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Ovicidal activity of different formulation of Neem extract against Erias vitella (Lepidoptera) on Okra

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ABSTRACT

Okra is most common vegetable of India. It is highly nutritive having protein, calcium, magnesium, oxalic acid, iron, phosphorus etc. The most common pest of Okra is spotted boll worm (Eriasvitella) that can cause 36-40% damage in yield of okra. In present study, author has evaluated the efficacy of certain neem based formulation against spotted boll worm. The fruit containing egg was treated with Nimbiciden, Achook, Suneem and RD-9 replin with different concentration against total inhibition of adult emergence. The experiments were set up in completely randomized design and treatment was replicated thrice. On the basis of over all performance of different neem based formulations for ovicidal activity, the Nimbiciden was most effective with descending order of Achook, Suneem and RD-9 Replin. Since the inhibition of adult emergences is prime importance in pest management, the present investigation can be a mile stone.

KEYWORDS: Okra, Erias vitella, Ovicidal, Nimbicidin, Achook, Suneem, RD-9 replin

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INTRODUCTION

Okra (Abelmoschus esculenthus L) most common and widely grown vegetable all over India (Javed et al 2009). Its original home is Africa. Okra is mostly grown in Africa. The unripe fruits of Bhindi are used as vegetable.

Okra is grown to an extent of 0.529 Mha with 61.51 lakh MT production and 12.1 tonnes/ha productivity (Anon 2017). It contributes 5.8 percent of the entire vegetable area and nearly 4 percent of total vegetable production of India.

The fruits are of high nutritive value: 100gram edible fruits contain 89.6g moisture, 1.9g protein, 0.2g fat, 0.7g minerals, 0.66g calcium, 0.043g magnesium, 0.0008 g oxalic acid, 0.056 g phosphorus, 0.0015g iron, 0.0069g sodium, 0.00007g thiamine, 0.0001g riboflavin, 0.0006g nicotinic acid, vitamin A and Vitamin B is also found in it. It's ripened fruit and stem have crude fiber used in the paper industry (Kumar et al 2013).

The major pest of Bhindi (okra) are spotted boll worm (Eariasvitella) L. Jassid (Amrasca biguttula biguttula Ishida), Red cotton bug (Dysdercus cingluatus Fabr), Leaf Rollor (Sylepta derogeta Fabr), Red spidermites (Tetranychus cinnabarinus Boisd), stem fly (Melanagroryza obtus M.). Flower beetle (Mylabries pustulata Thunb) and various other polyphagus insect pest. Which may cause upto 68% yield loss (Dubey et al, 1999; Basu, 1995; Lohar 2001).

Among them spotted bollworm is the most important pest. (Gulati 2004). The damage to the crop is done by two ways first; the terminal portions of growing shoots are bored by the caterpillars, which move down by making tunnels inside. As a result the shoots drop downward or dry up. Second the larvae enter the fruits by making holes, rendering them unfit for human consumption. According to an estimate the spotted bollworm can cause 36-90% loss in the yield of Okra (Mishra et al, 2002).

For the control of this noxious insect, number of chemical pesticides have been recommended (Ahmed et al 2013, Ahmed et al, 2016, Fu et al, 2017; Ahmed et al, 2018, Ahmed et al, 2019). But the use of the hazardous chemicals is being discouraged due to their harmful effects on human being, undesirable residue on plants and side ill effects on parasites, predators and non-targetted organisms. Considering the persistant harmful adverse effects of these chemical pesticides the use of plant product is recommended (Rajput 2004, solangi and lohar, 2007).

Keeping in view the limitation of chemical pesticides in context to man and biosphere, it is imperative to find out the other alternate and feasible methods which are non-hazardous to human beings in particular and the other biotic flora and fauna in general.

Due to their potential insecticidal effects, botanicals can be an approach to managing insect pests. The advantage of the bioinsecticides is that, unlike other poisons, they are readily available and cheaper. They are relatively easily available, less

harmful to natural enemies, mammalian pollinators and environment friendly. Plant parts and derivatives have been used for traditional practices for many years (Adedire et al, 2011, Qari et al, 2020; Iqbal et al 2021).

The present author has therefore, deemed it desirable to evaluate the bioefficacy of certain neem based formulation against spotted boll worm (E. vitella) infesting okra.
The present study incorporates the result on toxicity and Juvenomimetic effects of Nimbiciden, Achook, suneem and RD-9 Repelin on the test insect and the results thus, obtained have been discussed critically in the light of earlier findings.

MATERIALS AND METHODS:

Earias vitella were collected from the Bhindi fields and on light trap during night (7-9 P.M.), they were released in glass glove placed over the young twig of Okra dipped in a glass jar containing water.

The mouth of each glove was covered with a piece of muslin cloth secured with rubber band. The adults were fed 10% glucose water solution through soaked cotton ball. Eggs were laid singly on the fruits and tender parts of the plants. Fruits containing eggs are kept dipped in the solution and dried under electric fan. Such treated fruits were kept in Petri dishes (10 cm). All the treatments were replicated thrice including control, where the fruits were dipped in distilled water only.

The observations were observed by different concentrations of Nimbecidine, Achook, Suneem and RD-9 Repelin on ovicidal activity. The data thus obtained on various aspects of the proposed studies have been subjected to statistical analysis to signify the results.

The experiments were set up in Completely Randomized Design (CRD) and treatments were replicated thrice. The data, thus, obtained were subjected to statistical analysis so as to signify the results.

Table 1 : DETAILS OS NEEM BASED FORMULATIONS USED IN THE PRESENT STUDY.

S.No.	Common Name	Formulation	Active ingredient(s)
1	Nimbecidine	0.03% EC	Neem oil 90.5%
2	Achook	Powder form	Azadirachtin (2800 ppm) neam compounds
3	Suneem	92.5 EC	Azadirachtin (2900 ppm) neem extract
4	RD-9 Repelin	93 EC	Azadirachtin Concentrate (3000 ppm)

RESULT AND DISCUSSION:

EFFECT OF NEEM BASED FORMULATIONS ON INHIBITION OF ADULT EMERGENCE IN Earias vitella:

The data generated on the effect of different Neem based formulations on inhibition of adult emergence has been presented in Table 2 and their effects and described separately as given below:

Table 2: EFFECT OF NEEM BASED FORMULATIONS ON % INHIBITION OF ADULT EMERGENCE IN *Eariasvitella.*

S.No.	Dosage in %	Total No. of Larvae in 3 replications	% inhibition of adult emergence (Average) Nimbecidine	Achook	Suneem	R.D-9 Repelin
1	1.0	30	86.66 (68.57)	83.33 (65.90)	73.33 (58.90)	60.00 (50.76)
2	0.5	30	76.66 (61.11)	66.66 (54.73)	63.33 (52.73)	53.33 (46.90)
3	0.25	30	66.66 (54.73)	56.66 (48.82)	46.66 (43.08)	43.33 (41.16)
4	0.125	30	56.66 (48.82)	46.66 (43.08)	33.33 (35.26)	33.33 (35.26)
5	0.05	30	33.33 (35.26)	30.00 (33.21)	23.33 (28.88)	20.33 (26.56)
6	0.03	30	16.66 (24.08)	13.33 (21.41)	13.33 (21.41)	10.00 (18.43)
7	Control	30	0.00	0.00	0.00	0.00
	C.D. at 5%		9.41	8.15	6.15	12.13

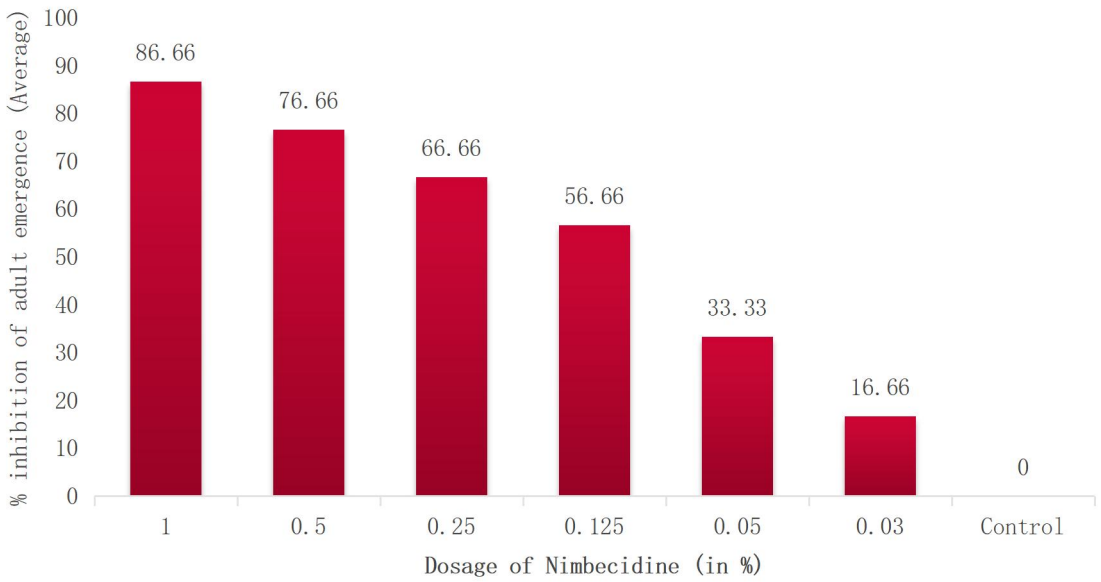
Figures in parenthesis are the angular transformed values.

Nimbecidine:

The impact of Nimbecidine was more pronounced at higher concentrations, specifically 1.0% and 0.5%, resulting in adult inhibition rates of 68.57% and 6.11%, respectively. In the remaining treatments, the inhibition of adult emergence varied between 24.08% and 54.73%. A nearly 50% inhibition (48.82%) was observed at a concentration of 0.125%, followed closely by 54.73% at 0.25%. Notably, in the control group, all adults emerged successfully, indicating a complete absence of inhibition.

No statistically significant differences in adult emergence inhibition were found between the concentrations of 1.0% and 0.5%, 0.5% and 0.25%, or 0.125% at a 5% significance level. Statistically, all treated groups demonstrated significantly higher inhibition compared to the control.

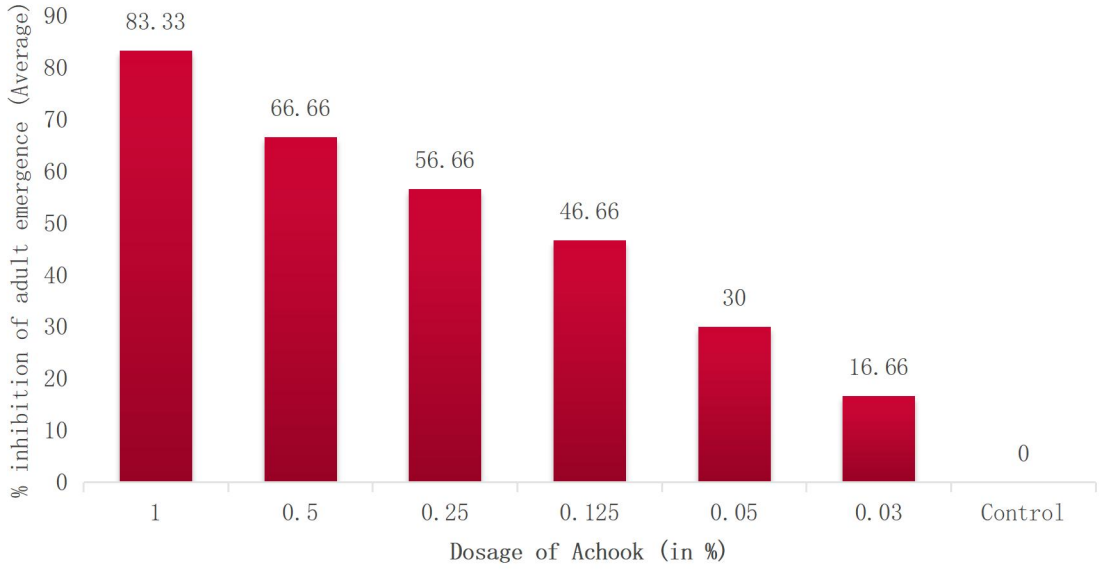
Figure 1



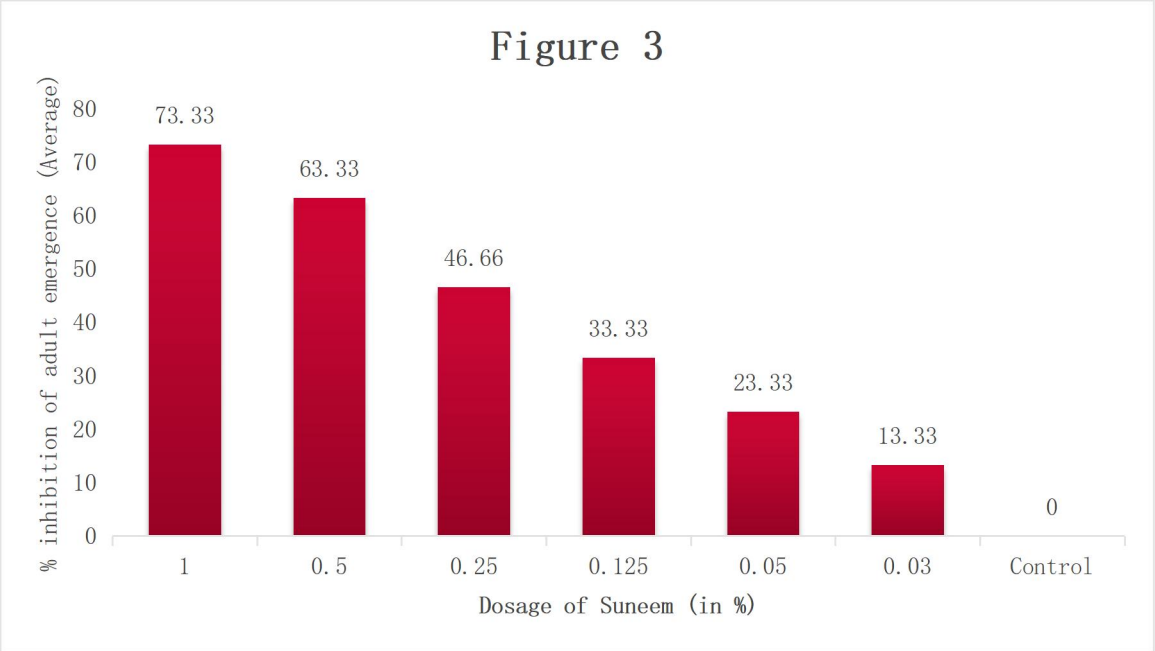
Achook:

Table 2 clearly demonstrates that Achook achieved 65.90% adult inhibition at a concentration of 1.0%, followed by 54.73% inhibition at 0.5%. The inhibition range across concentrations of 0.03%, 0.06%, 0.125%, and 0.25% varied between 21.41% and 48.82%. Approximately 50% inhibition was observed at the intermediate dose of 0.25%, where the recorded value was 48.82%. This was followed by 43.08% inhibition at 0.125%. Meanwhile, concentrations of 0.06% and 0.03% resulted in 33.21% and 21.41% inhibition of adult emergence, respectively. In the control group, no inhibition was observed. Statistical analysis revealed no significant difference in adult emergence inhibition between concentrations of 0.5% and 0.25%, as well as between 0.25% and 0.125%, at a 5% significance level. However, all treatments showed significantly greater inhibition compared to the control. Notably, the highest inhibition (65.90%) was recorded at the 1.0% concentration of Achook, making this treatment significantly superior to all others in the study.

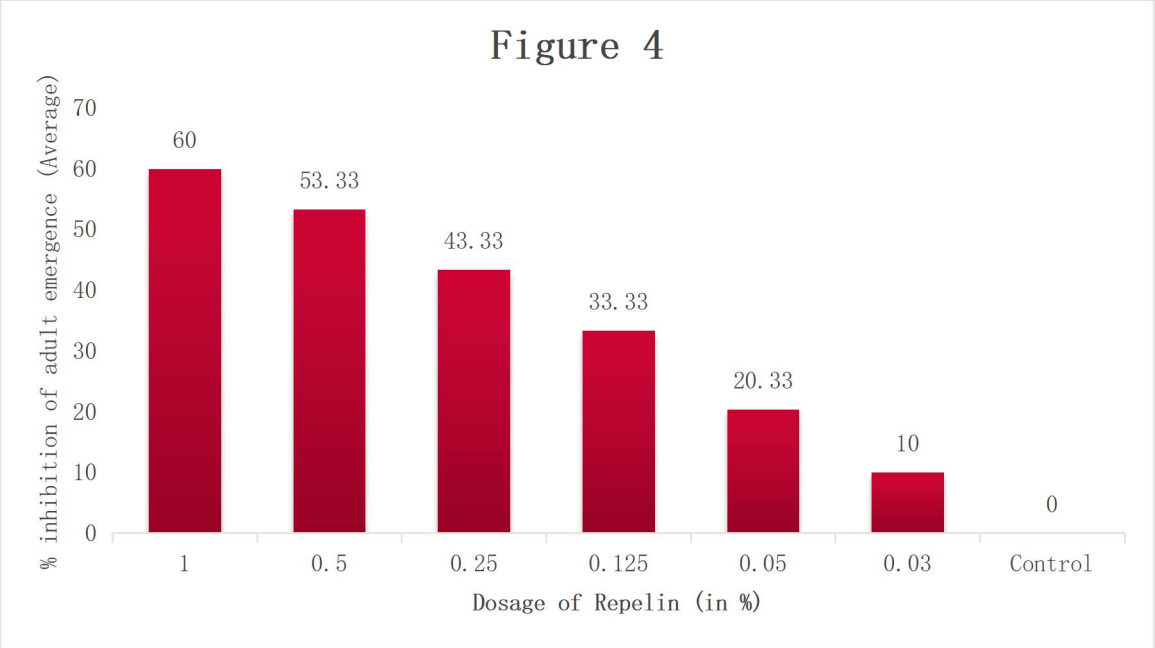
Figure 2



Suneem :
The impact of Suneem was more pronounced at higher concentrations of 1.0% and 0.5%, resulting in adult emergence inhibition rates of 58.90% and 52.73%, respectively. In the remaining treatments, inhibition ranged between 21.41% and 43.0%. In the control group, all adults successfully emerged, indicating no inhibition. Statistical analysis confirmed that all treatments differed significantly from each other at a 5% significance level and were also significantly more effective than the control (Table 2).



Repelin :
RD-9 Repelin exhibited 50.76% adult inhibition at a 1.0% concentration, followed by 46.90% at 0.5%. The inhibition rate across concentrations of 0.03%, 0.06%, 0.125%, and 0.25% ranged from 18.43% to 41.16% (Table 2). A concentration of 0.25% resulted in 41.16% inhibition, followed by 35.26% at 0.125%. Lower doses of 0.06% and 0.03% led to 26.56% and 18.43% inhibition, respectively. No inhibition was observed in the control group. Statistical analysis indicated no significant difference in inhibition among the concentrations of 1.0%, 0.5%, and 0.25%; 0.5%, 0.25%, and 0.125%; 0.125% and 0.06%; and 0.06% and 0.03% at a 5% significance level. However, all treatments were significantly more effective than the control.



On the basis of over all performance of different Neem based formulations in affecting the inhibition of adult emergence in E. vitella, the following descending order of the test compounds was recorded.

Nimbecidine > Achook > Suneem > RD-9 Repelin

CONCLUSION:

The role of environment friendly botanicals in the inhibition of adult emergence is of prime importance in the pest management because this is the adult population which is responsible for egg laying out of which the larvae hatch and core damage to the crop. Therefore if the farmer or plant protection worker is able to wipeout initial emerging adult population from the field, the question of its incidence on the crop does not arise at all. (Anuradha, A and Annadurai, R.S.; 2018) and (Adilakshmi et al, 2010).

Keeping in view the importance of adult emergence or its inhibition the present author deemed it desirable to study the effect of the experimental neem based formulation on the inhibition of adult emergence on the inhibition of adult emergence in Earias vitella (Copping and Duke, 2007). It is evident that nimbecidine proved to be most effective in resulting the maximum inhibition of adult emergence at all the concentration, which were compared with the other experimental compounds.

The percentage adult inhibition ranged from 68.57 to 24.08 and it was closely followed by Achook, where the inhibition was in the range of 65.90 – 21.41 percent. The least effective experimental material was RD-9 Repelin which could inhibit the adult emergence from 50.76 – 18.434 percent at its various concentration used suneem behaved intermediary as far as the percentage inhibition of adults emergence in Earias vitella is concerned.

From the foregoing conclusions, it is obvious that Nimbecidine is the most effective environment friendly pest control against Bhindi Shoot and fruit borer (Earias vitella). Since it is registered by the control insecticide Board, Commercially available in the market and safe to human being domesticated animals, wild life and non-target organisms including parasites, predators and pollinators, hence it can further be exploited to incorporate in the recent concept of integrated pest management.

DECLARATIONS

Conflicts of interest: There is no any conflict of interest associated with this study
Consent to participate: There is consent to participate.
Consent for publication: There is consent for the publication of this paper.
Authors' contributions: Author equally contributed the work.

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