

Studied on the parasitic plants of Pondicherry Engineering College Campus, Puducherry

B. SELVI AND D. KADAMBAN

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SUMMARY

Parasitic plants namely, *Dendrophthoe falcata* (L.f.) Ettingsh of Loaranthaceae and *Cassytha filiformis* L. of Lauraceae infesting the plants of Pondicherry Engineering College Campus at Pillaichavady were studied. They were growing on various hosts causing extensive damage to gardens and forest plants. *Dendrophthoe* was found growing on 26 species of angiosperms of which 22 were trees and 4 were shrubs, *Cassytha*, a leafless parasite was found growing on 20 species of which seven were trees, four shrubs, five climbers and four herbs. The parasite, *Dendrophthoe* was growing luxuriantly on exotic plants such as *Cassia siamea*, *Acacia auriculiformis*, *A. holosericea* and *Samanea saman* whereas the *Cassytha* was found on indigenous plants such as *Azadirachta indica*, *Cissus vitiginea*, *Benkara malabarica* and *Syzygium cumini*. Both are non host specific, but show preferential growth on certain hosts was evident from their morphological manifestation. The growth of *Dendrophthoe* on *Moringa oleifera* is reported for the first time and is a new host recorded in this study.

Key words : Parasite, Host, *Dendrophthoe*, *Cassytha*, exotic, Indigenous.

Many flowering plants, besides a large number of cryptograms, are known to exist as parasites and cause considerable damage to the garden and forest plants (Mathur, 1949). 277 genera and 4100 species of flowering plants are reported to be parasitic on different host plants, out of which only 25 genera can cause negative impact (Nickrent and Musselman, 2004). They grow on other plants to secure maximum amount of sunlight, food, water and air for themselves. The “struggle for existence” and “the survival of the fittest” makes the parasitic flowering plants imperative for such weaklings to seek the help of others. Parasitic plants such as *Cuscuta*, *Cassytha*, *Balanophora*, *Orobanche*, *Christionia*, and *Rafflesia* are total parasites, whereas *Dendrophthoe*, *Viscum*, *Santalum*, *Pedicularis*, *Myzodendron*, *Rhinathus*, *Thesium*, *Melampyrum*, *Tozzia*, *Euphrasia*, *Barisia* etc. are partial parasites (Mathur, 1949). *Dendrophthoe* belongs to Loranthaceae and is called as mistletoe whereas *Cassytha* belongs to Cassythaceae and is called as dodder. Both mistletoes and dodders cause serious problems for the host plants and are stem parasites (Mathur, 1949). Dodder is weedy, cover woody plants and damages certain economically important crop plants. Mistletoes can become so abundant on a tree, that most of the foliage is of parasite not the host in some cases. Parasite never kills the host, so they live unhappily together

(Nickrent, 2002). Brand (1938) reported that *L. longiflorus* var. *falcata* (*Dendrophthoe falcata*) is the main species attacking at least 110 tree species including *Tectona*, *Acacia*, *Albizia* and *Melia* species in Chennai.

Anuradha (2005) has reported the infestation of *Dendrophthoe* on 44 arborescent species in the forest of Shakthi – Auroville of Tamil Nadu. *Cassytha* is a highly climbing, parasitic vine of laurel family. The host-range of *Cassytha* is broad and is abundant in Southern Florida and in Australia (Nickrent and Musselman, 2004). Although the host parasite relationship exists in plants, we will understand very little about how and why different plants are selected, why some plants are favoured, and some are avoided entirely (Nickrent and Musselman, 2004).

Double, triple and hyper-parasitism are also common where *Loranthus* serves as a host for some other species while it is itself a parasitic on another plant. Ezekiel (1935) reported the occurrence of double parasitism of *Loranthus* and *Viscum* on *Eugenia* plants. Rao (1938) has also reported the case of triple parasitism from Bangalore where *Shorea talusa* is severely infested by *Dendrophthoe* (*Loranthus*) and in turn it is infected by *Viscum ramosissimum*.

Cassytha was found also growing on *Dendrophthoe falcata*, an evergreen parasitic shrubs, itself growing on a wide range of hosts (Ghosh *et al.*, 2002). *Cassytha* makes haustorial nodes on almost all vegetative and reproductive parts of *Dendrophthoe* viz., branches, lamina, petioles, flowering peduncles and young fruits. Both parasites belong to two different genera and families of Lauraceae and Loranthaceae, respectively. This

Correspondence to:

D. KADAMBAN, Department of Botany, K.M. Centre for Post Graduate Studies, Lawspet, PUDUCHERRY (U.T.) INDIA

Authors' affiliations:

B. SELVI, Department of Botany, K.M. Centre for Post Graduate Studies, Lawspet, PUDUCHERRY (U.T.)

phenomenon was noticed on a shrub, *Gmelina asiatica* of Verbenaceae.

These devastating parasites are controlled by various ways : removing the infected portions of the host before it flowers (Brand, 1938), some chemotropic reactions with haustoria are provided naturally with host to prevent the attack (Lacy, 1936), cut the infected branch and burn it. (Hayes, 1945) and chemical spray to control the parasites is quite expensive method.

Because of the co-evolution of host and parasite, total elimination is unrealistic and cannot be achieved. Watson (2001) suggested a modified management practices system in complex forest ecosystem to protect the economically important species.

An attempt was made to understand the biology of the hosts of the two important parasites *Dendrophthoe* and *Cassytha* to eradicate / prevent the spread of the parasites in the natural vegetation of Pondicherry Engineering College Campus at Pillaichavady, Puducherry.

MATERIALS AND METHODS

The present study was made to list out the plants infested by the angiospermic parasites namely, *Dendrophthoe falcata* and *Cassytha filiformis* in the Pondicherry Engineering College Campus (PEC). They were identified using the regional and state manuals of floras (Mathew, 1983; Gamble, 1925). The names of exotic species growing in PEC campus, was collected and cross checked with Auro Herbarium, Shakthi and French Institute.

The PEC campus is situated at Pillaichavady about 12 km North of Puducherry town. It spreads over an area of 210 acres on the shores of Bay of Bengal. Many exotic species apart from indigenous species are introduced to make it more greenary. Most of the plants are infested by parasites and are facing devastation. To save these plants, the present attempt is made during January - May 2006. The leaf area of parasite was determined using Kemp (1960) formula. The leaf at the third node from the top was taken for measurements.

$$\text{Leaf area} = L \times B \times K$$

where, L = length of the leaf,

B = Breadth,

K = kemp's constant (0.66 for dicots)

RESULTS AND DISCUSSION

A total of 26 species of angiosperms were infested by the parasite, *Dendrophthoe*, of which 22 of them were trees, and the remaining four were shrubs (Table 1). Among the hosts 14 were exotic and 12 of them are

indigenous. The luxuriant growth of the parasite was observed on the exotic trees, such as *Cassia siamea*, *Acacia auriculiformis*, *Acacia holosericea* and *Samanea saman*, *Tectona grandis*, *Pongamia pinnata* and *Pithecellobium dulce* and the indigenous species had given best cushion for the parasite. The garden plants such as *Citrus limon* and *Moringa oleifera*, were infested. The possible relation with *Moringa oleifera* was found here for the first time (Table 1).

Out of 20 host plants infested by *Cassytha*, only two of them are exotic and 18 plants were indigenous. It affected a wide range of habits *i.e.* seven were trees, four shrubs, five climbers and four herbs. The growth

Table 1 : Host plants infested by *Dendrophthoe*

Sr. No.	Host plant	Family	Habit	Indigenous / exotic
1.	<i>Acacia auriculiformis</i>	Mimosaceae	Tree	Exotic
2.	<i>Acacia holosericea</i>	Mimosaceae	Tree	Exotic
3.	<i>Albizia lebbek</i>	Mimosaceae	Tree	Indigenous
4.	<i>Anacardium occidentale</i>	Anacardiaceae	Tree	Exotic
5.	<i>Azadirachta indica</i>	Meliaceae	Tree	Indigenous
6.	<i>Caesalpinia pulcherrima</i>	Caesalpinaceae	Shrub	Exotic
7.	<i>Cassia siamea</i>	Caesalpinaceae	Shrub	Exotic
8.	<i>Casuarina equisetifolia</i>	Casuriaceae	Tree	Exotic
9.	<i>Citrus limon</i>	Rutaceae	Shrub	Indigenous
10.	<i>Citrus medica</i>	Rutaceae	Shrub	Indigenous
11.	<i>Delonix regia</i>	Caesalpinaceae	Tree	Exotic
12.	<i>Eucalyptus sp.</i>	Myrtaceae	Tree	Exotic
13.	<i>Ficus benghalensis</i>	Moraceae	Tree	Indigenous
14.	<i>Magnifera indica</i>	Anacardiaceae	Tree	Indigenous
15.	<i>Manilkara zapota</i>	Sapotaceae	Tree	Exotic
16.	<i>Millingtonia hortensis</i>	Bignoniaceae	Tree	Exotic
17.	<i>Moringa oleifera</i>	Moringaceae	Tree	Indigenous
18.	<i>Peltophorum pterocarpum</i>	Caesalpinaceae	Tree	Exotic
19.	<i>Pithecellobium dulce</i>	Mimosaceae	Tree	Indigenous
20.	<i>Pongamia pinnata</i>	Fabaceae	Tree	Indigenous
21.	<i>Psidium guajava</i>	Myrtaceae	Tree	Indigenous
22.	<i>Samanea saman</i>	Mimosaceae	Tree	Indigenous
23.	<i>Spathodea campanulata</i>	Bignoniaceae	Tree	Exotic
24.	<i>Tabebuia argenta</i>	Bignoniaceae	Tree	Exotic
25.	<i>Tabebuia rosea</i>	Bignoniaceae	Tree	Exotic
26.	<i>Tectona grandis</i>	Verbenaceae	Tree	Indigenous

and abundancy were found on *Cissus vitiginea*, *Benkara malabarica* and *Azadirachta indica* (Table 2).

Both *Dendrophthoe* and *Cassytha* were found growing on the same indigenous trees species like *Anacardium occidentale* and *Azadirachta indica* and a case of double parasitism was observed.

The morphological variation of the parasitic leaves in different hosts was studied. *Cassytha* is a leafless dodder, whereas *Dendrophthoe* bears stem, leaves, flowers and fruits. *Dendrophthoe* growing on *Acacia holosericea*, showed the maximum leaf area 60.40 cm² followed by 42.90 cm² and 37.95 cm² on the hosts like *A. auriculiformis* and *Psidium guajava*, respectively, Minimum leaf area of 20.64 cm² and 12.77 cm² are seen on the host plants, *Azadirachta indica* and *Citrus limon*, respectively.

The plants infested by *Dendrophthoe falcata* and

Cassytha filiformis were studied in the PEC campus. *Dendrophthoe* infested 26 species out of which 22 are tree species remaining four were shrubs whereas *Cassytha* was found growing on 20 species of varied habit, viz., seven were trees, four shrubs, five climbers and four herbs. *Dendrophthoe* was growing luxuriantly mostly on exotic species whereas the *Cassytha* infested indigenous species. The luxuriant growth of *Dendrophthoe* was seen on the exotic trees such as *Cassia siamea*, *Acacia auriculiformis*, *Acacia holosericea* and *Samanea saman*. *Tectoniza grandis*, *Pongamia pinnata* and *Pithecellobium dulce* were the indigenous species, which had given the best cushion for the parasite. Its growth on *Moringa oleifera* is recorded first time in this study. *Cassytha* is a leafless dodder like parasite found devastating on plants like *Cissus vitiginea*, *Benkara malabarica* and *Azadirachta indica*. It agrees with the earlier report of Nickrent and Musselmon (2004) who reported the host range of *Cassytha* from Southern Florida and in Australia.

A case of double parasitism was observed in the case of two indigenous species namely, *Anacardium occidentale* and *Azadirachta indica* wherein both *Dendrophthoe* and *Cassytha* grew luxuriously on them. The occurrence of double parasitism is similar to the earlier report of Ezekiel (1935) where *Loranthus* and *Viscum* grew on *Eugenia* plants.

Morphological variation of the *Dendrophthoe* leaves in different hosts was studied and found maximum on *Acacia holosericea* (60.40 cm²) followed by *A. auriculiformis* (42.90 cm²) and *Psidium guajava* (37.95 cm²). Minimum leaf area of 20.64 cm² and 12.77 cm² were seen on the host plants *Azadirachta indica* and *Citrus limon*, respectively. It confirms the earlier report of Anuradha (2005).

Parasitic plants are considered as pathogens. Both *Dendrophthoe* and *Cassytha* have negative impact on hosts by causing extensive damage as reported earlier by Mathur (1949) and Nickrent and Musselman (2004). In addition, both the parasites never kill the host, so they live unhappily together as reported by Nickrent (2002).

Conclusion:

The present attempt was made to study the negative impact of *Dendrophthoe* and *Cassytha* on the host species of the vegetation of Pondicherry Engineering College campus, and to protect the vegetation from the parasites. They can be eradicated by removing the infested portions and burning them to avoid the incidence of devastation by these parasites.

Sr. No.	Host plant	Family	Habit	Indigenous / exotic
1.	<i>Ammania baccifera</i>	Lythraceae	Herb	Indigenous
2.	<i>Anacardium occidentale</i>	Anacardiaceae	Tree	Exotic
3.	<i>Aristida hystrix</i>	Poaceae	Herb	Indigenous
4.	<i>Azadirachta indica</i>	Meliaceae	Tree	Indigenous
5.	<i>Bankara malabarica</i>	Rubiaceae	Tree	Indigenous
6.	<i>Bougainvillea glabra</i>	Nyctaginaceae	Climber	Exotic
7.	<i>Canthium coromandelicum</i>	Rubiaceae	Shrub	Indigenous
8.	<i>Cissus vitiginea</i>	Vitaceae	Climber	Indigenous
9.	<i>Dichrostachys cinerea</i>	Mimosaceae	Tree	Indigenous
10.	<i>Diospyros ferrea</i>	Ebenaea	Tree	Indigenous
11.	<i>Ervatamia divaricata</i>	Apocynaceae	Shrub	Indigenous
12.	<i>Hibiscus vitifolius</i>	Malvaceae	Herb	Indigenous
13.	<i>Hemidesmus indicus</i>	Asclepiadaceae	Climber	Indigenous
14.	<i>Ixora pavetta</i>	Rubiaceae	Shrub	Indigenous
15.	<i>Jasminum angustifolium</i>	Oleaceae	Climber	Indigenous
16.	<i>Pavonia zeylanica</i>	Malvaceae	Shrub	Indigenous
17.	<i>Polyalthia longifolia</i>	Annonaceae	Tree	Indigenous
18.	<i>Rivea hypocrateriformis</i>	Convolvulaceae	Climber	Indigenous
19.	<i>Syzygium cumini</i>	Myrtaceae	Tree	Indigenous
20.	<i>Waltheria indica</i>	Sterculiaceae	Herb	Indigenous

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