



Research article

Dendrophthoe falcata (L.f.) Ettingsh on different host recorded from Kurdeg, Simdega District in Jharkhand, India

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Abstract: A hemiparasite known as *Dendrophthoe falcata* is frequently observed in mango trees along with other tropical timber-yielding trees. This hemiparasite severely impacts the fruit and timber yield of such plants. As per recent reports, can now grow as a host on several other varieties of trees. The focus of the current study was the exploration of this hemi-parasitic plant and its host in and around the Kurdeg Simdega forest through a survey, which was conducted from February 2022 to December 2023. There were only 20 screened trees (belonging to 13 different families, including Anacardiaceae, Sapotaceae, Moraceae, Rhamnaceae, Verbenaceae, Bombacaceae, Lamiaceae, Dipterocarpeaceae, Fabaceae, Meliaceae, and Combretaceae) that had hemiparasites associated with them. In this region, infestations were more frequent on fruit-producing trees like *Buchnanian lazan* and *Mangifera indica* as compared to alternative host trees like *Albizia lebeck*, *Bombax ceiba*, *Ficus religiosa*, *Senna siamea*, *Melia azedarach*, *Vitex negundo*, *Shorea robusta* Roth., *Tectona grandis*, *Acacia auriculiformis*, *Ailanthus exelsa*, and *Cassia fistula*. As such, there is a need to protect the forest flora from such infestation. To the best of our knowledge, there has been no record submitted about this hemiparasitic plant and its host in the Simdega district till date. As such, this investigation may help to protect forest flora from economic losses.

Keywords: *Dendrophthoe falcata* - Hemiparasite - Loranthaceae - Trees - Simdega.

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INTRODUCTION

Dendrophthoe falcata (L.f.) Ettingsh (known as mistletoe), also known as Banda belonging to the family Loranthaceae, is an angiospermic perennial climbing woody hemi-parasitic plant indigenous to tropical regions, especially in India, Sri Lanka, Thailand, China, Australia, Bangladesh, Malaysia, and Myanmar. The genus comprises about 31 species spread across tropical Africa, Asia and Australia and reported on the number of hosts (Huaxing & Michael 2003). It is widely distributed throughout India, frequently observed on many host plants and about 7 species of it are reported in India (Kodithala & Kiran Mani 2013). It is also known as *Loranthus falcatus* L. f [Banda]. It is indigenous to India, Sri Lanka, Thailand, Indo-China region, and Australia. Winter is the ideal time to watch the plants bloom. Simdega is well known for its Chironji and mangoes (Ammara & Prabha 2023). Mahua and Imli are grown extensively in Simdega district. On the other hand, Sal is the most dominant timber-producing plant found in Simdega, planted in every nook and corner for timber production. In order to protect our plants from the adverse effects of this parasitic shrub, we must be aware of it. This parasite has been reported to have more than 3009 hosts. In India, there are approximately 7 species. The whole *Dendrophthoe falcata* plant holds significant ethnobotanical value and is utilized in traditional medicine systems for its medicinal properties, including cooling, astringent, aphrodisiac, narcotic, and diuretic effects.

The plant parts like leaves, stem and bark are known to possess antibacterial and antioxidant activities (Gaurav *et al.* 2010).

MATERIAL AND METHODS

Study Area

Kurdeg Block located in the Simdega district of Jharkhand constitutes the research area for the present investigation (Fig. 1). The Simdega district is situated between 22° and 20 minutes to 22° and 51 minutes north latitude and 84° and 01 minutes to 85° and 05 minutes east longitude. Simdega, Kurdeg, Bolba, Thethaitangar, Kalebira, Bano, Jaldega, Pakartanr, Bansjore and Kersai belong to the 10 blocks or circles and 94 Panchayats. In the summer, the highest temperature varied from 38°C to 42°C, and in the winter, it was between 25°C and 28°C (JSAC 2022).

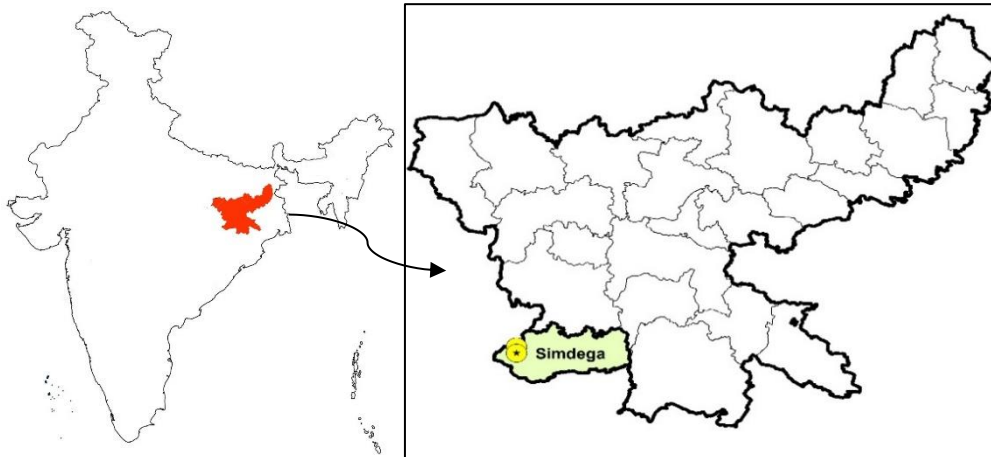


Figure 1. Kurdeg block in Simdega Jharkhand, India.

Methodology

- i. Field study: Survey was conducted over a span of six months from February 2022 to December 2023. Name of the host species, phenological phase, number of parasites per host, and parasite phenology were gathered in the field.



Figure 2. Digital herbarium of *Dendrophthoe falcata* (L.f.) Ettingsh (accession number CAL0000275430).

- ii. Collection and identification of plant specimens on the basis of taxonomical characters: From a distance, one can observe the bright red flowers and fruits of this hemiparasite on the host tree. The departing corolla tube or other flower parts are found beneath the canopy of the host trees. Thus, it is not difficult to recognize the invasion. The collected plant specimen sent to BSI, Kolkata for authentication, digitization and online accession (Fig. 2). The Kew Herbarium Catalogue (IPNI 2023), e-flora of India (2007 onwards) and the International Plant Name Index POWO (IPNI 2023) were utilized to further endorse the specimen's identities.
- iii. Taxonomical Characters: A large bushy usually glabrous branch parasite, bark grey, smooth, small twigs of aerial branches ranging from 2.0 mm to 2.5 cm in thickness, stem slightly rough to touch, fracture irregular, fractured surface dark brown, no distinct taste or color. Leaves thick, coriaceous, usually opposite, 7.5–18.0 by 2–10 cm, petiolate, exstipulate, decussate, simple, ovate to oblanceolate. Flowers are arranged in short, spreading, stout, unilateral racemes that are frequently two from an axil. The bract is 1.6 mm long, about oblong, sub-acute concave, and orange-red in color. Calyx is around hoary and 4 mm long. Corollas ranged in length from 2.5 to 5.0 cm, are divided at the back, and have a curving, slightly expanded tube. Berry 8 to 13 mm long, pink, smooth, and ovoid to oblong in shape, with a cup-shaped calyx on top (Hasan & Samad 2019). The seed after germination forms a specialized structure called the haustorium (Fig. 3) which taps into the host's vascular system to absorb water, minerals, and nutrients. The gynoeceium consists of one ovary, one style and one stigma, upper parts of style and stigma of the mature flower are red (Fig. 4).

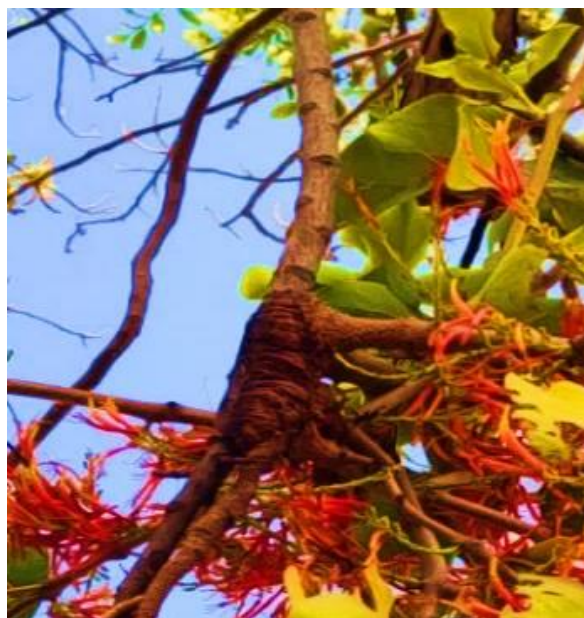


Figure 3. Haustorium of *Dendrophthoe falcata* (L.f.) Ettingsh.

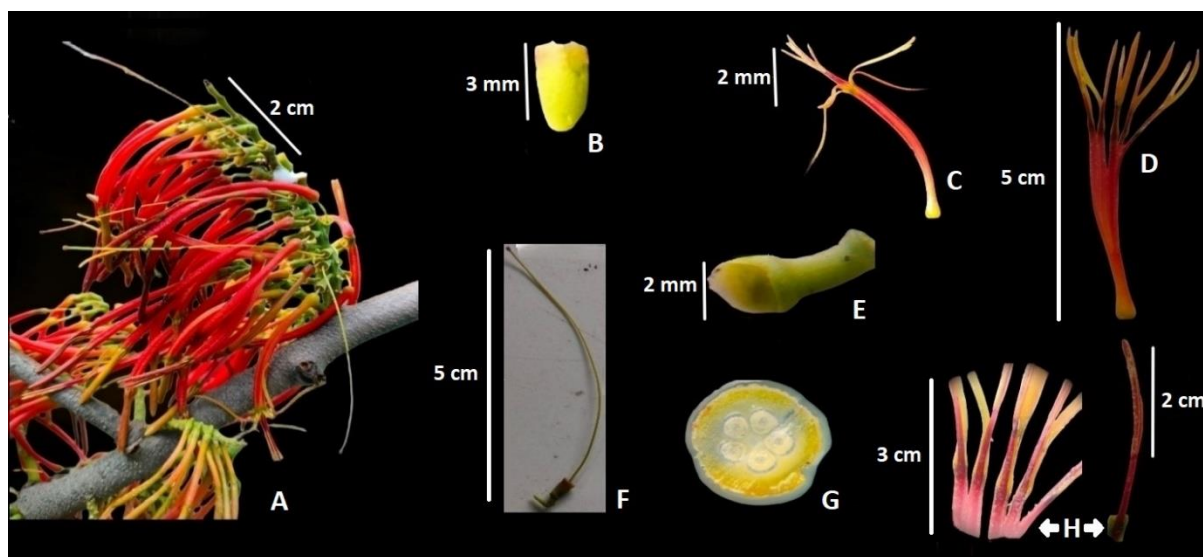


Figure 4. *Dendrophthoe falcata* (L.f.) Ettingsh: A, Inflorescence; B, Sepal; C, Corolla Tube; D, Corolla Tube (dissected); E, Bract; F, Style; G, T.S. of Ovary; H, Anther.

RESULTS AND DISCUSSION

Dendrophthoe falcata is the most prevalent parasitic angiosperm that is being reported worldwide. According to the availability or absence of vulnerable plants and the dispersal agent, the number of hosts varies across locations. A total of 40 roadside trees within Tiruchirapalli City Corporation, Tamil Nadu serve as hosts for *Dendrophthoe falcata* (Vijayan *et al.* 2015). Selvi & Kadamban (2009) listed 26 host species from the Pondicherry Engineering College Campus in Pondicherry, India. Similarly, in Karnataka reported widespread presence of this parasitic plant on 98 hosts species across 28 families (Thriveni *et al.* 2010). Maximum 400 host species of *Dendrophthoe falcata* have been reported by Joshi & Kothiyari (1985) from tropical rain forest of Bangladesh. The growth of *Dendrophthoe falcata* across different hosts suggests that certain hemiparasite plants preferred trees over shrubs. *Dendrophthoe falcata* infestations were found in 20 different species of plants from 13 families across the research area.

This study reports 20 host species of *Dendrophthoe falcata* (Table 1). Some of the observed hosts of the species have been shown in figure 5. Dicotyledonous angiosperms are composed of all the currently known host plants. There were no herbaceous species detected in the present survey. The findings correspond with those of prior researchers. The abundant and voluminous growth of this parasite was spotted on some trees such as *Buchnanian lanzan* Spreng., *Madhuca longifolia* (J.Konig ex L.) J.F.Macbr., *Mangifera indica* L., *Albizia lebbek* (L.) Benth., *Bombax ceiba* L., *Ficus religiosa* L., *Senna siamea* (Lam.) H.S. Irwin & Barneby, *Melia azedarach* L., *Ziziphus jujuba* Mill., *Vitex negundo* L., *Shorea robusta* Roth., *Tectona grandis* L.f., *Acacia auriculiformis* Benth., *Ailanthus exelsa* Roxb., *Cassia fistula* L., *Aegle marmelos* (L.) Corr., *Terminalia arjuna* (Roxb. ex-DC.) Wight & Arn., *Dalbergia sissoo* Roxb., *Bauhinia purpurea* L., and *Gmelina arborea* Roxb. In the present investigation, Fabaceae was found as a major family consisting of seven genera followed by Anacardiaceae, and Lamiaceae consisting of 2 genera each. The highest infestation was recorded from the family Fabaceae with a value of 27%, Lamiaceae 20% and Anacardiaceae 13%, respectively (Fig. 6).

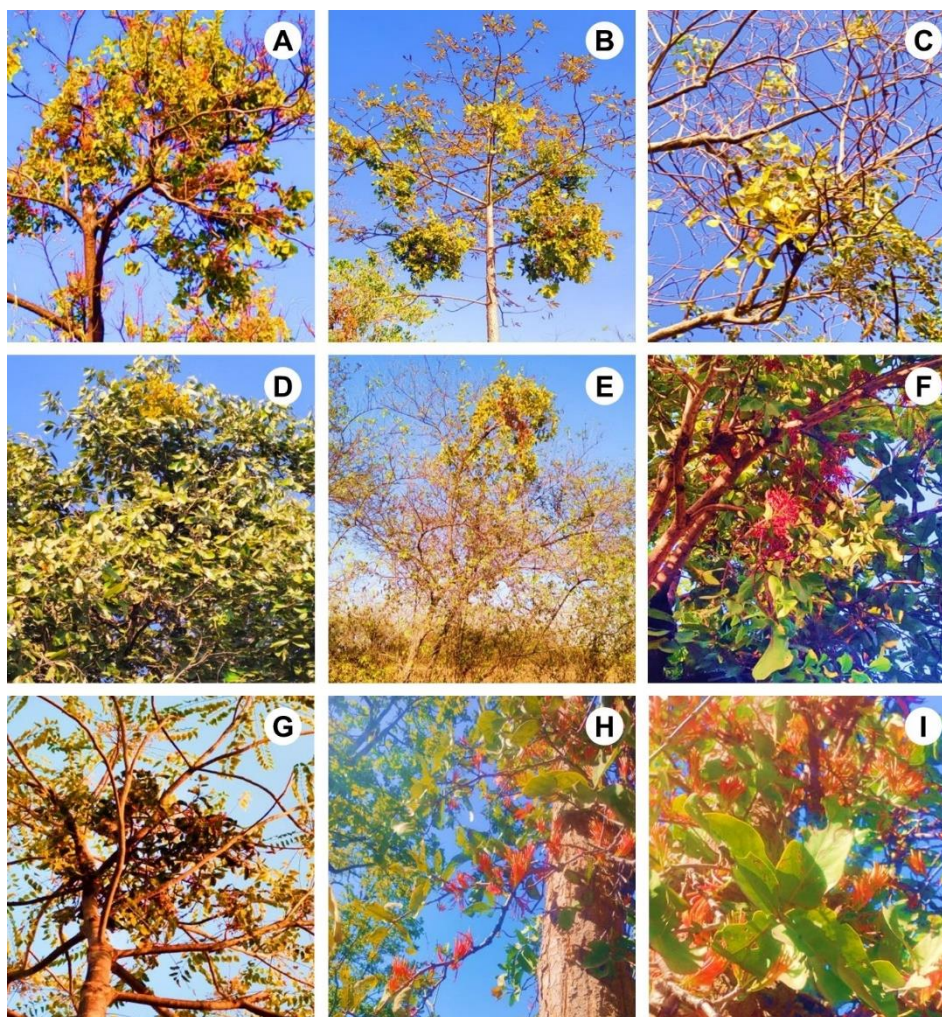
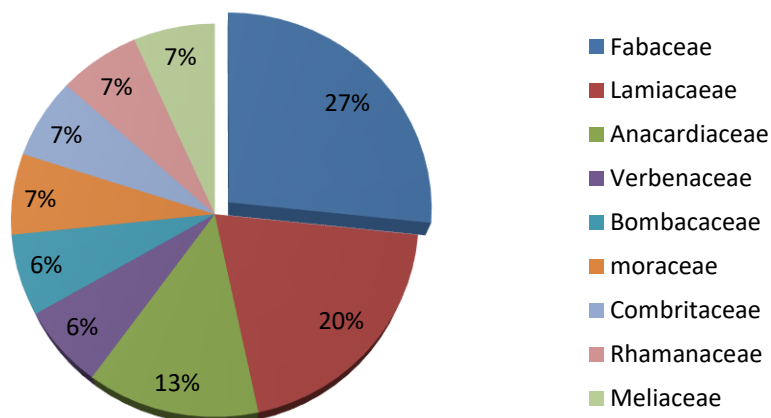


Figure 5. Some photographs of *Dendrophthoe falcata* (L.f.) Ettingsh on host species: **A**, *Melia azedarach* L.; **B**, *Bombax ceiba* L.; **C**, *Gmelina arborea* Roxb.; **D**, *Terminalia arjuna* (Roxb. ex-DC.) Wight & Arn.; **E**, *Vitex negundo* L.; **F**, *Buchnanian lanzan* Spreng.; **G**, *Ailanthus exelsa* Roxb.; **H**, *Shorea robusta* Roth.; **I**, *Mangifera indica* L.

Table 1. List of the host species of *Dendrophthoe falcata* (L.f) Ettingsh of Kurdeg, Simdega district in Jharkhand.

S.N.	Family Name	Scientific Name	Local Name	Phenology
1	Anacardiaceae	<i>Mangifera indica</i> L.	Aam	Feb-March
2	Bombacaceae	<i>Bombax ceiba</i> L.	Semal	Feb-March
3	Meliaceae	<i>Melia azederach</i> L.	Bakain	Feb-March
4	Lamiaceae	<i>Tectona grandis</i> L.f.	Teak	Nov-Dec
5	Fabaceae	<i>Cassia fistula</i> L.	Amaltas	April-May
6	Lamiaceae	<i>Gmelina arborea</i> Roxb.	Gamhar	Feb-March
7	Lamiaceae	<i>Senna siamea</i> (Lam.) H.S. Irwin & Barneby	Minjiri	Throughout year
8	Combretaceae	<i>Terminalia arjuna</i> (Roxb. ex-DC.)Wight & Arn.	Arjun	April-May
9	Moraceae	<i>Ficus benghalensis</i> L.	Peepal	March-April
10	Rhamanaceae	<i>Ziziphus jujuba</i> Mill.	Ber	Nov-Dec
11	Fabaceae	<i>Dalbergia sissoo</i> Roxb.	Sisum	Feb-March
12	Rutaceae	<i>Aegle marmelos</i> (L.) Corr.	Bel	April-May
13	Fabaceae	<i>Albizia lebbeck</i> (L.) Benth.	Sirish	Feb-March
14	Fabaceae	<i>Acacia auriculiformis</i> Benth.	Akashmani	July-Aug
15	Fabaceae	<i>Bauhinia purpurea</i> L.	koinar	Feb-March
16	Dipterocarpeceae	<i>Shorea robusta</i> Roth.	Sal	March-April
17	Anacardiaceae	<i>Buchnania lanzan</i> Spreng.	Chironji	Feb-March
18	Verbenaceae	<i>Vitex negundo</i> L.	Sindwar	June-Sep
19	Simaroubaceae	<i>Ailanthus exelsa</i> Roxb.	Mahaneem	Feb-March
20	Sapotaceae	<i>Madhuca longifolia</i> (J.Konig ex L.)J.F.Macbr.	Mahua	Feb-March

**Figure 6.** Family-wise distribution of *Dendrophthoe falcata* (L.f.) Ettingsh.

CONCLUSION

Dendrophthoe falcata is a novel species reported in the current study area. We observed that this hemiparasite was associated with 20 different host plant species, the majority among which had not yet been reported. This study has recognized a baseline for the study of host range for *Dendrophthoe falcata* of the given area. During the study period of approx. 10 months, few trees like *Melia azedarach*, *Mangifera indica* and *Bombax ceiba* were noted to have been destroyed due to the hemiparasite infestation. The existence of *Dendrophthoe falcata* on different hosts indicate increased adaptability of the hemiparasite that has added up to the damage of the trees in the study area. Hence there is a need to find the control measure to protect the forest flora from infestation.

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