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INSECTICIDAL EFFECT OF NEEM DERIVATIVES AGAINST *HENOSEPILACHNA VIGINTIOCTOPUNCTATA* (FABR.) ON BITTERGOURD

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ABSTRACT – Lethal effect of neem derivatives viz., neem oil, extracts of neem cake, seed kernel, seed coat and bark powder were evaluated against the adults of *Henosepilachna vigintioctopunctata* Fabr. Compared with all neem derivatives, neem oil recorded very low LC_{50} value. Neem oil at 0.802 % offered fifty percentage of mortality (LC50). Lethal effect of neem oil is followed by neem seed kernel extract (1.018%), neem cake extract (1.423%), neem seed coat extract (2.550%) and neem bark powder extract (3.968%). Neem seed coat and bark powder extracts showed very low residual toxicity. LC_{50} values of neem derivatives are higher than quinalphos (0.003%).

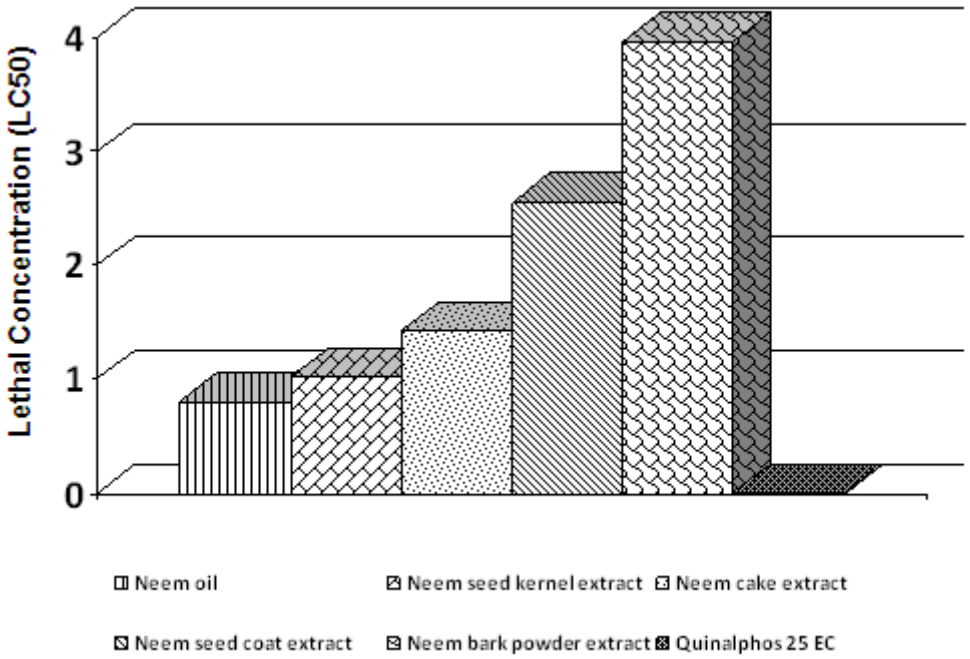
Key words : Median lethal dose (LC_{50}), Neem derivatives.

INTRODUCTION

The phytophagous epilachna beetle, *Henosepilachna vigintioctopunctata* (Fabr.) is economically important pest of bittergourd. It is widely distributed in Asia, Europe, Australia, America, and West Indies. This beetle feeds exclusively on the plants belonging to the Cucurbitacae family and plants of other families. They feed on the leaves, buds, flowers and fruits of bittergourd. The leaves are eaten leaving out only the veins, sometimes even the midrib. Both grub and adult feed on the epidermal tissues of leaves by scraping surface and damage up to 80% of plants (Rajagopal and Trivedi, 1989). Thirty five to seventy five percent leaves were severely damaged by grubs and adults (Srivastava and Katiyar, 1991). The grubs confine their attack to the lower surface of the leaves and adults usually feed on the upper surface of the leaves (Pradhan *et al* 1990). Synthetic insecticides have raised serious ecological and economical problems due to high cost and environmental effects. Naturally occurring plant products may play an important role to replace or minimize the excessive use of pesticides as they constitute a rich source of bioactive components (Wink, 1993). A number of plant products or botanicals with a series of important properties such as; insecticidal, antifeedant, repellent, growth inhibitory, chitin synthesis inhibitor property and environmental friendly nature, attracted the attention of researchers in the direction of pest control programme (Satpathi and Ghatak, 1990; Chitra *et al* 1992; Venkataramireddy *et al* 1993; Prajapati *et al* 2003; Lee *et al* 2004; Murugesan and Murugesh, 2008; Swaminathan *et al* 2010; Ghosh and Chakraborty, 2012). Neem derivatives and their formulations have excellent potential in view of the low capital cost, eco-friendly, easily bio-degradable and indigenous. Susceptibility of neem oil against *E. dodecastigma* was observed by Anam *el al* (2006). Islam *et al* (2011) evaluated the crude aqueous extracts of *Ricinus communis*, *Calotropis procera* and *Datura metel* against *E. vigintioctopunctata*. Azadirachtin was found very effective against the epilachna beetle, achieving more than 60% mortality at 4 days after spraying (Ghosh *et al*, 2012). Mala *et al* (2012) studied residual effect of neem oil. As these botanicals possess more than one active components, there will be less chance of development of resistance and easily biodegradable in the environment. Keeping view in mind the crude aqueous extracts of neem, *Azadirachta indica* were evaluated to investigate their median lethal dose for the control of *H. vigintioctopunctata*.

MATERIALS AND METHODS

The culture was initiated from the egg masses of *Henosepilachna vigintioctopunctata* collected from the field and incubated at room temperature 28±2ºC. After the young ones hatched, they are transferred into plastic basins (40.0 cm x 8.8 cm), twenty five larvae per basin. Mouth of the basin is covered with mosquito net and tied with elastic band. Every morning, the containers are cleaned and provided with fresh bittergourd leaves. Studies are undertaken using the beetles reared from such stock culture. To evaluate the median lethal concentration of neem oil, neem cake, neem seed kernel, neem seed coat, neem bark powder extract and quinalphos by rinsing the petri dishes with different concentrations of test solutions and the solvent is left to evaporate under an electric fan for twenty minutes. There are three replications each



Graph 1 : Lethal concentration of neem derivatives against *Henosepilachna vigintioctopunctata.*

having twenty insects. Observations are recorded after twenty four hours of release. The lethal concentration is worked out by Finney's method (1962).

RESULTS AND DISCUSSIONS

The median lethal dose (LC50) for neem oil, extracts of neem seed kernel, neem cake, neem seed coat and neem bark powder were furnished in Table - 1. When the adults of *H. vigintioctopunctata* allowed to crawl on the neem oil treated surface, 0.802% of neem oil caused fifty percentage of mortality. This is in accordance with the earlier findings of Singh *et al* (1988). When *Lipaphis erysimi* are treated with neem oil, they observed the LC_{50} value of neem oil and ethanol extract of neem oil ranged from 0.674 % to 0.328%. Krishnaiah and kalode (1993) also found the LC_{50} value of neem oil as 1.308 % and 2.242 % for *Nephotettix virescens* and brown leafhopper. Ghosh *et al* (2012) reported azadirachtin @ 1500 ppm was very effective against the epilachna beetle, achieving more than 60% mortality at 4 days after spraying. When the adults of *H. vigintioctopunctata* are allowed to move the neem seed kernel extract treated surface the LC 50 value is 1.018%. Petroleum ether and ethanolic extract of neem seed was 0.02 and 0.145 for *Mythimna separata* (Singh and Gour, 1993). The LC_{50} values were higher at 3rd instar and it was lowest on 1st instar larvae of *Epilachna dodecastigma* (Anam *et al,* 2006). The insecticidal effect of neem seed kernel extract is also studied by Krishnaiah *et al* (2000) on *Nephotettix*

Table 1 : Lethal effect of neem derivatives against *Henosepilachna vigintioctopunctata*

Treatment	Median lethal dose(LC 50)
Neem oil	0.802
Neem seed kernel extract	1.018
Neem cake extract	1.423
Neem seed coat extract	2.550
Neem bark powder extract	3.968
Quinalphos 25 EC	0.003

virescens. In the present investigation, it is observed neem cake extract 1.423% has the LC_{50} value. The insecticidal effect of neem cake extract is also studied by Goyal *et al* (1971). They recorded the toxic effect of four fractions of alcoholic extract of neem cake extract ranged from 0.05 to 0.08% against *Rhopalosiphum numphae*.

In the present study it is observed neem seed coat extract and neem bark powder extract 2.550 and 3.968% concentrations have the LC_{50} value. The residual toxicity of neem seed coat and bark powder extract was very low when compared to neem oil and neem seed kernel extract. Quinalphos has the LC_{50} value of 0.003%, when adults are treated with different concentrations. It is inferred that insecticidal effect of synthetic pesticide is higher than neem derivatives (Graph-1). This is accordance with earlier findings of (Murugesan

and Murugesh, 2008). They found higher reduction in the population of *H. vigintioctopunctata* when treated with neem oil and the effect was at par with neem cake extract. Moreover, the plant products were less effective than carbaryl, but better than the untreated control. Mala *et al* (2012) reported that the residual effect of siperin, malathion and neem oil against larval instar and adult of epilachna beetle. They found that neem oil has less residual toxicity than other two insecticides. This experiment demonstrated that neem oil has the very low LC_{50} value. The LC_{50} value of neem oil is followed by extracts of neem seed kernel, neem cake, neem seed coat and neem bark powder.

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