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Constraints and challenges of silkworm seed production in North West Bengal

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Abstract

Sericulture is an agro-based cottage industry. Availability of quality seed cocoons is a detrimental factor for the production Disease Free Layings (DFLs), hence stringent selection criteria is followed as per the norms for the purchase of seed cocoons from the Adopted Seed Rearers (ASRs). Superior quality mulberry leaves, proper knowledge in rearing and disease management are quintessential for the success of a P1 crop. In North West Bengal, production of superior quality seed cocoons is very much challenging due to extreme climatic fluctuations in different seasons. The present study unravels the constraints facing by ASRs of North West Bengal for the generation of quality seed cocoons.

Keywords: sericulture, seed cocoons, adopted seed rearers, mulberry, DFLs

Introduction

West Bengal is the third largest mulberry silk producing state in India, which has a long legacy of sericulture amalgamated within their rich traditions and culture. It creates employment opportunities for more than 1 lakh families in West Bengal there by uplifts living standard and socio-economic status of the rural populations (DOS, WB). Sericulture activities in West Bengal are season specific. Seasons from November to April i.e. Aghrayani (winter), Chaitra (spring) and Baisakhi (summer) are favorable for silkworm rearing whereas seasons from June to October i.e. Jaista, Shrivani, Bhaduri (Rainy) and Ashwina (autumn) are considered as unfavorable due to heavy fluctuations in climatic conditions (Chakraborty *et al.* 2020) [1]. Sericulturists of North West Bengal do not practice Jaista and Ashwina crop.

Production of superior quality parental seeds (P1) is the primary requisite for the existence of silk industry, which is ensured by the skilled Adopted Seed Rearers (ASRs). Rearing of P1 crops starts 42-45 days before commercial crop, P1 rearing especially during unfavorable seasons is one of the major challenges for ASRs due to unpredicted & extreme climatic fluctuations (high temperature & high humidity). Dry summer of P1 Shrivani (May) experience extreme temperature whereas high humidity is the key issue in rainy seasons of P1 Bhaduri (late June- July) however P1 Aghrayani (September) encounters both high temperature and high humidity concomitantly. Rearing of Multivoltine races such as Nistari, M12W, M6DPC etc are preferred for seed production during unfavourable seasons whereas double hybrid (SK6xSk7) is reared by skilled ASRs of West Bengal state government in selected areas during P1 Falgooni (December-January) & P1 Baisakhi (March). Variations of temperature and humidity in different seasons directly affects cocoon weight, shell weight and shell ratio of the cocoon (Rahamathulla *et al.*, 2011, Hussain *et al.*, 2011) [6, 2, 3, 4]. Superior quality seed cocoons are imperative for the production of healthy commercial eggs, hence the purchase seed cocoons is done as per standard norms. The expected yield of P1 seed cocoons during unfavourable seasons is more than 18kg/100 DFLs, however for favourable seasons the yield is expected more than 25kg/100 DFLs. Government offers a higher support price for P1 seed cocoons/kg in unfavourable seasons than favourable seasons and also extends several supports to the ASRs.

Farmers of Malda, WB are practicing sericulture for several generations, State government has selected skilled farmers as adopted seed rearers for P1 rearing in 1992. In contrast to commercial rearing, P1 rearing is done in harsh environmental conditions which demands high technical knowledge and skills. Unlike other states, most of the ASRs of North West Bengal are marginal farmers. The present study is to investigate issues besetting in seed cocoon production in Gazole, Malda.

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Materials and Methods

The study was conducted among the ASRs of Gazole, Malda. For the collection of primary data, a structured questionnaire was given to the ASRs and also personnel interview was conducted. Land holding capacities, infrastructure of rearing rooms, challenges facing during unfavourable seasons and usage of disinfectants were taken into consideration to understand the constraints.

Results and Discussions

Small land holding capacities: Most of the ASRs in North West Bengal are having small mulberry gardens, half acre to one acre which is suitable to rear 100-200 Dfls. Moreover some of the mulberry gardens are fragmented and also far from their home, transportation of mulberry leaves from field to home during hot summer and rainy seasons is laborious. Most of the farmers are using S1635 mulberry varieties however some of the farmer are using old mulberry variety. Under Rashtriya Krishi Vikas Yojana (RKVY) scheme, government offered support for the conversion of existing mulberry plantations to high yielding varieties (HYV) in phased manner to maximize the utilization of leaf yield per unit area, but most of the ASRs were unaware about the scheme and couldn't utilize its benefits properly.

Proper spacing & irrigation: Previously mulberry plantations were closed type with uneven spacing or 2'x2' spacing. Uneven spacing often leads to unhealthy competitive growth and poor leaf yield. High yielding varieties (HYV) were introduced to increase the quality and quantity of leaves, however HYV demands wider spacing but most of the farmers are not willing to adopt the recommended spacing. Farmers opting for upgradation of plantation may suffer crop loss, for that Government has offered compensation packages at a rate of Rs. 30000 per acre plantation, but farmers have not utilized this beneficiary scheme. For the production of superior quality foliage proper irrigation facilities are essential but still some of the farmers lack proper irrigation facilities.

Incubation facilities for DFLs: Maintenance of optimum

temperature and humidity is a prerequisite for uniform hatching especially during unfavourable seasons. Most of the ASRs do not have proper facility for incubation of DFLs in their home; hence they procure DFLs from P2 farms, once it turns blue egg stage.

Higher rate of DFLs: West Bengal state government is offering a lesser price for P1 DFLs compare to Central government. The price for 100 DFLs is Rs 180.00 in state government whereas it is Rs 250 per 100 DFLs in central government. Because of lower price, ASRs prefer DFLs from State government rather than Central government.

High temperature in P1 Shravani (summer): Larvae are highly sensitive to external temperature, 5th instar larvae prefer lower temperature (24-25°C) (Hussain *et al.* 2011) [2, 3, 4]. ASRs are not having thermometer to check the temperature inside the rearing room. Higher temperature in P1 shravani reduces larval period and also mulberry leaves wither fast. Hence ASRs are advised to ensure proper cross ventilation facilities, usage of wet gunny cloths and advised to open windows and doors during night and early morning hours to reduce the temperature inside the rearing room.

Challenges in P1 Bhaduri (Rainy Season): Water logging in mulberry plantations due to heavy rain is a serious issue during P1 Bhaduri crop (fig:1). Wet leaves are collected from distant field are dried under fan and fed to larvae. Some of the ASRs don't have proper facilities to dry leaves. Feeding mature larvae with moist leaves makes the larvae more vulnerable for several diseases and also it increases the bed humidity. Few ASRs don't have separate leaf keeping room; hence they keep moist leaves in the rearing room itself, which increases the humidity of the room. Spreading of newspapers are recommended to reduce the moisture from leaves and fecal pellets. Most of the ASRs are using Chula and electric bulb during winter to maintain the optimum temperature inside rearing room. Dala (bamboo rearing tray) near to Chula/electric bulb are exposed to higher temperature causing larvae to grow unequally.



Fig 1: Water logging in mulberry plantations during P1 Bhaduri crop

P1 Agrahayani the most uncertain crop: P1 agrahayani encounters both hot and humid conditions simultaneously. Silkworms are poikilotherms hence fluctuations in outside temperature and humidity directly affects the physiological functions of the larvae. Higher temperature and humidity is

highly detrimental to the survival of the late age larvae (Pandey *et al.*, 2006, Hussain *et al.*, 2011) [5, 2, 3, 4]. In P1 Agrahayani, seed cocoon size is smaller and disease percentage and mortality of pupae is higher compare to other seasons. Considering the uncertainty of the crop, Government

is offering higher support price to the ASRs for seed cocoons produced.

Cross contamination: ASRs rear different multivoltine races inside same rearing room, those kind of rearing practices are highly susceptible for outbreak of diseases, hence ASRs are instructed to do rearing for different multivoltine races in separate room by following proper disinfection processes.

Shortage of Dala (bamboo rearing tray): Adequate spacing of larvae is required for proper development of silkworms, but some of the ASRs are not having enough Dala, hence more larvae are grown in dala than the recommended. Overcrowding of larvae always leads to an unhealthy development.

Early Harvesting of larvae: Mature larvae is transferred to bamboo chandraki (mountage) for spinning. Due to shortage of chandraki, ASRs hire chandraki from other farmers or harvest early spun immature cocoons, later chandraki is used for other spinning worms. This decreases the pupation rate and negatively affects the quality of the seed cocoons and profitability of ASRs.

Effective disease management: Silkworm is susceptible for various diseases. Proper disinfection of grainage rooms and appliances is essential before and after every crop and also usage of bed disinfectant such as labex, vijetha is recommended during rearing however due to high cost of disinfectants, ASRs are not applying any disinfectants or applying at a lower dose which results in disease outbreak. Even though Mass disinfection programme was introduced by state government for disinfection of rearing room and appliances with the help of external agency, it was not successful.

Conclusion

P1 crop in North West Bengal always experience harsh climatic fluctuations. Production of superior quality seed cocoons depends on mulberry varieties, rearing practice and environmental conditions. This study has revealed several constraints facing by the ASRs. ASRs are not having dry and wet thermometer to check temperature and humidity and also proper infrastructure such as electric room heaters, humidifiers etc. to maintain optimum temperature and humidity are lacking. Due to the high cost of bed disinfectants, most of the ASRs are not using bed disinfectant, which makes the silkworm highly susceptible for various diseases. ASRs need support from the state government for upgradation and gap filling of mulberry plantations. ASRs have great potential to increase the productivity and quality of seed cocoons, hence appropriate extension training and awareness programmes have to be conducted to surmount the constraints and also for the betterment of ASRs in North West Bengal.

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