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LARGE SCALE BIVOLTINE SERICULTURE FARMING BENEATH CLUSTER PROMOTION PROGRAMME BY A FARMER IN KALYANDURG, ANANTHAPUR DISTRICT- *A SUCCESS STORY*

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ABSTRACT

Demand for the gradable class of Bivoltine raw silk production in India and projecting itself into the international market is the main objective. For elevating of India to the level of said standards into International market with gradable silk, Cluster Promotion Programme (CPP) was launched during 2008-2019 under XI & XII five year plans. Being one of the important clusters under 13 to be implemented in Andhra Pradesh Kalyandurg has got its own importance as most traditional area for crossbreed silkworm rearing zone. Since initiation of CPP under the cluster 28.51 lakh DFLs were distributed as against the target of 24.75 lakh with a significant achievement of 121.44%. With the above harvested 26.80 lakh DFLs producing 1397.7MT cocoon contributing in generation of 275.85MT graded standards of Bivoltine raw silk. During the CPP period the cocoon yield was enhanced from 45kg (benchmark level) to 68.11kg/100 DFLs fetching with an average market worth of Rs. 395/- per kg. Under the programme Shri. Ch. Peddanna, S/o of Ch. Muridappa, Duddekunta village was adopted and extended moral, technical and financial supprt under CPP during 2015-2019 and motivated in practicing of Bivoltine sericulture. With the sincerity and dedication Peddanna initiated Bivoltine sericulture in 10 acres of mulberry garden brushing 250 DFLs/acre/crop with 5 crops schedule during 2015-16. From the establishment period (2nd year onwards) a total of 12,500 DFLs/year/5 acres brushed during 2015-19 with an average yield of 87kg per 100 DFLs producing 10,875kg cocoon, generating 1,553.57kg raw silk and fetching with an average market rate of Rs. 413/- per kg which is utmost market rate ever achieved by any sericulture farmer in the vicinity. Based on the above facts Peddanna's annual net income was recorded Rs. 36,87,712/- per year with a monthly returns of Rs. 3,07,309/- by which he could relieve from all his debts incurred due to other than sericulture farmings. The support extended under CPP, promises made by the CPP team and the benefits harvested through sericulture by Peddanna got rewarded with a National Award as the *'Best Sericulturist'* for the year 2019.

KEYWORDS: Bivoltine cocoon, CPP, DFLs, Sericulture, Silkworm rearing.

INTRODUCTION

The Cluster Promotion Programme (CPP) was implemented under XI & XII five year plans during 2008 to 2012 & 2013-2019 respectively, in India for boosting the bivoltine sericulture development and generate graded silk. The Central Silk Board (CSB) under Ministry of Textiles and Department of Sericulture of State Governments have jointly organised 174 clusters all over India *i.e.*, 102 clusters in 5 states of Southern zone, 45 in 5 states of North-western zone, 11 in 3 states of Central Western Zone, 7 in 3 states of Eastern zone and 9 in 8 states of North Eastern zone, respectively. Out of 102 clusters in Southern India 46 clusters were implemented in Karnataka, 28 clusters in Tamil Nadu, 17 clusters in Andhra Pradesh, 4 in Maharashtra whereas 2 in Kerala with an anticipated 167.06 lakh DFLs brushing and to generate 1920 MT of graded bivoltine raw silk (Himantharaj *et al.*, 2012; Qadri, 2012; Sudhakar *et al.*, 2018, 2019).

Kalyandurg cluster is one among 17 clusters of Andhra Pradesh was considered to implement bivoltine sericulture development under CPP. Kalyandurg is one of the historical important areas under Ananthapur District (Sathyanarayana Raju *et al.*, 2014; Vindhya, 2012). Beneath the Vijayanagara Empire of Krishnadevaraya (in 16 century) Kalyandurg was ruled by Boya Palegars by constructing Kalyandurg and Rayadurgam forts under the leader ship of Boya Kalyanappa, hence named on his memory as Kalyandurg. It has geographically located at 14'55°N and 77'10°E under arid zone with poor stony red lateritic

soils. The annual rainfall of the area is about 550 mm, temperature from min. 16 to max. 42°C with a relative humidity (RH) between 30-90%. The area also witnesses moderate to high density of pump sets, low level irrigaation with low cropping intensity. As per 2011 senses the population of Kalyandurg was 32,328 constituting with 16,036 males, 16,292 females along with 3,404 children with average literacy rate of 74.14%.

Though the age-old farming of the area is Ground nut but due to uncertain monsoon and low rainfall compelled the farming community to adopt and depend on mulberry for their domestic needs. Sericulture scenario of the area comprise with 413 sericulturists having 446 acres of mulberry acreage imparting traditional silkworm rearing with cross breeds earning Rs.8000 to 10000 depending on their skill and involvement under Kalyandurg. With the onset of CPP under the area (2009-10) bench mark survey of Kalyandurg cluster revealed that farmers practicing sericulture brushed 25,000 DFLs of Bivoltine with 45.0 kg/100 DFLs yield and 93,000 cross breed (CB) DFLs with 53.4 kg/100DFLs yield contributing 13,133 kg raw silk production of CB and bivoltine. The above information indicates that Kalyandurg area is not new for bivoltine sericulture but traditional for cross breed. Therefore, CPP was implemented in order to increase graded bivoltine raw silk production during XI and XII five year plans in Kalyandurg cluster (Kiran Kumar *et al*., 2019).

MATERIALS AND METHODS

With the commencement of Cluster Promotion Programme (CPP) in Kalyandurg cluster a bench mark survey was conducted on the existence of bivoltine sericulture to discern the status of technical knowhow of the farming community on various aspects of sericulture during 2009-10. Survey revealed that, both bivoltine and cross breed (CB) silkworm rearing were existing to a limited level, disease free laying (DFLs) brushing was ranging at 25000 lakh with a insignificant level of cocoon yield with 45 kgs/100dfls obtained with a market value of Rs. 223/-per kg indicating the uneconomic and not a viable venture of adopting sericulture by the farming community. Further survey also extended by the Scientist and Dept. of Sericulture (DOS) jointly to understand the prominence of mulberry area, variety, spacing, rearing house and rearing facilities to quantify the requirement of farmers and also funds to meet the farmers requirements. Subsequently, the CPP was launched by involving all the modalities during 2010 to 2019 to boost the Bivoltine sericulture in and around the vicinity of cluster. Under this programme, adjoining villages within the radius of around 30-40km are selected to facilitate closer monitoring and interactions of scientist as well as field functionaries with cluster farmers and to ensure good and anticipated results (Sudhakar *et al*., 2019; Vindhya, 2012). Basing on the survey the following 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. i). The cluster was operated closely by the REC, CSB and DOS, Kalyandurg a Scientist as Cluster Development Facilitator (CDF) and Technical Staff of REC, in association of a CDF from the DOS with Co-ordination of extension functionaries of Kalyandurg. ii). A localized Chawki Rearing Centre (CRC) was recognized followed by the proper training to the entrepreneur at CSRTI, Mysore and required financial assistance was extended under CDP. iii). The chawki worms were reared at CRC and healthy and chawki worms were supplied after joint quality Chawki certification by the coordinating Cluster Development Facilitators (CDFs) - Scientist and DOS official. iv). Sericulture farmer's field visits were regularly conducted by CDFs, Technical and field functionaries and extended technical guidelines for quality mulberry leaf production and successful rearing crops. v). Sericulture farmer's garden soils collection, analysis and analysis based soil nutrient management recommendations were served followed by the issue of soil health cards to improve their garden soils for enhanced quality leaf production. vi). Sensitised farming community on the importance of green manuring during monsoon with sunhemp (*Crotalaria Juncea*) green manure seeds (@ 8kg/ac to sow during monsoon) under INM to enrich the soil nutrient status. vii). Bio-control agents like *Cryptolaemus montrouzieri, Cryptolaemus montrouzieri and Nesolynx thymus* were supplied to control Tukra, Leaf roller and Uzy, respectively. viii). The Extension communication programmes *viz.* Film shows, Group discussions, Awareness Programmes, Farmers days, Field Days, Enlightenment programmes, Exhibitions, Study tours and Farmers Skill Training Programmes were conducted to enrich the knowledge of the farmers on Bivoltine sericulture framing. Required data was collected systematically and subjected for statistical analysis to know the impact of CPP implementation on cocoon production quality, cocoon quality and economic benefit of the sericulturists in Kalyandurg cluster (Jaishankar and Dandin, 2005; Sreenivas *et al*., 2010; Sudhakar *et al*., 2019).

RESULTS AND DISCUSSION

During the CPP implementation under Kalyandurg the perusal of the results were beyond belief and encouraging. Bivoltine DFLs brushing was raised progressively from the bench mark level (25,000) to 59,600 (2010-11), 63,300 (2011-12), 69,925 (2012-13), 1,33,025 (2013-14), 2,46,945 (2014-15), 3,27,895 (2015-16), 5,40,625 (2016-17), 6,53,100 (2017-18) and 7,56,400 (2018-19) with a total DFLs distribution of 28.51 lakh against the target of 24.75 lakh with 110.2% achievement over the given annual target for the reporting period. Bivoltine DFLs brushing has shown linier gradual significant achievement from 2010-11 to 2018-19 (**Table 1**). Through the above quantity of DFLs brushing a total of 1397.7MT cocoon generated contributing to the production of 275.85MT raw silk. Moreover, the cocoon yield/ 100 DFLs (kg) was also

recorded significant level of increase ranging from 61 kg to 76 kg per 100 DFLs with an average yield of 68.11kg compared to the bench mark yield of 45 kg/100 DFLs. Bivoltine DFLs brushing and cocoon yield/100 DFLs were increased due to the adoption of various technologies like usage of recommended manure and fertilizer application, adopting soil analysis based amelioration of their mulberry gardens and effective disinfection of silkworm rearing houses by usage of Serifit and better rearing management. The results obtained are in agreement with the earlier studies conducted (Jaishankar and Dandin, 2005; Himantharaj *et al*., 2012; Sreenivas *et al*., 2009; Sudhakar *et al*., 2019). This study is also corroborated with the similar study conducted by other scientists in various clusters (Sreenivas *et al*., 2010; Himantharai *et al*., 2012; Sudhakar *et al.,* 2018, 2019). Bivoltine cocoons generated by the cluster farmers fetched higher market prices which ranged from Rs. 288 to Rs. 482.0/kg during the CPP implementation period 2010-2019 in comparison to the benchmark rate of Rs. 223.0 due to qualitative improvement (**Table 1**).

Table 1: Influence of Cluster Promotion Programme in improving Bivoltine sericulture under Kalyandurg cluster.

CPP Activities	*2010-2011*	*2011-2012*	*2012-2013*	*2013-2014*	*2014-2015*	*2015-2016*	*2016-2017*	*2017-2018*	*2018-2019*	*Total*
DFLs target (Lakh)	50000	60000	65000	100000	150000	300000	360000	640000	750000	**24.75**
No. of DFLs reared (Lakh)	59600	63300	69925	133025	246945	327895	540625	653100	756400	**28.51**
% of Achievement	119	106	108	133	165	109	150	102	101	**121.44**
DFLs harvested (Lakh)	55400	60300	65900	125678	215125	325805	495625	643100	693350	**26.80**
Actual cocoon yield (MT)	20.71	23.18	25.52	57.88	96.45	165.33	248.47	361.99	398.16	**1397.70**
Yield/ 100 Dfls (kg)	61	62	62	68	67	71	71	75	76	**68.11**
Production of raw silk (MT)	4.85	5.34	5.88	12.16	20.57	33.26	49.99	68.95	74.84	**275.85**
Market Rate (Rs/ kg)	301	309	311	331	341	288	423	482	338	**347.11**
New plantation Target	20	25	50	50	50	50	50	50	50	**395.00**
Mulberry plantation achieved	23	56	88	103	193	259	302	392	442	**1858.00**
% of achievement	115	224	176	206	386	518	604	783	883	**432.78**
Among the no. of farmers	20	43	99	80	174	199	288	274	276	**1453.00**

During the programme period 2010-2019 a total of 1453 farmers have undertaken 1857 acres of new mulberry plantation with high yielding mulberry varieties like V1 and G4 in varied geometries such as paired row [(3'x2')5'], 6'x2', 3'x3' and 4'x4' in low bush form and wider spacing like 8'x8' and 10'x10' spacing in tree form with partial irrigation or micro irrigation (drip irrigation) conditions to combat with the prevailing drought stricken conditions in Kalyandurg area under Ananthapur District, Andhra Pradesh. Since from the inception of CPP in Kalyandurg cluster a total of 1858 acres of new mulberry plantation with V1 & G4 in improved spacing was undertaken among the 1453 farmers witnessing the vertical growth of Bivoltine sericulture during CPP under the cluster (**Table 2**). Further, all the above results are also may be due to the organization of 157 ECPs of various kind and 41 FSTs on various aspects of technology interactions on Bivoltine sericulture adoption and sensitization 61041during XI & XII plan in Kalyandurg cluster under CPP. Enthusiastic participation of sericulturists in various ECPs is also one of the main reasons for the successful implementation of CPP and achieving anticipated results in bivoltine sericultural development in Kalyandurg cluster during 2010-2019.

Table 2: ECPs organised and sensitised the farming community for the development of Bivoltine sericulture under Kalyandurg cluster.

Name of ECP	**During the period 2010-2019**									**Total**
	2010-2011	**2011-2012**	**2012-2013**	**2013-2014**	**2014-2015**	**2015-2016**	**2016-2017**	**2017-2018**	**2018-2019**	
Film shows	3	9	6	0	0	0	0	0	0	18
No. of farmers sensitised	36	105	165	0	0	0	0	0	0	306
Group discussion	6	9	6	4	6	7	6	6	10	60
No. of farmers sensitised	86	98	126	76	154	221	167	186	283	1397

Awareness Programme	2	4	4	9	2	1	2	0	0	24
No. of farmers sensitised	63	118	139	257	65	189	336	0	0	1167
Farmers days	0	0	0	2	0	0	2	4	2	10
No. of farmers sensitised	0	0	0	64	0	0	145	278	157	644
Field Day	2	6	4	0	2	0	1	3	2	20
No. of farmers sensitised	40	100	111	0	66	0	165	361	221	1064
Enlightenment programme	1	1	1	0	1	0	0	0	0	4
No. of farmers sensitised	133	96	157	0	150	0	0	0	0	536
Exhibition	0	4	4	2	2	0	0	0	0	12
No. of farmers sensitised	0	94	227	191	275	0	0	0	0	787
Study tour	3	3	0	1	0	0	2	0	0	9
No. of farmers sensitised	64	60	0	39	0	0	40	0	0	203
Target of ECPs	**17**	**36**	**24**	**11**	**13**	**8**	**10**	**13**	**8**	**140**
Total ECPs conducted	**17**	**36**	**25**	**18**	**13**	**8**	**13**	**13**	**14**	**157**
% of achievement	**100**	**100**	**104**	**164**	**100**	**100**	**130**	**100**	**175**	**1073**
Total farmers sensitised	**422**	**671**	**925**	**627**	**710**	**410**	**853**	**825**	**661**	**6104**

Success story of a Bivoltine farmer Shri. Peddanna Under CPP, Kalyandurg

Sri. Peddanna belongs to Duddekunta, Beluguppa Mandal, Anantapur Dist. He has 40 acers of red loamy fertile land with rich water resources. He was practicing the farming tomato, green chilli, papaya, banana and groundnut before sericulture practice and faced 40 lakh rupees loss during 2011 to 2016 due to various reasons like drought stricken conditions, limited water resources and uncertainty of the market rates. Research Extension Centre, Kalyandurg approached the farmer convinced with the bright future of Bivoltine sericulture and enrolled him to extend CPP benefits. With the encouragement and motivation by the CPP team Sri. Peddana convinced to adopt Bivoltine sericulture and planted 10 acres of mulberry garden with recommended V1 high yielding mulberry variety for South India in (7'+3')x2' in semi tree form in the year 2015-16. Being spirited and self-reliant Peddanna constructed a huge and model rearing house (120'x24'x22') with 10'x24' intermediate anti chamber in the middle for movement and leaf storage separating the entire shed in to two parts with 55'x24'x22' of each by investing more than 15 lakh by his own along with Govt. critical support. Further to monitor ideal climate for successful silkworm rearing a veranda of 12' width all four sides of the rearing house, 6 tires of shoots rearing stands each side in 6' feet width by spending 6 lakh from his own. Installed cooling systems, foggers for maintaining ideal climate (around 25ºC temperature & 75-85% relative humidity) and also used as multipurpose for disinfecting of rearing house through foggers. Serifit, Astra, Vijetha, Vijetha green as bed disinfectants as recommended by the CPP team to protect his silkworm rearing from various pests and diseases. Run electric heaters during winter seasons to accelerate the temperature ideal for silkworm rearing. Intensively imparted all the recommended package of practices in production of enhanced quality leaf with 5 crop schedule/year (Dandin *et al*, 2003) (**Fig. 1**). By imparting all the above technologies Sri Peddanna initiated his Bivoltine sericulture cultivating 10 acres with 5 mulberry harvesting crops schedule by brushing of 250 DFLs/acre/crop during 2015-16. From the establishment period (2nd year) onwards during the period 2015-19 a total of 12,500 DFLs brushing/year with average yield of 87kg per 100 DFLs produced 10,875kg cocoon, generating 1,553.57kg raw silk and fetching with an average market rate of Rs. 413/- per kg. Based on the above facts Peddanna's annual net income (excluding the input cost @ 30%) gone up to the level of Rs. 31,43,962/- and including incentive (Govt. critical support of Rs. 50/- per kg) economic benefit gone up to Rs. 36,87,712/- per year. Therefore, it was worked out as the farmers monthly income was Rs. 3,07,309/-. Whatever the promise made by the CPP team and with their sincere commitment the farmer was convinced and comprehend with the reality of sericulture benefit (**Fig, 2 & 3**).

Fig. 1: Luxuriant mulberry garden and spacious rearing house of Shri. Peddanna, serulturists.

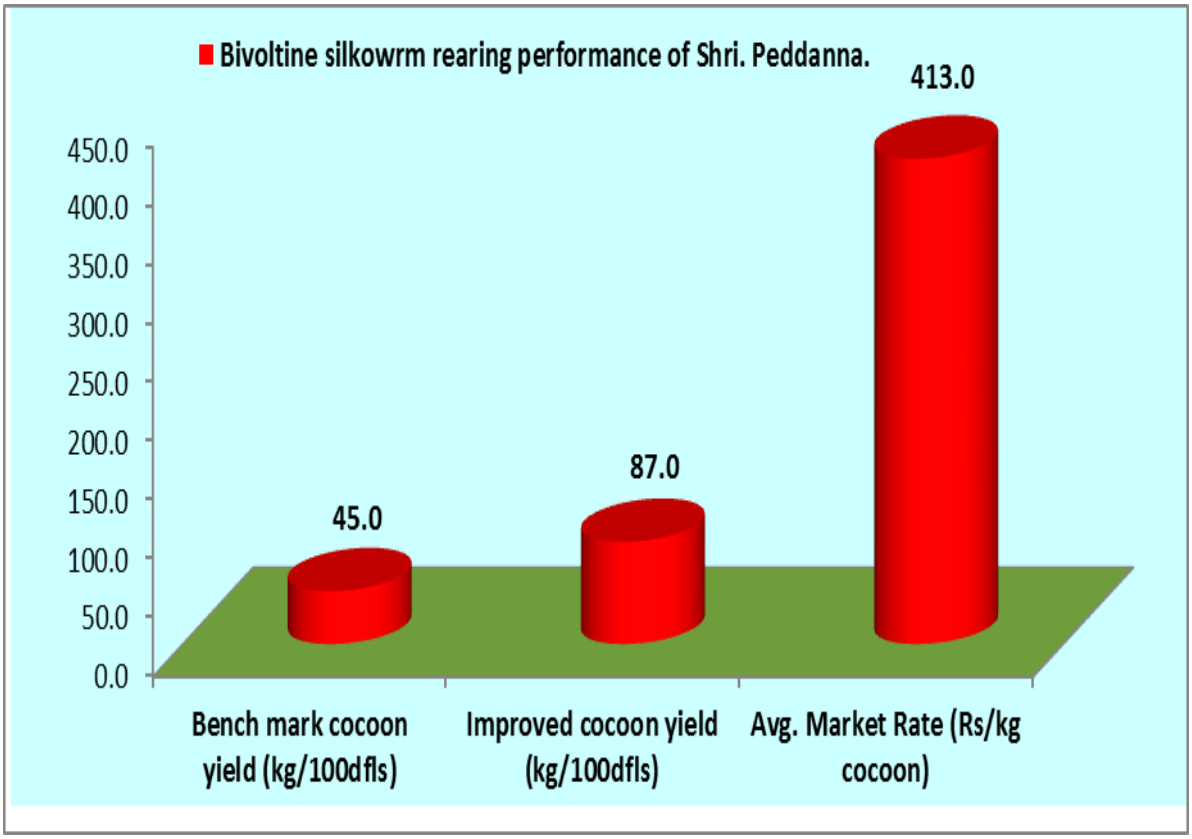

Fig. 2: Performance of Bivoltine sericulture rearing and economic benefit of Shri. Peddanna.

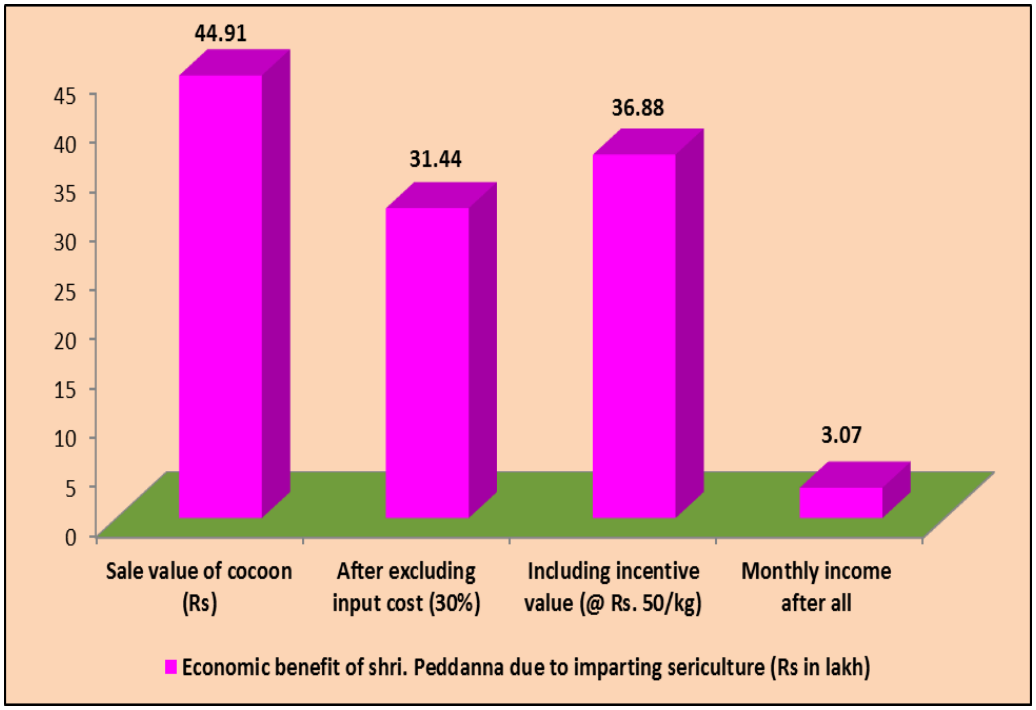

Fig. 3: Economic benefit of Shri. Peddanna due to adoption of Bivoltine sericulture.

Before the adoption of Bivoltine sericulture under CPP, Sri Peddanna was a man of desperate, defeated and humiliated farmer with his loss due to cultivation of cash crops, horticultural and vegetable farming. With the intervention of CPP team, encouragement and courage poured in him he could endeavour Bivoltine sericulture and the results were beyond his belief and astonishing. His monthly income through the secured practice of sericulture Rs. 3.07 lakh was unbelievable and expresses his regards in following ways:

- He was overwhelmed with the benefits of sericulture and feels as proud corporate farmer and posing as employer to many poor and helpless people (more than 20 workers) by offering work at his farm and rearing.
- With the above earnings within two years period he could clear all his debts (>Rs. 45 lakh) incurred due to previous farming.
- Though he is a rich man by birth having all infrastructural facilities to lead luxury life, but regardful to sericulture for further relaxing him in his life style.
- Peddanna today considered as the most successful farmer in sericulture and become role model for the other farmers.
- Today he is popular nationwide and farmers from every nuke and corner of the country are paying visit to his farm, rearing interacting hours together and learning tips for success in sericulture.
- His innovative cultivation practices such as green manuring, mechanized farming, use of compost decomposers in trenching n mulching process, fertigation through drips and mini-tractor fitted power sprayer for foliar spray of growth hormones on mulberry for boost up growth and also for pest & disease control measures benefitted his economy.
- He is not only attracting other state and central farmers to his garden but also VIPs, higher ups, commissioners and planning committees are visiting his garden and adopting his policies in improving sericulture stature.
- For his sincere and dedicated efforts Indian Govt. has awarded him a National Award as **'Best Sericulturist'** from Andhra Pradesh for the year 2019.

CONCLUSION

Based on the above depicted results of the study, it can be concluded that the improvement in all aspects indicates the success of intensive execution of CPP in Kalyandurg during 2010-19. The similar strategy and technical knowhow is enforced elsewhere in the sericulture areas of the country in future to ensure higher rate of adoption of technologies, higher returns from sericulture farming and promotion of bivoltine sericulture. Moreover, through the popularization of imparting of Bivoltine sericulture many more successful farmers like Peddanna can be generated for the better future of farming community and sericulture industry of India elevating it in international stature with graded silk production thereby projecting India as one of the potential bivoltine silk producers at international market.

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REFERENCES

1. Dandin, S.B., Jayaswal, J. and Giridhar, K. *Handbook of Sericulture Technologies* (Recommended for South Indian States). Pp. 259. Published by Central Silk Board, CSB Complex, BTM Layout, Madivala, Bangalore, Karnataka, 2003.
2. Himantharaj, M.T., Umesha, A., Jaishankar. and Quadri, S.M.H. Cluster promotion programme and its impact on cocoon production and socio-economic status of sericulturists. *Green Farming*, 2012; 3(5): 597-600.
3. Jaishankar and Dandin, S.B. 2005. Socio-economic attributes in the adoption of improved sericultural technologies by farmers in Kolar district. *Indian J. of Seric*, 47: 155-160.
4. Qadri, S.M.H. Role of Cluster Promotion Programme (CPP). Brain Storming Workshop on CPP, RKVY and MGNREGS, 30-31st Jan, 2012, CSRTI, Mysore, Karnataka, 2012.
5. Sathyanarayana Raju, Ch., Prasad, G.V., Mogili, T., Kasi Reddy, B., Reddy, M.P., Rao., M.V., Purushotha, S., Sivarami Reddy, N., Vindhya, G.S. and Qadri, S.M. Impact of cluster promotion programme on bivoltine sericulture in Andhra Pradesh. *Indian Silk*., 2014; 4(52old): 10-11: 4
6. Sreenivas, B.T., Umesha, A., Humantharaj, M.T., Jaishankar, Qhadri, S.M.H and Kamble, C.K. Institute Village Linkage Programme (IVLP) in sericulture and its impact on productivity and adoption of sericulture technologies at farmers level. *J. Exp. Zool. India*, 2010; 13(1): 143-146.
7. Sudhakar, P., Krishnappa, B.L., Jalaja S. Kumar. and Sivaprasad, V. Impact of Cluster Promotion Programme (CPP) on the Bivoltine cocoon production under Shapur cluster, Kolar, Karnataka. *Green Farming*, 2018; 9(1): 129-133.
8. Sudhakar, P., Nagarangaiah, M., Vijaya Naidu, B. and Teotia, R.S. "CLUSTER PROMOTION PROGRAMME (CPP)- A novel method for bivoltine sericulture development in Hindupur, Ananthapur District of Andhra Pradesh. *Int. J. of Rec. Sci. Res.*, 2019; 10(4B): 31746-31751.
9. Vindhya, G.S. 2012. Impact of Cluster Promotion Programme on popularization of bivoltine sericulture in South India. *National Workshop on Promotion of Sericulture for Sustainable income*, 17-18th, March, Annamalai University, Chidambaram, Tamil Nadu, 2012.
10. Kiran Kumar, K.P., Vijaya Naidu, B., Sudhakar, P., Vijaya Kumar, I. and R.S. Teotia, R.S. Cluster promotion programme (CPP)-A boon for Development of bivoltine sericulture in Kalyandurg, Ananthapur district of Andhra Pradesh. In: Nat. Conf. on "Challenges and Innovative Approaches in Agriculture and allied sciences research" 26-27th, July, 2019 at Salem (*Accepted*), 2019.