Received: 21-07-2025; Accepted: 02-09-2025

https://doi.org/10.56024/ispm.75.3ampersand4.2025/65-78

PHYTOMORPHOLOGY

Two New Additions of Showy Mistletoe Species to the Flora of Barak Valley, with Notes on Host Range in Assam, India

Debasish Deb | **Mukul Kumar Baruah**

Department of Botany, Cachar College, Silchar, Assam, India
E-mail: debasishdeba11@gmail.com, baruahmkb@gmail.com

Author for correspondence: Debasish Deb
Department of Botany, Cachar College, Silchar, Assam, India
E-mail: debasishdeba11@gmail.com

Abstract

A floristic exploration of the family Loranthaceae in the Cachar district resulted in the addition of two showy mistletoe species, *Macrosolen cochinchinensis* (Lour.) Tiegh. and *Helixanthera ligustrina* (Wall.) Danser. to the Flora of Barak Valley, Assam. A detailed description with key identifying features and photographs is provided to identify the species easily. In addition, periodic field surveys were carried out to assess the host range of both the mistletoes within the Cachar district of Barak Valley. *M. cochinchinensis* and *H. ligustrina* parasitized 16 and 3 host species belonging to diverse angiospermic families. Among the host species, *Terminalia arjuna, Ceiba pentandra, Camphora officinarum, Litsea glutinosa, Litsea monopetala, Elaeocarpus serratus, Ficus religiosa, Flacourtia jangomas, Schima wallichii, Ziziphus mauritiana,* and *Choerospondias axillaris* are recorded as new hosts of *M. cochinchinensis*; and *Aphanamixis polystachya* as a new host of *H. ligustrina* for the state of Assam. This study has established a foundation for investigating the host range of both mistletoes within the study area. The existence of *M. cochinchinensis* and *H. ligustrina* on different horticulturally important host plants indicate increased adaptability of the hemiparasites in Cachar district of Barak Valley.

Keywords: Loranthaceae, Cachar district, *Helixanthera, Macrosolen,* Hemiparasite, Infestation, Horticultural plants

Introduction

Showy mistletoes of the family Loranthaceae are a morphologically heterogeneous group of aerial plants that parasitize both wild and cultivated plants (Solikin, 2022). Loranthaceae is diverse in tropical areas with 73 genera and ca. 900 species, and has been divided into three tribes: Nuytsiae, Elytrantheae, and Lorantheae (Vidal-Russell & Nickrent, 2008). The Elytrantheae genus *Macrosolen* (Blume) Rchb. consists of hemiparasitic plants with a distinct six-merous corolla distributed in South Asia and Malesia, extending from India to New Guinea (Kuijt & Hansen, 2015). Besides, the Lorantheae genus *Helixanthera* Lour. consists of hemiparasites with four-merous corolla found across tropical and subtropical Africa, extending eastward through southern Asia to northwestern Malesia (Barlow, 1995). *Macrosolen* and *Helixanthera* consist of 43 accepted species each that parasitize mostly trees and often cause decline of their hosts (Devkota & Kunwar, 2006; Singh et al., 2016; Anonymous, 2025a). Among them, 6 *Macrosolen* and 10 *Helixanthera* species are reported from India (Balakrishnan et al., 2012; Singh, 2013; Mishra et al, 2024). Regarding the state of Assam, 2 species of *Macrosolen* and 4 species of *Helixanthera* are hitherto reported (Kanjilal et al., 1940).

The state of Assam can be divided into three distinct physiographical units: (i) the Brahmaputra Valley in the north; (ii) the central hilly regions of Karbi-Anglong and North Cachar and; (iii) the Barak Valley in the south (Barbhuiya, 2014; Anonymous, 2025c). The pioneering floristic work, Flora of Assam (Vol. 1-4), provides the oldest comprehensive account of the plant species of North East India, including a part of the then Sylhet district of present Bangladesh (Borah, 2014). In Flora of Assam (Vol. 4), *Macrosolen cochinchinensis* (Lour.) Tiegh. was recorded from Lakhimpur, Nagaon, and Goalpara districts of Brahmaputra Valley, as well as from the Garo Hills of Meghalaya. Also, *Helixanthera ligustrina* (Wall.) Danser. was recorded from Lakhimpur, Darrang, and Goalpara districts of Brahmaputra Valley; and Garo, Khasi and Jaintia Hills of Meghalaya (Kanjilal et al., 1940). Subsequently, both the mistletoes were reported from five protected areas of the Brahmaputra Valley, viz., Orang National Park and Tiger Reserve (recorded *H. ligustrina*), Raimona National Park, Behali Reserve Forest, Manas National Park (recorded *M. cochinchinensis*) and Chirang Reserve Forest (Nath & Chowdhury, 1994; Sarmah & Borthakur, 2009; Borah et al., 2020; Basumatary et al., 2022; Basumatary & Baruah, 2024). The most significant contribution to the floristics of Barak Valley is the Flora of Barak Valley (Vols. 1 and 2), which provides detailed information about the diverse range of ferns, fern allies, and flowering plants of southern Assam. In Flora of Barak Valley Volume 2, no Loranthaceous hemiparasites were noted; however, in Volume 1, *Dendrophthoe falcata* (L.f.) Ettingsh. was recorded from Sribhumi district (Das et al., 2013; Baruah & Choudhury, 2015). Although several reports have documented the presence of *M. cochinchinensis* and *H. ligustrina* in the Brahmaputra Valley, there has been no documentation on the occurrence of these hemiparasites in the Barak Valley.

To date, *M. cochinchinensis* is reported to infest 13 host species in Assam, including 4 new additions in recent times and 7 that were previously noted in Flora of Assam (Kanjilal et al., 1940; Basumatary & Baruah, 2024). Similarly, *H. ligustrina* occurs on 10 host species in Assam, including 2 new additions in recent times (Kanjilal et al., 1940; Nath & Chowdhury, 1994; Sarmah & Borthakur, 2009; Basumatary & Baruah, 2024). During floristic exploration of the Cachar district in January 2025, we came across two parasitic plants growing on a Mango tree and a Hairy fig tree in Thaligram village area, Udharbond block, Cachar district (Fig. 1). Critical examination of the parasitic plants and an extensive literature survey revealed that the species parasitic on the Mango tree was *Macrosolen cochinchinensis* and that on the Hairy fig tree was *Helixanthera ligustrina*. As there are no records of the occurrence of these two species in Barak Valley, and limited knowledge exists on their host range in Assam, the present investigation was carried out.

Figure 1. Habit of *M. cochinchinensis* and *H. ligustrina*. (A, B) *M. cochinchinensis* parasitizing *Mangifera indica*; (C, D) *H. ligustrina* parasitizing *Ficus hispida*

Material and methods

The Barak Valley in southern Assam consists of three administrative districts: Cachar, Sribhumi, and Hailakandi. The present study was conducted in Cachar district, which covers an area of approximately 3,786 km², representing 4.83% of Assam's total area (Baruah et al., 2013). Cachar district is geographically bordered to the north by Dima Hasao district of Assam and Meghalaya state, to the south by Mizoram state, to the east by Manipur state, and to the west by Sribhumi and Hailakandi districts of Barak Valley, Assam (Das et al., 2008; Astapati & Das, 2010). Floristic surveys were conducted within the study area, and parasitic plant samples were collected. Specimens were collected in flowering and fruiting stages for proper identification, and photographs were taken at the survey site. For each parasitized host plant species, specimens were collected from a particular study location and their detailed field information was recorded. The host plants were carefully examined, local names were documented after enquiring with the inhabitants, and photographed on the spot to aid in identification. Voucher specimens of the hemiparasites have been submitted to the Herbarium at the Botanical Survey of India, Eastern Regional Centre, Shillong (ASSAM) for future reference. The identification and updated nomenclature of the collected and documented species were confirmed with standard literature (Kanjilal et al., 1940; Balakrishnan et al., 2012; Singh, 2013; Basumatary & Baruah, 2024; Anonymous, 2025a,b).

Results and discussion

Taxonomic synopsis

Macrosolen cochinchinensis (Lour.) Tiegh., in Bull. Soc. Bot. Fr. 41:122. 1895; Kanjilal et al., Fl. Assam 4:127. 1940; Barlow, Fl. Males. 13: 366. 1997; Fl. India 23:20. 2012. *Loranthus ampullaceus* Hook. f., Fl. Brit. India 5:220. 1890. (Fig. 2).

Shrub, parasitic, up to 1.5 m tall; branches greyish to light brownish, terete, scattered lenticellate. Leaves opposite, rarely alternate, ovate, elliptic or lanceolate, 4-13 × 2-6 cm, sometimes pale reddish brown, coriaceous, lustrous above, dull below, base broadly cuneate, margin entire, apex acuminate or sometimes obtuse or shortly rounded; lateral nerves 4-8 pairs, inconspicuous, glabrous both sides; petiole 4-7 mm long. Inflorescence axillary pseudoracemes, solitary or 2-3-fascicled, often at older leafless nodes, 1.5-5 cm long, 2-8-flowered; floral buds inflated in the middle; peduncle 1-3.5 cm long, green and persistent. Flowers 1.5–2.3 cm long; pedicel 1.5-2.1 mm long; bracts 3, somewhat connate, broadly ovate, 0.6-1 mm long. Calyx tubular, 1-3 mm, green. Corolla 6-lobed, united, rather gibbous, lobes lanceolate, reflexed from the middle, 5-13 mm long, yellowish green, reddish-brown colouration at the middle. Stamens 6, epipetalous; inserted at base of corolla lobes; anther light yellow, 0.8-1.8 mm long; filament 5-10 mm long, green. Style 1-1.5 cm long, green; stigma pink. Ovary ellipsoid, 2-2.5 mm long. Berry ellipsoid to globose, 5-10 × 2.5-10 mm, yellowish green to yellow.

Flowering and Fruiting: February to July.

Occurrence: Aerial stem parasite mostly occurs on *Mangifera indica* L. The host plants grew in home garden

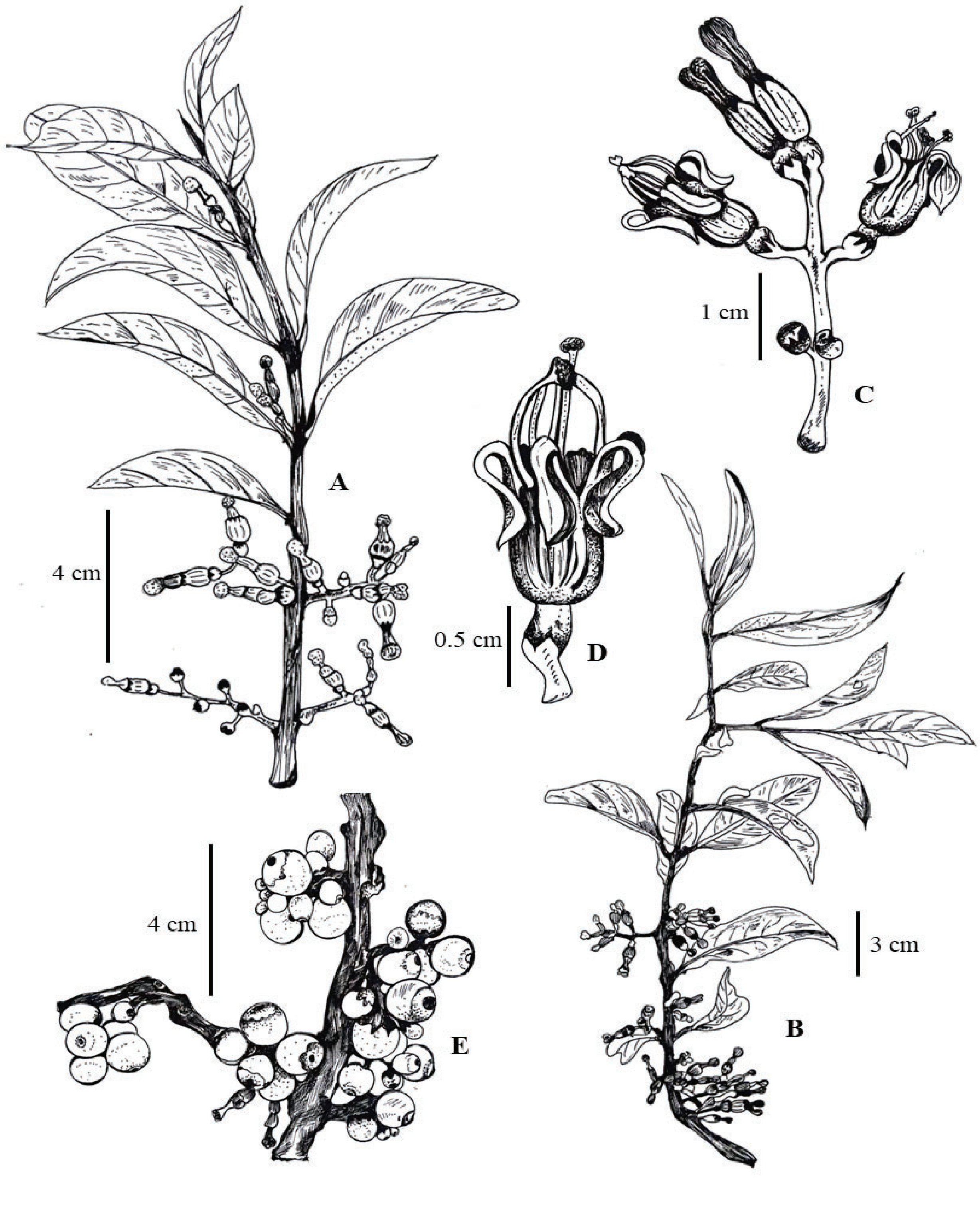

Figure 2. *Macrosolen cochinchinensis* (Lour.) Tiegh., (A, B) Flowering twig, (C) Inflorescence, (D) Flower in side view, (E) Fruits

plants, thickets and along roadsides.
Distribution: India, Bangladesh, Nepal, Myanmar, China, Malaysia, Indonesia, Cambodia, Vietnam, Philippines, Thailand, and New Guinea.
Specimens examined: India, Garo Hills, Damra Forest, 28.03.1941, R. A. Dc 20207 (ASSAM!); India, Khasi and Jaintia Hills, Umsaw Forest, 22.05.1941, G. K. Deka 20211 (ASSAM!); India, North Nicobars, Car Nicobar, Sawai, 04.06.1975, N. G. Nair 2665, (CAL [PBL0000017165] digital image); India, Cachar district, Thaligram, 24°55'N, 92°55'E, 20.04.2025, D. Deb DEBH77 (ASSAM!).

Helixanthera ligustrina (Wall.) Danser., in Bull. Jard. Bot. Buitenzorg ser. 3, 10:317. 1929; Kanjilal et al., Fl. Assam 4:121. 1940; Fl. India 23:15. 2012. *Loranthus ligustrinus* Hook. f., Fl. Brit. India 5:207. 1890. (Fig. 3)

Aerial stem-parasitic shrubs with epicortical runners bearing secondary haustoria, up to 2.5 m tall, densely branched, crown at the base, old stem rusty brown, young stem yellowish or greenish-brown, glabrous or glabrescent, terete. Leaves opposite or alternate, sometimes crowded in false whorls, petiole 5-10 mm long; leaf blade elliptic to oblong-lanceolate, glabrous, 5.5-9 × 2-4 cm, mostly subcoriaceous, base broadly acute, or often attenuate, margin entire, apex obtusely acute, subacute or acuminate; lateral nerves 4-6 pairs, sometimes inconspicuous. Inflorescence axillary paired pseudoraceme, 1 to 3 cm long, 2-6 flowered; peduncle solitary or paired, 0.5-2 cm. Flowers 7-12 mm long; pedicels glabrous, 1-3 mm long, bent at the attachment of the tubular calyx; bract single, cucullate, ovate-elliptic, 1-2 mm long, green, margin brown. Calyx united, urceolate or cupular, greenish brown in colour, brown dotted, persistent, 0.5-2 mm long. Corolla 4-angled, choripetalous, 8 - 10 mm long, red, yellow green during immature, widening towards base, constricted above base, bent downwards from the middle. Stamens 4, epipetalous, inserted at the middle of the petals, red, 5 - 6 mm long; anthers basifixed, contiguous with the filaments; filaments 4.5 - 5 mm long. Ovary cupular, 2 - 2.5 mm long; style subcylindric, reaching to the top of the anthers, 8-10 mm long, red with a yellow tint; stigma red, capitate. Fruit ovoid with persistent stylar scar, 5 - 8 x 3 - 4 mm, cinnamomeous brown when ripe.
Flowering and Fruiting: February-July
Occurrence: Aerial stem parasite mostly occurring on *Ficus hispida* L.f. The host plants grew in public parks, wastelands, and along roadsides.
Distribution: India, Bangladesh, Nepal, Myanmar, Philippines, Thailand, Vietnam.
Specimens examined: India, Assam, Near Naga Hills, 04.1899, Dr. Prain 884, (CAL [CAL0000211658] digital image); India, Khasi and Jaintia Hills, 15 Miles, G. S. Road, 12.06.1939, R. N. De 18258 (ASSAM!), India, Garo Hills, Tura Forest, 26.03.1941, R. N. De 20209 (ASSAM!); India, Cachar district, Thaligram, 24°56'N, 92°55'E, 13.04.2025, D. Deb DEBH12 (ASSAM!).

Host range

The field surveys conducted during the present study revealed that 16 angiospermic tree species serve as hosts of *M. cochinchinensis* in Cachar district, in contrast to 13 hosts that were previously reported for the state of Assam (Fig. 1A, B; 4C, D; 5, 6, 7). Additionally, *H. ligustrina* was found to

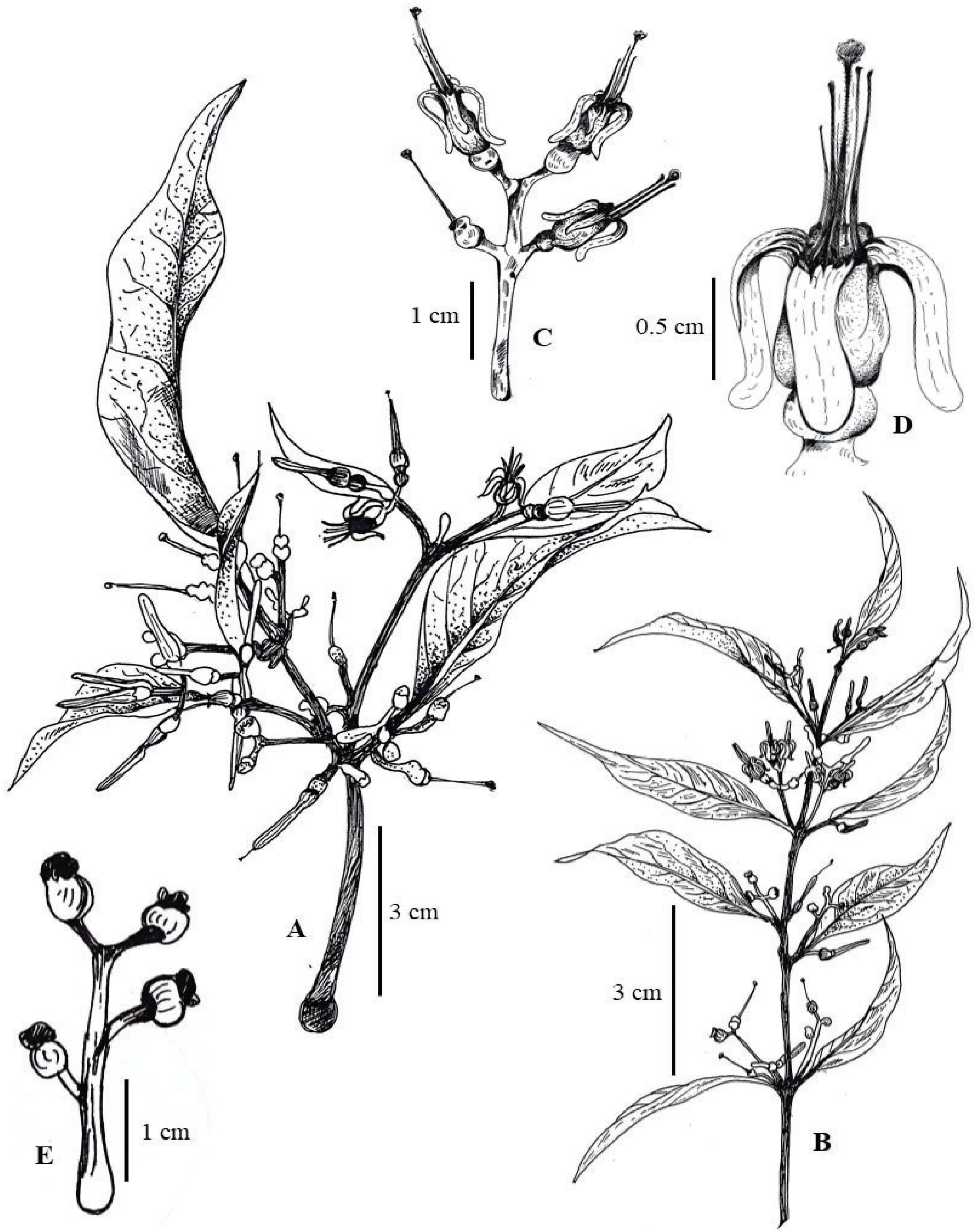

Figure 3. *Helixanthera ligustrina* (Wall.) Danser., (A, B) Flowering twig, (C) Inflorescence, (D) Flower in side view, (E) Fruits

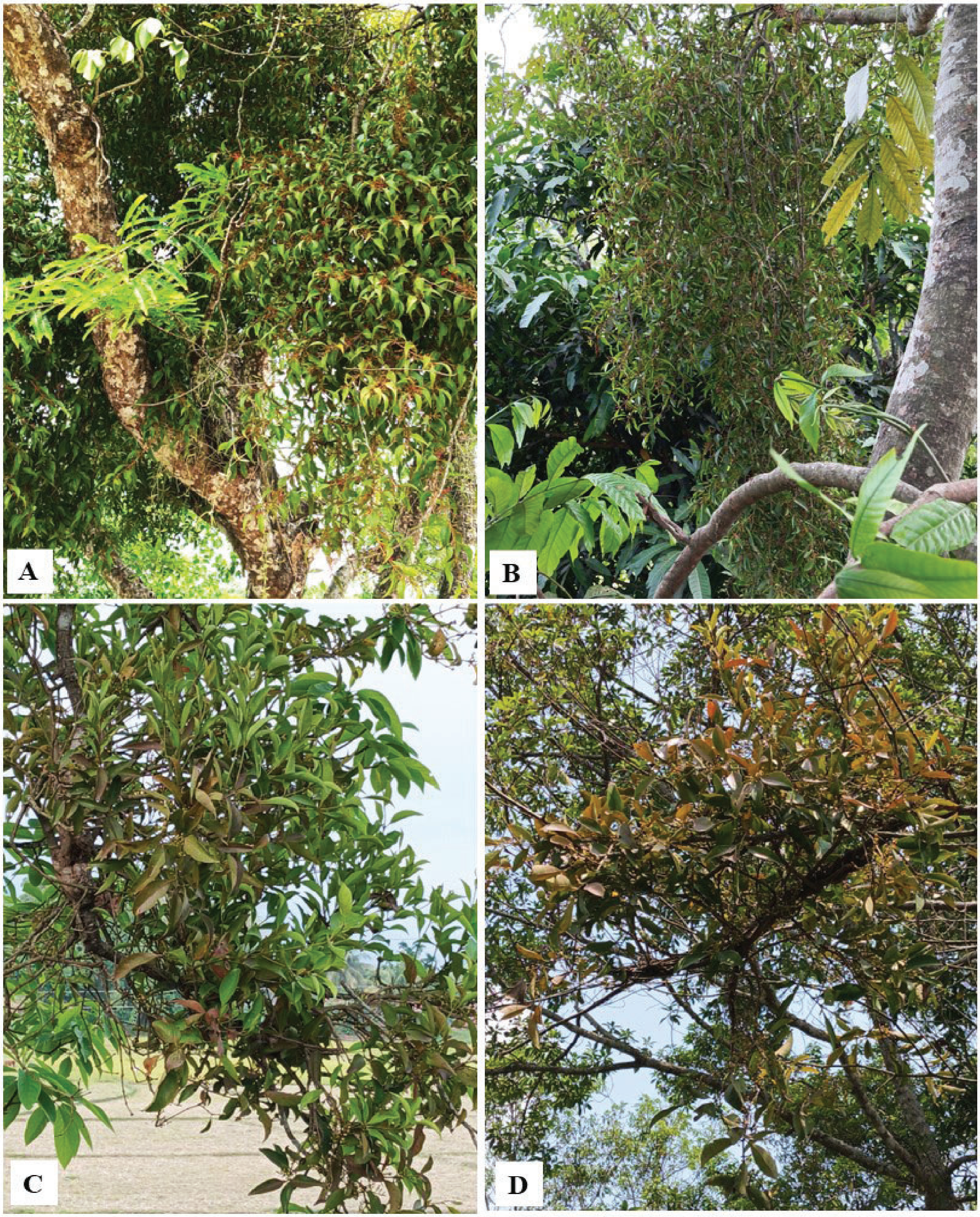

Figure 4. Infestation of *H. ligustrina* on: (A) *Phyllanthus emblica*, (B) *Aphanamixis polystachya*. Infestation of *M. cochinchinensis* on: (C) *Schima wallichii*, (D) *Ziziphus mauritiana*

Figure 5. Infestation of *M. cochinchinensis* on: (A) *Camphora officinarum*, (B) *Litsea monopetala*, (C) *Ficus religiosa*, (D) *Litsea glutinosa*

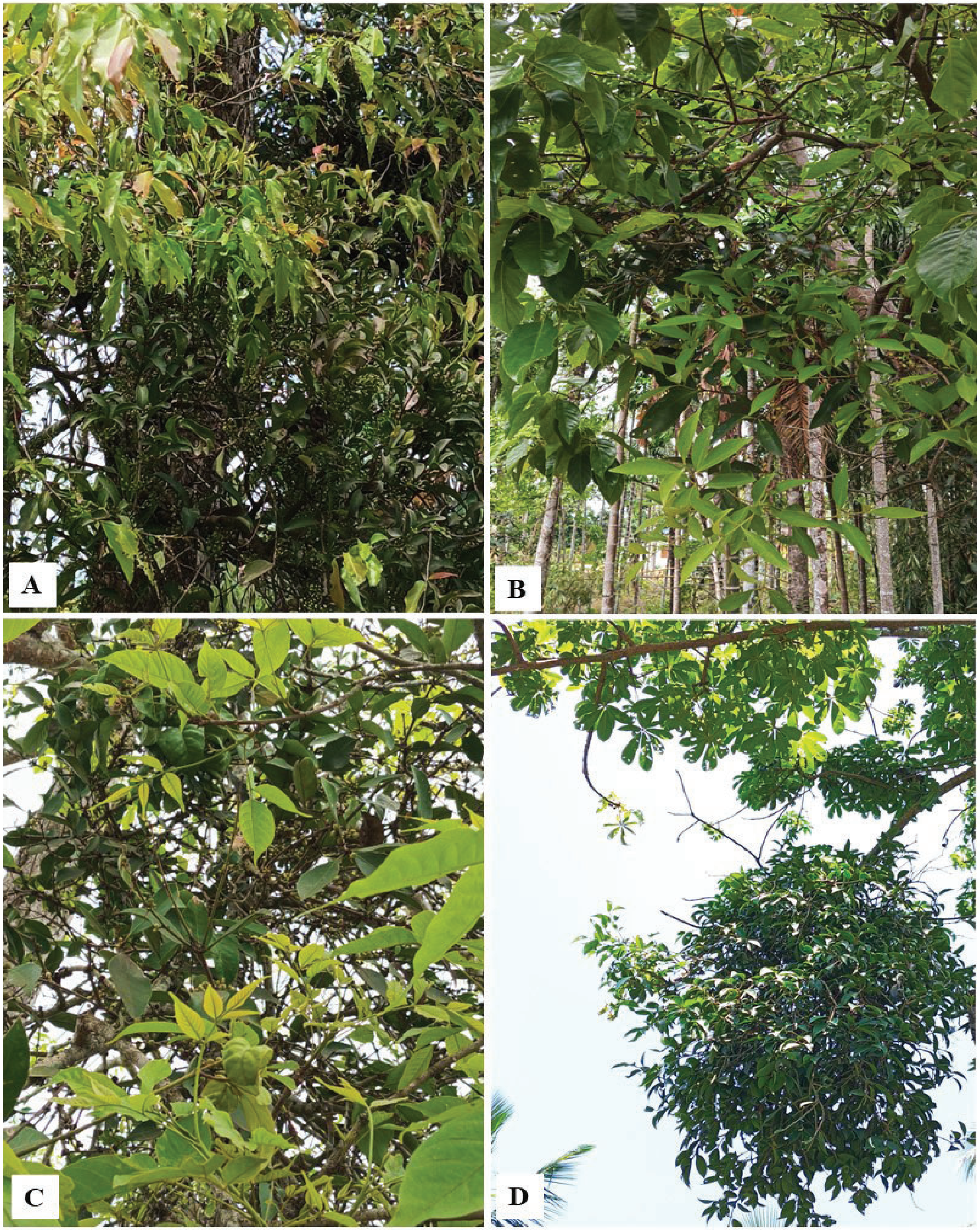

Figure 6. Infestation of *M. cochinchinensis* on: (A) *Flacourtia jangomas*, (B) *Elaeocarpus serratus*, (C) *Choerospondias axillaris*, (D) *Ceiba pentandra*

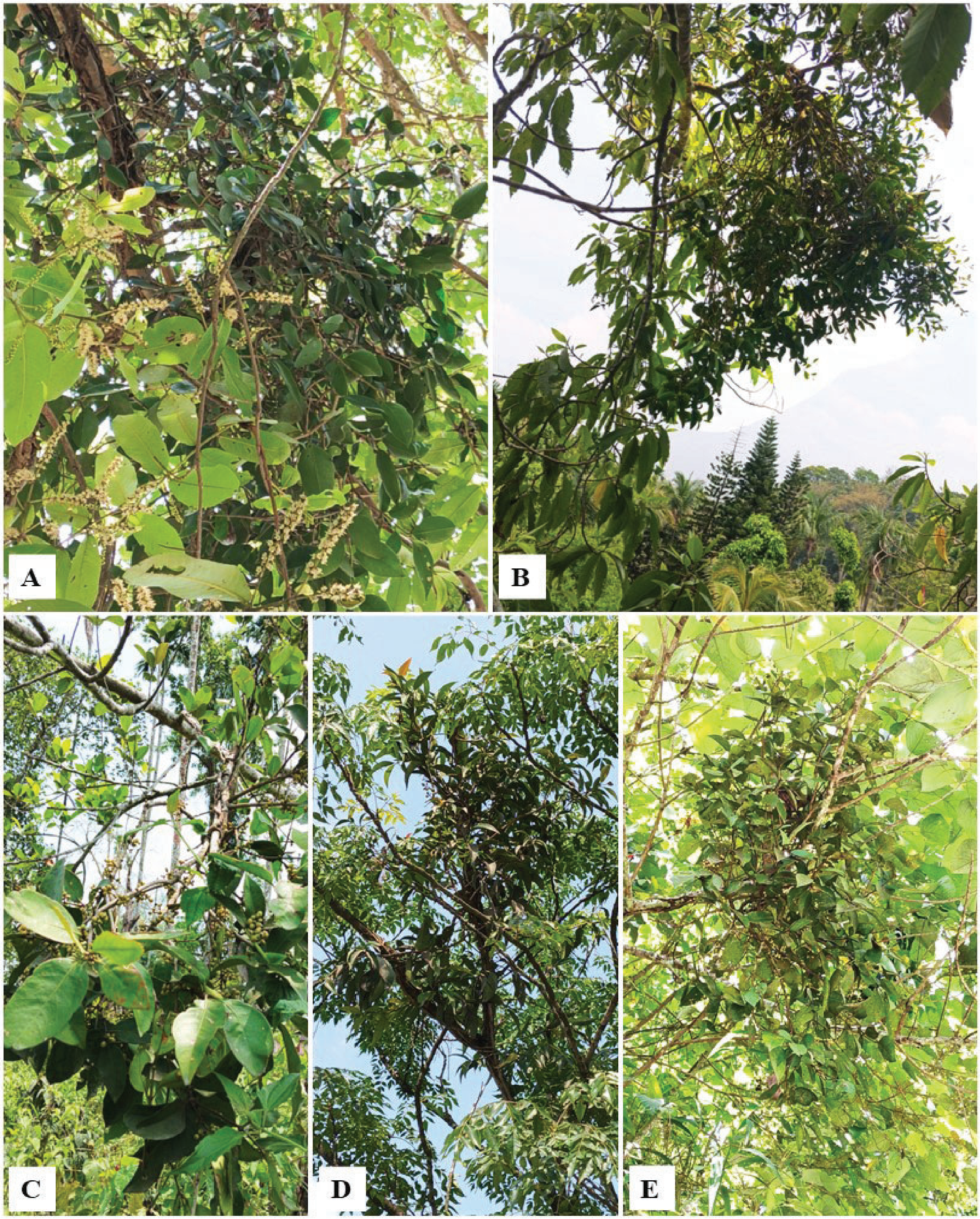

Figure 7. Infestation of *M. cochinchinensis* on: (A) *Terminalia arjuna*, (B) *Magnolia champaca*, (C) *Artocarpus heterophyllus*, (D) *Melia azedarach*, (D) *Macaranga denticulata*

parasitize 3 dicotyledonous tree species in Cachar district, as compared to 9 hosts earlier recorded for Assam (Fig. 1C, D, 4A, B) (Table 1). In Flora of India (Vol. 23), the authors mentioned that *H. ligustrina* occur on a limited number of hosts (Balakrishnan et al., 2012). Our findings corroborated the observations made in Flora of India (Vol. 23), and only 3 hosts of *H. ligustrina* were traced in the Cachar district of Barak Valley. Among the diverse hosts of *M. cochinchinensis*, 12 tree species were recorded as new hosts for the state of Assam, viz. *Terminalia arjuna, Ceiba pentandra, Camphora officinarum, Litsea glutinosa, Litsea monopetala, Elaeocarpus serratus, Ficus religiosa, Flacourtia jangomas, Choerospondias axillaris, Ziziphus mauritiana, Magnolia champaca* and *Schima wallichii*. Furthermore, *Aphanamixis polystachya* has been documented as a new host of *H. ligustrina* for Assam. Some plants

Table 1. List of host tree species infested by *H. ligustrina* and *M. cochinchinensis* in Cachar district, Barak Valley, Assam

Host species	**Family**	**Local name**
Helixanthera ligustrina (Wall.) Danser.		
Ficus hispida L.f.	Moraceae	Kakdumur
Phyllanthus emblica L.	Phyllanthaceae	Aamloki or Amla
Aphanamixis polystachya (Wall.) R.Parker	Meliaceae	Junglee Rata or Royna
Macrosolen cochinchinensis (Lour.) Tiegh.		
Artocarpus heterophyllus Lam.	Moraceae	Kathal
Ficus religiosa L.	Moraceae	Ashvattha bot tree
Melia azedarach L.	Meliaceae	Ghura neem
Macaranga denticulata (Blume) Müll.Arg.	Euphorbiaceae	Jagura or Jakura
Mangifera indica L.	Anacardiaceae	Aam
Choerospondias axillaris (Roxb.) B.L.Burtt & A.W.Hill.	Anacardiaceae	Amrda or Junglee amra
Terminalia arjuna (Roxb. ex DC.) Wight & Arn.	Combretaceae	Arjun
Ceiba pentandra (L.) Gaertn.	Malvaceae	Sada shimul
Camphora officinarum Boerh. ex Fabr.	Lauraceae	Korpur
Litsea glutinosa (Lour.) C.B.Rob.	Lauraceae	Kukurchita or Chapaiitta
Litsea monopetala (Roxb.) Pers.	Lauraceae	Sualu
Elaeocarpus serratus L.	Elaeocarpaceae	Jolpai
Flacourtia jangomas (Lour.) Raeusch.	Salicaceae	Lukluki
Schima wallichii (DC.) Korth.	Theaceae	Bonak
Ziziphus mauritiana Lam.	Rhamnaceae	Boroi
Magnolia champaca (L.) Baill. ex Pierre	Magnoliaceae	Champa

were common hosts wherever they occurred, for example, *Mangifera indica* and *Flacourtia jangomas*, for *M.cochinchinensis* and *Ficus hispida* for *H. ligustrina*. The above-mentioned hosts usually supported vigorous growth of these two mistletoes. Other types of trees (for example, *Terminalia arjuna* and *Magnolia champaca* for *M. cochinchinensis*; and *Aphanamixis polystachya* for *H. ligustrina*), while common and found in many areas, had mistletoes less often. However, when they did, the mistletoes were usually robust or moderately so. Particularly, *M. cochinchinensis* was found to be associated with 16 different horticulturally important hosts belonging to 12 distinct dicotyledonous families; the majority of which had not yet been reported from Assam. Also, the observational incidence of tree infestation by *M. cochinchinensis* was higher than that by *H. ligustrina*. This is the first report on the occurrence and host range of *M. cochinchinensis* and *H. ligustrina* in Barak Valley. However, additional reports on the prevalence of these hemiparasites will be necessary to develop strategies for safeguarding flora from infestation and consequent decline.

Conclusions

Macrosolen cochinchinensis (Lour.) Tiegh. and *Helixanthera ligustrina* (Wall.) Danser. are reported as new additions to the Flora of Barak Valley. The host diversity of these two showy mistletoe species was recorded, revealing that they parasitize horticulturally important plants in the Cachar district of Assam. Detailed analysis is required to assess the frequency of their occurrence on these hosts.

Acknowledgements

The authors extend their sincere thanks to the Scientist-in-charge, Botanical Survey of India, Shillong (ASSAM) for permitting them to submit voucher specimens and consult different herbarium specimens. The authors are also thankful to the villagers and local residents of different areas of Cachar district for their support during the floristic explorations.

Authors' contributions: DD conceptualized the scheme of work. DD and MKB conducted the field studies. DD critically analyzed the results and wrote the manuscript. MKB reviewed the final draft manuscript..

Conflict of interest: Authors declare no conflict of interests.

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