Indian Journal of Plant Sciences ISSN: 2319–3824
An Open Access, Online International Journal Available at http://www.cibtech.org/jps.htm
2020 Vol. 9, pp.99-102/Kalaichelvi et al.
Research Article

STUDY ON BIOLOGY, SPREAD AND CONTROL OF LORANTHUS (*DENDROPHTHOE FALCATA*) IN NEEM TREE

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ABSTRACT
A research work was carried out to study the biology and control of Loranthus (*Dendrophthoe falcata*) in neem tree. *Dendrophthoe falcata* is a semi-stem plant parasite having thick leathery leaves arranged oppositely, ellipticovate or elliptic lanceolate nearly acute or obtuse or spear shape. Auxillary raceme, 4-5 stamens with single stigma, yellow in colour, tip green in colour, yellow turns to red when dried. Flowering starts from November to May. Fruiting starts by the end of April month and usually it gets ripened by May – June months. Percentage of Loranthus infestation was ranged from 0 to 75% in neem trees of different sites of AC&RI, Madurai. Almost all the sites were infested with Loranthus if it is not timely controlled 10-15 number of trees will be dried and dead due to Loranthus infestation. Average wet weight of Loranthus twig was 1540 g/plant and dry weight of 903 g/plant. Loranthus has recorded 0.82,0.04 and 0.16% of N, P and K respectively in plant samples. From this study on management of Loranthus, it can be concluded that there was no regeneration in cutting manually using saw 30 cm before the haustoria attachment, Pasting 2, 4- D Na salt 1% in cutted portion of Loranthus, Pasting 2,4- D Na salt 1% + Wiping with Glyphosate 10 ml/litre in cutted portion of Loranthus. Slight drying was with 2, 4-D Na salt applied branch and severe drying in 2, 4-D Na salt and glyphosate 1% wiping in cut portion was observed and within a week, new leaves and branches of neem were emerged from the dried portion of Neem tree. But there was also no regrowth of neem from the herbicide applied or cut branch of Neem tree.

Keywords*: Loranthus, Biology, Infestation, Percentage Control*

INTRODUCTION
Parasitic plants or Mistletoes are common in various kinds of plants or trees which are belonging to the family Loranthaceae. It is the most common of all the mistletoes that occur in India. At the moment reports say that it has around 401 plant hosts. The genus *Dendrophthoe* comprises about 31 species spread across tropical Africa, Asia, and Australia among which 7 species are found in India. These can attack numerous trees in forest and plantation leading to untimely death of the host plant. In forests, they are reported to reduce the productivity of timber and related forest products. In trees, the parasite enters the endophytic system, invades the heartwood and thus affects the wood quality. Wood quality is also affected by larger knots and other altered physical properties. Mango and Cashew are some of the most seriously affected ones. Moderate to severe infestation of Loranthus was observed in the campus of Agricultural College and Research Institute was observed and hence the experiment has been conducted to study the biology and control of Loranthus in neem trees.

MATERIALS AND METHODS
A research work was carried out at Agricultural College and Research Institute (AC&RI), Tamil Nadu Agricultural University, Madurai during 2018-19 to study the biology and control of Loranthus (*Dendrophthoe falcata*) in neem tree. Flowering and ripening period were observed for a year. Wet and dry weight of individual loranthus twigs were observed. Percentage of infestation in neem tree were recorded at Agricultural College and Research Institute, Madurai. Nutrient analysis were done in neem and loranthus and non – infested neem tree also to study the nutrient flow from host to the parasite. Cutting manually using saw 30 cm before haustoria including the haustoria attachment, Pasting 2, 4- D Na salt 1% in cutted portion of Loranthus, Pasting 2,4- D Na salt 1% + Wiping with Glyphosate 10

ml/litre in cutted portion of Loranthus, and cutting of loranthus twig alone were the treatments imposed for controlling Loranthus in neem tree.

RESULTS AND DISCUSSION

Biology

The identified species at Agricultural College and Research Institute, Madurai is *Dendrophthoe falcata*. It is a semi-stem plant parasite having thick leathery leaves arranged oppositely, ellipticovate or elliptic lanceolate nearly acute or obtuse or spear shape Auxillary raceme, 4-5 stamens with single stigma, yellow in colour, tip green in colour, yellow turns to red when dried. Flowering starts from November to May. Fruiting starts by the end of April month and usually it gets ripened by May – June months. Unripe fruit are green in colour and turned to yellow when it matures. Fruits are small berry type with single seeded /fruit. The seed is very small in size. The seeds are disseminated by birds from one tree to another tree. Seeds dropped along with the faeces on young branches of the host plant germinate and penetrate the tissue. The parasitic stem attached itself with a peg like-haustoria or knot like structures with host. The sharing of the nutrient and water along with the parasitic plant was done through this haustoria and renders the host plant lesser growth eventually became unproductive. Once, Loranthus infestation starts, the neem tree show decline in growth and after 4-5 years, the plant show decline symptoms and finally dies (Singh *et al*., 2016).

Table 1: Study on floral and fruit formation in Loranthus

Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec
++	+++	++++ ++	++++ ++	+++ ++	+++ ++	++++	+ ++	+ ++	+	++	++

+ - vegetative stage; ++- flowering stage; +++- fruit formation; ++++- fruit ripening

April – may - leaf falling was observed

Flower to fruit formation – 2 months

Fruit - fruit ripening -2 weeks (green to yellow colour formation)

Spread of loranthus in neem tree of Agricultural College and Research Institute, Madurai

Table 2: Assessing% of Loranthus infestation in *Neem* tree

Site No.	No of trees infested	Total number of trees	% of infestation
Gate path			
1.	6	15	40.0
2.	7	19	36.8
3.	19	56	33.9
4.	0	20	0.0
5.	2	18	11.1
6.	3	4	75.0
7.	0	17	0.0
8.	3	4	75.0
Play ground			
9.	1	3	33.3
10.	3	28	10.7
11.	9	51	17.6
12.	2	11	18.2
13.	5	11	45.5
orchard			
14.	4	11	36.4
15.	0	1	0.0
Total	64	269	23.8

Loranthus infested tree has been marked with a white dot using paint. Different sites in AC& RI, Madurai was surveyed both the sides of path, play ground and orchard were taken for the study. Both the infested and total number of trees was accounted to assess the percentage of infestation.

Percentage of Loranthus infestation was ranged from 0 to 75%. Out of 269 neem trees 64 were infested with Loranthus including single and multiple infestations and accounts for an average infestation of 23.8%.

Severity of infestation:

As already stated, 10-15 number of trees is in dying stage almost dried due to Loranthus infestation. In almost all the infested trees, 3-4 Loranthus infestation (multiple infestation) was observed revealed that easily multiplying in the infested trees as already stated by Docters, 1954.

Table 3: Wet weight and Dry weight of Loranthus

SI. No.	Wet weight (g/plant)	Dry weight (g/plant)
1.	1250	680
2.	2500	1800
3.	1850	720
4.	1150	715
5.	950	600
Mean	1540	903

Mean wet weight of Loranthus twig was 1540 g/plant and dry weight of 903 g/plant .

Table 4: Total N, P and K uptake

SI.No	Treatment	N(%)	P(%)	K(%)
1.	**Neem - healthy tree** without Loranthus infestation	1.13	0.09	0.07
2.	**Neem – Loranthus infested**	1.48	0.07	0.07
3.	**Loranthus**	0.82	0.04	0.16

Loranthus has recorded 0.82,0.04 and 0.16% of N, P and K uptake respectively. There was no much difference among healthy (non – infested) and Loranthus infested neem trees. Total nitrogen and phosphorus uptake were comparatively higher in neem tree over Loranthus. Potassium uptake was higher in Loranthus when compared to neem tree. Nutrient uptake of Loranthus was calculated as 740: 36:145 g NPK on dry weight basis per infestation. Even with this low flow of nutrients it has the capacity to dry the neem branches and kill due to multiple infections. Besides this unknown physiology is should be between the host and parasite to kill the entire tree.

Control of Loranthus in Neem tree

1. Cutting manually using saw 30 cm before the haustoria attachment

Using saw Loranthus infested branch were cut down 30 cm before the haustoria attachment. Five branches were cut down. There was no regeneration of loranthus or neem from the cut portion.

2. Pasting 2, 4- D Na salt 1% in cutted portion of Loranthus

Five branches were selected and were cut down before the haustoria 2,4 – D Na salt 1% was pasted in the cut portion. Slight drying of neem tree in the cut branch was observed on 1 week after treatment. Regeneration was observed in the drying portion but there was no regeneration of loranthus or neem from the cut portion.

3. Pasting 2,4- D Na salt 1% + Wiping with Glyphosate 10 ml/litre in cutted portion of Loranthus

Five branches were selected and were cut down before the haustoria 2,4 – D Na salt 1% was pasted and wiping of glyphosate 1 % in the cut portion. Severe drying of neem tree in the cut branch was observed on 1 week after treatment. New leaves were observed in the drying portion but there was no regeneration of loranthus or neem from the cut portion.

4. Cutting of loranthus twig alone

There was regeneration of Loranthus as new plant.

From this study, it can be concluded that there was no regeneration in cutting manually using saw 30 cm before the haustoria attachment, Pasting with 2, 4- D Na salt 1% in cut portion of Loranthus, pasting 2, 4-D Na salt 1% in haustoria - neem tree, Pasting 2,4- D Na salt 1% + Wiping with Glyphosate 10 ml/litre in cutted portion of Loranthus, but also there was no regrowth of Neem from the cut portion.

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