



RESEARCH ARTICLE

IMPACT OF CAPACITY BUILDING TRAININGS AND EXTENSION COMMUNICATION PROGRAMMES ON THE BIVOLTINE SERICULTURE DEVELOPMENT IN ANDHRA PRADESH

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ABSTRACT

Production of gradable Bivoltine raw silk and elevation of India in to International market has become the priority of Indian Sericulture Industry. To achieve the above objective a novel method "Cluster Promotion Programme (CPP)" was implemented under XI & XII five year plans during 2014-2019 all over India. Out of 178 clusters chosen to implement CPP in India for the development of Bivoltine sericulture, 102 clusters were considered to implement in Southern India and out of which 13 were identified to administer CPP in Andhra Pradesh (AP). Accordingly during the period a total of 642 CBTs and ECPs were organized along with other cluster development activities and sensitized 41,139 farmers on improved technical knowhow of mulberry cultivation and silkworm rearing for enhanced quality leaf and Bivoltine cocoon production. The details of ECPs organization in the increasing order as 46 ECPs were organized by sensitizing 2,556 farmers under East Godawari district followed by 49 ECPs among 2,870 under West Godawari; 67 ECPs among 2,322 farmers under Prakasham; 79 ECPs among 3,044 farmers under Kurnool; 149 ECPs among 13,856 farmers under Chittoor, whereas 252 farmers among 15,491 farmers under Ananthapur district, respectively.

Due to the above efforts a total of 382.13 lakhs of DFLs were brushed as against the target of 351.50 lakhs DFLs with 112.61% of achievement. Cocoon yield for 100 dfls brushed was recorded 71.07kg compared to the bench mark yield of 42kg/100 dfls with 112.61% increase. The international standards of raw silk production was enhanced to the level of 3,899.3 MTs compared to the bench mark yield of 13.5MT during the period resulting in 99.56% thereby influencing the increased market value of cocoon fetching to a tune of Rs. 366.9 over bench mark rate (Rs. 212.5) resulting in 72.66% increase. The impact of CBTs & ECPs also corroborated in enhancing the quality cocoon production of 28,478.4MT among 10,993 sericulturists. The extension communication activities were also motivated 1,43,467 farmers to take up sericulture by undertaking 16,615.5 acres of new mulberry plantation with V1 high yielding mulberry variety contributing to the horizontal growth of sericulture by replacing the other agricultural, horticultural and floricultural crops as because they have been proved not prospective, unstable and incur huge losses. Further, in-depth adoption level of sericulture among the sericulturists not only contributed significant level production of gradable Bivoltine raw silk but also generated a ray of hope in improving the socio economic conditions of the sericultural farming fraternity.

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INTRODUCTION

Sericulture is a multifaceted agro-based cottage industry which aims in uplifting the socio economic standards of its practisers. It deals with production of mulberry with royal of silkworm growth and extraction of lustrous silk fibre communicating several occupations that entangle usual and traditional needs of the mankind. A great adoption breakthrough is in the offing to

produce enormous quantity of silk, the essential fibre, through the adoption of extensive mulberry growth and intensive silkworm rearing technology. Quality mulberry with nutritive leaf and improved strains of silkworm are the two prime aspects, for the development of the sericulture industry. Though the annual raw silk production of India has reached a level of 23,060 MT by the year 2011-12 through intensive efforts of state (Department of State Sericulture) and central Govt. (Central Silk Board), but still there is a short fall of 5,700 MT of

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raw silk production taking into the account of actual domestic requirement in the country. Moreover, about 90% of the mulberry raw silk produced in the country is of cross breed (CB) silk which is rather non-gradable in quality. Therefore, production of gradable quality bivoltine silk of international standards for exporting has become the prime agenda of Indian sericulture industry (Himantharaj *et al.*, 2012).

Jaishankar and Dandin (2005) emphasised on the effective extension communication mechanisms, percolation of cost-effective technologies that fit well into the region and followed by the better interaction and involvement of Scientists, extension and field functionaries towards the end users to identify, assess and find a solution to a problem. In this direction many extension approaches such as Catalytic Development Programmes, Institute Village Linkage Programmes and Technology Validation and Development Programmes have adopted by the Central Sericultural Research and Training Institute (CSR&TI), Mysore was adopted this ideal concepts in sericulture for the transfer of technologies to the farmers from time to time with the support of State Sericulture Department and the outcome was encouraging (Sreenivas *et al.*, 2010). Out of them cluster development approach is one such approach, which is holistic, information based and participatory extension mode with Research-Extension-Farmer (R-E-F) linkage. This approach was effectively implemented in the farm of five year plans during 2008-13 for large scale promotion of bivoltine sericulture in India particularly in Southern major silk producing regions and the results were heartening (Himantharaj *et al.*, 2012, Qadri, 2012, Sudhakar *et al.*, 2018). The Cluster Promotion Programme (CPP) was implemented under XI & XII five year plans during 2013-2019 in India for boosting the bivoltine sericulture development, the Central Silk Board (CSB) and state sericulture department, have jointly organised 178 clusters all over India. Out of which 13 clusters were preferred to implement in all the nook and corners of Andhra Pradesh (AP) major Districts *viz.* Kurnool, Anantapur, Chittoor Districts of Rayalaseema area; Prakasham, Guntur, Krishna Districts of Andhra area and West Godavari and East Godavari districts of Coastal area were preferred.

Under the above detailed modalities Capacity building of the sericulturists through farmers skill training programmes and intensive extension communication programmes of several kind have exhibited outstanding impact among the farming community in not only improving their technical knowhow but also achieving successful silkworm rearing crops with enhanced quality cocoon production. In the present study the impact of various training programmes and ECPs was discussed in detailed and presented in the Figures & Tables.

MATERIAL AND METHODS

Cluster Promotion Programme (CPP) was effectively implemented in Andhra Pradesh (AP) under XI & XII five year plan from 2014-2019 for the development of bivoltine sericulture. Implementation of CPP among the 3 important zones of Andhra Pradesh, 13 clusters were preferred to implement in Atmakur & Pathikonda under Kurnool district; Penukonda, Hindupur, Madakasira and Kalyanadurgam under Anantapur district; Palamaner, V. Kota and Chittoor under

Chittoor district; Giddalur under Prakasham district; Guntur and Vijayawada under Guntur & Krishna districts, Bhimadole under West Godavari district where as Chebrolu under East Godavari district. During the CPP approach in each cluster group of villages and conventional sericultural families located nearby were selected and adopted to have areas/mass effect of the improved technologies incorporated under the programme so that the activities are manageable easily with the limited technical (Scientist & Technical staff) and extension field functionaries jointly by the active involvement of local stake holders. Under this programme, contiguous villages within the radius of around 20-30km are selected to save time and money on transport and to facilitate closer monitoring and interactions of scientist as well as field functionaries with cluster farmers and to ensure good and anticipated results. One village or a cluster of villages located nearby is selected such way that as far as possible eligible farmers of villages/cluster of villages are covered under the CPP approach

(Sathyanarayana Raju *et al.*, 2014; Sudhakar *et al.*, 2018).

To begin with, a preliminary bench mark survey was conducted jointly by the Scientists and Dept. of Sericulture (DOS) among the clusters to understand the status of mulberry area, variety, spacing, rearing house and rearing facilities to quantify the requirement of farmers and also funds to meet the farmers requirements. Basing on survey the assistance is provided to the farmers through Catalytic Development Programme (CDP) to strengthen the facilities, encourage and motivate the bivoltine sericulture farming under the cluster. The benchmark survey revealed that the brushing capacity was ranging from 35000-45000 DFLs of CB & Bivoltine among the farmers with 14.7 to 18.9 MT cocoons with 2.10 - 2.70MT raw silky with an average cocoon yield of 42kg/100 DFLs with a meager average market rate of Rs. 210/- per kg. With the above initial information the cluster promotion programme was implemented meticulously following all the modalities as depicted by Himantharaj *et al.*, 2012. As a part of scrupulous imparting of CPP for the development of Bivoltine sericulture, organizing of various kinds of Capacity Building Training programmes under which the sericulturists were trained for two days on improved technologies and taking them to the developed sericultural areas to interact with the proven farming community on third day as exposure visit. Further several Extension Communication Programmes (ECPs) programmes like Group Discussions (among >25 farmers), Farmers days (>50 farmers), Awareness/Field Days Programmes (>100 farmers), Exhibitions (>50 farmers), Film Shows (around 25-50 farmers), Krishimela/Enlightenment Programmes (among >800 farmers) etc were organized under various clusters of the state and sensitizing them on the improved technical know on mulberry cultivation & silkworm rearing. The impact of CPP implementation for 5 years from 2014-2019 among 14 clusters impact study was conducted and the brunt of CPP on cocoon production, quality and economic gain of the sericulturists were assessed and the results are presented in Table 1,2 and Fig. 1-5.

RESULTS AND DISCUSSIONS

The CPP was imparted meticulously for 5 years from 2014-19 during XI & XII 5 year plans among the 13 Clusters under Andhra Pradesh and achieved significantly outstanding results

as depicted below. In addition to all the efforts as detailed in the materials and methods for the development of Bivoltine sericulture development under CPP enormous number of farmers trainings under CBT and ECP programmes were targeted to be organized to sensitize the farming community on improved technical knowhow for enhanced sericulture growth and improving the enhanced quality cocoon production. During the period a total of 675 CBTs and ECPs were targeted to sensitize around 42,500 farmers. Basing on the above target during the period 642 CBTs and ECPs were organized and sensitized 41,139 farmers on improved technical knowhow of the mulberry cultivation and silkworm rearing for enhanced quality leaf and Bivoltine cocoon production. The details of ECPs organization in the increasing order as 46 ECPs were organized by sensitizing 2,556 farmers under East Godawari district followed by Bhimadolu with 49 ECPs among 2,870 under West Godawari; Giddaluru 67 ECPs among 2,322 farmers under Prakasham; 79 ECPs among 3044 farmers under Kurnool; 149 ECPs among 13,856 farmers under Chittoor; whereas 252 farmers among 15,491 farmers under Ananthapur district, respectively (Table 1).

Table 1 Organization of FSTs/ECPs to sensitize the sericulturists on improved technologies for the development of Bivoltine sericulture

| Cluster areas of AP | CBTs*/ECP details# | 2014-15 | 2015-16 | 2016-17 | 2017-18 | 2018-19 | Total |
|---------------------|--------------------|---------|---------|---------|---------|---------|-------|
| Atmakuru | ECPs organised | 15 | 10 | 7 | 21 | 8 | 61 |
| | Farmers sensitised | 364 | 236 | 284 | 1089 | 337 | 2310 |
| Bhimadolu | ECPs organised | 9 | 7 | 9 | 14 | 10 | 49 |
| | Farmers sensitised | 966 | 221 | 416 | 818 | 449 | 2870 |
| Chebrolu | ECPs organised | 12 | 2 | 9 | 15 | 8 | 46 |
| | Farmers sensitised | 675 | 44 | 542 | 962 | 333 | 2556 |
| Chittoor | ECPs organised | 0 | 0 | 19 | 0 | 8 | 27 |
| | Farmers sensitised | 0 | 0 | 566 | 0 | 333 | 899 |
| Giddaluru | ECPs organised | 16 | 9 | 15 | 17 | 10 | 67 |
| | Farmers sensitised | 801 | 380 | 721 | 987 | 433 | 3322 |
| Hindupur | ECPs organised | 16 | 10 | 16 | 14 | 2 | 58 |
| | Farmers sensitised | 1126 | 389 | 1518 | 1116 | 111 | 4260 |
| Kalyanadurga | ECPs organised | 13 | 8 | 13 | 16 | 14 | 64 |
| | Farmers sensitised | 710 | 410 | 853 | 1318 | 661 | 3952 |
| Madakasira | ECPs organised | 14 | 11 | 18 | 17 | 12 | 72 |
| | Farmers sensitised | 394 | 451 | 1053 | 1621 | 710 | 4229 |
| Palamaneru | ECPs organised | 13 | 9 | 10 | 15 | 11 | 58 |
| | Farmers sensitised | 891 | 415 | 505 | 819 | 656 | 3286 |
| Pattikonda | ECPs organised | 0 | 0 | 9 | 0 | 9 | 18 |
| | Farmers sensitised | 0 | 0 | 339 | 0 | 395 | 734 |
| Penukonda | ECPs organised | 10 | 9 | 13 | 15 | 11 | 58 |
| | Farmers sensitised | 370 | 430 | 644 | 990 | 651 | 3050 |
| V. Kota | ECPs organised | 12 | 14 | 13 | 14 | 11 | 64 |
| | Farmers sensitised | 376 | 875 | 6750 | 992 | 678 | 9671 |
| TOTAL | ECPs organised | 130 | 89 | 151 | 158 | 114 | 642 |
| | Farmers sensitised | 6673 | 3851 | 14191 | 10712 | 5747 | 41139 |

*CBTs= Includes Farmers Skill Trainings, Refresher Trainings etc.; #ECPs= Includes Group Discussions, Field Days, Awareness & Enlightenment & Farmers Day programmes, Film Shows, Exhibitions & Farmers Study Tours

Due to the above efforts and imparting extensive number of CBTs and ECPs a total of 382.13 lakhs of DFLs were brushed as against the target of 351.50 lakhs DFLs with 112.61% of achievement. If the same will be compared over the bench mark level of brushing the achievement of DFLs brushing resulting in 99.41% over achieved brushing level whereas as the same is 16,188.6% of achievement over benchmark level of brushing (Fig. 2).

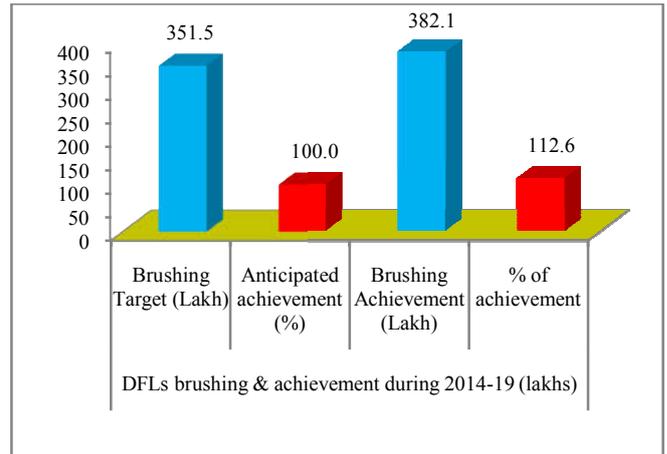


Fig 2 Achievement of Bivoltine DFLs brushing due to CBTs & ECPs organized under CPP.

The impact of CBTs and ECPs also influenced the increased yield of cocoon over the 100 dfls brushed. It was recorded 71.07kg/ 100 dfls compared to the bench mark yield of 42.0kg/100 dfls with 112.61% increased yield was recorded (Fig. 3). Similarly, the raw silk production was also significantly influenced due to the extensive organization of CBTs & ECPs generating awareness on the benefits of Bivoltine sericulture and popularizing the safety and security of imparting sericulture farming compared to other farming. The Intensive imparting of ECPs raw silk production was enhanced to a level of 3899.3 MTs compared to the 13.5MT of bench mark yield during the period resulting in 99.56% increase over raw silk production (3899.3MT/ 5years) during the CPP period where as 28,783.7% improvement of raw silk production over benchmark level of production (13.5MT). Due to the extensive propagation of CBTs & ECPs the market value of cocoon rate was increased to a tune of Rs. 366.9/- per kg from the bench mark market value of Rs. 212.5/- resulting in 72.66% increase over bench mark value of cocoon (Fig. 4).

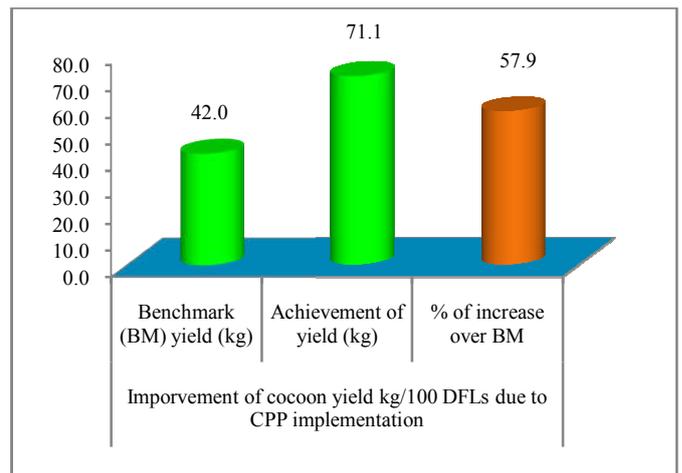


Fig 3 Increase of Bivoltine cocoon yield/100 DFLs due to imparting of CBTs & ECPs under CPP.

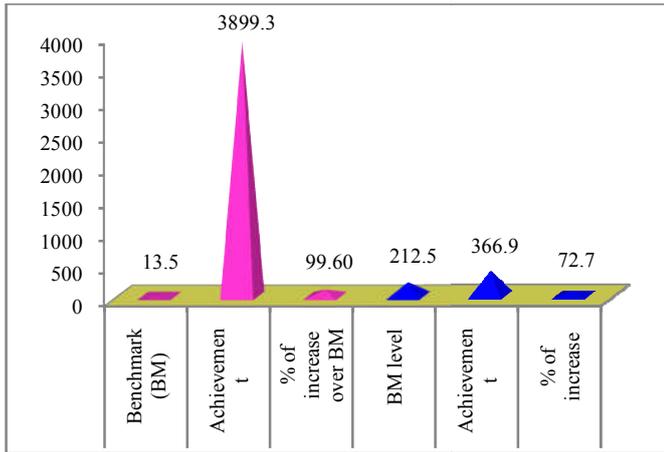


Fig 4 Impact of CBTs & ECPs in enhancing Bivoltine raw silk production and market value.

The impact of CBTs & ECPs organization also witnessed in enhancing quality cocoon production and mulberry acreage. During the 5 years period (from 2014-2019) 28,478.4MT Bivoltine cocoon was produced among 10,993 sericulturists. The extension communication activities were motivated 1,43,467 farmers to take up sericulture imparting 16,615.5 acres of new mulberry plantation by switching over to mulberry cultivation from the other agricultural, horticultural and floricultural crops as because they are not remunerative, unstable and incurring huge losses (Fig. 5). The results of the study are in conformation with the earlier studies conducted by several workers in CPP implementation in various locations under different states (Himantharaj *et al.*, 2011; Sudhakar *et al.*, 1992). Further, the above improvement are also due to the intensive efforts such as imparting integrated nutrient management (INM) to improve farmers garden soils through green manuring by sowing sunhemp (*Crotolaria juncea*), dhaincha (*Sesbania bispinosa*), cowpea (*Vigna unguiculata*) and horse gram (*Macrotyloma uniflorus*) etc. in monsoon crops, use of integrated pest management (IPM) through the supply of biological control agents such as lady bird beetles (*Scymnus coccivora* and *Cryptolaemus montrouzieri*) for tukra and *Trichogramma chiloins* for leaf roller to enhance quality mulberry leaf production. Whereas, biocontrol agents of *Nesolynx thymus* to control Uzi menace during silkworm rearing and Asthra and Serifit as effective rearing bed disinfectants for newly evolved silkworm rearing crops were played a major role in preventing the silkworm rearing crops failures and contributing in producing enhanced quality cocoon as detailed in Tables. The improved rearing technologies popularized among the farming group also resulted in minimizing the cocoon melting percentage. It is proved that generating awareness through the CBT and ECP activities on improved rearing technologies among the cluster farmers resulted in prevention of silkworm rearing crops and reduction of defective cocoon percentage leading to enhanced quality cocoon production.

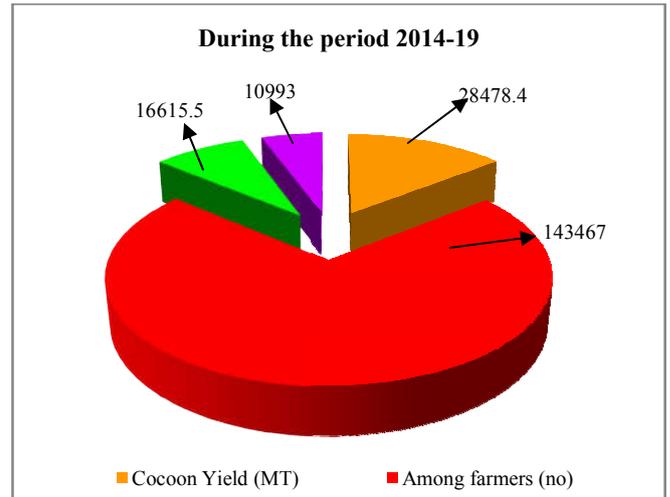


Fig 5 The impact of CBTs & ECPs on enhanced cocoon production and mulberry acreage.

During the cluster promotion programme period under Andhra Pradesh state among various Districts cluster farmers were motivated in under taking new mulberry plantation, rearing house provided infrastructural facilities of rearing and mulberry garden establishment by supporting under various Govt. subsidized programmes such as Catalytic Development Programme (CDP), State Sericulture Development Programme (SSDP), Mahathma Gandhi National Rural Employment Generation Programme (MGNREGA), Rashtriya Krishi Vicas Yojana (RKVY) and Prime Minister Krishi Sichayee Yojana (PMKSY) and several central Sector Schemes (CSS) etc. During the programme period under XI and XII five year plan (2014-2019) farmers have undertaken new mulberry plantation with high yielding mulberry varieties like V1 and G4 in varied geometries such as paired row [(3'x2')⁵], 3'x3' and 4'x4' in low bush form and wider spacing like 6'x3', 8'x4' and as 10'x10' spacing in tree form with partial irrigation or micro irrigation (drip irrigation) conditions to combat with the prevailing drought stricken conditions in Andhra Pradesh and Telangana states. During the CPP programme significant improvement in socio-economic conditions of the seri-farming community was noticed. The programme supported the farmers in adoption of bivoltine sericulture, earning encouraging money, investing the same for sericulture up-liftment, purchasing land, vehicles, jewels, house hold articles, improved children education, conducting respectable rituals and becoming self sufficient in repayment of long pending borrowed loans.

Thus, the success of the programme can be attributed to co-ordinated and close working of different organizations involved in sericulture development such as REC, CSRTI, Mysore, National Silkworm Seed Organization (NSSO), Central Silk Technological Research Institute (CSTRI), Bangalore and State Sericulture Department at gross root level as well as higher level for common cause. Further, the cluster approach helped in succeeding in pooling the resources such as man power, money, and infrastructural facilities *etc.*, for conducting extension programmes effectively. The CPP offered how best the limited resources could be effectively utilized for promotion of bivoltine sericulture. Intensive ECPs undertaken under the states and active participation of the sericultural fraternity (Fig. 3,4)

are helped the farmers to accept and adopt the improved technologies and achieve the anticipated and encouraging results in improving bivoltine cocoon yield levels significantly (Himantharaj et al. 2012; Vindhya et al., 2012; Sudhakar et al., 2019).

CONCLUSION

Therefore, with the above findings the study can be accomplished that the improvement of Bivoltine sericulture among the 13 clusters of Andhra Pradesh under CPP programme during XI & XII five year plan (2014-19) is witnessed due to the intensive adoption of extension and management approaches, effective adoption of integrated technologies, percolation of innovative technologies through the organization of various kinds of ECPs among the farming community by the central and state officials and extension field functionaries efforts. This approach with suitable refinement can be adopted elsewhere in the sericulture areas of the country to ensure higher rate of adoption of technologies, higher returns from sericulture and promotion of bivoltine sericulture during future course of time. Further, it is essential to continue the intensive bivoltine promotion programmes of this kind in future in the new clusters established under CPP so as to make our country self sufficient and self reliable in quality bivoltine silk production thereby projecting India as one of the potential bivoltine silk producers at international market with gradable quality of raw silk.



Fig 6 Sensitization of sericultural farmers on various improved technologies during ECPs organized under Andhra Pradesh and Telangana States.

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