Biospectra : ISSN: 0973-7057, Vol. 18(1), March, 2023, pp. 123-126 **Animal Science**
An International Biannual Refereed Journal of Life Sciences

ISSN : 0973-7057

Study on the impact of *Annona squamosa* on the biological control of *Spilosoma obliqua* on the jute plant

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Received : 06th January, 2023 ; Revised : 05th February, 2023

Abstract- Agriculture, which is the science of cultivating the soil, growing crops, and raising livestock, is the key to development in the rise of sedentary human civilization. A significant problem now is to expand food production without harming the environment. Synthetic pesticides that are sold commercially can harm both human civilization and the environment as a whole. Pesticides are administered, and more than 85% of them end up in the environment, posing serious health risks. Commercially available synthetic insecticides harm both human civilization and the entire environment. Synthetic pesticides were used, which resulted in bioaccumulation in agricultural fields, which raised resistance and decreased soil biodiversity. Therefore, it is important to promote natural pesticides and insecticides that are safe for the environment. *Spilosoma obliqua* is a polyphagous pest that causes significant damage to plants. In this study *Annona squamosa* active ingredients are employed as biopesticides to reduce *Spilosoma obliqua*. When compared to Control, the larval population of *Spilosoma obliqua* in *A. squamosa* dropped by a maximum significant amount of 7.09 and 11.02%, respectively, at 1 and 2 weeks, respectively. After three and four weeks, the findings showed that *A. squamosa* had the highest increase in the reduction of the larval population (22.26 and 47.23%, respectively) when compared to Control (0.00%). The greatest increase in *A. squamosa* larval population after 5 weeks was 82.52%, which was declared non-significant when compared to control's minimum larval population decline of 0.00%.

Key words: ***Annona squamosa, Spilosoma obliqua,*** **bioaccumulation, Synthetic pesticides**

INTRODUCTION

Jute production is one of India's oldest and most well-known industries. However, due to the greater number of mills, West Bengal is where the Indian jute sector is most dependent. About 3.5 lakh people are employed in the sector, including those who depend on the jute industry's forward and backward linkages. 800,000 hectares of land are typically used for the cultivation of raw jute and mesta. The jute industry plays a significant role in India's national economy. The golden fibre, jute, is natural, renewable, biodegradable, and satisfies all requirements for "safe" packaging. With an estimated 1.968 million tonnes of annual production, India is the world's largest producer of jute. Improvements in crop cultivation techniques and the use of technology to the jute farming industry are credited with India's prominence in the world's jute production. Jute is produced in Bihar, which is India's second-largest producer. West Bengal is at the top. Due to its hardiness and ability to withstand moisture stress, it is grown in a

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variety of agro-climatic conditions as opposed to jute, which is only grown in eastern and north eastern States. The soil is acidic in nature across a large portion of the Jute region, especially in North Bengal, Bihar, and North-Eastern States.

Spilosoma obliqua (Walker), the Bihar hairy caterpillar, is a polyphagous pest that belongs to the lepidoptera order of class of insect with a chewing type of mouthpart. It is only found in the oriental region and is known to severely harm a number of crops of agricultural and horticultural value. *Spilosoma obliqua*, a jute hairy caterpillar, is the most prevalent and harmful pest. The Bihar hairy caterpillar, *Spilosoma obliqua* seriously harms a number of crops. Their attack significantly lowers the yield and lowers the fibre quality. Jute hairy caterpillar larvae devour the leaves voraciously, skeletonizing them, which reduces photosynthesis, growth, and fibre production. One of the most dangerous polyphagous and widely dispersed insect pests, *Spilosoma obliqua*, often known as the jute hairy caterpillar or the Bihar hairy caterpillar, damages a variety of cultivated and non-cultivated plant species. In a crowded environment, the adult female cluster-lays eggs on the underside of the epidermis of the leaves. While later stages of the larvae consume the leaves from the margin, giving the plant's leaves the appearance of a net or web, the young caterpillars are gregarious and they feed on green, soft tissues while leaving behind the veins, skeletonizing the leaves. Larvae of *S. obliqua* go through six instars. Early instars of *S. obliqua* have a gregarious feeding behaviour, and later instars are voracious feeders, which significantly harm the developing plant. It first infests jute in the month of April, when the plants are approximately two to three feet tall, but the heavy infestation happens in the months of June and July. After the eggs hatch, the young caterpillars start feeding in clusters on the lower epidermis of the leaves. The adult female deposits her eggs in clusters on the lower surface of the leaves. Early leaf deterioration takes on a strange membranous aspect. If not quickly handled after emerging, the jute hairy caterpillar can be quite harmful. The final element of an integrated pest management system is chemical control. Chemical control is typically an efficient way of control, particularly in times of urgency when the pest population surpasses the economic threshold. The polyphagous behaviour of S. *obliqua* larvae has, however, received little research in Bihar. Knowing which host plants, the pest prefers and at when stages of the life cycle they are vulnerable may assist reduce the insect's population and lessen the harm it causes.

MATERIALS & METHODS

Areas from Saharsa's rural regions were worked out for this investigation. Jute fields were mostly explored during the investigation. The fields that were chosen were from various parts of Bihar's Saharsa district. Samples were collected by touring different jute fields. The hairy caterpillar was collected in its mature and immature phases in the field and treated with biopesticides. In cage containing jute plants, several male and female adults were gathered.

The fresh leaves of *A. squamosa* were crushed with a small amount of fresh water, and then the resulting paste was sieved through a piece of cloth. Water was then added to the resulting sieved solution. As stock solutions, these solutions were employed in the treatment processes. 20 ml of leaf extracts of *A. squamosa* /80 ml of water were combined to create the needed spray at a 20 percent concentration, and it was then used. A 2-3 week old fungal culture was employed for a variety of tests. By scraping the culture's surface with a sterile loop and distilled water, conidia containing mycelia were collected, and the concentration was set at 20%.

After 1, 2, 3, 4, and 5 week of *A. squamosa* solution treatment on jute plants in plastic jars, the Abbott's formula was used to compute the % mortality of larvae and pupae.

$$\text{Corrected \%} = 1 - \frac{\text{n in T after treatment}}{\text{n in Co after treatment}} x\ 100$$

Where: n = Insect population,
T = treated,
Co = control

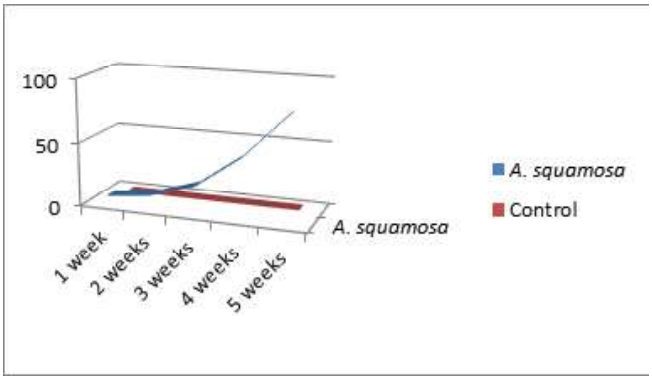
RESULTS & DISCUSSION

After 1, 2, 3, 4, and 5 week, the impact of treatments with *A. squamosa* on the population of *Spilosoma obliqua* larvae following findings were observed. The results after 1 and 2 weeks showed that the larval population of *Spilosoma obliqua* in *A. squamosa* decreased by a maximum meaningful amount of 7.03, 11.02% respectively as compared to Control. The data showed a highest rise in the reduction of the larval population in *A. squamosa* 22.26, 47.23% respectively as compared to Control, 0.00%, after 3 and 4 weeks. After 5 weeks, the results indicated a

maximum rise in *A. squamosa* decrease of the larval population of 82.52%, which was deemed non-significant when compared to Control's, minimum reduction of the larval population of 0.00%. (Table 1 & Graph 1)

Table 1- Effect of *A. squamosa* on larval population of *S.obliqua*

Duration	*A. squamosa*	Control
1 week	7.03	0
2 weeks	11.02	0
3 weeks	22.26	0
4 weeks	47.23	0
5 weeks	82.52	0



Graph 1- Effect of *A. squamosa* on larval population of *S.obliqua*

Fig. 1- Egg of *Spilosoma obliqua*

Fig. 2- Larval (1st instar) population of *Spilosoma obliqua*

Fig. 3- Larval (3rd instar) population of *Spilosoma obliqua*

Fig. 4- Jute field infected by *Spilosoma obliqua*

According to the results of the current study, *S. obliqua* larvae infected plants become dormant and stop feeding when treated with leaf extracts of *A. squamosa*. The larvae eventually die, generally within days, after becoming pale yellow and black, becoming flaccid. As the body parts decay, they shift from brown to black. This inhibits development, transformation, and procreation. In a holistic pest management strategy, leaf extracts of *A. squamosa* can be extremely effective against the *Spilosoma obliqua* Bihar hairy caterpillar. For organic gardeners, caterpillars can provide a significant challenge. Depending on the species, caterpillars have the power to wreak havoc on ornamental plants, crops, shrubs, and even trees. Pesticides can eliminate caterpillars, but the drawback is that they also eliminate helpful insects.

The current study found that treatment with leaf extracts of *A. squamosa* causes *S. obliqua* larvae-infected plants to go dormant and stop feeding. Eventually, the larvae die, usually within a few days after becoming pale yellow and black and becoming flaccid. The body components change colour from brown to black as they deteriorate. This prevents growth, transformation, and

reproduction. *A. squamosa* leaf extracts can be very efficient against the *Spilosoma obliqua* Bihar hairy caterpillar when used as part of a comprehensive pest management plan. Caterpillars can present a big barrier for organic gardeners. Caterpillars can destroy attractive plants, crops, shrubs, and even trees, depending on the species. Although pesticides can kill caterpillars, they also kill beneficial insects, which is a negative.

The effectiveness of *Annona squamosa* against the Bihar hairy caterpillar (*Spilosoma obliqua*) was also examined by Srimannarayana *et al.* (2000)[7]. The best antifeedants were discovered to be Annona oil-based formulations, followed by *Annona* seed extracts and leaf-based formulations. The antifeedant *Annona* products were more effective against silkworm than against Bihar hairy caterpillar at the same concentration when compared to a neem-based pesticide. Similar studies were also done on cabbage leaves in plastic jars, the effectiveness of botanical extracts against *Spilosoma obliqua* caterpillars was investigated. These extracts included Neem, Sarifa, bioagent *Beauveria bassiana*, and insecticide (Cypermethrin 0.07%).[8]

CONCLUSION

Most developing nations today rely heavily on the use of imported insecticides. The output of the agricultural sector is declining as a result of this dependence. The growth is good at the moment when we use such synthetic pesticides, but the fertility of the land declines. Additionally, it might cause bugs to become more resilient. Although the body can easily metabolise and remove the majority of highly hazardous pesticides, acute short-term exposure might result in their buildup. Pesticides' active components, transporters, solvents, and emulsifiers can have harmful side effects. Biopesticides can be a more effective alternative to synthetic pesticides in terms of regulated release of the active components, stability, and sustainability.

REFERENCE

1. **Biswas C., Dey P., Satpathy S., Satya P. 2012.** Establishment of the fungal entomopathogen *Beauveria bassiana* as a season long endophyte in jute (*Corchorus olitorius*) and its rapid detection using SCAR marker. *BioControl*. **57(4):**565-571.

2. **Gupta G. & Bhattacharya A. K. 2008.** Assessing toxicity of post emergence herbicides to the *Spilarctia obliqua* Walker (Lepidoptera: Arctiidae). *J Pest Science.* **81:**9-15.

3. **Hussain M. & Begum M. 1995.** Food preference of jute hairy caterpillar *Spilosoma obliqua* (Walk.) on some varieties of jute. *Bangladesh J Entomology.* **5(1&2):**57-59.

4. **Chowdhury H., Kar C. S., Sarkar S. K. and Tripathi M. K. 2012.** Feeding inhibitory effect of some plant extracts on jute hairy caterpillar, *Spilosoma obliqua. Indian J. Agric. Sci.* **82:**59–62.

5. **Sivakumar G., Kannan M., Babu V. R., Mohan M., Kumari Surabhi, Rangeshwaran R., Venkatesan T., Ballal Chandish R. 2020.** Characterization and field evaluation of tetrahedral and triangular nucleopoly hedrovirus of *Spilosoma obliqua* (SpobNPV) strain NBAIR1 against jute hairy caterpillar. *Egyptian Journal of Biological Pest Control*. **30(82).**

6. **Srimannarayana G., Raman G. V., Rao M. S., Venkateswarlu B. 2000.** Bio-efficacy of custard apple (*Annona squamosa*) formulations against mulberry pest, Bihar hairy caterpillar (*Spilosoma obliqua*) and mulberry silkworm, *Bombyx mori*. *Sericologia*. **40(2):**267-273.

7. **Hussein A. Salim and Mohammed S. Abed. 2015.** Effect of botanical extracts, biological and chemical control against *Spilosoma obliqua* on cabbage (*Brassica oleracea*). *Journal of Entomology and Zoology Studies.* **3(1):** 43-46