

Persistence of Different Neem Based Pesticides Against Diamond Back Moth, *Plutella xylostella* Linn

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SUMMARY

A field - cum laboratory study was carried out on residual toxicity of field weathered deposits of five neem based pesticides. *viz.*, Neemazal, Bioneem, Neemgold, Nimbicidine and Achook at 1 and 2 per cent concentrations against third instar larvae of Diamond back moth, *Plutella xylostella* Linn. Results showed that Neemazal was most toxic and persistent pesticide as initially it offered maximum kill of larvae and continued to give mortality even after 10th day of spraying, where as Achook proved to be least effective and persistent. However, Bioneem, Neemgold and Nimbicidine behaved intermediary.

Key words :

Neem based pesticides,
Diamond back moth, *Plutella xylostella* Linn.

The present day need is to produce uncontaminated food including vegetables, fruits, pulses, cereals etc. for growing population at the global level. The increasing use of synthetic insecticide, have posed the problems of their residual hazards, resistance in pest species against them and pest resurgence after their use, which has diverted the attention of the scientists to shift from the common philosophy of pest control with the application of insecticides, on the ecofriendly approaches for suppressing the pest problems. Neem (*Azadirachta indica* A. Juss), a well known Indian tropical plant, is found to have more than hundred terpenoids from different parts of its biological constituent, the most active and well studied compound is azadirachtin, highly oxidized triterpenoid. Neem has easy available and fast degradating and persistency impact on pest multiplication. These qualities of neem make it more suitable for managing the pests on vegetables where its less persistence becomes more appropriate to grow uncontaminated healthy vegetable for human consumption. Diamond back moth, *Plutella xylostella* Linn. is a serious pest of cruciferous crops. The larval stage of the pest is phytophagous in nature feeding on cruciferous (Brassicaceous) plants like cauliflower, cabbage, radish, mustard, turnip etc.

MATERIALS AND METHODS

The residual toxicity of various neem based pesticides, *viz.*, Neemazal, Bioneem, Neemgold, Nimbicidine and Achook were

studied in the field. For this purpose, the cabbage plants were selected and different neem formulations were sprayed at two concentrations *viz.*, 1.00 and 2.00 per cent. In order to study the residual toxicity of the formulations, the sprayed leaves of cabbage were plucked and brought to the laboratory just after zero hour of spray. After 1, 2, 3, 5, 7 and 10 days of spraying, the leaves were kept in Petridishes after plucking from the fields. Ten, third instar larvae of *P. xylostella*, starved for seven hours, were released in each Petridish. The feeding larvae were recorded for observing the persistence or residual life of these formulations in field conditions. The moribund larvae were taken as dead for calculating the percentage mortality.

RESULTS AND DISCUSSION

The results of the tests on the persistence of the spray deposits against *P. xylostella* larvae are given in Table 1. The Neem mortality of the larvae of the test insect has been expressed as the time in days after spraying. The age of the deposits was considered as the best criterion to assess the combined effects of weathering, dilution due to the growth of the leaves, penetration into the cuticle and chemical change of the deposits.

It is amply documented from Table 1 that after one hour of spray, highest concentration (2.00%) of Neemazal proved to be significantly superior over all the treatments. It registered maximum (93.33%) larval mortality. It was followed by 2% each of Bioneem, Neemgold,

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Table 1: Residual toxicity of Neem based pesticides to larvae of *P. xylostella* on cabbage leaves at different intervals after spraying

Formulation/ Treatments	Concentrations (%)	1 hours		1st day		2nd day		3rd day		5th day		7th day		10th day	
		mortality (%)	Degree	mortality (%)	Degree	mortality (%)	Degree	mortality (%)	Degree	mortality (%)	Degree	mortality (%)	Degree	mortality (%)	Degree
Neemazal	1%	66.66	54.99	60.00	50.76	56.66	48.84	50.00	48.84	43.33	45.00	41.15	16.66	23.85	-
Neemazal	2%	93.33	78.44	86.66	68.85	80.00	63.43	60.00	63.43	50.00	50.933	45.00	20.00	26.07	3.33
Bioneem	1%	63.33	52.77	50.00	45.00	46.33	43.07	43.33	43.07	36.66	41.07	37.22	16.66	23.36	-
Bioneem	2%	83.33	66.14	80.00	63.92	76.66	61.92	56.66	61.92	43.33	49.22	41.07	10.00	21.27	-
Neemgold	1%	50.00	45.00	46.66	43.84	43.33	41.07	40.00	41.07	33.33	38.85	35.00	13.33	21.14	-
Neemgold	2%	73.33	59.70	56.66	48.84	50.00	45.00	36.66	45.00	23.33	30.00	28.28	6.66	13.64	-
Nim bicidine	1%	46.66	43.07	43.33	41.15	40.00	39.23	33.33	39.23	30.00	35.00	31.92	10.00	16.35	-
Nim bicidine	2%	66.66	54.78	53.33	53.06	46.66	42.78	23.33	42.78	20.00	28.28	26.56	3.33	8.84	-
Achook	1%	43.33	41.07	40.00	38.85	33.33	35.00	20.00	35.00	16.66	26.56	23.36	6.66	11.55	-
Achook	2%	63.33	52.85	50.00	45.00	40.00	38.85	16.66	38.85	10.00	23.36	16.35	3.33	8.84	-
SE (diff.)			4.16		3.84		4.51		4.51		5.18		5.50		
C.D. (P=0.05)			12.28		11.36		13.30		13.30		15.29		16.25		

Degree = Angular transformed value

Nimbicidine and Achook as they offered 83.33, 73.33, 66.66 and 63.33 per cent mortality, respectively. Bioneem was at par with Neemgold at 5% level of significance and superior to rest of the treatments whereas, Neemgold, Nimbicidine and Achook were not significant among themselves. It would be worth mentioning here that at 1% concentration of Neemazal was found at par with Bioneem and significantly superior to rest of the treatments. Similarly, Bioneem was at par with Neemgold and significantly superior to Nimbicidine and Achook at 5% level of significance. Ist day after spray, Neemazal (2.00%) gave 93.33% mortality and thus proved most effective. The next in order of toxicity was Bioneem and its per cent mortality was 83.33 at the concentration of 2%. It was followed by Neemgold, Nimbicidine and Achook, whereas, Neemgold was at par with Nimbicidine at 5% level of significance. Nimbicidine and Achook were less persistent and non significant with each other. As regards persistence in terms of larval mortality observed after 2nd day of spraying, Neemazal (2.00%) was found significantly superior over all the treatments. Nimbicidine and Achook were least effective. Neemazal was found at par with Bioneem at 5 per cent level of significance. Neemgold (1.0%) was observed significantly superior over Mimbicidine and Achook when used at 1.00 per cent concentration. The residual toxicity after 3rd day of spray, Neemazal (1.00 and 2.00%) was found at par with Bioneem and significantly superior to rest of the test formulations with Neemgold and significantly superior when compared with Nimbicidine and Achook at the concentration of 2.00 per cent. Both these treatments were less persistent and statistically non significant with each other at both the doses (1 and 2 per cent) The higher concentration (2.00%) of all the neem based formulations proved significantly superior upto 3rd day of spraying. However, there was no statistical difference in the larval mortality obtained at 1 and 2 per cent concentration of each test compound on 5th and 7th day of spraying. There was no persistence of any neem based formulation on 10th day of spray as on the basis of larval mortality. It may be concluded that Neemazal proved to be the most persistent followed by Bioneem and Neemgold, whereas, Achook was found least persistent against the larvae of *P. xylostella*.

In the filed experimentation for residual toxicity of various neem based pesticides against *P. xylostella*, it was found that Neemazal is most toxic and persistent as it continued to give mortality even after 10th day of Achook and proved to be least effective and persistent. Neemgold and Numbicidien behaved intermediary. The results are in accordance with the findings of Joshi *et al.*

(1984), Kumar *et al.* (2003) and Kumar (2006).

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