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IMPACT OF NEEM OIL ON THE FEEDING PHYSIOLOGY AND PROTEIN ESTIMATION OF POLYPHAGOUS PEST (*PERICALLIARICINI*) (LEPIDOPTERA: ARCTIDAE)

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ABSTRACT

Neem oil is used in manufacturing of insecticide, because it contains *Azadirachtin* which affect over six hundred species of pests. It is completely safe to non-target organisms. *Azadirachtin* acts as a famous natural anti- feedent, growth regulator and ovipositional repellent against insects, which makes it useful as a perfect alternative to chemical pesticides. The present investigation carried out on the biological effects of neem oil to control the *Pericallia ricini*. Neem oil plays on important role in evolving on ecologically and environmentally acceptable disease management system. Neem oil affects both the feeding and growth rates of *Pericallia ricini*. The results recorded in the present study that neem oil was less economic, less hazardous to the environment and it was effective to control the *P. ricini* pest.

KEYWORDS: **Neem oil, castor leaves, *Pericallia ricini* and *Azadirachtin*.**

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INTRODUCTION

Neem oil is a feeding inhibitors and growth disrupting compound for most insect's .It affects the growth, development and it reduces oviposition of the pest [1].Whereas some other investigation have been carried out on the efficiency of extracts in seeds and roots of *Azadirachta* and *pongamia* respectively [2] to control the insect's pests. *Azadirachta indica is* a versatile tree containing large number of chemical and biologically active compounds. More than four hundred key pests of agriculture are susceptible to various behavioural and physiological effects of neem on corcidolomiabinotalis. By use of these natural pesticides instead of chemical pesticides it could reduce environmental pollution, preserve non-target organisms and avert insecticides, induced pest management. As *Azadirachtin* is more effective against phytophagous insect and it has a minimal toxicity to the beneficial insect it gets increases its potential value to pest management[3].

MATERIALS AND METHODS

(i) Bio pesticide Source

Neem oil was used as a bio pesicides in the present study it was prepared by dissolving concentrations of 100ppm, 200ppm, 300ppm, and 400ppm and then it dissolved in distilled water to evaluate a range of biological effects on *P. ricini.*

(ii) Biology of the pest

The polyphagous wooly bears moth *Pericalliaricini*(Lepidoptera: Arctidae) lays egg on the leaf of main host plant, *Ricinus communus*. The eggs hatch in to slender transparent larvae about 8mm long and 0.2 mg live weight. Larvae are sandy brown or black in colour, thickly covered with fire long blackish hair on its body. During the monsoon period in Tamil Nadu from October to December *P. ricini* produces about their generation and thus the larvae are exposed to a wide of temperature fluctuation in between 20^0 to 30^0C. The adult is gray with dark spots on the pinkish hind wings. Sex could be distinguished only at the adult stage. The pupae of last generation undergo diapause in the leaf litter beneath the soil and emerge at the onset of North- east monsoon

Figure1
Life cycle of *P. ricini*

The third, fourth and fifth instar larvae were introduced in separate containers and fed with the leaves soaked with different concentration of the neem oil. Distilled water with 2 ml of alcohol forms the control solution. Both the treated and control larvae were maintained under identical condition till pupation. The duration of larval period was recorded and feeding budget of third, fourth and fifth instar were calculated[4]. The scheme of feeding budget in the present investigation was designed by using the 1 BP formula [5] CR = Consumption rate (mg / gmday), AR = Assimilation rate (mg / gm day), PR = Production rate (mg / gm day), MR = Metabolic rate (mg / gm day).The total protein content estimated with control pupae compared to neem oil treated pupae. Standard method carried out by the estimation of protein by taking 5 mg of dry samples, from each treatment. The total protein estimation is carried out by method of [6]. Statistical tools used in these studies were Standard deviation (SD), Correlation co-efficient, and Regression

RESULTS

The various concentration of neem oil is treated with the larval duration of various larval instars. The feeding budget of third, fourth and fifth instars larvae treated with different concentration of neem oil. The table 1 shows the relationship between the various feeding parameter with the concentration of the neem oil. . The results showed that the larvae fed with neem oil treated feed the consumption, assimilation, production, and metabolic activity and their respective rates get decline compared to that of control group. Consumption decreases from 140 mg in to 32.6 mg in the 400ppm concentration. In assimilation rate 20.3 mg / gm / day in 300ppm concentration get decline to 3.7 mg / gm / day. In the production rate get decreased to 8.2 mg when larvae treated with 400ppm concentration of neem oil. Similarly the metabolic results get decline from 83.3 mg / gm to 12.26 mg / gm at 400ppm concentration.

Table1

Effect of Neem oil on the feeding parameter of third, fourth and fifth instars larvae of P.ricini.

Conc	Larval stage	Consumption	Assimilation	Production	Metabolism
Control	Third instar	24.4 ± =0.30	20.3 ± = 0.35	15.0 ± = 0.62	9.34 ± = 0.41
	Fourth instar	67.7 ± = 0.39	36.26 ± = 0.46	19.5 ± = 0.38	16.6 ± = 0.66
	Fifth instar	92.95 ± = 0.16	92.7 ± = 0.07	9.40 ± = 0.18	83.3 ± = 0.38
100ppm	Third instar	11.4 ± = 0.20	7.13 ± = 0.04	19.9 ± = 0.04	27.03 ± = 0.03
	Fourth instar	34.8± = 0.33	16.0 ± = 0.48	16.5 ± = 0.63	32.5 ± = 0.60
	Fifth instar	57.85 ± = 0.22	57.67 ± = 0.17	9.8 ± = 0.37	48.03 ± = 0.47
200ppm	Third instar	6.41 ± = 0.30	3.01 ± = 0.42	16.2 ± 0.39	22.6 ± =0.38
	Fourth instar	23.1 ± = 0.33	64.6 ± = 0.34	10.6 ± = 0.34	54.0 ± = 0.50
	Fifth instar	26.38 ± = 0.21	25.89 ± = 0.09	9.2 ± = 0.35	16.69 ± = 0.20
300ppm	Third instar	6.82 ± = 0.27	4.32 ± = 0.21	17.2 ± = 0.30	21.52 ± = 0.24
	Fourth instar	54.15 ± = 0.03	33.5 ± = 0.37	7.6 ± = 0.34	41.1 ± = 0.42
	Fifth instar	23.67 ± = 0.25	23.08 ± = 0.04	8.6 ± = 0.34	14.48 ± = 0.19
400ppm	Third instar	5.4 ± = 0.30	3.7 ± = 0.32	1.06 ± =0.13	6.9 ± = 0.20
	Fourth instar	32.6 ± = 0.45	8.9 ± = 0.42	7.4 ± = 0.46	16.3 ± = 0.31
	Fifth instar	20.67 ± = 0.24	20.46 ± = 0.04	8.2 ± = 0.30	12.26 ± = 0.13

Each value represents an average performance (Mean ± SD) of 5 replicas. (Mg/g)

Table2

Relation between various feeding parameters with the concentration of the neem oil

Parameter	Correlation coefficient (r)		
	Third Instar	Fourth Instar	Fifth Instar
Consumption	-0.8528	-0.2423	-0.8527
Assimilation	-0.6413	-0.2725	-0.8488
Production	-0.8883	-0.9217	-0.8378
Metabolism	-0.9080	-0.5020	-0.9959

(Mean, ± SD) average of five replicate (mg / %)

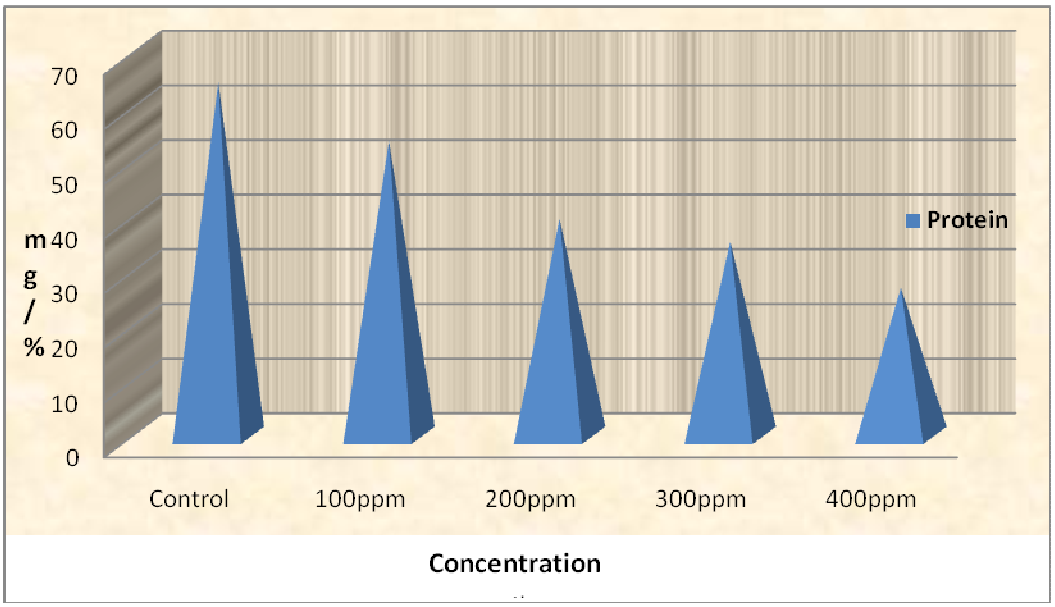

Figure2

Effect of neem oil on protein content (%) of the pupae of P.ricini

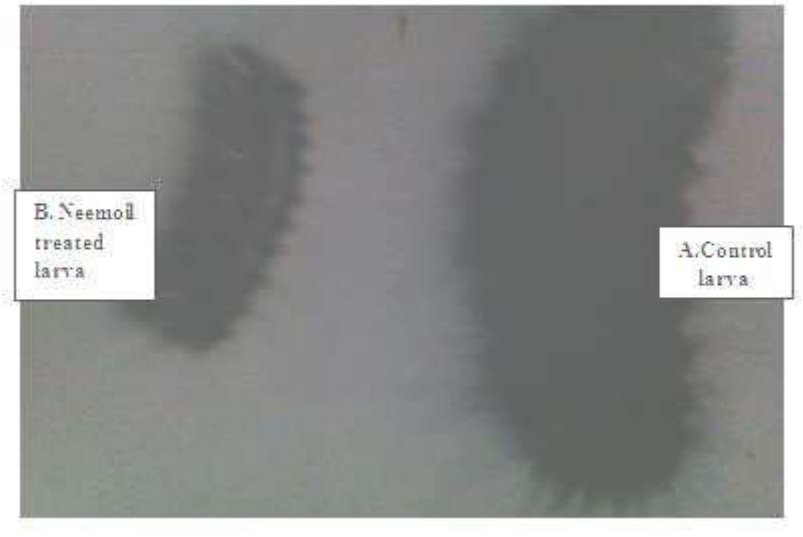

Figure3

Neemoil treated withthird larval instar(A.Control larva, B. Neem oil treated larva)

Figure 2 shows the effect of various concentration of neem oil on bio- chemical constituents of treated larvae. The total protein contents get decrease when the concentrations get increased, and the decline is found to be statistically significant. Considerable reduction in protein content was observed in almost all treatments. Protein contents in control pupae about 64.59 mg/ 100 mg compared to neem oil treated pupae at 400ppm was about 26.98 mg/ 100 mg. The reduction in protein content might also be due to the metabolism of protein in the insects affected by the neem oil. Fig 3 shows that the neem oil treated larva gets reduced in their size compared to that of control larva. The result concluded that the Neem oil is effective to control the *P. ricini* pest.

DISCUSSION

The neem oil was effective and it affects the feeding, reproduction, or development of the pest [7]. Assimilation of consumed food materials in larvae of *P.ricini* feeding on neem oil was found to be very much reduced [8]..The adults were shorter in length with crumpled wings. The fifth instar larvae were also crumpled and hairs were found to be lost when treated with 400ppm concentration of neem oil. Lack of protein caused retardation of many physiological processes in insects, and many adult insects requires protein to promote ovulation and egg development [9]. The study observed that the reduction in growth, protein analysis and suppression in hatchability to effects on the population density of *Pericallia ricini.*

CONCLUSION

Based on the results of the present Iinvestigation, neem oil can be used safely for the effective control the *Pericallia ricini* pest. In comparison to the chemical pesticides the neem oil is less hazardous to the environment. The results confirmed that neem oil is a natural pesticide to control the pest.

REFERENCES

1. Jacobson, M., Redfern, R.E and Giles, D.M., In: Naturally occurring insect growth regulators III. Echinolone, a highly active juvenile hormone mimic from Echinacea angustifoba roots. Doydia (cinci), 38: 473-476, (1975).
2. Butterworth, J.H. and E.D. Morgan, E.D., Investigation ohn the locust feeding inhibition of the seeds of the neem tree, *Azadirachtaindica*, *J. Insec physiol*., 17: 969- 977, (1975).
3. Lowry,D.T and Isman, M.B., Insect growth regulating effects of neem extract and azadirachtin on aphids*, Entomol.Exp.Appl*, 72:77-84, (1995).
4. Waldbauer, G, P., *The consumption and utilization of food by insects.*Advances in Insect Physiology Academic Press,London. .5:229-268, (1968).
5. Petrusewicz and Macfadyan, K.A., *In: Productivity of Terrestrial Animals*. IBP hand book 13:19, (1970).
6. Lowry,O.H., Farr,A,L., Randall, R.J and Rosebrough, N.J., Protein measurements with Folin-phenol reagent.*J.Biol-Chem*,.193: 165-175, (1951).
7. Walter.J.F. *Commercial experience with neem products*, In: F.R. Hall and J.J. Menn (eds). Biopesticides: Use and Delivery. Humana, Totowa, N.J pp.155-170, (1999).
8. Chokalingam, S. and Nalinasundari, M.S., Antifeedant activity of neem oil extractive on the pest *pericalliaricini* F. (LepidopteraArctidae:). Proc. Symp. Alternatives to synthetic insecticides, CRME, Madurai; 83-89, (1983).
9. House .H.L., Nutritional *diseases. In: Insect Pathology.* An Advanced reatise (E.A.Steinhaus,ed) Academic press, Newyork. 1:133-160, (1963).