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## Standardization of package and practices for the success of bivoltine autumn crop in temperate region of the Kashmir Valley: A review

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#### Abstract

In the present study an attempt of review was made to standardize the package and practices for the success of silkworm bivoltine autumn crop in temperate region of the Kashmir Valley. Kashmir has very salubrious climate, which is ideal and favorable for cultivation of mulberry and raising quality cocoon production. But, autumn crop is not popular since 1965 due to the fact that, the productivity is very low as compared to the spring season. With this background, alteration of existing methods/technologies through utilization of stable races/hybrids, mulberry pruning schedule, garden should be nourished with recommended dose of fertilizers, manures, irrigation and leaves be tested, meteorological data of 5 to 10 years be cross checked, *etc.* Beside, rearing house and surrounding be disinfected, insects & disease infestation should be tested, rearing condition should be checked out timely by avoiding scattered nature of trees, transportation with long distance in vehicles, *etc* without taking any precautionary measures, using of by-products of sericulture activity, marketing the cocoons, modernization of reeling sector, rationalization of low cost technologies at farmers level, *etc* are in-depth discussed herein.

**Keywords:** Standardization, package & practices, silkworm bivoltine, autumn crop and Kashmir Valley

#### Introduction

There are five traditional sericulture states in India were produced raw silk (MT) like, Karnataka (9645), Andhra Pradesh (6485), West Bengal (2500), Tamil Nadu (1602) and Jammu and Kashmir (138) during the year 2014-15 <sup>[1]</sup>. Sericulture in North West India has remained a subsidiary occupation primarily because of the fact that most of the farmers are involved in rearing of only spring silkworm crop. Even though autumn crop is considered as second largest crop after the spring and productivity is very low due need of improvement <sup>[2]</sup>. Although considerable work has been done and efforts have been made to popularize the autumn crop in North West India, but still only 30-35% farmers are involved in autumn rearing. Moreover, the breeding plan was initiated to evolve bivoltine races during 1965 through hybridization, as an important tool has been exploited by breeders in improving silkworm to attain maximum silk productivity in temperate region of Dehradun, India <sup>[3]</sup>. The reason for the failure of autumn crop has been reported as lack of autumn specific breeds and autumn specific package and practices in vogue in the region. Therefore, there is a need to standardize the existing package and practices vice versa the introduction of autumn specific hybrids, alteration in brushing schedules to avoid clash with the other crops, alteration in pruning schedules to match the timings of autumn rearing in the region, proper follow up of irrigation and input regime of fertilizer, *etc* <sup>[2]</sup>. Though the government agencies organize several extension programmes and training courses, wherein involvement of the farmers was the basic criteria for popularizing any technology. In spite of availability of plenty of improved techniques in host plant management and as well as silkworm rearing, majority of the silkworm rearers of Jammu and Kashmir were still inclined to follow their traditional practices <sup>[2]</sup>. In this connection, few reports were also made by <sup>[4]</sup> developed ATR breeds for adverse conditions at RSRS, <sup>[5]</sup> evaluated seven RSJ breeds and their hybrids performance in comparison to SH 6 x NB<sub>4</sub>D<sub>2</sub> for autumn crop improvement in Jammu region. Apart, by <sup>[6]</sup> have reported that, SK1, SH6 and NB<sub>4</sub>D<sub>2</sub> breeds resulted excelled their performance under early autumn season of the Kashmir climatic conditions. Moreover, there were also few reports made by <sup>[7]</sup> on performance of seasonal effects and adaptation of selected bivoltines under temperate climatic conditions of Kashmir.

Apart, through analyzing the strength of sericulture in Jammu & Kashmir Japanese Scientist [8] said that, 'Kashmir in view of its favorable climatic conditions could be converted into silkworm gene bank for sustaining the sericulture of the whole world'. Hence, keeping all the aspects in mind, a review was made for standardization of package and practices through modification of existing one for sustainable bivoltine autumn crop to make sericulture more remunerative in temperate region of the Kashmir Valley.

## **2. Key points to be altered for the success of autumn crop**

**2.1 Identification of autumn specific silkworm breeds/hybrids:** Primarily, we should be well organized system of production and supply of disease free eggs [2]. Further, one should go through the details for the testing sources of the selected silkworm hybrids with its biochemical/physiological and genetical expression under autumn crop and these stabilized silkworm hybrids seed should be selected based on qualitative and quantitative parameters for rearing. Moreover, the frequent failures and low cocoon yield & inferior quality during autumn season are of prime concern and constrains in the expansion of the trade. As long as the two crops are not harvested, the occupation is going to remain a subsidiary one. If the experiences have shown that the failure of autumn crop is not essentially because of non existence of region specific autumn silkworm hybrids but because of bad quality of leaf under field conditions.

**2.2 Alteration in pruning schedules to match the timings of autumn rearing in the region:** For this region, Sericulturists are not following the proper pruning schedule for the autumn crop. Hence, shape/size of the mulberry trees grow as tall as 20-30 meters with haphazard branching pattern. Therefore, timely pruning schedule should be followed particularly for autumn crop with keeping in mind of rearing schedule. In some cases, after the spring rearing is over, the mulberry plants are subjected to ruthless, incomplete and haphazard bottom pruning without following the scientific norms with the result portion of branches along with some leaves remain there on the plants. Meanwhile buds also start sprouting in 10-12 days and foliage becomes available for 2<sup>nd</sup> crop by mid August which along with the leftover leaves is fed to the worms. This has, however also not picked up well because of low yield of mulberry leaves and also because of ruthless leaf harvesting from such plants adversely affect the leaf yield of plant in the following spring mainly due to its shorter branch length, unscientific leaf harvesting, *etc.* further, Miyashita, (1986) revealed that, the quality of the leaf is being treated as one of the most important parameter for the production of good cocoon crop. Later on, [9, 10, 11, 12] were suggested can be produced quality leaves through proper pruning schedule. In order to make sericulture more sustainable through regular stabilized crop this pruning technology will provide leaves suitable for rearing in such in adverse climatic condition and for better growth, it is advisable to maintain 8-10 healthy branches/plant by removing weak branches after 30-35 days of pruning [13]. Further, [14] has investigated and resulted valuable information on pruning and training of mulberry plant for quality leaf harvest during autumn rearing in Doon Valley of Uttaranchal.

**2.3 Alteration in irrigation schedules and input regime of host plant:** The mulberry trees are also of local varieties

which are poor yielders and also poor in nutrition status. These trees also quite old, planted on the road side, bunds and barren lands with no inputs given. As the leaf quality is a major contributing factor (38.2%- [15]) for the successful bivoltine cocoon crop, the bivoltine rearing in the North West temperate and sub-tropical regions suffer badly for want of quality leaf. [16] Observed that, the practices like method of leaf harvesting were 100% adopted by all the sample farmers. The majority of farmers did not adopt the practices like, time of harvesting of leaf, by plant to plant spacing, planting of recommended mulberry varieties, transport of leaf and method of recommended application of fertilizers, manure and level of protection measures [2]. Hence, recommended doses of fertilizers applied in the initial plants grow in 55 to 60 days after planting, preferably after the second round of weeding, manures, vermicompost, *etc* should be given timely for mulberry garden [13].

**2.4 Brushing schedule of silkworm to avoid clash with the other crops:** The main important other than the mulberry silkworm crops are growing in the region is paddy, saffron, apples, *etc.*, which are most popular and remunerative crops of the farmers during autumn season. Hence, the farmers are interested to take up those said crops during autumn season. Thereby, to avoid that problem, the silkworm brushing schedule should not be clash with the said crops and should stress on the importance of autumn crop in economic way of attract, boost up and avoid the clashes with the said crops harvesting season and hence farmers will take up interest in the rearing.

One cropping schedule is being followed in J&K and the main crop is harvested in spring season. Attempts to introduce the second crop during autumn season have given encouraging results and more remunerative crop in terms of high productivity.

In Kashmir valley generally one set of mulberry plantation used for spring rearing is available and rearing is mainly practiced once *i.e.* during May-June in a year. If however, some farmers conduct second rearing (summer or early autumn) they use the leftover mulberry leaves of spring rearing for summer rearing, which are not only over mature at that time but are also very poor in nutritive contents especially moisture, carbohydrates & proteins. Hence, it is not suitable for rearing of silkworms and feeding worms on such leaves adversely affect the health of larvae & cocoon yield. Hence, to overcome from the dilemma, one should prune the mulberry plant especially for next crop and giving fresh appropriate leaves gives excellent productivity during autumn season.

Application of different kinds of disinfections / disinfectants (disinfections for rearing house/bed disinfectants) methods and spacing disinfection should be strictly followed [2] to avoid the adverse affect of the different diseases. After rearing house disinfection, the rearing appliances (trays) were shifted out of rearing house and sun dried for 10-12h [17]. Moreover, care of hygienic and optimum level of temperature and relative humidity should be maintained in the rearing room, while silkworm rearing and a proper settling of silkworms for molting and resuming are prime concerned for the silkworm rearers.

**2.4 Some of the minor alteration should be required for success of autumn crop:**

Farmers are reluctant to harvest leaves from mulberry trees by

cutting the shots during autumn rearing as this practice reduces the leaf availability during the next spring season which is considered best season for silkworm rearing and vice-versa for autumn season.

Farmers have to keep their cocoons one to two months in their house before the cocoon markets are arranged for its disposal. Usually marketing of cocoons auction happens once or twice in a year.

Since, state does not have sufficient reeling & weaving establishments, the sericulture industry is at the mercy of cocoon buyers of other states mainly from West Bengal.

Sericulture is a subsidiary crop and the income generated by sericulture farmers is very remunerative. Hence, boost their interest in economical point of view for autumn rearing.

By avoiding scattered nature of mulberry trees, transportation with long distance of mulberry leaves in tractor, lorry, auto *etc* without taking any precautionary measures, by this leaf moisture is reduced which further deteriorates leaf quality, which is unfit for silkworm growth and development.

Using of by-products of sericulture activities, modernization of reeling sector, rationalization of low cost technologies at farmer's level is very much need of the hour in Kashmir Valley to boost sericulture industry, *etc*.

### 3. Conclusion

The analysis of the factors to know the reasons responsible for slow development of sericulture industry in temperate region of Kashmir Valley is need of the standardization of existing package & practices for the success of bivoltine autumn crop, in which following are the main constraints like, autumn specific stable breeds/hybrids, brushing schedule of silkworm to avoid clash with the other crops, alteration in pruning schedules to match the timings of autumn rearing in the region, alteration in irrigation schedules and input regime of host plant, leaf shortage, leaf quality & cropping pattern, *etc*.

Hence, keeping all the aspects in mind, the sources /informations herein gathered is worthy to summarize this review paper. It may be said the present communication can be considered as a little foundation work based on which a great deal of study can be planned for detailed research investigations and utilization of information at farmers level through proper modification of package and practices for stabilization and success of autumn crop to enhance the quality cocoon productivity in temperate of the Kashmir Valley.

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