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Evaluation of different bed disinfectant against the diseases of silkworm, *Bombyx mori*.

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Abstract
The silkworm, *B. mori L.* is highly susceptible to pathogens such as protozoa, virus, bacteria and fungus. To evaluate the various plant oriented herbicides such as, neem *Azadirachta indica,* amla *Phyllanthus emblica,* haldi *Curcuma longa,* ber, *Zizipus mauritiana,* tulsi, *Ocimum tenuiflorum* compared with RKO and chemical disinfectant for their suitability and standardization for the management of diseases during silkworm rearing. The rearing of silkworm race CSR2 x CSR4 was carried out in the centre. In the present study the larvae treated with Tulsi and Amla powder weighed 3.764g and 3.760g respectively at late 5th instar stage, whereas larvae of control reached 3.372g, with RKO 3.381g. Larval mortality was mearly 1% and 4% with Amla and Tulsi leaf powder respectively, while in control it was 46%. The cocoon characters significantly improved with the application of amla powder compared to other disinfectants. Thus the present study suggests that, among all the disinfects, especially Amala and Tulsi leaf powders will be effective in management of diseases in the silkworm compared to traditional disinfectants.

Introduction

Sericulture is an important agro based cottage industry contributing more to the smaller and marginal farmers giving regular income throughout the year. Silkworms have been domesticated over centuries become very delicate and susceptible to diseases due to the infection by a number of pathogens. Cocoon crop losses due to diseases are prevalent in all leading silk producing countries. Mulberry *Bombyx mori L.* has an economic importance because of the commercial value of its silk.

The silkworm, *B. mori L.* is highly susceptible to pathogens microsporidian, virus, bacteria and fungus. Since there are no specific preventive measures for the occurrence and spread of disease other than sanitized rearing methods, the only commercial practice today is to discard large stock of worms in case of infection to avoid the spread of disease (Acharya *et al.*, 2002). However, due to continuous rearing of mulberry silkworms have become highly susceptible to number of diseases caused by different pathogen, account 30-40 percent loss in the cocoon yield (Doreswamy *et al.* 2004; Chandrasekharan *et al.,* 2006). Once the pathogen invade the silkworm, it is difficult to control or curb the pathogen. Disinfection and maintenance of hygiene are the most important for prevention of silkworm diseases during rearing. Disinfectants are applied on rearing bed to prevent contamination, further spread and multiplication of diseases. Hence in the present study, an attempt has been made to evaluate the various plant oriented herbicides such as, neem, *Azadirachta indica,* amla, haldi, *Curcuma longa,* haldi with RKO, ber, *Zizipus mauritiana,* tulsi, *Ocimum tenuiflorum* compared with and chemical disinfectant for their suitability and standardize for the management of diseases during silkworm rearing.

Materials and methods

Disinfectants : The disinfectants such as RKO (Reshim keet Oushad), 2 % Bleaching powder (2g Bleaching powder + 98g lime powder), 10 % Neem leaf powder (*Azadirichita indica*) (10g Neem leaf powder + 90g lime powder), Amla leaf powder (pure), Haldi (*Curuma longa*) (pure), Haldi + RKO(1:1 ratio), Ber leaf powder (*Zizipus mauritiana*) (pure), Tulsi (*Ocimum tenuiflorum)* (pure). Leaves of different plants/herbs were collected dried under shade, powdered using electric grinder, sieved through the muslin cloth and used as preventive measures.

Treatment: The disease free layings of bivoltine cross breed, CSR_2 x CSR_4 race of silkworm, *B. mori L.* race were procured from NSSO, Bangalore. About 900 newly moulted third instars larvae were distributed in nine trays, having 100 each. About 10 larvae weighed taken individually before using any disinfectants. Trays were coded as T1 control without any disinfectant, and, T2, T3, T4, T5, T6, T7, T8 and T9 as described in Table 1. The application dusting of different disinfectants was done once in a day after the bed cleaning throughout the rearing up to beginning of spinning. The amount of disinfectants was 1g, 2g and 3g for third, fourth and fifth instars stage larvae respectively. All the larvae were fed with normal leaves. The culture was maintained using rearing environment suggested by (Krishnaswami, 1986). Amount of leaves provided for feeding regulated as per their requirement at every feeding. Various growth parameters such as larval duration, larval weight, mortality, cocoon weight, shell weight, shell ratio, filament length and haemolymph protein level were recorded and compared.

Result and discussion

The larval mortality was 46% in control compared to lowest 1% and 4% obtained with Amla and Tulsi leaf powder respectively. Both neem and 2% Bleaching powder treatment recorded 8% mortality. The disinfectant such as Turmeric + RKO, Pure Turmeric and RKO produced12, 16 and 20% larval mortality respectively (Table 1). Kasiviswanatan (1976) have also reported mortality in control (24.32 and 24.35 %, respectively) in first and second rearing respectively. The lowest 10.16 and 10.17 % obtained with daily application of active lime powder at the rate of 3 g / sq ft + application of Bundh powder (Trade name) after every moult and hydrated lime powder at the of 5g / sq ft + application of bundh powder after every moult respectively in first and second rearing. These results were confirmed with the farmer practicing the bundh powder in Kolar and Chikkaballapur districts. Chithran *et al.* (1975) reported 30-40% crop loss due to diseases which could be reduced by using effective bed disinfectants

Swati *et al.* (2014) was recorded higher larval weight with daily application of active lime powder at the rate of 3 g/ sq ft + application of bundh powder after every moult (2.64g) and application of hydrated lime powder at the rate of 5g / sq ft + application of bundh powder after every moult (2.67g) in first and second rearing indicating the use of active lime in high temperature reducing matured larval weight 2.64g and 2.67g hydrated lime powder. However, use of hydrated lime with bundh powder in high temperature enhance of the matured larval weight.

In the present study the larvae treated with Tulsi and Amla powder produced recorded larvae having higher weight 3.764g and 3.760g at maturity in 5th instar stage respectively, where as in control it reached 3.372g while larvae treated with regular RKO disinfectant, recorded 3.381g (Table 2). The similar results have also been reported by Shivashankar (2003). The control group produced larvae having lowest larval weight in both first and second rearing (2.10 and 2.11g).

There was no significant difference observed cocoon weight with any disinfectant. The filament length was with Neem and Tulsi were 1010 and 1053 meter respectively. Samson *et al.* (1987) reported that RKO reduces disease incidence compared to control batches and consequent improvement in yield. Similar results were also reported by Narasimhanna *et al* (1975) and Jagannatha (1996) where significantly higher filament length obtained with the application of formalin chaff and Lime + dithane M-45. The present study was observed that amla powder application significantly reduced mortality and cocoons produced having high economic characters, which confirm that the plant disinfects could produced the better management of disease results as compared to the traditional disinfectants.

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