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Research Article

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Role of Central Tasar Silkworm Seed Station for Quality Egg Production in the Growth of Tasar Industry

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Abstract The total sericulture industry revolves round the seed sector and production of quality seed is the vital aspect in silk industry. Tasar silk sector qualifies as one of the most appropriate agro based cottage industry which provides employment to tribal and weaker section of the farmers and the activities are of forest based agricultural activity and industrial in nature. The activities covers production of egg, cultivation of host plants, silkworm rearing and cocoon production. Tasar silkworm growth and subsequent cocoon production are normally influenced by the breed, feed and the rearing environment. To ensure the production of quality tasar seed and their supply to the tribal farmers, Central silk Board (CSB) has established Basic Tasar Silkworm Seed Organization (BTSSO) and it undertakes the responsibility of producing the entire basic seed requirement of the Tasar sector, generated through a three tier multiplication system. The basic seed produced by the Basic Seed Multiplication Training Centre (BSMTCs) would be further multiplied by the State grainages and private grainuers. Under BTSSO, one Central Tasar Silkworm Seed Station (CTSSS) and 21 BSMTC's were established in tropical areas of the country. The CTSSS conduct rearings of elite seed and produces and supply nucleus seed to BSMTCs under replenishment programme. These centers conduct the rearings of nucleus seed and produce the basic seed before reaching to the farmers. In the present paper the role of CTSSS is discussed in ensuring quality Tasar Dfls production for the growth of tasar industry.

Keywords Silkworm Seed, Tasar Industry

Introduction

The total sericulture industry revolves round the seed sector and production of quality seed is vital aspect in tasar silk industry. Tasar silkworm growth and subsequent cocoon production are normally influenced by the breed, feed and rearing environment. Healthy basic seed is the backbone of sericulture industry. Poor seed health is the primary reason for poor productivity and basic seed at the same time, may act as one of the main vehicles for dissemination of diseases. Hence, healthy basic seed material, free from diseases and having high viability is essential for establishing the crop. India is the only country, which commercially exploits the semi-wild sericigenous insect *Antheraea mylitta* Drury popularly known as Tasar Daba Bivoltines and Trivoltines. The Tasar silkworm rearing being an outdoor practice mostly on nature grown food plants, the success of the crop go with breed engaged for rearing [1]. Though the seed organization is a multi-tier system of seed multiplication for meeting the demand of seed to a greater extent, the production is still adequate to meet the ever increasing demand of seed for higher silk production.

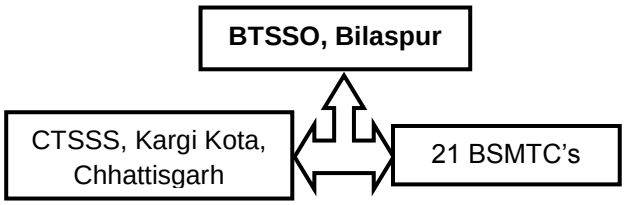
In Tasar industry, production of quality seed is one of the most challenging tasks, a systematic and methodological approach of silkworm seed production is required to sort out the problems which in turn leads to higher production of cocoons [2, 3]. The tropical Tasar silkworm is wild in nature and it undergoes diapauses at

pupal stage. The diapauses period is dependent upon the voltinism, regulation and emergence patterns are greatly influenced by abiotic factors. The diapause nature of pupae, outdoor nature of rearing coupled with changing climatic conditions results into pupal mortality, erratic and un-seasonal emergence during preservation and unsynchronized moth emergence, prolonged emergence duration, low mating percent, low fecundity and poor hatching together with extended duration of egg laying and hatching thereby causing loss of valuable seed material [4, 5]. Keeping these constraints, Central Silk Board has streamlined and established the Basic Tasar Silkworm Seed organization (BTSSO) under which *one Central Tasar Silkworm Seed Station (CTSSS) and 21 Basic Seed Multiplication and Training Centers (BSMTC's)* to produce the quality seed and for meeting the requirement of tribal farmers.

BTSSO, head quartered at Bilaspur, Chhattisgarh looks after the entire Tropical tasar basic seed production through 1 nucleus seed unit at Kargi Kota and 21 Basic Seed Multiplication and Training Centers located in 10 tasar producing States. It undertakes the responsibility of producing the entire basic seed required for the Tasar sector, generated through a three tier multiplication system. The basic seed produced by the BSMTCs would be further multiplied by the State grainages and private grainuers before reaching to the farmers. Along with producing the basic seeds required for the sector, the BSMTCs are also supporting the seed production centers of State and private sector for maintaining quality standards, improving seed production techniques, and training to technicians and skilled workers [6, 7].

The commercial silkworm seed is made available to the farmers through an intricate 4 tier seed multiplication process. The State and private seed production units are the last link of the seed production network whereas the CSB continues to hold the first three multiplication levels i.e. nucleus and basic seed. Central Silk Board, over the Plan periods, had invested much of its material and manpower to develop well organized and systematic "Seed Organizations", separately for Mulberry, Tasar, Muga & Eri. Each of these organizations have been provided with necessary functional freedom supported by adequate facilities to upkeep a three tier multiplication system for retaining the inherent genetical characters like, hybrid vigour and disease freeness and above all maintain and regulate high quality standards among all the stakeholders in the seed production scenario. Seed Organizations have also been entrusted with the responsibilities of implementing the recently enacted Seed Act bring in quality standards in Seed production process.

The Central Tasar Silkworm Seed Station (CTSSS) was initially established in 1964 at Lakha, Raigarh, Chhattisgarh with an aim to supply tasar seed cocoons/ tasar seed to traditional tasar producing states. The centre has been shifted from Lakha, Raigarh, Chhattisgarh to Kargi Road, Kota, Bilaspur, Chhattisgarh during March, 2007, as the centre was proposed under submerged area of the Kelo dam at Lakha, Raigarh. The unit is presently functioning at Arpa irrigation colony, Kota, Bilaspur, Chhattisgarh under BTSSO.



Mandate of Central Tasar Silkworm Seed Station:

- To act as a nucleus seed station of tropical tasar.
- Multiplication of breeders stock obtained from CTR&TI, Ranchi at regular intervals.
- Raising and maintenance of stock, production and supply of Nucleus Seed.
- To maintain disease freeness.
- To arrange practical training program for state officials.
- To monitor performance of nucleus seed supplied from this unit.

Present seed multiplication and supply system: To steam line tasar silk worm seed production and supply system in the country an integrated four tier seed multiplication and supply system prevails in vogue involving both Central Silk Board and tasar producing state (Fig.1). The integrated seed multiplication and supply system has played pivotal role in organizing tasar seed sector on scientific lines since 1980. It is a chain type activity involving apex institutions i.e., CTR&TI, Ranchi to evolve high performing, elite races as a breeder stock and

supply to breeding station along with package for supply of elite seed to great-grand parent station (P3) for further maintenance and multiplication under the close monitoring and guidance of P4 station. However, the P3 station is supposed to produce nucleus seed after scrupulous observation of the protocol for production and supply of nucleus seed under replenishment program (biennial) to P2 stations *i.e.*, BSM&TCs for production and supply of basic seed to State Sericulture's Pilot project centers (P1) for multiplication and production of commercial seed for supply to commercial rearers.

Table 1: Details of BSM&TC under BTSSO, Bilaspur

Sl No.	Name of the State	Location of BSM&TCs	No. of units
1	Jharkhand	Kathikund, Madhupur, Kharswan & Deoghar	4
2	Bihar	Bhagalpur	1
3	Chhattisgarh	Pali, Boirdadar, Bastar, Bilaspur & Ambikapur	5
4	Madhya Pradesh	Balaghat	1
5	Orissa	Nabrangpur, Pallahara, Baripada & Sundergarh	4
6	Andhra Pradesh	RC Varam	1
7	Telangana	Chinoor & Narsapur	2
8	Maharashtra	Bhandara	1
9	West Bengal	Patelnagar	1
10	Uttar Pradesh	Dudhi	1
Total No. of Units			**21**

Targeted BSM&TCs under replenishment programme: For implementing the programme once in two years, the targeted crop for biovoltine is from second crop grainage and for trivoltine it is third crop grainage are earmarked for supply to BSM&TCs for bi-voltine and tri-voltines respectively.

Reared variety: The eco-races which are reared extensively for commercial tasar cocoon production are Daba Bivoltine and Daba trivoltine. Cooler climatic zones are suitable for rearing of Daba bivoltine while zones having warmer climate are suitable for Daba trivoltine. At present these two eco-races are being multiplied and supplied to various BSMTC under replenishment programme, the supply details of which are presented in Table 2.

Bivoltine tasar insect has two life cycles, the first being the seed crop produced by rearing basic seed [July-August] with short larval span yielding non- diapausing cocoons with thin shell and simultaneous moth emergence followed by egg laying while subsequent crop [October-December] being raised through rearing nucleus seed is of longer larval span yielding cocoons with thicker shell undergoes pupal diapause of 6-7 months. However in trivoltines basic seed produced by two cycles *i.e.* Processing diapausing stock of corresponding last year followed by processing of non-diapausing cocoons raised from first crop in 2nd grainage. The third crop grainage conducted by processing non-diapausing cocoons yields nucleus seed.

Performance of Daba Bivoltine.

Under the replenishment programme during II crop during 2010-11 a total of 5,165 Bv dfls were supplied to 8 BSM&TCs Madhupur, Deoghar, Narsapur, Kendujhar, Pali, Bastar, Dudhi and Kathikund. Each of these centres was supplied with 100 dfls on cellular basis and the remaining in batches of 5 dfls. The average hatching in the replenished seed was recorded to be 87.75% where as average cocoon yield per Dfls was 64.39 and the average shell weight was 1.80 gm. Higher cocoon yield were recorded at BSM&TC Pali (123 cocoon/dfls) followed by Dudhi (87cocoons/ dfls) and Madhupur (77 cocoons/dfls).

Performance of Daba Trivoltine.

A total of 3600 Daba TV dfls were supplied during 2010 - 11to six BSM&TCs *viz*, Baripada, Sundergarh, Patel nagar, Bhandara, Bilaspur and Boirdadar in third crop. Average hatching was 87.77% and average cocoon yield per dfls was 76.56%. Average shell weight was recorded to be 1.22gm. Higher cocoon yield was observed in BSM&TC Patelnager (110 cocoons/dfls) followed by Baripada (96 cocoon /dfls) and Bilaspur (93 cocoons/ dfls).

Strategies adopted for Seed Quality maintenance at CTSSS

For production of quality tasar seed, an integrated strategy was focused by CTSSS, Kota on host plant improvement and disease containment and the strategy consists of the following components.

a) Implementation of all latest technologies with required inputs to ensure the quality leaf for rearing of silkworms

b) Discarding of poor fecundity layings.
c) Proper disinfection of rearing field, grainage houses and equipments.
d) Rearing of silkworms under supervision of technical staff by ensuring optimum conditions.
e) Rearing of young age larvae on chawki garden under nylon net.
f) Adoption of proper brushing schedule.
g) Visual selection of healthy mated female moths by identifying non spotted clear haemolymph.
h) Use of nylon bags for egg laying particularly in 2nd and 3rd crop grainage.
i) Adoption of improved technology for egg washing.
j) Strict visual selection of healthy and robust seed cocoons for diapausing broods for basic seed selection (only 80% selected seed cocoon utilization).
k) Quality assessment during seed cocoon purchase through smear testing of pupa & testis examination.
l) Production of DFLs through mother moth examination by adopting centrifugal method.
m) Rearing of tasar silk worm & preservation of seed cocoon under shed nets.
n) Assurance of 2 grams of eggs in one DFL containing approximately 200 eggs.
o) Drying of eggs by adopting motorized egg drying machine and packing of eggs in muslin cloth bags.

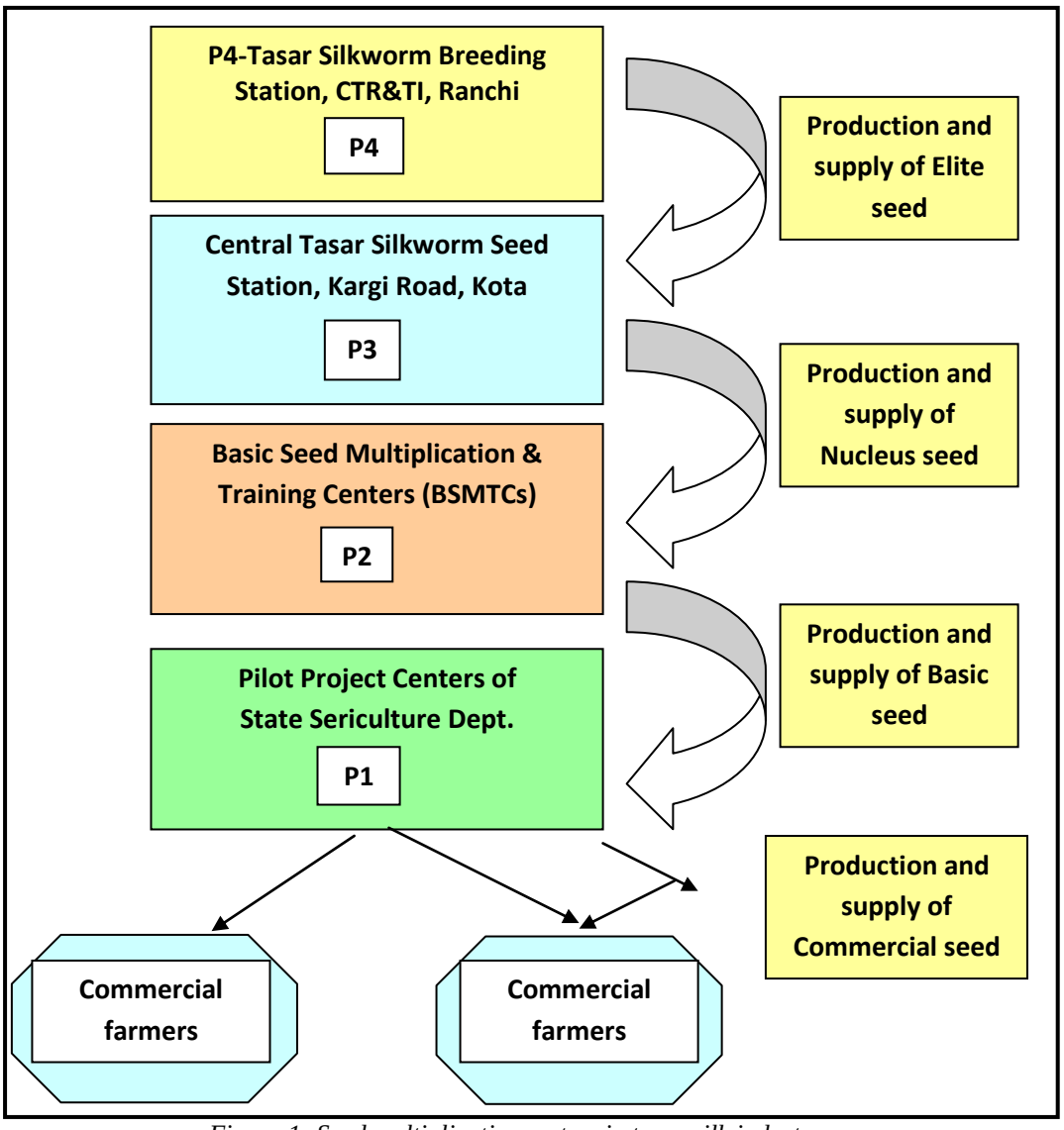


Figure 1: Seed multiplication system in tasar silk industry

The disease free layings (DFLs) produced at BSM&TCs (P2 stations), the nucleus seed supplied by CTSSS is the main source for the production of basic seed. In turn for the production of commercial seed at Pilot Project Centers (PPC) of respective state governments, the seed produced by BSMTCs is the source. Likewise in the process of producing the quality seed, CTSSS is playing an anchor role which inturn ensuring the quality egg production for commercial purpose. The concerted efforts of BTSSO and their units, seed multiplication system is effectively functioning in tasar silk industry and gradually a momentum is taken for seed production (Table 3).

Table 2: Supply of nucleus seed to various BSMTC's by CTSSS

S.No	Name of the Eco- Race	Year of supply (No. of Dfls)			
		2012 - 13	**2013 - 14**	**2014 - 15**	**2015 - 16**
1	Daba Bivoltine	6650	6150	11830	9110
2	Daba Trivoltine	3940	5070	5920	4590
	Total	**10590**	**11220**	**17750**	**13700**

Table 3: Details of seed supplied by BTSSO units

S.No	Name of the Eco-Race	Year of supply (No. of Dfls in Lakhs)				
		2010 - 11	**2011 - 12**	**2012 - 13**	**2013 - 14**	**2014 - 15**
1	Daba Bivoltine	19.62	24.12	30.12	24.8	21.81
2	Daba Trivoltine	11.32	9.18	8.99	10.9	12.52
	Total	**30.94**	**33.30**	**39.11**	**35.7**	**34.33**

Though the seed organization is a multi-tier system of seed multiplication for meeting the demand of seed to a greater extent, the production is still inadequate to meet the ever increasing demand of seed for higher silk production. However the Central Tasar silkworm Seed Station is only station for production of P3 DFLs in tropical Tasar industry and functioning its best in ensuring the seed requirement of Tasar industry. Thus healthy basic tasar silkworm seed free from diseases and having high viability is essential for establishing the crop in the first instance. During the process of healthy basic seed material production and for smooth functioning multiplication system, CTSSS is playing a pivotal role while ensuring the quality seed production in tasar industry.

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