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EXPERIMENTAL STUDY TO FIND THE EFFECT OF DIFFERENT NEEM (*AZADIRACHTA INDICA*) BASED PRODUCTS AGAINST WASP MOTH CATERPILLAR (*AMATA PASSALIS*)

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ABSTRACT

Neem is a safe natural pesticide; the present study was undertaken to find the feasibility of utilizing its product in the control of insect foliage feeder *Amata passalis* (Wasp moth caterpillar) in mulberry (*Morus spp.*). Therefore a comparative study was carried out by application of different neem products EC, Dust and WDP in different proportions viz., 1, 2, 3 & 4% concentration on mulberry leaves and feeding the dried leaves to the larvae of *Amata passalis* after 1, 24 and 48 HAS. Bioassay against the larvae of *passalis* revealed that neem products significantly altered the feeding, larval duration and influenced the larval mortality in *Amata passalis*. Critical analysis of the results also reveal that, EC at 1,2,3 and specifically at 4% concentration was found to be most effective after 1 and 24 hour of spray on the leaves of mulberry (*Morus* spp.) and its subsequent feeding to *Amata passalis*.

KEY WORDS: Neem products, *Amata passalis, Neem.*

INTRODUCTION

Mulberry is an important commercial crop grown extensively as a food plant for silkworm *Bombyx mori* L. (N. Earanna and R. Govindan, 2002). The mulberry silkworm *Bombyx mori* is a monophagous insect feeding only on mulberry leaves due to the presence of morin (Tribhuwan & Mathur, 1989). Mulberry, *Morus* spp is infested by a number of insect pests among these "*Amata passalis*" a polyphagous pest which is responsible for the highest damage to mulberry plants. (Handbook on pest and disease control of mulberry and silkworm). The Wasp moth caterpillar, *Amata passalis* is dull white in colour with thin brownish hairs all over the body. The head capsule is shiny and the prothoracic segment is provided with a light brown shield. The caterpillars are active and scrape the chlorophyll layer of the leaves. On the growing of caterpillar the body colour changes to brown. The full-grown caterpillar measures 20-25mm in length, when the caterpillar disturbed, it emits a defensive fluid. The larval period last for about 32 days with 7 moults than caterpillar pupates in the folds of leaves with in a silken web. The wasp moth caterpillar (Lepidoptera: Amatidae) is mostly prevalent during February to August in the northern plains of India. The economy of sericulture industry depends not only on high quantity but also on the quality of mulberry leaves (Das *et al*., 1983). Mulberry sericulture is one among the income assuring occupations to rural folks. It needs low capital and ensures round the year employment opportunities (Hanumappa & Erappa, 1985). It is important that menace of wasp moth hairy caterpillar be marginalized to increase mulberry leaf yield. But different persistent insecticides tested for their efficacy against various pests have been phased out due to their deleterious effect on the silkworm. Therefore the need arises for testing a plant origin insecticide that has minimum effect on the physiology and growth of silkworm.

The Indian neem tree, *Azadiarachta indica* A. Juss has aroused considerable interest as a mean of alternative plant protection during the past two decades. The extracts of fruits and leaves cause inhibition of feeding and oviposition, growth disruption and sterility in insects. It exhibits repellant activity at the higher concentration and phagostimulatory effect at the lower level. Many commercial formulations are used in the diversified agro-climatic region of the world. Use of neem derivatives is being advocated for the protection of different species of silkworm (Singh *et al*., 1993, Srivastava and Mishra, 2000.) In the present study efficacy of different neem based products have been tested against the polyphagous insect pest wasp moth hairy caterpillar of mulberry.

MATERIALS AND METHODS

The neem-based products have been bioassay against the polyphagous insect pest of mulberry, wasp moth hairy caterpillar. Under the study two experiments were set up to study the effect of neem product on wasp moth hairy caterpillar viz., persistence of feeding deterrence, effect on mortality rate% and total larval period (days). Wasp moth hairy caterpillar *(Amata passalis)* used in the test was collected from mulberry garden in March 2006. All the tests were carried out with neem rich insecticide (available in the form of WDP, Dust, and EC) obtained from T. Stanes and Company limited Coimbatore, Tamil Nadu. For the practical utilization of these materials water dispersible powder (WDP) and dust both based on the

crushed kernel and the Emulcifiable concentration (EC) based on neem oil were applied in different concentrations (%) on mulberry leaves, thereafter the dried leaves were fed to larvae of *Amata passalis* in glass petridishes using no-choice feeding bioassay technique. A batch of 7 larvae of *Amata passalis* (10day old 3h starved) were released in each Petridish and allowed to feed for 4hour. On termination of the experiment a leaf feeding diagram was sketched on graph paper and the observations were recorded on the mean leaf area consumed (MLAC) in cm^2 at 01, 24 and 48 hour after spraying (HAS). Control batches were also maintained separately.

TABLE 1 Persistence of feeding activity of different neem products sprayed on mulberry under Lab conditions against *Amata passalis*.

Con.	MLAC values for EC			MLAC values for Dust			MLAC values for WDP		
(%)	01HAS	24HAS	48HAS	01HAS	24HAS	48HAS	01HAS	24HAS	48HAS
1.00	24.80	37.40	39.50	26.85	37.42	44.50	26.45	36.90	43.15
2.00	14.10	32.50	36.56	16.78	34.68	39.90	16.50	33.80	38.50
3.00	12.59	31.18	34.80	14.65	32.58	36.56	14.60	32.44	36.10
4.00	7.95	24.10	31.46	8.98	26.40	35.12	8.80	26.12	35.00
Control	31.06	44.45	-	31.45	45.00	-	31.00	44.00	-
Mean	18.10	32.51	35.58	19.74	35.21	39.02	19.47	33.23	38.18

Note- Con.- concentration, MLAC cm^2-Mean leaf area consumed, HAS- Hours after spray, (-) Data not required taken due to excessive feeding.

TABLE- 2 Efficacy of different neem products on larval duration and larval mortality *Amata passalis*

	EC		Dust		WDP	
Con. (%)	Larval period Day	Mean larval mortality%	Larval period Day	Mean larval mortality%	Larval period Day	Mean larval mortality%
1.00	33.23 ± 2.13	37.80 ± 2.45	32.00 ± 2.11	31.89 ± 2.15	32.45 ± 2.10	35.45 ± 2.04
2.00	34.45 ± 1.98	48.56 ± 2.01	33.50 ± 1.94	44.50 ± 1.87	33.89 ± 1.98	45.75 ± 1.84
3.00	35.00 ± 1.64	64.50 ± 1.85	33.98 ± 1.85	61.00 ± 1.54	34.12 ± 1.54	62.50 ± 1.78
4.00	36.12 ± 1.32	70.00 ± 1.54	35.50 ± 1.21	65.45 ± 1.23	35.56 ± 1.32	66.33 ± 1.41
Control	32.00 ± 1.00	00	32.00 ± 1.00	00	32.00 ± 1.00	00
Mean	34.16	55.21	33.39	50.71	33.60	52.50

The bioactivity of neem kernel and oil is well established (Saxena *et al*., 1981; Jotowani and Srivastava, 1984). Mean leaf area consumed was determined with the help of graph paper sheet an expressed as (MLAC) in cm^2 following Mishra, (1995). Data for the parameters like larval period (days), larval mortality, and persistence of feeding activity were collected and analyzed. Results for the same has been presented in table-1, table-2.

RESULTS AND DISCUSSION

The results of the present study indicate, that neem compound significantly altered the growth and development of insect in dose dependent manner, similar observation were recorded by Wilps, 1986; Garcia and Rembold, 1984 and Schluter *et al*., 1985.

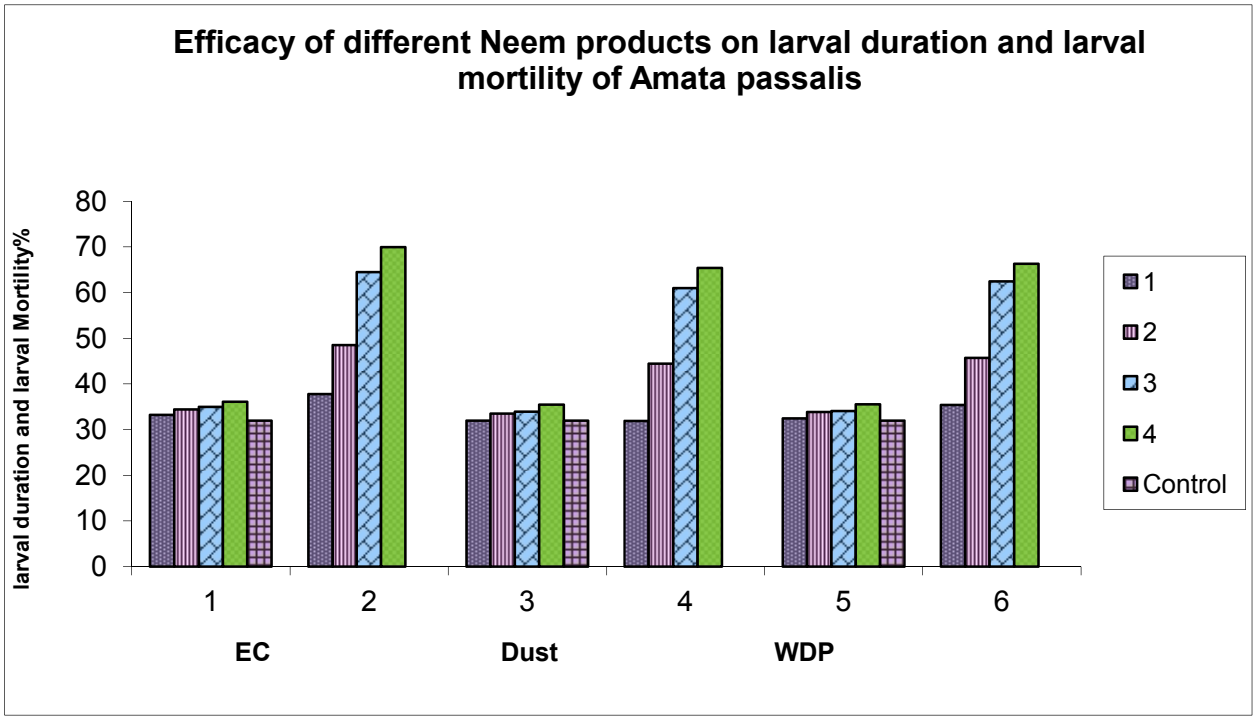
The results (table-1) studied for parameter viz. Persistence of feeding activity of different neem products sprayed on mulberry under Lab conditions against *Amata passalis* viz., Emulcifiable concentration (EC), Dust and Water dispersible powder (WDP) in different concentrations (%) after 1, 24 and 48 hour spraying showed varied results for the parameters studied. The mean leaf area consumption by the pest had differential pattern in function to time on application of 1.00, 2.00, 3.00 and 4.00 % concentrations of EC, WDP and Dust. On perusal of the data (table-1) EC had best inhibitory affects at 4% conc. Application viz., 7.95, 24.10, 31.46 followed by WDP 8.80, 26.12, 35.00 and Dust 8.98, 26.40, 35.12 At 3% concentration the values had best results for EC 12.59, 31.18, 34.80 followed by WDP 14.60, 32.44, 36.10 and Dust 14.65, 32.58, 36.56, Again at 2% EC showed comparatively better results 14.10, 32.50, 36.56, WDP, 16.50, 33.80, 38.50, Dust 16.78, 34.68, 39.90 and At 1% EC has best results 24.80, 37.40, 39.50 followed by WDP 26.45, 36.90, 43.15, Dust 26.85, 37.42, 44.50 In Control mean leaf area consumption was found at 32.00, 44.45 and (-) data not recorded due to irrelevance (excessive feeding) as shown in graph-1.

On critical analysis of the results table-2, for the parameter studied viz. larval duration and larval mortality %. The present study found highest mortality % on application of 4% concentration of the different neem products (EC 70.00%, dust 65.45%, WDP 66.33.00%). It was observed that EC was found to be most effective against *Amata passalis* in all the concentrations used during the study. Mortality increased with increase in neem concentration, a similar result was reported by Bidman *et al*., 1986; Wilps 1986; Miller and Chamberlain 1989; Chavan 1983; Akou-Edi, 1983; Rangaswami, et al., 1978; Gaaboub and Hayes 1984 on another pests.

Larval duration (days) was prolonged in the case of application of different neem products (4%- EC 36.12, dust 35.50, WDP, 35.56, 3%- EC 35.00, dust 33.98, WDP, 34.12, 2%- EC 34.45, dust 33.50, WDP 33.89 and 1%- EC 33.23, dust 32.10, WDP 32.45 days) in comparison to

control (32 days). Azadirachtin is a botanical growth inhibitor, which induces dramatic change in insect growth, development and reproduction (H. Rembold, 1994; Jaiswal, *et al*., 2004 & 2005). The larval period was prolonged for 1-5 days for different doses concentration. Similar trend were observed by Thangavelue and Singh, (1994) in *B. zebina* Walker. In the end the study draws the conclusion that EC at higher concentration is effective against *Amata passalis* for inhibition of feeding, prolonging larval period and controlling the insect population. Further work is underway, to find affect of these products on mulberry silkworm *Bombyx mori.*

GRAPH-1



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