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A STUDY ON THE CROP DAMAGE FROM BIHAR HAIRY CATERPILLAR AND AVAILABLE MEANS TO REDUCE IT EXTENT OF SUCH DAMAGE

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Abstract

Weeds and herbs in the Koshi region are seen to be affected by Caterpillar invasion to a great extent. Therefore it becomes necessary to understand how these insects feed and grow on their hosts and also ways to reduce and prevent this damage.

During the survey, different stages of *Spilosoma obliqua* larval population were collected and reared in the bio-control laboratory. The larva undergoes 5 moults, passing through 6 instars and subsequently enters for pupation. After larval eclosion, the adults mate and lay eggs in the cluster. *Spilosoma obliqua's* life cycle on crops and weeds can be detrimental to their growth and harvest.

The present study is attempted at a detailed study of caterpillar's growth cycle, longevity and food consumption from host plants and also ways to minimise crop damage from their infestation.*Spilosoma obliqua* is a polyphagous insect mostly confined to the Koshi region and capable of infesting 126 plant species belonging to 24 plants families including a number of economically important plants such as jute, vegetable (drumstick), cereals grains, oil seeds, pulses and many useful medicinal weeds.

Introduction

Bihar hairy caterpillar, Spilosoma obliqua is one of the major pests and highly polyphagous which infests many economically important crops, often causing severe economic damage including Vegetable and jute. Both species of cultivated jute crop (Corchorus olitorius and C. capsularis) are highly susceptible to S. obliqua particularly during the active growth period of the crop. In jute, it causes yield loss up to 30% . It also infests another bast fibre crop i.e. mesta (Hibiscus spp). However, jute is a more preferred host than mesta. Tossa jute (C. olitorius) is more susceptible to S. obliqua than the white jute. S. obliqua earlier considered as a sporadic and irregular pest of jute, however, in recent years, outbreaks of this pest were reported from jute growing areas causing substantial loss to the fibre.

India has estimated about 31-34% fibre loss due to multiple insect pests attack in Bihar. Among them jute hairy Caterpillar, Spilosoma obliqua (Lepidoptera: Arctidae) is one of the highly

polyphagous key pests which infests many economically important crops often causing severe economic damage (Gupta and Bhattacharya, 2008). It is a regular pest of jute causing defoliation and crop damage extensively. It often causes severe economic damage to jute crop reducing the fibre yield loss up to 30 % . Timely management of this pest is very important as delay may lead to complete defoliation of crop. Farmers are resorting to frequent use of toxic insecticides and a considerable level of resistance to conventional insecticides has developed . Therefore, the role of natural enemies for management of this pest needs to be explored.

Spilosoma obliqua is a polyphagous insect mostly confined to the Koshi region and capable of infesting 126 plant species belonging to 24 paint families including a number of economically important plants such as cereals grains, oil seeds and pulses.

Caterpillar invasion can come in several ways, ranging from small subtle signs to big and noticeable features such as complete devastation of leaves, buds and branches. Whatever the way these creatures may show up, if let without any control measures, caterpillars will sweep away everything from the plantation. Nonetheless, when they come, they will notice a few things quickly.

Features of caterpillar invasion include:

- The first thing we are likely to see if there is a caterpillar invasion is holes on leaves. As mentioned, caterpillars are herbivorous thus they devour any green matter fast. Leaves are the first culprits. Apart from the leaves, target fresh buds and the result is wilting bud and crop.
- Leaf yellowing - after a few days of caterpillar invasion, plants will start to yellow their leaves. In most cases, this happens after some damage has been done of the stem and or the roots.
- Irregular holes - caterpillars have no manners at all. They chop weed leaves with no regular pattern at all. The chomped holes may be tiny, even some measuring a few millimeters while others measure up to a few centimeters without following an 1 specific pattern.
- Stem damage - the worst havoc is when the caterpillars eat up the stem. These insects start by digging holes into the stem to usurp the ingredients in the stalk. If left without guard, the stalk will fall within no time and that would be the end to that stalk.

Methodology and Result

To understand the duration of life cycle, longevity and fecundity of the insect, newly hatched larvae were separated from the stock culture of S. obliqua and 20 each were released in the individual rearing jar containing foliage of respective hosts. Six replications were maintained separately for P. vulgaris and I. carnea under laboratory conditions of 24+2°C, 65t 5% RH and Ca 12:12 hrs (L:D) photoperiod.

The size variation in the head capsule is an index of growth and development of the larvae. Therefore, head capsule measurement was considered here to determine the immature instars of the insect. Eggs obtained from the culture were allowed to hatch. From the emerging larvae, ten larvae were reared individually on each host mentioned above in a separate jar. The head capsules were collected at every successive moult, right from initial stage and were stored separately in a small labeled plastic vial for the individual instars. At the end of the experiment, all the head capsules were separately measured across the greatest width (at the base of mandible) as well as the greatest length with the help of stereomicroscope having an ocular micrometer.

$$\text{Growth index (G.I.)} = \frac{\text{\% pupation}}{\text{Larval period}}$$

Since the first three early larval stages usually occur in a cluster of more than hundred individuals, their food consumption index (CI) was not calculated due to their aggregation pattern, but rest of the stages were assessed for Cl and other parameters. Required the number of larvae were collected from stock culture and reared on the foliage of the respective hosts and carefully monitored for - moulting and food consumption. The difference between initial weight of the leaf and unconsumed part of the leaf after 24 hours of interval was considered as food consumption. The insect's weight gain was calculated by subtracting its initial weight from its final weight. The quantum of ingested food was determined by subtracting the weight of left-out food from the weight of food = provided earlier. The fecal matters of individual larva were separated from uneaten food and weighed. The following indices were calculated by computing the data using gravimetric analysis (Waldbauer, 1968; Singh & Sehgal, 193)

The growth index of S. obliqua (GI) was calculated on the basis of available data on larval duration, percentage pupation and adult emergence. This index was found to be 3.12 on P.vulgaris and 2.05 on I. carnea (values significant at $P < 0.01$). While comparing the GI between the two plants, a sharp difference could be seen between them, reflecting the insect's better

performance on the crop than that of the weed host. This index also confirms the superiority of the crop in terms of nutrition so as to promote the insect's breeding ability.

Methods to Minimise Caterpillar Infestation

1. Remove Them Physically -
On a small land holding, the process of physical removal seems a very effective method but in the case of a large land holding, the method can be cumbersome, time consuming and thus, inefficient.

2. Use Bacterial Sprays –

Bacterial sprays that contain pesticides are the best in annihilating caterpillars. We should not apply pesticides when we are nearing harvest time for this may pose irreversible danger on the people who will use the crop.

3. Depend on Praying Mantises -
Praying mantises may appear to be other pests but they are good in eliminating caterpillars.These creatures wait patiently for anything that may invade our crops and the moment they spot caterpillars, praying mantises turn these devastating caterpillars into their delicacy.

Conclusion

Based on the above observations it is inferred that P.vulgaris is an ideal host for S. obliqua. However, under the field condition, I. carnea is used by them as a temporary reservoir especially during the off season of the crop. Thus, S.obliqua is able to maintain its population continuously for seven months both on crops & weed host, under the climatic conditions of Koshi.

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