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Study on the use of *Azadirachta indica* as biological control agent of *Spilosoma obliqua*

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Abstract- Agriculture is the key for development in the rise of sedentary human civilization, it is the science of cultivating the soil, growing crops and raising livestock. Commercially available synthetic pesticides damage the entire environment as well as human civilization. Due to the use of synthetic pesticides it led to bioaccumulation in the agriculture field causing increased resistance and reduction in soil biodiversity. Therefore it is time to draw attention towards environmentally friendly natural pesticides and insecticides. *Spilosoma obliqua* is a sporadic pest and polyphagous which damages a large number of plants. In this paper active ingredient of neem (*Azadirachta indica*) plants which exhibit agromedicinal properties are used as biopesticides in control of *Spilosoma obliqua*.

Key words: Agriculture, *Spilosoma obliqua*, *Azadirachta indica*, biopesticides, Azadirachtin

INTRODUCTION

Spilosoma obliqua is a polyphagous moth. It is brown with a 40-50 mm wing span and a red abdomen. The larvae are covered with long yellowish to black hairs. The pupa forms a thin silken cocoon by interwoven shed hairs of the larvae.¹ It feeds on at least 126 species of plant including cereals, pulses, oilseeds, turmeric, vegetables, mulberry, fibre crops and non-cultivated plants and weeds. In India, the insect is a serious pest of fibre crops, sometimes occurring in epidemic outbreaks.² It has been found to be serious Lepidopteron nocturnal erebid pest of varieties of weeds & agricultural crops of rural areas of Saharsa. It feeds differently in different stages of life, young larvae feeds gregariously on the under surface of the leaves

and cause loss by way of defoliation, pupae damages seeds. It damages almost every part of plant leading to decline in agricultural produce.³

Now a day's increase in food production without damaging the environment is a major challenge. Extensive use of commercially available synthetic pesticides damages the entire environment as well as human civilization. Over 85% of the applied pesticides enter the various environmental resources which results to severe health issues. Therefore, growing attention has been given towards the development of alternate environment friendly pesticides/insecticides that would aid an efficient pest management system and also prevent chronic exposures leading to diseases.⁴

In this paper one of such active ingredients has been studied. *Azadirachta indica* commonly known as neem have many different traditional uses. It is known for its

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pesticidal and insecticidal properties, but people also use it in hair and dental products. One of the traditional uses of neem has been for controlling pests of stored products. Farmers usually mix neem leaves with grain before keeping it in storage for several months. A mixture of neem leaves with clay and cow-dung develops pest resistant property so it can be used to make bins for storage of grain.⁵ The use of biopesticides could effectively control insect pest complex associated with jute.⁶ Azadirachtin is the most prominent constituent and pivotal insecticidal ingredients of neem plant which exhibit agro-medicinal properties. It acts as an antifeedant, repellent, and repugnant agent and induces sterility in insects by preventing oviposition and interrupting sperm production in males.

MATERIALS & METHODS

In this study areas from rural regions of Saharsa were worked out. During the study cotton fields and jute fields were basically explored. The selected fields were from different areas of Saharsa district of Bihar. Samples were collected by visiting various cotton as well as jute fields. Mature and immature stages of hairy caterpillar were collected from the field and were used for biopesticides treatment. Several male and female adults were collected and released into cage along with jute and cotton plants. For performing this work extract of neem leaves, neem kernels have been procured from the local area.

Neem Kernel:- The simple method of preparation of neem kernel aqueous solution has been implemented. For this dried neem seeds were taken, their seed coats were removed with the help

of mortar and pistal and after that seeds were grinded and powder was procured. The powder was not the dust it was grinded so, that it gives a tea like powder. The grinded neem kernels were soaked into water in a jar over night and pH neutral adjutant was added. The very next day the solution obtained was filtered and get sprayed on the plants infected with *Spilosoma obliqua*.

Neem Leaves:- Preparing biopesticides from leaves of neem (*Azadirachta indica*) is very easy just fresh leaves of neem were gathered and were soaked in fresh water overnight. The very next day the leaves were filtered out of the water and then the liquid extract is sprayed over the infected plants.

OBSERVATION

The solution obtained by neem leaves and kernel do not usually kill insects directly, but they can affect their behavior in significant ways to reduce pest damage to crops, and reduce their reproductive potential. The larval mortality was observed after 24 hours of sparkling the Biopesticides.

Unlike the chemical insecticides, azadirachtin affects the hormonal system, not the nervous and digestive system. And this affects insect physiology by mimicking a natural hormone. It disrupts or inhibits the resistance in future generation. It sterilizes adults, inhibits the formation of chitin and disrupts mating deterring females from laying eggs. It has been observed that it affect egg production and hatching rates.



Fig. 1. *Spilosoma obliqua* feeding on jute plant



Fig. 2. Adult of *Spilosoma obliqua*



Fig. 3. Adult of *Spilosoma obliqua* before placing in cage

In larvae, azadirachtin can inhibit molting, preventing them from developing into pupae. The potential use of azadirachtin in crop protection, considering the gaps and obstacles associated with the development of sustainable agriculture were observed.

RESULTS & DISCUSSION

Neem extracts can be made from leaves and other tissues, but the seeds contain the highest concentrations of azadirachtin. Azadirachtin works as an insect repellent and reducing insect feeding. It interferes with the insect hormone systems of insects, so they do not mature correctly or lay eggs. In the present study, it is found that plants infected by *S. obliqua* larvae were when treated by azadirachtin, the larvae become inactive and stop feeding. The larvae become pale yellow and black, flaccid, eventually dies, usually within days. The body contents turn brown to black as they decompose. This prevents growth, metamorphosis and reproduction. Azadirachtin can be quite effective against *Spilosoma obliqua* Bihar hairy caterpillar as part of a comprehensive pest management plan.

Caterpillars can be a big problem for organic gardeners. Depending upon the type of caterpillar, they can destroy ornamental plants, vegetables, and even shrubs and trees. While it's possible to knock caterpillars out with pesticides, the problem is, you also knock out beneficial insects. You run the risk of killing butterfly caterpillars along with destructive moth caterpillars.

Azadirachtin causes a cessation of feeding, delay of moulting and death of larvae in a dose-dependent manner. Microbial activity was enhanced either by causing insect

toxicity or by potentiating of the crystal protein. Similar observations were reported by Chowdhury *et al.* (2012)⁷. The use of neem bark as a bio-insecticide is limited, as its pesticidal efficacy is lower than the other components of the neem tree including neem seed and leaves in controlling insect pests.⁸

The toxicity of neem against second instar and resistant effects could be useful for resistant pests as well.^{9,10}

CONCLUSION

In today's world most developing countries relies mainly on the use of imported pesticides. Due to this dependence, the product of agriculture field is decreasing. Instantly for current period when we use those synthetic pesticides the growth is good, but the fertility of land decreases. It may also lead to development of resistant pests. Most of the highly toxic pesticides are readily metabolized and eliminated by the body, however, acute short term exposure can lead to their accumulation. The active ingredients, carriers, solvents, and emulsifiers present in pesticides can cause severe side-effects.¹¹ To provide controlled release of the active ingredients and to improve stability and sustainability, biopesticides can offer better alternative instead of synthetic pesticides. It enables safe control of pests without hampering the soil fertility rather increases fertility.

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