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Rathore MS

Basic Tasar Silkworm Seed
Organisation, Central Silk Board,
Bilaspur, Chhattisgarh, India

Chandrashekharaiyah M

Basic Tasar Silkworm Seed
Organisation, Central Silk Board,
Bilaspur, Chhattisgarh, India

Sinha RB

Basic Tasar Silkworm Seed
Organisation, Central Silk Board,
Bilaspur, Chhattisgarh, India

Linkage of rearers for production of commercial DFLs in tropical tasar silkworm, *Antheraea mylitta* D

Rathore MS, Chandrashekharaiyah M and Sinha RB

Abstract

In order to fulfill the huge demand of disease free laying (DFLs) in tropical tasar silkworm, a new approach has been developed called Private Graineur (PG) as a small entrepreneurs for the commercial seed production through cluster approach. This study has been planned to analyze the impact of PG adoption by the Basic Tasar Silkworm Seed Organisation (BTSSO) on DFLs production and profit per PG generated over the years. The study revealed an increased trend over the years recorded in both number of seed rearers as well as PG in the adoption programme. A total of 1,59,855 dfls were supplied to seed rearers during 2018-19 and cocoon production increased significantly with a positive trend across the years. DFLs production increased significantly over the years, to an extent of 126 % from 2004-05 to 2018-19. The profit per graineur was Rs. 4,798/- during 2004-05 and increased substantially over the years to an extent of 6.18 times in 2018-19 (Rs. 30,314/-). This study indicated that the PG is a profitable venture for the rural youth and can potentially improve employment in tasar sector.

Keywords: Rearers, commercial DFLs, tropical tasar silkworm, *Antheraea mylitta* D

Introduction

Tasar culture is a forest based industry, therefore, its practice is symbolic association between forest and tribal people. It has direct implication tribal economy and indirectly on forest management as well. Usually the tribal populace in Jharkhand, Chhattisgarh, Odisha, Uttar Pradesh, Madhya Pradesh, Maharashtra, Telangana and Bihar are well aware with the tasar sericulture since long. They collect cocoons from nature grown or rearing of silkworms on the available natural flora in the vicinity of their living places during its active seasons. Since tasar culture is way of livelihood practice for many tribal and forest dwellers. Hence, silkworm rearing in forest is termed as 'Vanya Silk Cultivation' and thereby such populace can earn benefit directly from sericulture activities and indirectly help in conservation and protection of forest by reducing their dependency on forest. The National Forest Policy 1988 envisages primacy to ecological parameters over economic considerations and involvement of local people in forest management. In India, as per the Forest (Conservation) act-1980, Vanya silk cultivation is permitted on *Terminalia arjuna*, *T. tomentosa*, *Shorea robusta*, *Lagerstroemia indica*, *Lagerstroemia parviflora*, *Syzygium cumini* and *Ziziphus mauritiana*. Apart from the natural forest, the tasar sericulture activities are also permitted on degraded forest land under joint forest management especially in tribal areas with funding source under public-private-partnership.

Since, quality DFLs are the backbone of tasar silk industry. The demand for quality commercial seed in tasar sector far exceeds the actual production in the state government, which ultimately affect raw silk production. Further, the sericulture farmers have been depended on tasar sericulture would divert to other sectors for their employment (CSB and Pradhan, 2017) [3]. The result is that the rearers have to look for employment elsewhere or misuse the forest resources. Since, the production of such a huge amount of dfls is impossible at the government level. A new approach has been developed *i.e.*, 'Private Graineur' (PG), as a small entrepreneurs for the commercial seed production through backward and forward linkage approach in the potential cluster (Rathore *et al.*, 2018). In the present communication, it was intended to analyze the performance of Private Graineurs adopted by BTSSO for about fifteen years and to assess the scope of further improvement and expansion.

Corresponding Author:**Rathore MS**

Basic Tasar Silkworm Seed
Organisation, Central Silk Board,
Bilaspur, Chhattisgarh, India

Materials and Methods

The data on adoption of private graineurs linked in the public-private participation programme of BTSSO, Basic Seed Multiplication & Training Centres (BSM&TCs) spread over in 10 states was analyzed. Basic seeds were supplied to the seed rearers, which were linked with PG, by the nearest BSM&TCs which provided guidance in all technical aspects related to silkworm rearing and DFLs production. Data from 2004-05 to 2018-19 were collected from all the PG through BSM&TCs and was analyzed for various parameters. Further, similar procedure was also adopted in VCPP (Vanya Cluster Promotion Programme) and MKSP (Mahila Kisan Sashaktikaran Pariyojana) for collection and analysis of data. The VCPP was implemented from 2015-16 to 2018-19 in the clusters Barhait, Tonto, Rajnagar and Sidwasinga (Jharkhand), Jiranga-Pandaparra and Telkoi - Benamunda in Odisha Narsinghpur in Madhya Pradesh, Mungadih in Uttar Pradesh and Ambikapur in Chhattisgarh. Whereas, MKSP (Mahila Kisan Sashaktikaran Pariyojana) was implemented from 2014-15 to 2018-19 in Jharkhand, Bihar, West Bengal, Chhattisgarh, Maharashtra and Andhra Pradesh. Similarly, Tribal Sub Plan (TSP) in Chennur, Public Private centers nine tasar producing states and Community Based Organisation in Chhattisgarh.

Year-wise information on number of PGs adopted, number of dfls reared, quantum of seed cocoons generated, seed cocoons processed, the total seed produced and profit obtained were compiled and analyzed.

Results and Discussions

A total of 59 PGs were linked with 161 seed rearers during 2004 and during 2018, nearly 200 PGs linked with 486 seed rearers. The increased trend over the years was recorded in both number of seed rearers ($R^2=0.610$) as well as PG ($R^2=0.830$) in the adoption programme from 2004 to 2018. The dfls utilization under PG programme increased nearly 7.84 times till 2018-19. The cocoon production increased significantly ($F=38.44$; $df=1,29$; $P=0.001$) with a positive trend across the years ($R^2=0.905$) and nearly 745 % increase in last 15 years, with an average cocoon productivity ranging from 34.11 to 41.62 per dfl. The seed cocoons produced by the seed rearers were used by the respective PG linked in the clusters and subsequently, the cocoons were processed for dfls production. Positive correlation was found between number of PG and cocoon processed over the years ($R^2=0.99$). DFLs production increased significantly over the years ($F=34.21$; $df = 1,29$; $p=0.01$), to an extent of 126 % from 2004-05 to 2018-19. The cocoon: dfl ratio ranged from 2.34 to 4.76 throughout the adoption period. The profit per graineur was Rs. 4798/- during 2004-05 and increased substantially over the years to an extent of 6.31 times in 2018-19 (Rs. 30,314/-). This indicated that single PG with a capacity to process 25000 seed cocoons was able to produce about 5000 dfls and earned approximately Rs. 30,000/- profit through sale of dfls and pierced cocoons.

The commercial dfls generated through various programme has showed significant contribution towards raw silk

production ($F=8.617$; $df=1,29$; $p=0.006$). The expected raw silk production from the commercial DFLs generated in the schemes has positive correlation with the actual in Raw Silk production ($R^2=0.876$). The contribution raw silk production through various schemes was 2.04% during 2004-05 and 4.95 % during 2018-19. Among the various schemes, PG adoption under BSM&TCs, MKSP, VCPP, PPC adoption by BSM&TC, CBO and TSP has contributed 51.12 MT, 58.43 MT, 19.78 MT, 16.57 MT, 0.96 MT and 0.21 MT, respectively.

The achievements was due to the training given to the private grainage operators regularly under various Government schemes for processing cocoons and production of disease free layings. Further, assistance was also given for grainage building, insurance, maintenance of building, equipment, grainage equipment, consumables seed, seed cocoons etc. to enable them to produce quality dfls (Barsagade, 2017) ^[2]. The profitability and economic performance in terms of Rs.1.38 net income and Rs. 2.38 gross income per rupee investment on seed production by the PGs was highlighted in Adilabad, Warangal and Karimnagar districts (Jayaprakash *et al.*, 2011) ^[3]. Private graineur concept was viewed as a new technology for commercial seed production and also strengthening the silkworm seed multiplication channel in India (Ojha and Panday, 2004) ^[7].

Mangala Rai, in his foreword stated that “A new paradigm that has emerged in the recent years to address the problems and the potentials in a holistic manner is the ‘Public-Private Partnership’ (Ayyappan *et al.*, 2007) ^[1]. Under private participation, entire family is involved in the sericulture activities and earns maximum benefit either cocoon production or dfls preparation. A total of 2162 families are been engaged in the commercial private grainage under MKSP only in Kolhan cluster of Jharkhand (CSB and PRADHAN, 2017) ^[3]. Various factors also influence the involvement, success and adoption of the technologies. The empirical assessment on economics, knowledge and adoption level of technology in tasar private grainages of Andra Pradesh has revealed that, the factors such as education, family size and net income were found to have significant positive association with knowledge and adoption level of grainage technologies. Variables *viz.*, age and caste were found to be non-significant (Jayaprakash *et al.*, 2011) ^[6]. A study revealed that the tasar sericulture farmers skill, income and employment level has been improved substantially due to tasar cultivation at Saraikela, Kharsawan district of Jharkhand (Gaurav Kumar, 2017) ^[4].

The PGs are further encouraged for nucleus and basic seed production in a cooperative way by linking with state government for subsidies. Diversification of income sources other farm based practices is required to ensure income generation throughout year. The PG model is found profitable venture for rural youth upliftment. Apart from seeds, the varied aspects like organic inputs, biofertilizers, farm implements & machinery, chemicals etc., are also potential areas in the tasar sericulture sector which requires a public-private venture.

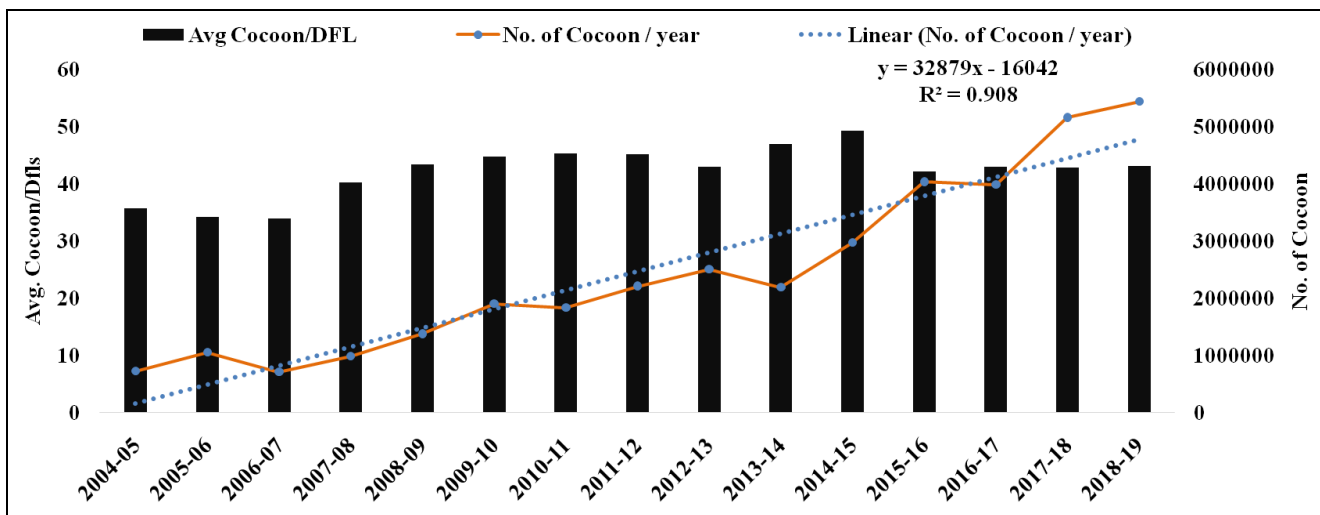


Fig 1: Relationship of cocoon production over the years and average cocoon productivity per dfl

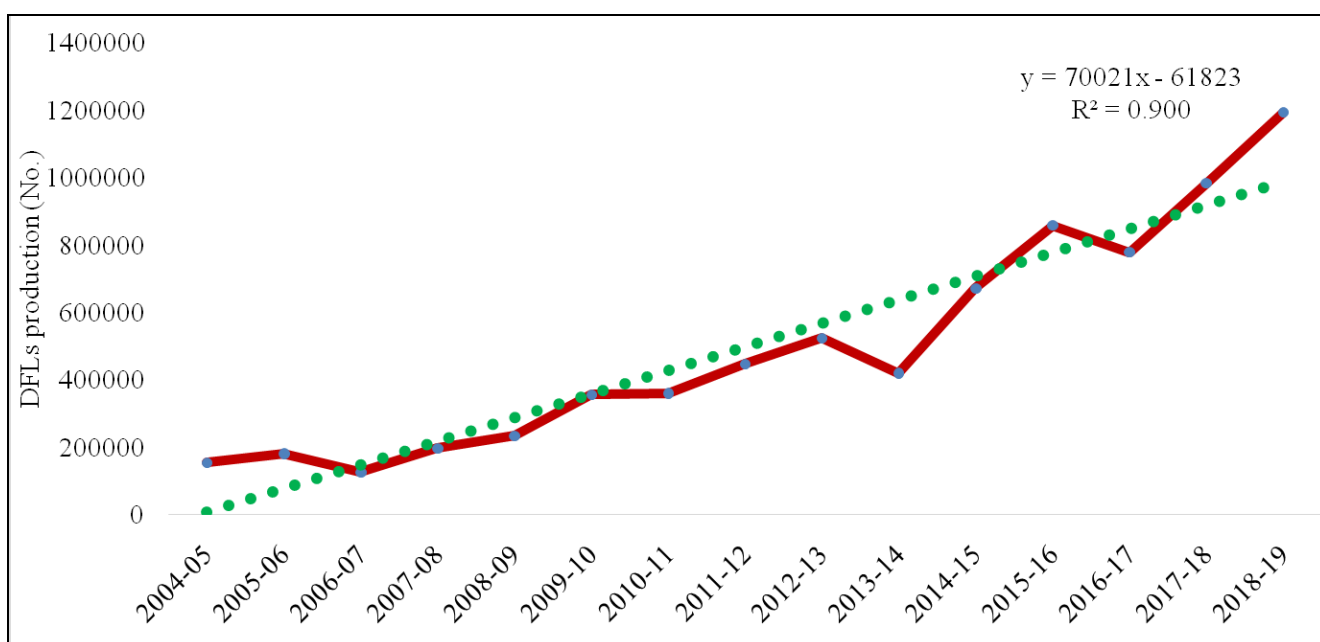


Fig 2: Total DFLs production over the year under private graineur adoption programme of BTSSO

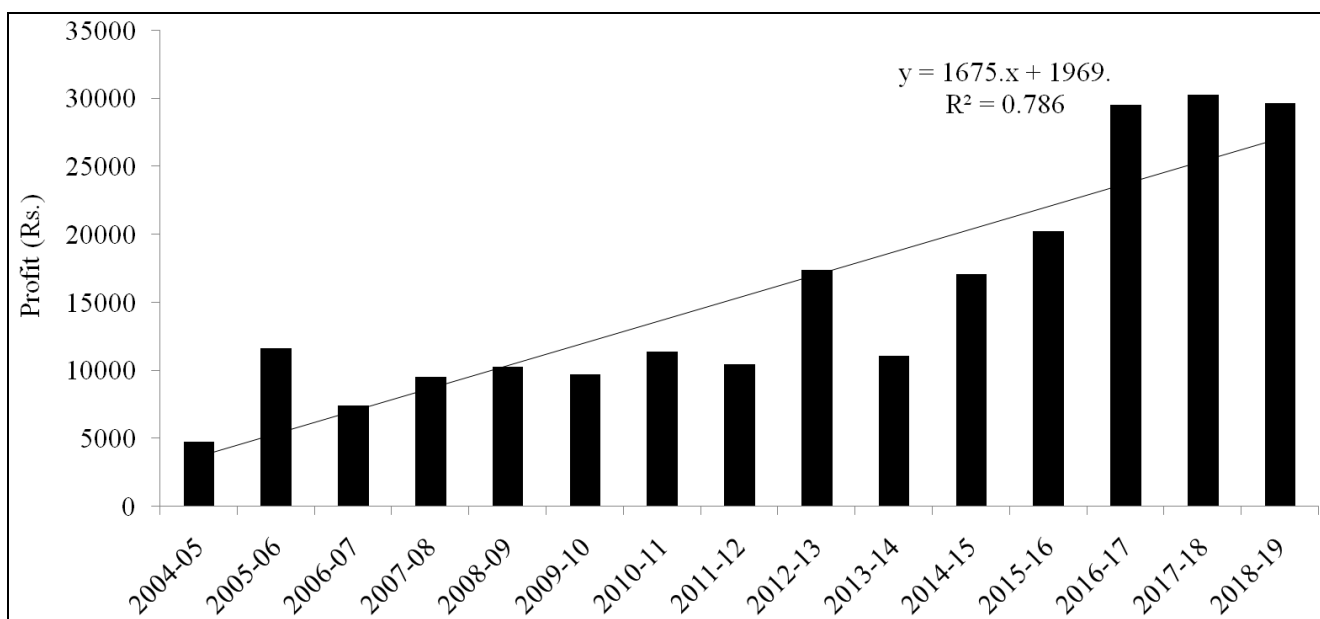


Fig 3: Average profit obtained per private graineur over the years in different part of the India during 2004 to 2017

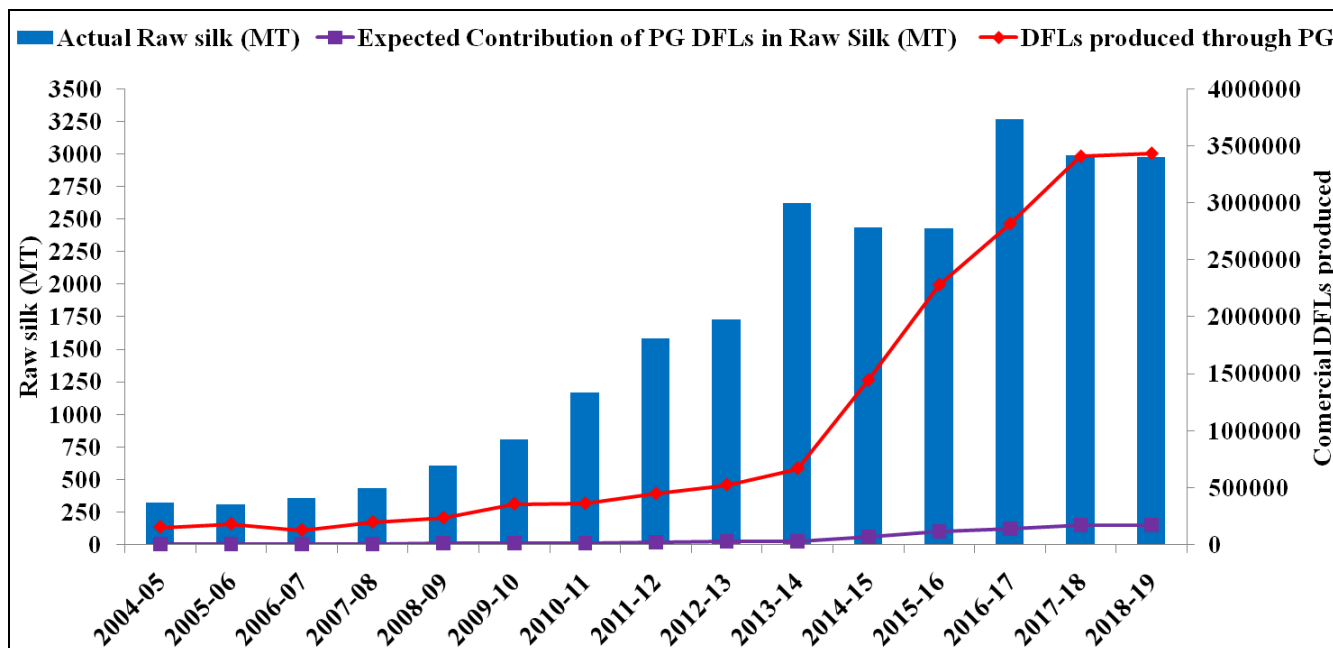


Fig 4: Raw silk contribution from the commercial seed produced from the various schemes

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