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Evaluation of certain eco-friendly treatments for the management of subterranean termites in Aonla and Ber trees

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Abstract

Field experiments were conducted to evaluate the efficacy of certain eco-friendly treatments for the management of subterranean termites *Odontotermes wallonensis* in Aonla and Ber trees. The treatments include application of leaf powders of *Calotropis*, *Vitex*, *Tulsi*, *Vinca*, Neem @ 50 gm/tree, swabbing with neem oil, lime, coal tar and Nimbecidine spray (1ml / lit). Number of termite galleries, length of galleries and number of termites per gallery were recorded both in Aonla and Ber trees. Termite incidence was high in Aonla compared to Ber. In Aonla trees *Calotropis* leaf powder and *Vinca* leaf powder recorded lowest number of galleries (1.4 and 1.4), length of gallery (7.0 and 6.2 cm) and number of termites per gallery (12.0 and 12.0). Untreated check had the highest incidence. In Ber trees *Vinca* leaf powder and *Tulsi* leaf powder recorded lowest number of galleries (1.4 and 1.8). Length of galleries was minimum (5.0cm) in nimbecidine spray and maximum (12.2 cm) in untreated check. Lowest number of termites per gallery was recorded in *Vinca* leaf powder (7.0) followed by *Tulsi* leaf powder (9.0) and nimbecidine spray (9.0). *Vinca* leaf powder @ 50 gm/tree was effective against termites both in Aonla and Ber trees.

Keywords: Termites, *Odontotermes wallonensis*, botanicals, swabbing, Aonla, Ber

Introduction

Termites cause serious damage to Agricultural Crops, Horticultural Crops, Forest trees and buildings. The arid zone fruit trees which are susceptible to termite damage are Aonla, ber, custard apple, jamun, bael, wood apple etc. Premalatha (2007) [6] conducted detailed studies on the bioecology of subterranean termites in southern districts of Tamil Nadu. Several studies were conducted to evaluate the efficacy of insecticides against subterranean termites on Coconut (Premalatha *et al.*, 2008) [7], sugarcane (Rajavel *et al.*, 2010) [9] and house hold termites (Rajavel *et al.*, 2010) [10]. Considering the ecological problems caused by Termiticides, non-insecticidal methods of termite control were developed. Rajavel *et al.*, (2007) [8] reported a new bait system for the management of subterranean termites. Secondary metabolites of plant onion have been reported to possess toxic, growth regulating and antifeedant effects against a host of insect pests. Effect of tomatine on *Odontotermes wallonensis* was reported by Datchinamurthy *et al.*, (2011) [2] and Nisha *et al.*, (2013) [5]. Another plant substance Sesamin effectively controlled *O. wallonensis* damage in groundnut under field conditions (Adlin Pricilla Vasanthi and Rajavel, 2016 [1]. The present study was conducted to manage subterranean termites in Aonla and Ber using plant substances viz., *Calotropis*, *Vitex*, *Vinca*, *Tulsi* and Neem.

Materials and Methods

A field trial was laid out at Regional Research Station, Aruppukottai during 2019. The trial was laid out in Aonla and Ber orchards to evaluate the efficacy of different eco-friendly treatments against termites. There were ten treatments as in Table 1 and they were imposed on five trees and each tree served as a replication. Two rounds of application of botanicals were given at fortnightly intervals and pre-treatment and post-treatment counts were recorded. Number of galleries per tree, length of galleries and number of termites per gallery were recorded. The data were analyzed using AGRES.

Result

Data collected on the effect of ecofriendly treatments for the management of termites.

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O. wallonensis in Aonla are presented in Table 1. *Calotropis* leaf powder, *Vinca* leaf powder and swabbing with neem oil recorded the lowest number of termite galleries (1.4). Untreated check registered higher number of 4.4 galleries. Length of galleries was lowest in *Vinca* treatment (6.2 cm) followed by *Calotropis* (7.0 cm). Swabbing with lime had gallery length of 7.6 cm. The maximum length of gallery (14.6 cm) was observed in untreated check. With regard to number of termites per gallery, the lowest number was recorded in swabbing with neem oil (10.0) followed by nimbecidine spray (11.0). *Calotropis* leaf powder and *Vinca* leaf powder had 12.0 number of termites per gallery. Untreated check recorded the highest number of 36.0 termite per gallery.

Table 2 depicts the effect of ecofriendly treatments on

termites in Ber trees. *Vinca* leaf powder and swabbing with neem oil recorded the lowest number of termite galleries (1.4). This was followed by swabbing with lime (1.6) and nimbecidine spray (1.6). Untreated check registered the highest number of 3.6 galleries. Nimbecidine spray recorded the lowest length of gallery (5.0 cm) followed by *Vitex* leaf treatment (6.2). Next best treatments were *Calotropis* leaf powder (6.8 cm) and neem leaf powder (6.8 cm). The highest gallery length of 12.2 cm was registered in untreated check. The lowest number of termites was recorded in *Vinca* leaf powder treatment (7.0). The next best treatments were Tulsi leaf powder, swabbing with lime and nimbecidine spray. All these treatments had 9.0 termites per gallery. The highest number of 28.0 termites per gallery was recorded in untreated check.

Table 1: Effect of certain eco-friendly treatments for the management of subterranean Termites in Aonla trees

S. No.	Treatments	Dose	No. of Galleries	Length of Galleries (cm)	No. of Termites /Gallery
1	<i>Calotropis</i> leaf powder	50 gm /tree	1.4	7.0	12.0
2	<i>Vitex</i> leaf powder	50 gm /tree	2.2	7.6	15.0
3	Tulsi leaf powder	50 gm /tree	2.0	8.4	14.0
4	<i>Vinca</i> leaf powder	50 gm/tree	1.4	6.2	12.0
5	Neem leaf powder	50 gm /tree	1.6	9.4	14.0
6	Swabbing with neem oil		1.4	9.8	10.0
7	Swabbing with lime		1.8	7.6	16.0
8	Swabbing with coal tar		2.0	10.6	18.0
9	Nimbecidine spray	1ml /litre	1.8	8.2	11.0
10	Untreated check		4.4	14.6	36.0
	CD (P=0.05)		1.41	3.71	13.06

Table 2: Effect of certain eco-friendly treatments for the management of subterranean Termites in Ber trees

S. No.	Treatments	Dose	No. of Galleries	Length of Galleries (cm)	No. of Termites /Gallery
1	<i>Calotropis</i> leaf powder	50 gm /tree	2.0	6.8	14.0
2	<i>Vitex</i> leaf powder	50 gm /tree	2.0	6.2	10.0
3	Tulsi leaf powder	50 gm /tree	1.8	8.2	9.0
4	<i>Vinca</i> leaf powder	50 gm /tree	1.4	7.6	7.0
5	Neem leaf powder	50 gm /tree	2.0	6.8	11.0
6	Swabbing with neem oil		1.4	7.0	16.0
7	Swabbing with lime		1.6	7.8	9.0
8	Swabbing with coal tar		2.0	6.6	13.0
9	Nimbecidine spray	1ml /litre	1.6	5.0	9.0
10	Untreated check		3.6	12.2	28.0
	CD (P=0.05)		1.12	3.82	10.30

Discussion

Among five leaf powders tested *Vinca* leaf powder and *Calotropis* leaf powder were found to be more effective in registering less number and length of galleries and low population of termites in Aonla and Ber trees. Leaf powders of *Vitex*, Tulsi and neem were also effective. Swabbing with neem oil and lime prevented termites attacking the trees. Coal tar swabbing was found effective in reducing length of galleries in Ber. The standard check nimbecidine was also an effective treatment in reducing termite incidence with less number of termites per gallery.

The results of the present study are in confirmation with the findings of Manager Singh *et al.*, (2002) [4] who reported that *Calotropis procera* extract reduced the infestation of termite *Odontotermes obesus* in sugarcane. Leaf powders of other plants viz., *Vinca*, *Vitex*, neem etc also possess insecticidal property. Jaydeep *et al.*, (2010) [3] reported the effect of methanolic extract of *Vinca rosea* on neonate larvae of gram pod borer. Flavonoids, alkaloids, saponins, sesquiterpenes, limnoids, phenols, stilbenes and coumarins of plant origin have been reported to possess toxic, growth regulating and

antifeedant effects against a host of insect pests (Sunita and Laljee, 2008) [11]. The secondary metabolites present in the leaf powders might be the reason for reduction in population and infestation of termites in Aonla and ber trees.

Conclusion

Use of leaf powders and swabbing of tree trunks with neem oil, lime and coal tar will provide an alternate management strategy for termites in arid zone fruit trees like Aonla and Ber. These inputs are eco-friendly in contrast to termiticides which persist in soil for longer period and pose problems to the environment.

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