



Adoption of biocontrol methods for the control of mealy bug and uzifly in sericulture

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ABSTRACT

The results revealed that awareness on the use of bio-control methods against tukra and uzifly was created due to the demonstrations conducted by the scientists and majority of the farmers found that the biocontrol agents were effective in checking the pest incidence. However, the farmers did not follow the technology after the demonstration. Non-availability of biocontrol agents was the primary reason expressed by the farmers for non-adoption of the technology.

Key words: Awareness, adoption, biocontrol agents, constraints, demonstrations, mealy bug (tukra), uzifly

INTRODUCTION

Pests of mulberry and silkworm severely affect the quality and yield of cocoon produced by the farmers. Nutritive mulberry leaf is essential for attaining the potential yield and the production of quality cocoons. The insect pests not only cause yield loss in mulberry but also affect the quality of the feed given for silkworm. The important pests of mulberry are mealy bugs, leaf roller, thrips, Bihar hairy caterpillar (tachinid fly, earwig, dermestid beetle, ants) and cut worms. Among these, pink mealy bug *Maconellicoccus hirsutus*, which causes tukra in mulberry, is a major pest. The average incidence and loss in mulberry leaf yield caused by these pests is estimated to be 34.24% and 4500 kg/ha/year, respectively (Manjunath *et al.*, 2003). Similarly, the tachinid fly *Exorista bombycis* (Louis), popularly known as uzi fly is the most serious pest in Karnataka, Andhra Pradesh, Tamil Nadu and West Bengal. Saratchandra (1997) recorded 10 to 40 % silkworm crop loss due to uzi infestation.

In order to minimize the chemical inputs and save environmental damage, a number of eco-friendly control strategies, chiefly bio-control measures employing parasitoids such as *Trichogramma chilonis* Ishi, *Tetrastichus howardi* Olliff and *Nesolynx thymus* Girault and predators like *Cryptolaemus montrouzieri* Mulsant, *Scymnus coccivora* Ayyari and *Brumus suturalis* have already been evolved to control the insect pests in sericulture. These bio-control agents have shown immense potential in containing the pest problem when used singly or in combination with other control strategies. Bio-control methods have become more relevant due to a number of advantages like safety to environment,

pesticides-free cultivation practices, low input based crop production programme, etc.

After the demonstrations were completed, a study has been undertaken to obtain feedback from the farmers with whom the use of biocontrol measures were demonstrated on the efficacy of the use of biocontrol agents against uzifly and mealy bug. The objectives of the study are: to analyze various control measures adopted by sericulturists against tukra and uzifly; to study the perception of farmers on the effect of biocontrol agents in suppression of tukra and uzifly; and to document the constraints in the use of biological control against the pests in question.

MATERIALS AND METHODS

The study was conducted by collecting data using pre-structured interview schedule from 75 randomly selected farmers of Chotnalli and Thadagavadi villages in Srirangapatna taluk in Mandya district of Karnataka, with whom the use of biocontrol agents was demonstrated by the scientists of CSRTL, Mysore under Central Sector Scheme (CSS-2110) of Central Silk Board.

The data were also collected from 75 randomly selected farmers, who had not adopted the bio-control measures, in the nearby villages so as to compare the performance of the technology. Thus, altogether, the total sample size was 150 farmers, which included 75 beneficiaries and 75 non-beneficiaries. The collected information were compiled, tabulated and subjected to tabular and percentage analyses.

RESULTS AND DISCUSSION

Awareness of the use of biocontrol agents against tukra and uzifly

As knowledge of the technology is essential for its adoption, the extent of awareness of the name and the quantum of the bio-control agents, which is required to be released, was recorded from the sample farmers. It can be inferred that the awareness of the use of biocontrol agents against uzifly was better than that of tukra. None the respondent was fully aware of the name of the bio-control agent released by the scientists to control tukra. However, 69.33 % were able to tell that some beetles were released in mulberry garden to control the pest. About 30.67 % of the respondents were totally not able to specify the biocontrol agents used against tukra. Though the awareness of the name of the bio-control agents against tukra was mostly partial, 72.00 % of them were aware of the exact quantum of the beetles to be released.

Effectiveness of biocontrol agents against tukra and uzifly

The farmers' opinion was collected on the effectiveness of bio-control agents against tukra and uzifly. About 90.67 % of the respondents felt that *N. thymus* was highly effective in control of uzifly, whereas only 62.67% of the respondents were of opinion that *S. coccivora* was effective in controlling tukra. As silkworm is reared in indoor conditions in separate rearing house or in dwelling house of the farmers, the results of release of *N. thymus* inside the building can be felt better by the farmers rather than the effect of *S. coccivora*, which is released in the open mulberry field.

Extent of suppression of pest incidence by biocontrol agents

About 58.00% of the respondents felt that the extent of suppression of tukra incidence was less than 30% due to use of bio-control agents and 42.00% of the farmers expressed

that the extent of suppression of tukra incidence was between 31% and 50% . On the other hand, when 57.33% of the farmers indicated that the extent of suppression of uzifly due to the use of *N. thymus* in the demonstrations, 21.33% of the respondents were of the opinion that the uzifly incident was brought down above 50% by the use of bio-control agents.

Adoption of biocontrol methods during post-demonstration period

It is disheartening to observe that none of the farmers adopted bio-control agents against tukra and uzifly during the post-demonstration period, though majority of the farmers felt that bio-control agents were effective in control of both the pests.

Control measures adopted by the farmers against tukra

Integrated Pest Management (IPM) for mealy bug (tukra) in mulberry involves a combination of physical, chemical and biological methods for keeping the pest below the Economic Threshold Level (ETL). Physical method of clipping off and burning the infected portions of mulberry plants, chemical method of spraying 0.2% DDVP (2.5 ml/l) twice with 10 days gap and biological method of releasing 250 – 300 ladybird beetles (*Cryptolaemus montrouzieri*) per acre are recommended for controlling the mealy bug (Dandin and Giridhar, 2010). However, it was observed that all the respondents resorted to chemical method in the study area (Table 1).

The adopted farmers sprayed chemicals (DDVP) 2.44 times/year for the control of tukra, whereas the non-adopted farmers undertook the spray of chemicals for 2.38 times/year. The total cost incurred for spraying chemicals worked out to Rs. 578.61/acre/year for the adopted farmers and Rs.607.61/acre/year for the non-adopted farmers.

Control measures adopted by the farmers against uzifly

Table 1. Details of the demonstrations conducted on use of biocontrol agents against tukra and uzifly by CSRTI, Mysore.

Particulars	Tukra	Uzifly
Name of the parasitoid/ predator	<i>Scymnus coccivora</i>	<i>Nesolynx thymus</i>
Period of release	February 09 - March 10	December 08 - January 10
Quantity of release	825 boxes	2000 pouches
Villages	8	2
Farmers	272	121
Coverage	460 acres	1,00,000 dfls
Pest incidence before release (%)	38.71	13.82
Pest incidence after release (%)	3.62	2.70
Extent of suppression in pest incidence (%)	90.58	80.46

For effective management of uzifly, various methods including exclusion method of using nylon nets in the entrance and windows of rearing house to prevent the entry of uzi flies, physical method of using uzitrap, a chemotrap that attracts and kills adult flies, chemical method of spraying uzicide for killing the eggs and adult flies and biological method of releasing the natural enemy *Nesolynx thymus*, which is an ecto-pupal parasitoid that kills the uzi pupae, are recommended as IPM practices (Dandin and Giridhar, 2010). It can be inferred from Table 6 that all the adopted and non-adopted farmers used nylon net for preventing the entry of uzifly into the rearing house, for which an expenditure of Rs. 1,523.00 and Rs.1,335.37 was incurred by the adopted farmers and non-adopted farmers, respectively. About 68% of the adopted farmers and 100% of the non-adopted farmers used uzitrap, which was supplied free of cost by the Department of Sericulture, Karnataka for attracting and killing the adult flies. About 21.33% of the adopted farmers and 6.65% of the non-adopted farmers indulged in chemical method of using zipowder/uzicide for which an expenditure of Rs. 151.43 and Rs.125.00 was incurred, respectively.

Farmers' preference of different control methods for suppression of tukra and uzifly

Though different methods are available to control insect pests of mulberry and silkworm, the farmers prefer a particular control method based on many factors such as effectiveness in controlling the pests, availability of chemical/inputs/biocontrol agents, convenience, cost, subsidy or free supply by the Government etc. Majority of the respondents (76% for tukra and 46% for uzifly) preferred a combination of different methods (physical, chemical and bio-control methods) for the control of tukra and uzifly. However, none of the respondent used biocontrol method against tukra and uzifly after the demonstration programme was completed. It implies that the farmers expect for the free supply of biocontrol agents. About 32.67% of the respondents preferred biocontrol method against uzifly, but none of the respondents preferred biocontrol method against tukra. About 22.67% of the farmers preferred chemical method for the control of tukra.

Constraints in adopting biocontrol methods

Though majority of the farmers found that bio-control agents were effective against tukra and uzifly, none of them used the bio-control agents after the demonstration programme was withdrawn from the area. Therefore, the respondents' opinions on constraints in use of bio-control agents were documented

and the results are furnished in Table 8. Non-availability of bio-control agents was the major problem reported by 93.33% for tukra and 96% for uzifly. Requirement of supply of bio-control agents at the doorsteps and free supply of biocontrol agents were the other reasons expressed by the farmers for not adopting the technology.

The results have revealed that awareness on the use of bio-control methods against tukra and uzifly was created due to the demonstrations conducted by the scientists of CSRTI, Mysore in the study area. The farmers did not follow the technology after the demonstration, though majority of the farmers found that the biocontrol agents used against tukra and uzifly were effective. Chemical method was the common practice adopted by the farmers to control of tukra and exclusion method (nylon net) and physical method (uzitrap, which was supplied free of cost by DOS) were used for the control of uzi fly.

Non-availability of biocontrol agents was the primary reason expressed by the farmers for non-adoption of the technology. There is a need for regular demonstrations and publicity programmes on the advantages and the use of bio-control methods. The bio-control agents may be made available to the farmers at subsidized rates through State Sericulture Departments for supporting and motivating the farmers to use bio-control methods against the major insect pests in eco-friendly manner.

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