K *CMPR-MSSH* 0135 (CMPR), Chandanatodu, 3 July 2007, Satheesh K *CMPR-MSSH* 0124 (CMPR), Chandanatodu, 20 March 2008, Satheesh K *CMPR-MSSH* 0162 (CMPR), Periya, 17 July 2008, Satheesh K *CMPR-MSSH* 0186. Kannur: Theerthundumala, 13 September 2008, Satheesh K *CMPR-MSSH* 0193; Parthenppara, 26 September 2008, Satheesh K *CMPR-MSSH* 0199. Kasaragod: Peruthady, 11 May 2008, Satheesh K *CMPR-MSSH* 0164; Ranipuram, 19 October 2008, Satheesh K *CMPR-MSSH* 0206 (CMPR).

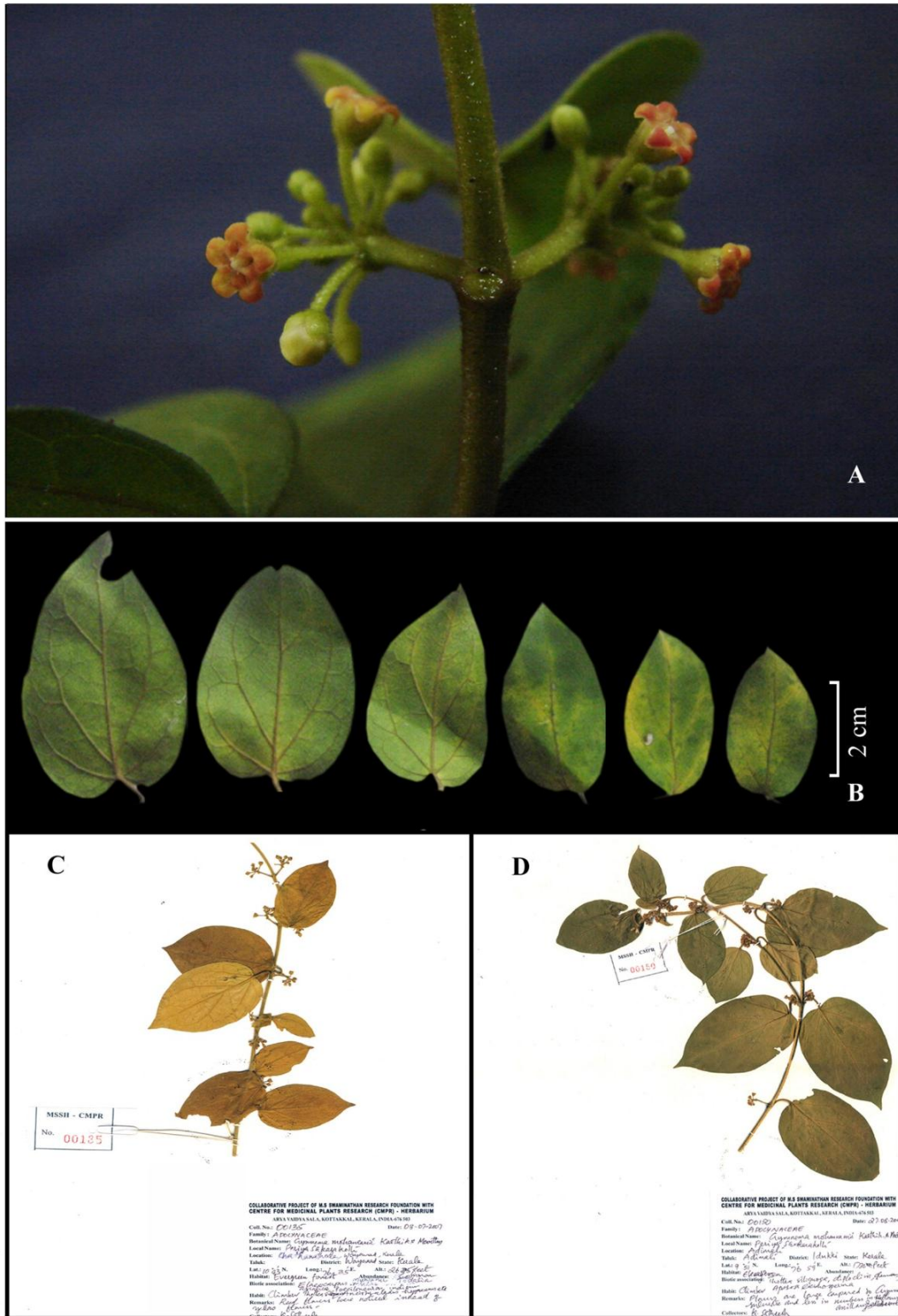


Plate 03: *Gymnema mohanramii* Karthik. & Moorthy. A. Inflorescence showing red coloured flowers; B. Leaf size variation; Herbarium specimens of: C. red coloured flower (CMPR 0135); D. Normal yellow coloured flower (CMPR 0150).

ACKNOWLEDGMENT

The authors are thankful to the authorities of Arya Vaidya Sala, Kottakkal and M.S Swaminathan Research Foundation for extending the facilities and TATA Trust Mumbai for the financial support.

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