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Antifeedant effect of some botanical extracts against cerambicid *Acanthophorous serraticornis*

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Abstract
Botanical extracts from seven plants *Azadirachta indica* (Neem), *Nerium oleander* (Kaner), *Polyalthia longifolia*, *Balanites aegyptiaca* (Hingota), *Calotropis procera* (Aakdo), *Putranjiva roxburghii* (Putrajiva), *Mentha spicata* (Mint) were tested for antifeedant properties against *Acanthophorous serraticornis* in laboratory conditions. The results of the experiment revealed that Neem, *Calotropis* and *Balanites* leaves extract has antifeedant action against larvae of *Acanthophorous serraticornis.* It has been concluded from the present findings that Neem leave extract was more effective antifeedent at 20%, 10% and 5%, Neem stem extract at 20% concentration followed by *Calotropis* and *Balanites* leaves extract at 20% concentration against larvae of *Acanthophorous serraticornis.*

Keywords: *Acanthophorous serraticornis*, botanical extracts, antifeedant

Introduction
Prosopis cineraria belonging to the family Leguminosae and subfamily Mimosoideae also referred as life line of Rajasthan owing to its utility during drought condition. It is a multipurpose tree species that provides fodder, fuel, food, timber, and shade and is known to effectively stabilize sand dunes and can withstand periodic burial (Gates and Brown 1988) [3]. It is endemic to the hot deserts of India and is considered to be an essential component of the agroforestry land use system with enormous economic and cultural values to the people of Rajasthan. But the population of Khejri, a priority tree of Arid ecosystem, is rapidly declining due biotic factors (root rot fungus *Ganoderma lucidum* and root borer, *Acanthophorous serraticornis* (Singh *et al*., 2012) [11] and abiotic factors *viz.*, over exploitation of ground water by way of tube wells, low rain fall over the years, consequent low ground water charging and change in agricultural practices by increased use of tractors and mechanized cultivation, resulting in harms to standing trees roots and seedlings (Ahmed *et al*., 2004) [1].
Careless and indiscriminate use of synthetic pesticides to manage insect pest during the past has resulted in malicious effects on the environment and may leads to "ecological backlash" (Sundararaj, 1997) [13]. Therefore search for alternative pest control technologies is the need of hour. Botanical insecticides are one of such novel and safer alternative strategy. Botanical insecticides, containing plant extracts as active components, are safer as well as environmentally friendly than synthetic insecticides. Use of these chemicals of plant origin, commonly called botanicals or phytochemicals have attracted particular attention because of their insect pests specificity, biodegradable nature and their potential for commercial application (Bishop and Thronton, 1997; Shukla *et al*., 2000) [12, 2]. For instance, neem, *Azadiractia indica* is well known to contain potent phytochemicals with adverse physiological effects on a number of insect pests (Schmutterer, 1990) [10]. Kulkarni *et al.,* (1997) [5] and Meshram (2000) [6] reported that *Dalbergia sissoo* leaf extract has antifeedant effect against *Plecoptera reflexa.*
A similar effort is hereby made to check the efficacy of some botanicals for their antifeedant activity as a biocontrol management strategy against *Acanthophorous serraticornis.*

Materials and Methods
Plant materials collection and processing
Leaves, stems of Neem, Kaner, *Balanites*, *Calotropis*, *Putranjeeva*, Mint were collected and thoroughly washed with tap water to avoid dusts and other unwanted materials

accumulated on the leaves from their natural environment. The dust free leaves /stems were allowed to dry under shade in the laboratory for 20-30d. The dried leaves/stems were powdered by using electric blender. Finally, fine powder was collected from the powdered leaves/stems by sieving through the strainer and further used for extraction.

Extraction procedure

Twenty gram of powdered plant material was taken in 200 ml conical flask and 100 ml of water was added to it. The mouth of the conical flask was covered with aluminum foil and kept in a reciprocating shaker for 24 h for continuous agitation at 150 rev/ min for thorough mixing. Then, extract was filtered by using muslin cloth followed by Whatman no 1 filter paper and concentrated by evaporating on water bath at 50°C temperature. Finally, the residues were collected and used for the experiment.

Test concentrations preparation

Stock solution was prepared as 1 mg/ml to which 0.1% of soap was added for emulsification purpose. From the stock solution 1%, 5%, 10%, 20% concentration of leave/stem extracts was prepared for antifeedancy test against *Acanthophorous serraticornis*.

Antifeeding Behaviour

The experiment was conducted to determine the effect of seven plant extracts mixed in artificial diet of third instar larvae of *Acanthophorous serraticornis*. The Antifeeding effect was estimated through a no-choice assay. The larvae were previously starved for 3–4 h before treatment to ensure an empty intestine. As a contrast, artificial diet alone was kept as control treatment. After 24 h, faeces were weighed and removed from treatments and the remaining diet left was weighed again. The experiment was designed in CRD design with three replications and analysis of data was done to calculate mean and standard deviation.

Results and Discussion

Larvae of *Acanthophorous serraticornis* were exposed to *Azadirachta indica*(Neem), *Nerium oleander* (Kaner), *Polyalthia longifolia*, *Balanites aegyptiaca* (Hingota), *Calotropis procera*(Aakdo), *Putranjiva roxburghii* (Putrajiva), *Mentha spicata* (Mint) leaves and stem extracts added to the diet in a no-choice assay and the weight of diet consumed by the larvae was recorded. A dose-dependent antifeeding effect was observed. Mean diet fed by larvae was least i.e. 0.02±0.04g when diet was mixed with extracts of neem leaves at 20% concentration followed by 0.09±0.01 g and 0.13±0.01 g *Calotropis* and *Balanites* leaves extract at 20% conc. Neem stem extract also showed antifeedant effect where the mean diet fed by larvae was 0.04±0.02 g in comparison to control where the mean diet fed by larvae was 1.26±0.04g (Table 1).

It has been concluded from the above findings that Neem leave extract was effective antifeedent at 20%, 10% and 5% concentration, Neem stem extract at 20% concentration followed by *Calotropis* and *Balanites* leaves extract at 20% concentration against larvae of *Acanthophorous serraticornis.* Many indigenous plant extracts have been reported to possess antifeedant properties against various insect pests (Rao *et al*., 2000) [9]. Geetanjaly and Tiwari (2013) [4], studied the effect antifeedant and growth disrupting action of neem leaf and jatropha seed extracts against *Spodoptera litura*. Panwar and Chibber (2006) [7] studied the effect of plant extracts on feeding potential of *Spilarctia obliqua*. They found leaf extracts of *A. indica* and *Eucalyptus* and *Lantana camara* have suppressants and deterrents properties. However, strong repellant activity was noticed in case of neem only. Prajapati *et al*., (2002) [8] found that exposure of fourth instars of *Spilarctia obliqua* Walker (Lepidoptera: Arctiidae) to excelsin over a 24 h period resulted in reduced feeding and growth rates.

Plant extracts can certainly be exploited against insect pests to prevent the damage and minimizes adverse effect on environment. These measures will lower down our dependency on insecticides. These studies clearly demonstrate the potential and possibilities of using plant and animal origin products alone and in combination with overall IPM strategies for the control of *Acanthophorous serraticornis*.

Table 1: Observation on antifeedacy of some plant extracts against *Acanthophorus serraticornis* larvae

S. No	Treatments /Plant extract used	Plant part used for extract	Concentration (%)	Diet given (g)	Mean of Diet left (g)	Mean of faces (g)	Mean diet fed ±SD
1.	*Azadirachta indica* (Neem)	Leaves	1	2	1.82±0.016	0.025±0.002	0.18±0.02
			5	2	1.946±0.034	0.021±0.001	0.05±0.04
			10	2	1.97±0.009	0.011±0.001	0.03±0.01
			20	2	1.976±0.032	0.001±0.001	0.02±0.04
		stem	1	2	1.77±0.008	0.034±0.002	0.23±0.01
			5	2	1.78±0.008	0.031±0.001	0.22±0.01
			10	2	1.82±0.016	0.024±0.001	0.18±0.02
			20	2	1.96±0.012	0.012±0.001	0.04±0.02
2.	*Nerium oleander* (Kaner)	leaves	1	2	0.54±0.012	0.045±0.001	1.45±0.02
			5	2	0.54±0.001	0.042±0.001	1.45±0.01
			10	2	0.54±0.001	0.041±0.001	1.46±0.01
			20	2	0.53±0.017	0.040±0.001	1.46±0.02
		stem	1	2	0.546±0.001	0.045±0.001	1.45±0.01
			5	2	0.556±0.012	0.044±0.001	1.44±0.02
			10	2	0.55±0.001	0.041±0.001	1.45±0.01
			20	2	0.54±0.014	0.04±0.001	1.46±0.01
3.	*Polyalthia longifolia*	leaves	1	2	0.44±0.012	0.037±0.001	1.56±0.02
			5	2	0.44±0.012	0.034±0.001	1.56±0.02
			10	2	0.47±0.001	0.034±0.001	1.19±0.58
			20	2	0.51±0.012	0.032±0.001	1.49±0.02
		stem	1	2	0.44±0.001	0.037±0.001	1.56±0.01

			5	2	0.45±0.001	0.035±0.001	1.55±0.01
			10	2	0.51±0.001	0.034±0.001	1.49±0.01
			20	2	0.51±0.001	0.033±0.001	1.49±0.01
4.	*Balanites aegyptiaca* (Hingota)	leaves	1	2	1.72±0.016	0.025±0.002	0.28±0.02
			5	2	1.83±0.001	0.022±0.002	0.17±0.01
			10	2	1.86±0.012	0.017±0.002	0.14±0.02
			20	2	1.86±0.005	0.013±0.000	0.13±0.01
		stem	1	2	1.64±0.029	0.035±0.001	0.36±0.04
			5	2	1.67±0.001	0.032±0.001	0.33±0.01
			10	2	1.726±0.017	0.024±0.001	0.27±0.02
			20	2	1.77±0.001	0.023±0.001	0.23±0.01
5.	*Calotropis procera* (Aakdo)	leaves	1	2	1.80±0.005	0.027±0.001	0.19±0.01
			5	2	1.83±0.020	0.025±0.000	0.17±0.03
			10	2	1.86±0.001	0.015±0.000	0.14±0.01
			20	2	1.91±0.001	0.011±0.001	0.09±0.01
		stem	1	2	1.76±0.021	0.026±0.000	0.24±0.03
			5	2	1.82±0.012	0.024±0.000	0.18±0.02
			10	2	1.846±0.012	0.014±0.000	0.15±0.02
			20	2	1.87±0.001	0.011±0.001	0.13±0.01
6.	*Putranjiva roxburghii* (Putrajiva)	leaves	1	2	0.97±0.012	0.033±0.001	1.03±0.02
			5	2	0.97±0.016	0.032±0.001	1.03±0.02
			10	2	0.97±0.041	0.032±0.001	1.03±0.01
			20	2	1.01±0.012	0.030±0.001	0.99±0.01
		stem	1	2	0.84±0.001	0.035±0.001	1.16±0.01
			5	2	0.843±0.012	0.035±0.001	1.16±0.02
			10	2	0.866±0.017	0.033±0.001	1.13±0.02
			20	2	0.93±0.035	0.031±0.001	1.07±0.04
7.	*Mentha spicata* (Mint)	leaves	1	2	0.876±0.012	0.036±0.001	1.12±0.02
			5	2	0.91±0.001	0.036±0.001	1.09±0.01
			10	2	0.913±0.001	0.035±0.001	1.09±0.01
			20	2	0.91±0.000	0.034±0.001	1.09±0.00
		stem	1	2	0.826±0.012	0.037±0.001	1.17±0.02
			5	2	0.816±0.016	0.036±0.000	1.18±0.02
			10	2	0.83±0.001	0.034±0.001	1.17±0.01
			20	2	0.826±0.012	0.032±0.001	1.17±0.02
8.	Control			2	0.74±0.029	0.036±0.001	1.26±0.04

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