Performance of P1 bivoltine seed rearing at Adopted Seed Rearers (ASRs) level during spring in three different seed zones

[“]Amardev Singh, [*]N.K. Bhatia, and [°]V.P. Gupta

[“]Scientist-B & Incharge, Silkworm Seed production Centre, Udhampur, J&K UT
[*]Scientist-D, Silkworm Seed production Centre, Dehradun U.K
[°]Scientist-D & Incharge, Silkworm Seed production Centre, Dehradun U.K.

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Abstract- The present studies on the performance of P1 bivoltine seed rearing of four different silkworm races on some of the economic traits by feeding S-$_{1635}$ variety of mulberry showed that in absence of extension supervision support due to outbreak of Covid-19 pandemic outbreak to the Adopted Seed Rearers (ASRs) have harvested good cocoon yield/100 dfls, pupation % was also attained above the norms set for procurement of seed cocoons etc., Further, highest single cocoon weight (g) and shell % was found in FC_2 pure breed.

Index Terms- ASRs, Cocoon yield, Pupation %. Pure breed, S-1635,

I. Introduction

P1 seed cocoons form the basic input for preparation of commercial silkworm seed. Considering the paramount importance the silkworm seed cocoon bears, it needs to be generated on scientific line by maintaining the racial characters, vigour and disease freeness. Quality of silkworms seed plays a vital role in the success of the silkworm crop at the farmers level. The main objective of the seed crop rearing is to address vital issues involved in silkworm seed organization and produce quality silkworm seed cocoons which conforms to the norms, quality and disease freeness (Raje *et al* ., 2011). As it is always proved that hybrid silkworm combinations performs better than pure races. So, we have to prepare hybrids for higher production under hard conditions. But the basic hybrid combination is the pure races. It is very much necessary to strengthen the base *i.e.*, pure races and it is indispensable to take extra care during P1 seed rearing. If the performance of the pure races is not of quality level, then our hybrid will also be weak. So, to produce the good quality hybrids seed, it is necessary to take care the pure races properly as the strength of our hybrids is directly proportional to the health of pure races.

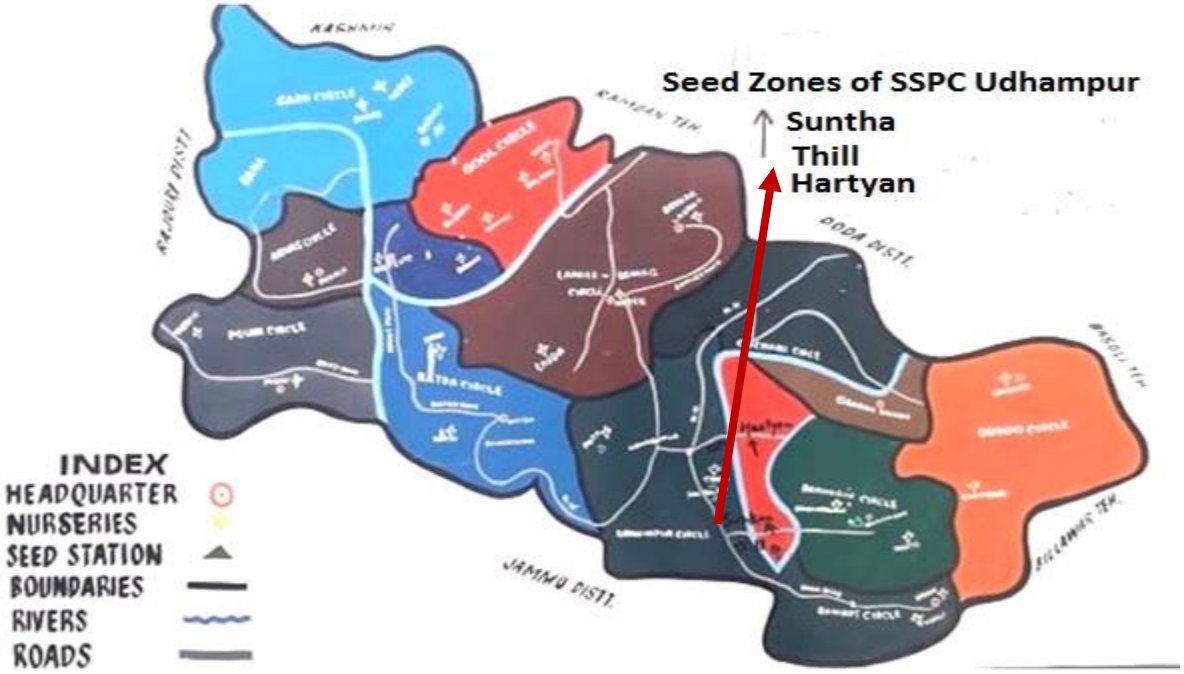
Traditionally in J&K (UT) silk farming is very old age practice and in India J&K is the only bivoltine region having congenial climatic conditions suited for conduct of bivoltine silkworm rearing. But due to lack of productive silkworm races suited to agro-climatic conditions prevailing in the J&K (UT) has been recognized bottleneck in boosting the silk cocoon production for the past many years. It is the need of the hour to identify the season and region specific breeds of silkworms by understanding the adaptability of silkworm genotypes which are largely influenced by climatic factors (Vijayalakshmi *et al.*, 2014). Attempts have been made by several researchers to identify season/region specific breeds throughout the country (Gangwar, 2012 Senapati and Hazarika, 2014, Vijayalakshmi *et al.*, 2014). The success of sericulture industry depends upon numerous factors of which the impact of the environmental factors such as biotic and abiotic factors is of vital importance. Among the abiotic factors, temperature plays a major role on growth and productivity of silkworm, as it is a poikilothermic (cold blooded) insect (Benchamin and Jolly 1986. It is also known that the late age silkworms prefer relatively lower temperature than young age and fluctuation of temperature during different stages of larval development was found to be more favorable for growth and development of larvae than constant temperature. There are ample literature stating that good quality cocoons are produced within a temperature range of 22–2 7°C and above these levels makes the cocoon quality poorer (Krishanaswami *et al.*, 1973). In sericulture, it is known that various factors play a decisive role for the growth and development of silkworm for the production of quality eggs. Silkworm seed quality refers to richness of layings, egg viability, hatching uniformity and more importantly good rearing performance of the progeny (Ullal and Narashimhanna, 1981) and it depends on management practices *i.e.*, rearing temperature, humidity, nutrition, and genotype of the breed. The better rearing conditions, environment and nutrition during larval period may leads to higher fecundity by silkworm moths (Miller, 2005; Malik and Reddy, 2007; Smita *et al.*, 2015; Biram *et al.*, 2009; Hussain *et al..*, 2011).

Objective of the study: To assess the performance of P_1 bivoltine seed rearing at Adopted Seed Rearers (ASRs) level during spring in three different seed zones

II. Materials and Methods

The present study was undertaken at Silkworm Seed Production Centre, Udhampur during the year 2019-20. The leaves of S-$_{1635}$ mulberry variety were selected and utilized for chawki rearing of all the four pure silkworms breeds viz., FC_1, FC_2, SH_6 and NB_4D_2 reared at the chawki rearing centre of SSPC,

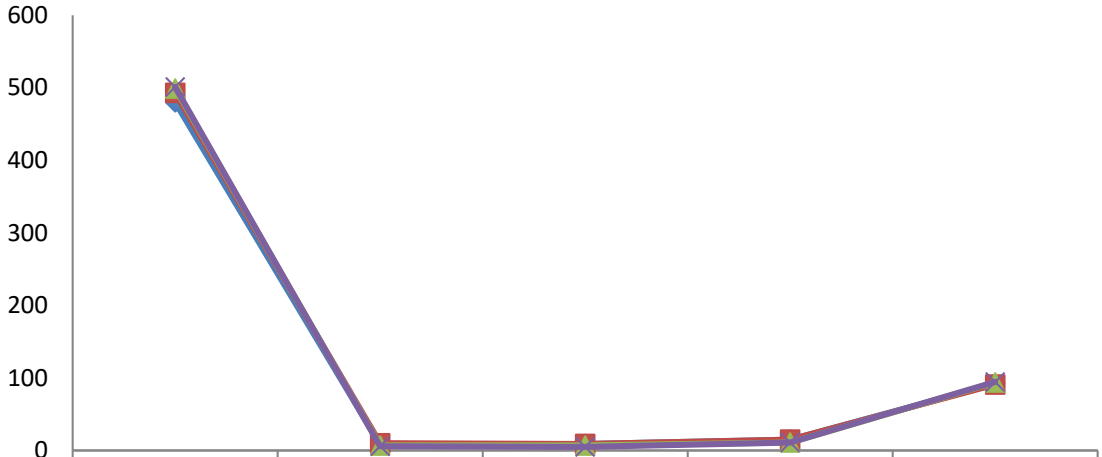
Udhampur. Leaf harvesting is carried out by plucking individual leaf during cooling hours of the day which is 45 days old from the well established chawki mulberry garden and the same was preserved with wet gunny cloth to avoid drying of leaves. These fresh leaves were chopped and used for feeding to the chawki silkworms. Disease free laying of the silkworm were obtained from P2-Basic Seed Farm, Dehradun (SH_6 & NB_4D_2) and Silkworm Seed Production Centre, K.R. Nagar (FC_1 and FC_2) and raised on fresh mulberry leaves of improved mulberry genotype S-1635 as per the rearing technology for silkworm rearing advocated by Dandin *et al.*, (2000). During this period, chawki worms were fed three times a day *i.e.*, 6.00 A.M, 2.00 P.M and 10.00 P.M as per the quantity recommended. A Thermo-Hygrometer was used to record the temperature and relative humidity near the larval bed. A bed disinfectant powder prepared by grinding Lime and Vijetha was dusted on the worms when the chawki worms were settled in the moult and come out of the moult as per the recommendation of the dosage. Dead larvae if any, during the course of chawki rearing were immediately removed and discarded properly every day before feeding the chawki worms. After passing out of the 2nd moults chawki worms were distributed among Adopted Seed Rearers (ASRs) of three different seed zones *viz.*, Suntha, Thill and Hartayan. After completion of the field rearing at ASRs level following economic parameters such as total ounces supplied to each seed zone among ASRs, total yield attained per ounce, average yield per ounce, income per farmer, pupation %, melting %, total larval duration, single cocoon weight (g), single shell weight (g) and shell % were recorded and value of the traits compiled for presenting the results of the findings in the form of graphs-(1-5).



Map of the Udhampur district depicting the P1 seed zones of SSPC, Udhampur

III. Results and Discussion

The results of the present studies showed that the hatching percentage was recorded more than 90 % in all the pure breeds (Fig-1) and the larval and moutling period was also normal it showed that the chawki rearing was carried out controlled environmental conditions (Fg-2). Highest average cocoon yield was recorded in SH6 (51.17 kg/100 Dfls) followed by NB_4D_2, FC_1, & FC_2, respectively (Fig-3). Highest pupation percentage was found in NB_4D_2 and lowest was recorded in FC_2 (81.19 %) (Fig-4). The highest single cocoon weight was recorded in the race FC_2 (1.8g) over rest of the race. Swamy (1999) reported that the highest single cocoon weight was recorded in P2D1 (1.38 g). Chattopadhyay *et al.*, (1992) reported that the highest single cocoon weight was recorded in OS-616 (1.27 g). The maximum shell percentage was found in the FC_2 (20.27%) and the minimum shell percentage was recorded in SH_6 (19.28%) (Fig-5).



	Hatched Larvae	Unfertilized Larvae	Late born Larvae	Dead Larvae	Hatching %
FC1	480	8	9	15	92
FC2	493	10	9	15	90.96
NB4D2	499	7	7	11	93.81
SH6	501	6	5	11	94.53

Fig 1. Chawki performance on no. of larvae hatched, unfertilized, late born, dead and hatching %.

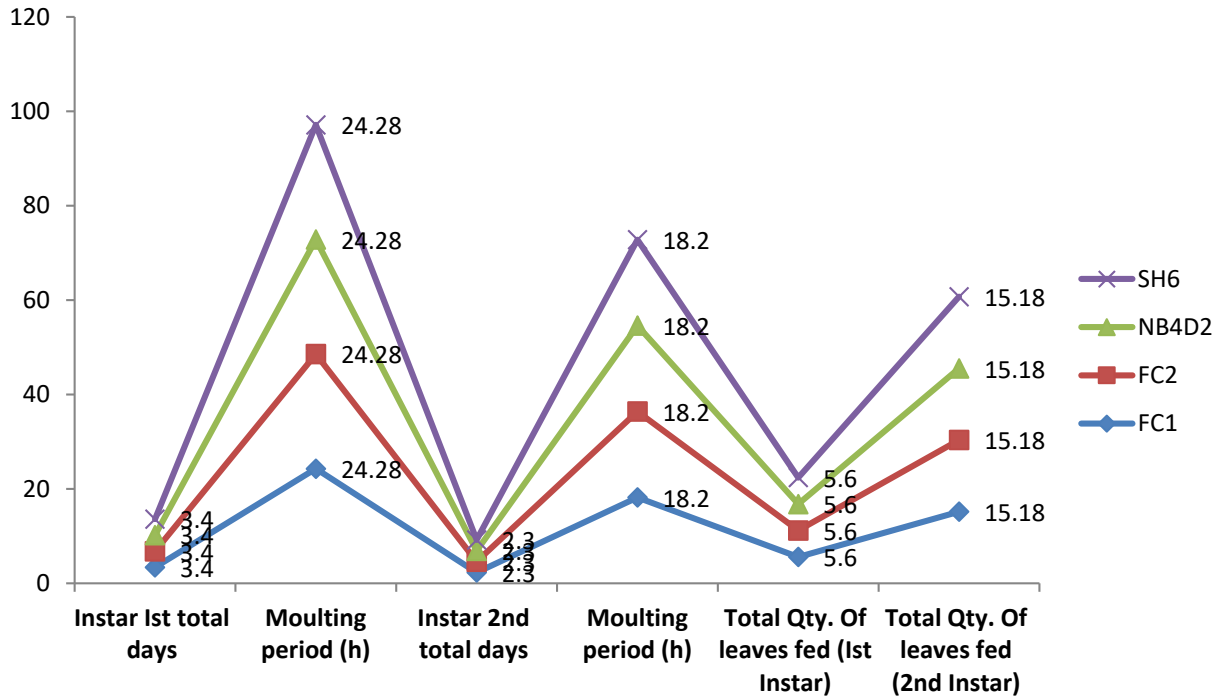
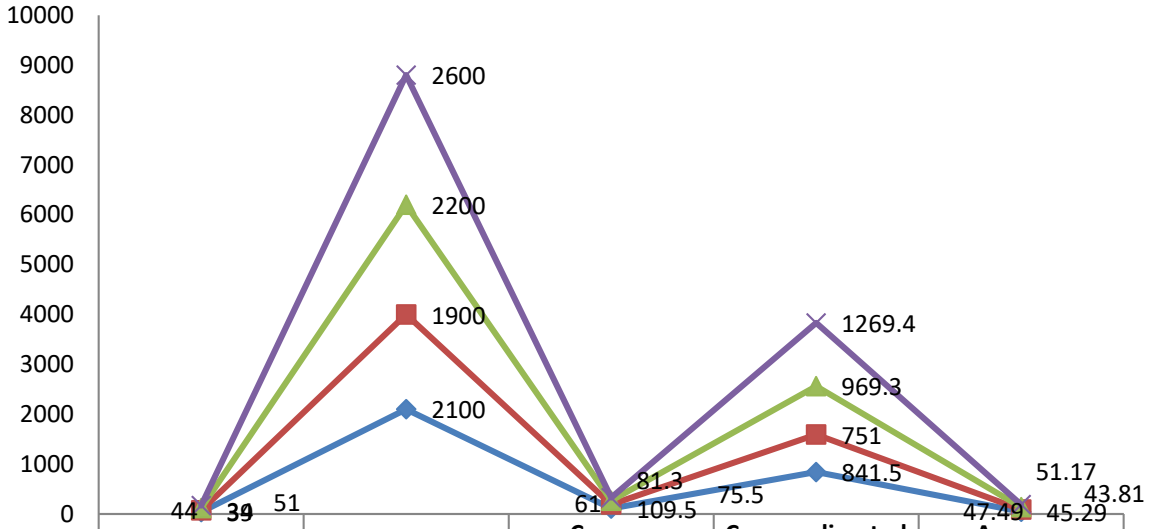
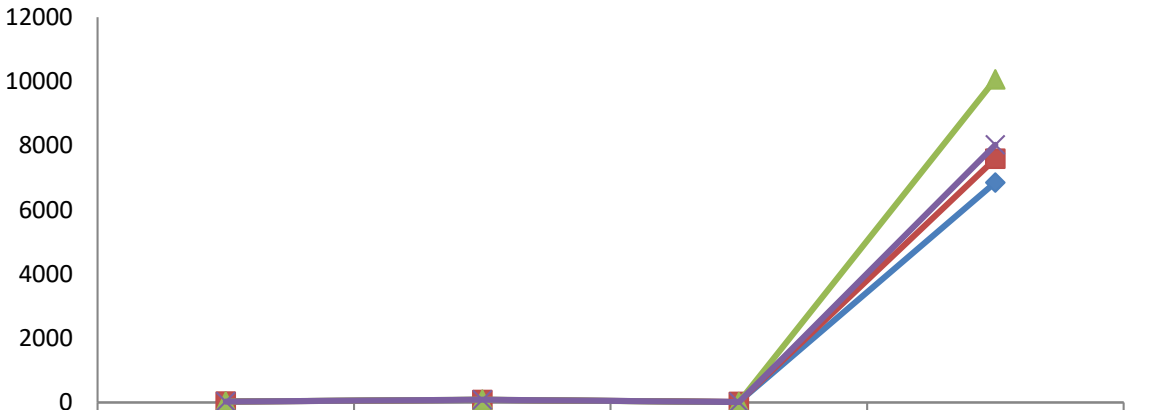


Fig 2. Chawki performance on total larval and moutling period and quanity of leaves consumed.



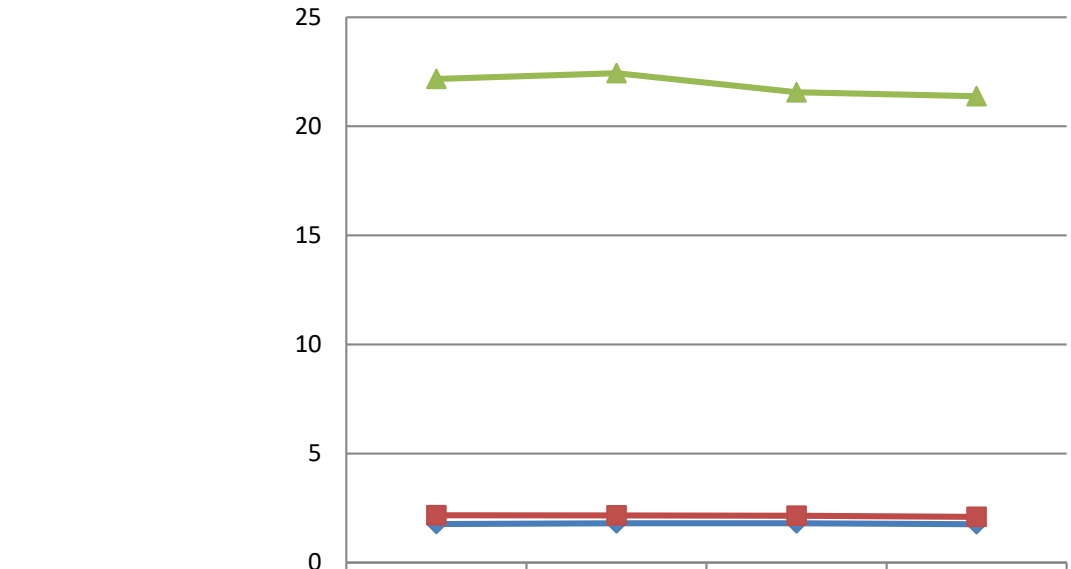
	No. of ASRs	No. of dfls distributed	Cocoon procured and processed (Kg)	Cocoon diverted to dry market (Kg)	Average Yield/100 Dfls (Kg)
SH6	51	2600	61	1269.4	51.17
NB4D2	44	2200	75.5	969.3	47.49
Fc2	34	1900	81.3	751	43.81
FC1	39	2100	109.5	841.5	45.29

Fig 3. Performance of P1 bivoltine seed rearing of four pure breeds.



	Total larval duration (days)	Pupation (%)	Melting %	Income per farmers (Rs)
FC1	31	81.82	18.18	6855
Fc2	31	81.19	18.81	7593
NB4D2	31	90	10	10067
SH6	31	88.3	11.7	8028

Fig 4. Performance of P1 bivoltine seed rearing of four pure breeds total larval duration, pupation %, melting % & Income per farmer per crop (Rs).



	FC1	Fc2	NB4D2	SH6
Shell %	20	20.27	19.41	19.28
Single shell weight (g)	0.4	0.365	0.35	0.34
Single cocoon weight (g)	1.77	1.8	1.8	1.76

Fig 5.Performance of rearing parameters on single cocoon weight (g), single shell weight (g) and shell % of four pure breeds.

IV. Conclusion

The present study showed that the performance of four different breed of silkworms was better even during lack of supervision due to Covid-19 pandemic outbreak as the field functionaries unable to monitor the P1 seed crop rearing in three seed zones. Further, it shows that ASRs are well aware know how to conduct the seed rearing even under lack of extension support.

References

[1] Benchamin, K. V. and M. S. Jolly Principles of silkworm rearing. In Proceedings of Seminar on Problems and Prospects of Sericulture, S. Mahalingam, Ed., 1986. pp. 63–106, Vellore, India.

[2] Biram, S.N.M., Tribhuwan, S. and Beera, S. Occurrence of Unfertilized Eggs in the Mulberry Silkworm, Bombyx mori L. (Lepidoptera: Bombycidae). IntERNATION Journal of Industrial Entomolgy:2009.18: 1-7.

[3] Chattopadhyay, S., Ghosh, B., Rao, P.R.T., Sudip Sen, Gupta, S.K., Roy, G.C., Sen, S.K. and Das, S.K. Analysis of quantitative traits in some evolved multivoltine silkworm breeds of Bombyx mori L. under two environments. Environmental Ecology., 1992. 10 (4): 845-848.

[4] Dandin, S.B., Jayaswal, J. and Giridhar, K. Handbook of Sericulture Technologies, Central Silk Board, Bangalore. 2002.pp. 259.

[5] Krishanaswami, S. M. N. Narasimhanna, S. K. Surayanarayana, and Kumararaj, S. Manual on sericulture. Vol 2., Silkworm rearing UN Food and Agriculture Organisation, Rome, Italy, 1973 .pp. 54-88.

[6] Malik, F.A. and Reddy, Y.S. Role of mulberry nutrition on manifestation of post cocoon characters of selected races of the silkworm Bombyx mori L. Sericologia, 2007.47: 63-76.

[7] Miller, W. E. Extrinsic effects on fecundity- maternal weight relations in capital-breeding Lepidoptera. Journal of Lepidopterans Soc., 2005.59: 143-160

[8] Mubashar Hussain,1., Shakil Ahmad Khan, Muhammad Naeem and M. Farooq Nasir Effect f Rearing Temperature and Humidity on Fecundity and Fertility of Silkworm, Bombyx mori L. (Lepidoptera: Bombycidae). Pakistan Journal of Zoology., vol. 43(5), 2011.pp. 979-985, 2011.

[9] Raje Urs, S., Sashindran nair, K. and Dandin, S.B. (2011). Manual on seed act implementation for seed officers and seed analysts. Central Silk Board, Bangglore.2011.P.11.

[10] Smita Shukla Gaurav, Surendra Prasad and Upadhyay V.B. Influence of Cocoon Refrigeration on the Reproductive Ability of Multivoltine Mulberry Silkworm (Bombyx mori L.) Academic Journal of Entomology.2015. 8 (4): 183-189.

[11] Swamy Performance of traditional multivoltine races of silkworm (B. mori L.) in non-traditional belt of North Karnataka. Indian Acad. Seric., 1999.pp: 12-15.

[12] Tayade, D.S. The feasibility and profitability of mulberry silkworm (B. mori L.) under Marathwada conditions. Res. Bull, Marathwada Agricultural University, Parbhani. 1983.7: 53-58.

[13] Ullal, S.R. and Narashimhanna, M.N. Handbook of practical sericulture. Central Silk Board, Bangalore, India, 1981.pp. 61-82.

Authors

First Author – Amardev Singh, Scientist-B & Incharge, Silkworm Seed production Centre, Udhampur, J&K UT
Second Author – N.K. Bhatia, Scientist-D, Silkworm Seed production Centre, Dehradun U.K
Third Author – V.P. Gupta, Scientist-D & Incharge, Silkworm Seed production Centre, Dehradun U.K

Correspondence Author – Dr. Amardev Singh, Scientist-B & Incharge , Silkworm Seed Production Centre, National Silkworm Seed Organization, Central Silk Board–GOI, Power House Road, Laddan, Udhampur -182 101. J & K (UT), Contact No: 09596748461, Email: drseriresearch@gmail.com