

IMPACT ASSESSMENT OF *AZADIRACHTA INDICA* LEAVES
EXTRACT ON *SPILOSOMA OBLIQUA* WALKER (BIHAR HAIRY
CATERPILLAR) INFESTING *MORUS ALBA* L., (MULBERRY
PLANT)

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ABSTRACT:

Numbers of plants have insecticidal properties this some of them are used in agriculture crop protection from polyphagous insect pests. *Azadirachta Indica* leaves have strong insecticidal properties. *Spilosoma obliqua* Walker is one of the major insect pest attacks on the mulberry plant and they are adversely affecting plant health which results in the deterioration of the quality and quantity of mulberry leaves. Mulberry leaves are the sole food material of silkworm larvae (*Bombyx mori* L.) which is used for rearing and production of natural silk. The seasonal incidence of *Spilosoma obliqua* Walker on mulberry was highest in the mulberry garden of the Ahamadnagar district from May 2016 to April 2017. The *Spilosoma obliqua* Walker exposed to *Azadirachta Indica* (Neem) leaves extracts against the 4th instar caterpillar under the laboratory of the Department of Zoology in Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (M.S) India. The results show that the 4th instar caterpillar does not feed the extract-treated mulberry leaves and mortality of the caterpillar was positive and other biological characteristics of the caterpillar show negative effects in treatment. Details of this are discussed in the text.

Keywords: *Spilosoma obliqua*, Mulberry, Neem, Silkworm, Silk, etc.

INTRODUCTION:

The feeding behavior of *Spilosoma obliqua* Walker is a voracious feeder during the 1st & 2nd instars larva are fed a great number of mulberry plant leaves. The 3rd and 4th instar larva is very dangerous to the mulberry plant because they feed continuous leaves from one plant and then they are moved one by one to another plant in the mulberry

garden and finally migrated from the garden to the garden in the field. Neem *Azadirachta Indica* is known to contain a diverse array of biologically active principles of which Azadirachtin are the best-known derivative that is used in sericulture to control various pests (R. N. Singh, 2005). The majority of the farmers faced the problem of a lack of knowledge about controlling pests of the mulberry crop (G. B. Malathesh, 2009). The rural area farmer generally depends on chemical insecticides for controlling pests and diseases of mulberry but many environmental problems such as the development of resistance in pests to pesticides, the resurgence of target and non-target pests, destruction of beneficial organisms, and pesticides residue in host plants may be reduced after proper use of the active ingredients present in the plants (Singh and Saratchandra 2002). Several species of *Spilosoma* are engaged in the defoliation of a large variety of plant species of economic importance in North American, Afro-Asian, and European countries the loss due to this pest is around 30%. (S. N. Tiwari 1989). The larvae feed on the leaves reducing leaf yield. (N. Vijaya Kumari, 2014.) The extracts of fruits and leaves cause inhibition of feeding and oviposition, growth disruption, and sterility in insects (S. K. Gangwar, 2012). The botanical plant extracts viz., *Azadirachta indica*, *Pongamia piñata*, and *Ocimum sanctum* were sprayed to occurring mealy bugs at the early cause of infection to V1 mulberry variety and reared to Silkworm (Samba Naik, 2013). The present investigation was carried out to generate information on the Impact of *Azadirachta Indica* (Neem) leaves extract against *Spilosoma obliqua* Walker (Bihar Hairy Caterpillar) infesting and causing damage to mulberry plant which causes economic loss to the sericulture industry from the Study area.

MATERIALS AND METHOD:

The Neem plant leaves-based product has been used against the insect pest of mulberry, viz. Bihar hairy caterpillar. The sample of eggs and caterpillar was collected from the mulberry gardens of Ahamadnagar district, where the infection of the Bihar hairy caterpillar was observed.

Under the laboratory Condition:

The collected pest was exposed to *Azadirachta Indica* (Neem) leaves extracts against the 4th instar caterpillar of *Spilosoma obliqua* walker under the laboratory condition and observed the impact of the extract on the caterpillar. The 10 caterpillars of *Spilosoma obliqua* walker were kept in three different paitry plates with small creased mulberry leaves. then spry the different concentrations of extract such as 1:2, 1:4, 1:8, % of (Neem) *Azadirachta Indica* leaves on mulberry leaves separately on the

caterpillar of pest, and paity plates were covered with muslin cloth and tied with rubber bands and the whole set were covered and were kept at room temperature in the laboratory. All the experiment was conducted in laboratory condition where the temperature was 27°C and the range of relative humidity was 40% to 50% during the study period.

Methods for recording observation:

In the testing of the impact of Neem leaf extract against *Spilosoma obliqua* walker, mulberry plant leaves were sprayed directly with leaf extract concentration with the help of a hand sprayer. For the evaluation of extract reared caterpillar of *Spilosoma obliqua* walker was used. An untreated control was kept as one treatment. The observations on the biological characteristics of the caterpillar were recorded 48 hours after treatment. In this study were observed the mortality, feeding behavior, length, and weight of caterpillars were. The data relating to mortality data were calculated by Abbott's formula (W. S. Abbott 1925). Given below:

$$\text{Abbott corrected mortality (\%)} = \frac{\frac{T-C}{100-C} - \frac{T-C}{100-C}}{\frac{T-C}{100-C} - \frac{T-C}{100-C}} \times 100$$

Where, T= mortality in Treatments (%), C= mortality in Control (%)

Preparation of Neem leaves extract:

Take one kg. Of sample leaves from the collected samples of Neem plants was cut into small pieces then crushed and milled by using a mortar and pestle to obtain the semi-solid mixture of leaf extract. This semi-solid extract was kept for 24 hours for constant agitation for soaking and stabilization in a 1 liter distilled water container (D. Dahiru 2006). After 24 hours crushed leaves extract are put in a 1000 ml beaker and filtered using 3-layered muslin cloth extract was filtered completely. The filtered extract was dissolved in distilled water and diluted into (1:2, 1:4, and 1:8) concentrations and used for treatment.

RESULTS:

The impact of Neem plant leaves extract on *Spilosoma obliqua* Walker caterpillar on feeding treated mulberry leaves sapling revealed significant results. The extract showed positive results or responses on the biological characteristics of the *Spilosoma obliqua* Walker caterpillar.

1. Weight of Caterpillar

The weight of the caterpillar is the important economic character of the caterpillar. The impact of Neem leaves extracts on the weight of *Spilosoma obliqua* caterpillar after 48 hours of treatment. Neem Plant leaves extract showed a positive response to the weight of the caterpillar. The data on the weight of the caterpillar of *Spilosoma obliqua* Walker is presented in table no-1 and graphically depicted in Figure no- 1. The results were very interesting in all the treated tests. It was observed the weight of the caterpillar was loosed in Test-1 (35.13 %), Test-3 (14.05 %), and Test-2 (13.81 %). The weight of the caterpillar was loosed in all treated tests when compared with the percent change over the control group. Based on the above observations it is confirmed Neem leaf extracts inhibit or have negative development in the weight of caterpillars. According to the concentration of extracts sprayed on fed.

2. Length of Caterpillar

The data on the length of the caterpillar are presented in table no-1 and graphically depicted in figure no-1. The results were very interesting in all the treated tests. It was observed that the length of the caterpillar was slowly increased in Test-1 (04.00 %), Test-2 (04.00 %), and Test-3 (04.00 %) It is clear that the length of the caterpillar was slowly increased in all treated tests when compared with percent change over the control group. Based on the above observations it is confirmed Neem leaf extracts inhibit or have negative development in the length of the caterpillar. According to the concentration of extracts sprayed on fed.

3. Mortality of Caterpillar

The results on the impact of Neem plant extract on mortality caterpillar were presented in table no-1 and graphically depicted in figure no-1. The mortality was observed in positive trends during the study period. The results are positive in all the treated cases. In the group treated with *Azadirachta Indica* (Neem) extracts, it was observed that the mortality of caterpillar was seen to increase in Test-1 (-44.44 %), Test-2 (-55.55 %), and Test-3 (-55.55 %) It is clear that the mortality of caterpillar was increased in all treated test when compared with percent change over the control group. Based on the above observations it is confirmed Neem leaf extracts are observed positive results. According to the concentration of extracts sprayed on fed.

4. Feeding Behavior of caterpillar

The results on the effect of plant extracts on the feeding behavior of *Spilosoma obliqua* Walker caterpillar are presented in table no-1. The results were very interesting in all the treated cases. It was observed that the feeding behavior of the caterpillar was

observed decreasing order by Test-1, Test-2, and Test-3 during the study period. Based on the above observation or results it is confirmed that after 48 hours of release there were as negative results in feeding behavior against botanical extracts. Bihar hairy caterpillar larva-infected mulberry plant leaves are treated with Neem leaf extract sprayed on mulberry leaves. Leaves extract concentration levels were slowly increased at particular intervals relative to the respective control group. Tests 1, 2, and 3 were treated with 1:2 % concentration extracts used for spray-on mulberry leaves. Observation shows that tests 1, 2, and 3 were feeds treated leaves of mulberry. Next time tests 1, 2, and 3 were treated with 1:4 % extract spray on mulberry leaves. Observation shows that all test groups of many numbers of caterpillars reduce the feeding ability. Tests 1, 2, and 3 were treated with 1:8 % extract for spray on leaves. A result shows the maximum number of caterpillars stopping the feeding of treated leaves of mulberry.

Table no-1 Impact of *Azadirachta Indica* leaves extracts on the biology of *Spilosoma obliqua* Walker, caterpillar from August to October -2016

Sr. No	Biological Characters of Caterpillar	Control Group		Treatment Groups			Percentage change over Control (%)		
				Test-1	Test-2	Test-3	Test-1	Test-2	Test-3
1.	Caterpillar Weight (gm)	1.850	After 48 hours	2.500	2.100	2.110	35.13	13.51	14.05
2.	Caterpillar Length (mm)	25		26	26	26	04.00	04.00	04.00
3.	Total Mortality	01		05	06	06	-44.44	-55.55	-55.55
4.	Feeding Behavior of caterpillar	+		+	-	-	+	-	-

Notes-

1. + = Positive feeding Behavior of caterpillar feeding the mulberry leaves.
 2. - = Negative feeding Behavior of caterpillars don't feed the mulberry leaves.
- + = Indicates positive impact - = Indicates negative impact

Figure no-1 Impact of *Azadirachta Indica* leaves extracts on biological characters of *Spilosoma obliqua* Walker, caterpillar from August to October 2016

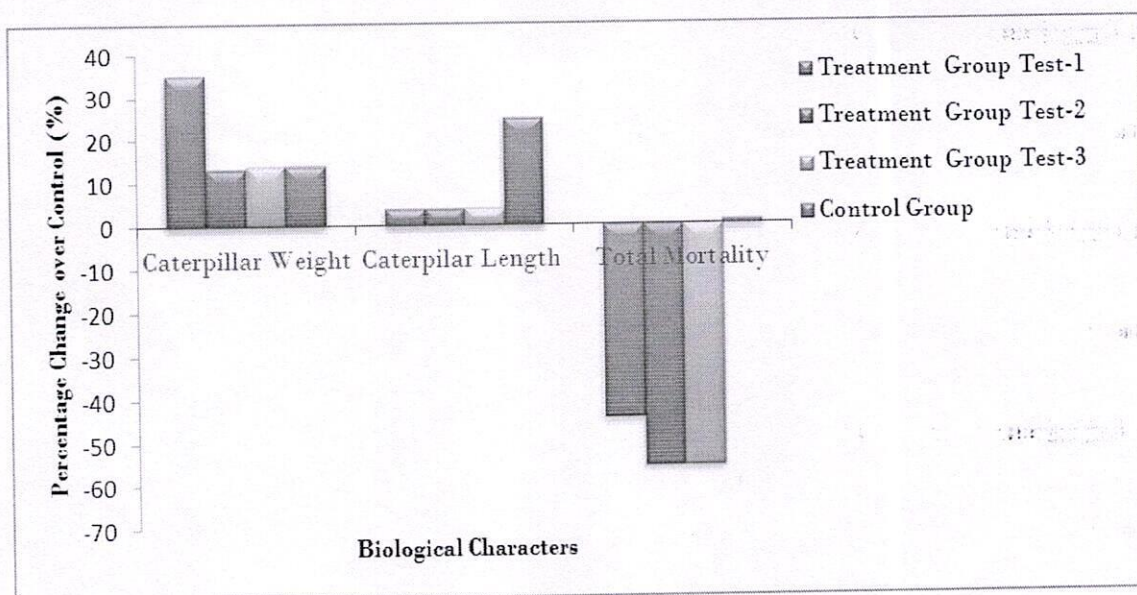


Figure no-1 shows the impact of NLE on the biological characteristics of *Spilosoma obliqua* Walker, caterpillar from August to October 2016. The figure indicates the NLE positive trends to stop the growth of the caterpillar i.e. very least increment in the weight of the caterpillar. The moderate or steady increment in the length of the caterpillar very well results in the mortality of the caterpillar observed during the study.

DISCUSSION:

Neem leaves extracts to produce compounds having properties of insect replant and contact poisons properties often these plants also have other uses like household insect repellents or plants with medicinal applications (R. N. Singh, 2005). To control pests and diseases several management strategies are followed which include physical, chemical, and biological methods. The seed kernel and leaf extracts of *Azadirachta Indica*, *Pongamia piñata*, *Madhucalongifolia*, and only leaf extracts of *Lantana camara*, and *Adathodavasica* were directly used as a foliar spray on M-5 mulberry variety under field conditions. The vast use of chemical insecticides has led to many unpredictable problems: acute and chronic toxicity to users, farmers, and even consumers, birds, fishes, and other wild animals, toxicity to natural enemies and pollinators, pollution of underground waters, danger to human health and environment and gradual resistance of insect pests to insecticides (Isman M. B. 2006).

CONCLUSION:

Based on the results of the present investigation, the study indicates the management of mulberry plant pests, the use of Neem plant leaves extracts is useful against the Bihar hairy caterpillar infesting mulberry gardens. The present results give an alternative source to harmful chemical insecticides.

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