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Bio effectiveness of some plant extracts along with conventional pesticide against *Brevipalpus essigi* Baker infesting *Codaeum* sp. (Acari: Tenuipalpidae)

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Abstract

Among 3 botanical pesticides viz. Nishinda (*Vitex negundo*), Bhat (*Clerodendrum viscosum*), Debdaru (*Polyalthia longifolia*), all in two concentrations (2.5% and 5%) and one conventional synthetic pyrethroid, Fenvalerate (0.5%), which were tested against *Brevipalpus essigi* infesting *Codaeum* sp. Bhat (5%) was the most effective registering mean mortality of 88.66% followed by Fenvalerate (0.5%) giving 76.30% while Nishinda (2.5%) was the poorest of all.

Keywords: Bio effectiveness, *Brevipalpus essigi*, *Vitex negundo*, *Clerodendrum viscosum*, *Polyalthia longifolia*, Fenvalerate.

1. Introduction

Brevipalpus essigi was found infesting *Codaeum* sp. at Narendrapur campus causing severe yellowing of leaves which later turned brownish and finally defoliated. In order to control this mite damage, a laboratory experiment was conducted with three plant extracts, viz. Nishinda, Bhat, Debdaru all in two concentrations (2.5% and 5%) along with one conventional synthetic pyrethroid, Fenvalerate (0.5%) for comparative bioefficacy. The present paper reports the results of their relative bio effectiveness.

2. Method for preparation of crude extract

The methodology which has followed for preparation of crude extract was as per Yathiraj and Jagadish (1999)^[4] and Gupta *et al.* (2007)^[1].

- The leaves of plants which were used for preparation of extracts were Nishinda, Debdaru, Bhat. In addition, to one conventional pesticide, Fenvalerate (0.5%), belonging to a synthetic pyrethroid group and very often used for control of sucking pests including mites, was also used for comparison purpose.
- The leaves of the plants were collected, washed and dried up within a hot oven maintained at 40 degree Celsius.
- The fully dried leaves of the respected plants when became crispy were crushed in a grinder and the powdered leaves was put into conical flask and to that acetone was added to keep the dust fully submerged in acetone.
- The conical flask was shaken at least 2-3 times a day, and on the third day was filtered. The filtrate was put in a glass Petridish allowing it to evaporate and that took about 2 days for complete evaporation.
- The dried crust left on the Petridish was the actual toxicant of the respected plants and that was scraped out with a fine blade and kept in a aluminum foil.
- The crust was weighed in microbalance and the total weight was recorded.
- The required concentrations of 2.5% and 5% in case of leaf extracts were prepared mixing with required quantity of water.

2.1 Method of application of botanical pesticides

The test mite species was procured from laboratory culture. 10 adult females were put into wet cotton pad in an excised leaves and the same was pressed in Petridish. 3 such Petridishes were maintained each having 10 mites on excised leaves to serve as 3 replications. Another excised untreated leaf having 10 mites was also maintained to serve as control dish.

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Each botanical pesticide was used in two concentrations i.e. 2.5% and 5%. Each of the excised leaf was sprayed with 2ml of plant extracts using a micropipette in such a way so that the test mites were fully drenched with plant extracts. It was then kept under ceiling fan for drying. Thereafter, observations towards mortality were recorded after every 24 hours and continued till 96 hours. The percentage mortality was calculated using the formula as below:-

Percentage mortality = Number of dead mites/Number of total mites X 100 (McDonald *et al.* 1970) [3]. The mortality data was analyzed statistically using ANOVA and SPSS 2008.

3. Results and Discussions

The percentage mortality recorded at different intervals was as below:-

3.1 24 hours after spraying: At this interval the highest mortality was achieved in case of Bhat (5%) which was 88.00% and it was significantly superior to all other treatments. It was followed by Fenvalerate (0.5%) which was 61.30%, Debdaru (5%) recorded 59.18% and Nishinda (5%) recorded 58.57% and all these were significantly at par. Debdaru (2.5%) registering mortality of 51.16%, Bhat (2.5%) registering mortality of 45.00% were also at par and the poorest was Nishinda (2.5%) in which mortality was recorded 30.19% and was significantly inferior to all other treatments. There was no mortality in case of control trial.

3.2 48 hours after spraying: At this interval, Bhat (5%) registered the highest mortality of 83.33% which was significantly superior to all other treatments, while Debdaru (5%) and Bhat (2.5%) were at par registering mortality of

68.35% and 66.67%, respectively. Nishinda (5%) and Debdaru (2.5%) also had shown no significant difference among themselves. As was seen in the previous case, Nishinda (2.5%) registered lower mortality of 46.51%. The control trial registered no mortality.

3.3 72 hours after spraying: Bhat (5%) continued to be the best among all the treatments registering 90% mortality followed by Fenvalerate (0.5%) were the mortality was 80.13%. Bhat (2.5%), Debdaru (5%) and Nishinda (5%) also had shown no significant differences among themselves registering mortality of 70.00%, 72.35% and 75.20%, respectively. Debdaru (2.5%) continued to be poorest of all the treatments. No mortality was recorded in control trial.

3.4 96 hours after spraying: At this interval Fenvalerate (0.5%) improved mortality to a great extent and was significantly at par with Bhat (5%). Both were superior to all other treatments. Bhat (2.5%) and Nishinda (5%) were also at par registering mortality of 73.33% and 80.10%, respectively. Nishinda (2.5%) and Debdaru (2.5%) were the poorest among all the treatments but had no significant difference among themselves registering mortality of 70.14% and 69.15%, respectively. As usual, no mortality was recorded in case of control trial.

3.5 Mean mortality: The mean mortality was highest in case of Bhat (5%) and was superior to all other treatments. Fenvalerate (0.5%), Bhat (2.5%), Debdaru (5%) and Nishinda (5%) all were statistically at par. It was followed by Debdaru (2.5%) and that was superior to Nishinda (2.5%) which was most inferior among all the treatments.

Table 1: Bioefficacy of different plant extracts on *Brevipalpus essigi* infesting *Codiaeum* sp. under laboratory condition.

Treatments	Concentrations	Initial population	Percentage Mortality after different intervals				Mean mortality
			24 hours	48 hours	72 hours	96 hours	
Nishinda (<i>Vitex negundo</i>)	2.5	10	30.19	46.51	61.99	70.14	52.20
	5	10	58.57	60.30	75.20	80.10	68.54
Bhat (<i>Clerodendrum viscosum</i>)	2.5	10	45.00	66.67	70.00	73.33	63.75
	5	10	88.00	83.33	90.00	93.33	88.66
Debdaru (<i>Polyalthia longifolia</i>)	2.5	10	51.16	59.10	61.40	69.15	60.20
	5	10	59.18	68.35	72.35	73.53	68.35
Fenvalerate	0.5	10	61.30	71.59	80.13	92.19	76.30
Control			0	0	0	0	
CD at 5%			2.58	5.39	3.91	7.61	4.87

4. Conclusion: The analysis of the mortality data revealed that Bhat (5%) was the best among all the treatments used in the experiment followed by Fenvalerate (0.5%), Bhat (2.5%), Debdaru (5%) and Nishinda (5%), and were superior to all and were statistically at par, Debdaru (2.5%) which, in turn, was superior to Nishinda (2.5%). The mortality data can be arranged in the following descending order:- Bhat 5% (88.66%)> Fenvalerate 0.5% (76.30%)= Nishinda 5% (68.54%)= Debdaru 5% (68.35%)= Bhat 2.5% (63.75%)> Debdaru 2.5% (60.20%) > Nishinda 2.5% (52.20%).

Karmakar (2009) against *Tetranychus urticae* infesting Ashwagandha, while trying Nishinda extract at 3% concentration reported 93% mortality after 72 hours but at 5% concentration the mortality achieved was 100% at the same interval. So far as extract of Bhat is concerned, it was tried against *Tetranychus urticae* at 5%, 4%, 3%, 2%, 1%

which registered mortality of 63.75%, 55.00%, 37.50%, 28.75% and 6.25% respectively (Yathiraja and Jagadish 1999) [4]. The same authors reported mortality of 41.25%, 41%, 31.25%, 26.25%, 13.75% mortality at 5%, 4%, 3%, 2%, 1% leaf extract of Nishinda. So the result achieved in the present experiment indicated that Bhat indeed may be a very effective botanical pesticide against mite. This is having another advantage because it is safe to predatory mites, *Transeius tetranychivorus* especially at lower concentrations (Yathiraj and Jagadish 1999) [4].

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