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The Study of Relative Toxicity of Various Neem Formulation against *Papilio Demoleus Linn*

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Abstract

The LC_{90} values (Table 1) in this case have also been calculated which results 5.0435, 6.001, 6.0304, 6.0393 and 9.1020 for Neemazal, Bioneem, Neemgold, Nimbicidine and Achook, respectively. But these values are quite high to give 90.0 per cent kill of *P. demoleus.* Therefore, not worthwhile to be adopted practically for the control of experimental insect.

Keywords: Neemazol, Bioneem, Neemgold, LC_{90}.

Introduction

Several million tones of food grains and fruits are either damaged or lost for want of scientific knowledge due to improper management in storage, and lack of strategic management of fruit crops in the field which are to be coped up to avoid substantial loss at their various stages. Amongst the major storage pests, almond moth (*Cadra cautella* Walker), feeds on varieties of cereals (external feeder) and cereal products, fruits, condiments, cotton seeds, date and other nuts etc. (Srivastava & Singh 1997), is a noxious insect pest inflicting heavy toll. In storage, the moth, normally 1.2 cm in wing- expanse grayish in colour with transverse stripes on its wings. The moths lay eggs in the food stuff. Behaviorlly while feeding, the larvae spin silken tubes in the food material; eventually numerous silken tubes are spectacular in affected lots. Pupation occurs in silken tube. On the other hand, lemon butterfly (*Papilio demoleus* Linn.), which feeds voraciously on citrus leaves and has the ability of protective/ defensive adaptations device with its surrounding as well as selection of safety niches. The pest has countrywide distribution. The caterpillars feed on leaves, leaving behind mid-ribs only and thus check the normal growth of the plant which ultimately results decrease in yields. The young caterpillars have a mixture of brownish black and white colour but turn green with brown band across the back as it grow older. The full grown caterpillar pupates on the plant. The pupae remain attached to the plant by its tail and held within a silver girdle. The adult butterfly is large in size with black and lemon yellow marks on its wings with two blue eye like marks on the hind wings.

Material and Method

Leaf pieces of 30 sq.cm. were cut from lemon leaf by means of a regular metal designed for this purpose and shrinkage was directly calculated by putting it on graph paper. Measured leaf pieces were dipped in neem based pesticide solution for 2 seconds and solvent was evaporated under fan for half an hour. Treated leaf piece were kept in each petridish having blotting paper over moist cotton in order to avoid desiccation of leaves. Each treatment was replicated thrice. 24-hour starved larvae were released on the treated leaf in each petridish. Observations on area of leaf piece left over was recorded. Leaf treated with solvent only was taken as control. All the neem based formulations were tested at the concentration of their Lc_{50} values against the test insects. Percentage feeding and leaf area protected over control were calculated by following formula:

$$\text{Percentage feeding} = \frac{\text{Leaf area given} - \text{corrected leaf area}}{\text{Leaf area given}} \times 100$$

Result and Discussion

The over all efficacy of all different neem based pesticides against *P. demoleus* was found in the following descending order.

Neemazal > Bioneem > Neemgold > Nimbicidine > Achook

The value of relative toxicity of different experimental neem based formulation have been calculated by taking LC_{50} of Nimbicidine as unity (Table 1). The neem based pesticides showed their toxicity as 1.5158, 1.3757 and 1.0272 times, respectively more then Nimbicidine whereas the toxicity of Achook was 0.6643 times less then compared with Nimbicidine. In the present study, Neemazal proved as most toxic amongst all neem based pesticides used against the larvae of *P. demoleus,* followed by formulation of Bioneem, Neemgold, Nimbicidine and Achook, respectively. The LC_{90} values (Table 1) in this case have also been calculated which results 5.0435, 6.001, 6.0304, 6.0393 and 9.1020 for Neemazal, Bioneem, Neemgold, Nimbicidine and Achook, respectively. But these values are quite high to give 90.0 per cent kill of *P. demoleus.* Therefore, not worthwhile to be adopted practically for the control of experimental insect (Table-1). Similar results are also found by Bhatnagar, A. (1998), Broadley, R.H. (1984). Seasonal incidence and Parasitism of *Heliothis* Sp. (Lepidoptera: Pyralidae) larvae in South Queensland Sunflower, Diraviam, J. *et. al.* (1993), Lal, S.S. (1981), Mahto, Y. (1990), Mishra, B.A., *et. al.* (1992), M.M. H. Khan (2019). Effect of temperature and relative humidity on the population dynamics of brinjal and tomato infesting whitefly, Bemisia tabaci, Patel, C.C., and Koshiya, D.J. (1997), Pimpale, T.D. and Summanwar, A.S. (1983), Sekhon, B.S. and Singh, S. (1985). Effect of temperature, relative humidity and rainfall on the population build up of cotton jassid, Sethi, G.R., *et. al.*

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(1979), Singh, K.M. and Singh, R.N. (1977), Yumamura K, *et. al.* (2006) and Zhang S, *et. al.* (2014).

Table 1.Showing the relative toxicity, regression equation, LC_{50} and LC_{90} values of various neem formulations against *Papilio demoleus* Linn

S. No.	Formulations	Heterogeneity	Regression equation	LC50	LC90	Relative toxicity		Rank
1	Neemazal	X^2(6) 3.5335	Y= -0.993 + 1.4419x	0.6512	5.0435	1.5158	1.1974	I
2.	Bioneem	X^2(6) 6.1456	Y=-1.9688+ 1.7814x	0.7175	6.001	1.3757	1.0051	II
3	Neemgold	X^2(6) 2.9203	Y= -1.3219 + 1.6067x	0.9609	6.0304	1.0272	1.0014	III
4	Nimbicidne	X^2(6) 2.5291	Y= -1.5077 + 1.6292x	0.9871	6.0393	1.000	1.000	IV
5	Achook	X^2(6) 3.972	Y= -1.9527 + 1.6667 x	1.4859	9.1020	0.6643	0.6635	V

* Based on 5 observations
Y = Probit kill X^2(6) = Neem based formulations and log concentration
X = Log concentration
LC50 = Concentration calculated to give 50 percent mortality
LC90 = Concentration calculated to give 90 percent mortality

Figure.In Parentheses and Transformed value

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