



E-ISSN: 2278-4136

P-ISSN: 2349-8234

JPP 2019; 8(5): 1664-1666

Received: 16-07-2019

Accepted: 20-08-2019

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## Analysis of factors responsible for variation in cocoon yield from different sources of CSR double hybrid (FC-1×FC-2) under subtropical condition of Jammu (J&K)

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**Abstract**

Evaluation of double hybrid (FC-1×FC-2) for the sources received from different places like SSPC, Vijayapura (Karnataka), SSPC, Udhampur (J&K) and DOS (J&K) during spring (2017 & 2018) for yield variation. Results revealed that yield obtained from SSPC (Vijayapura) is better (60.32 Kg/100 DFLs) when compared to SSPC, Udhampur (30.86 Kg/100 DFLs) and DOS (J&K) (35.88 Kg/100 DFLs) respectively during Spring (2017). The factors mainly observed for yield variation is that, quantity of seed received per 50 DFLs is less in two sources compared to SSPC (Vijayapura, KA) source and hatching percentage also it's less than 90 compared to SSPC (Vijayapura, KA). Visual observation of larvae resulted plain in case of SSPC, Udhampur, plain and marked in DOS source and marked in SSPC source (Vijayapura, KA). During Spring (2018), the results observed that yield obtained from SSPC source (Vijayapura, KA) was recorded i.e. 92 Kg when compared to SSPC, Udhampur i.e. 55 Kg and DOS, J&K i.e. 45.50 Kg/100 DFLs respectively. The factors mainly observed for yield variation is that the quantity of seed, hatching percentage, True hybrid and disease incidences.

**Keywords:** Double hybrid, seed, yield, factors, spring season

**Introduction**

Silk production has played a pivotal role in the pre-independence period in Jammu & Kashmir. Commercial production of silk through silkworm rearing is 'Sericulture'. It is labor intensive, agro-industry and is an important activity of the rural population in India as well as in Jammu and Kashmir. This industry attained a unique importance among all other sectors and provides an excellent and unique opportunity for socio-economic progress in the developing countries. There is an immense potential for the development of this agro-industry in Jammu and Kashmir State, as the state owing to favorable climatic conditions, offers tremendous scope for the cultivation of mulberry and the development of good quality raw silk, as well as opportunity to uplift the status of economically poor in the rural areas.

Jammu and Kashmir is the only state of the country which is in the same altitude in which leading bivoltine sericulture countries of the world lie. Even the sericulture experts of Japan have recognized the superiority of natural climatic conditions in the state favorable for the development of sericulture and for the production high grade raw silk of international quality. Women play a dominant role in this sector, as the activities are mostly home-based. Women have been contributing to all the sectors of sericulture starting from on-farm activities to fabric production, marketing and consumption. The involvement of women in different activities of sericulture is well above 53 percent<sup>[5]</sup>.

Sericulture industry in Jammu & Kashmir State is of very old origin. The department of sericulture was created in the year 1889 under the monopolistic control of government to promote silk industry in the state. There are 2, 800 villages and 33,000 households in which sericulture has become an important economic activity. Out of these, 1500 villages are situated in the Kashmir Division and the remaining 1300 villages in the Jammu Division. Presently about 25500 rural families generating income worth Rs.1100 lakhs annually & 1 lakh mandays in private reeling sector are associated with this profession<sup>[3]</sup>.

The CSR double hybrids are commercially used in J&K state since last few years. However in Jammu region, it has been observed that the silkworm seed procured from NSSO, Bengaluru has better cocoon productivity in comparison to the locally produced seed. This significant difference in cocoon productivity results economic loss to the farmer. The difference in the productivity level in different hybrid sources of seed varies from 8-10 Kg per 100 DFL's. On the basis of review of RSRS, Jammu report 2014-15,

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the seed which is procured from the NSSO, Bengaluru has an average yield of about 41.93 Kg/100 DFL's which is better than the other sources *viz.*, SSPC, Udhampur (37.91 Kg/100 DFL's) and State Dept. of J & K (32.63 Kg/ 100 DFL's) respectively.

Keeping in view, the yield difference and source of seed from different regions of same CSR double hybrid, the study is envisaged to be taken up with the objective to know the reasons behind yield variation in CSR double hybrid of different source. The probable reasons could be variation in quality of double hybrid seed of different sources, rearing of chawki worms with maintained chawki garden (F<sub>1</sub> seed), non-hibernated/ hibernated and procedure of seed preparation. By considering above probable reasons, the present work has been aimed to identify the reasons for variation in cocoon yield with different source of seed.

## Material and Methods

### Location

The experiment trial was undertaken at Regional Sericultural Research Station (RSRS), Miran Sahib, Jammu. The rearing was conducted in lab to know the factors responsible for variation in cocoon yield from different sources of CSR Double Hybrid - Silkworm, *Bombyx mori* L. seed during spring season (2017 & 2018), where the selected mulberry variety (S-146) is maintained according to advocated package of practice and their leaves was used for rearing of seed procured from different sources.

### Collection of data

The different sources of Double hybrid (FC1×FC2) seed received *i.e.* SSPC, Vijayapura (Karnataka), SSPC, Udhampur (J&K) and DOS, J & K were used for the study and collected the data to know the rearing performance of double hybrid of silkworm from different sources, each source reared having 50 DFLs. The rearing performance of silkworms was collected for each source; the details of economic parameters were recorded *viz.*, larval weight, cocoon weight, shell weight and shell ratio.

### Statistical analysis

The experimental data collected on various economic and yield parameters were subjected to Fisher's method of analysis of variance (ANOVA) as per methods outlined [6]. Critical difference (CD) was calculated wherever the 'F' test was found significant. The data are presented with the level of significance at 5 percent.

## Results and Discussion

Evaluation of double hybrid (FC-1 × FC-2) for the sources received from different places like SSPC, Vijayapura (Karnataka), SSPC, Udhampur (J&K) and DOS (J&K) during spring, 2017 & 2018. During spring (2017), results revealed that yield obtained from SSPC source (Vijayapura, KA) is better (60.32 Kg/100 DFLs) when compared to SSPC, Udhampur (30.86 Kg/100 DFLs) and DOS (J&K) (35.88 Kg/100 DFLs). The factors mainly observed for yield variation is that the quantity of seed received per 50 DFLs is less in two sources compared to SSPC (Vijayapura, KA) source and hatching percentage also it's less than 90 compared to SSPC (Vijayapura, KA) (Table 1). Visual observation of larvae resulted plain in case of SSPC, Udhampur, plain and marked in DOS source and marked in SSPC source (Vijayapura, KA).

During spring (2018), the results observed that yield obtained from SSPC source (Vijayapura, KA) was recorded *i.e.* 92 Kg when compared to SSPC, Udhampur *i.e.* 55 Kg and DOS (J&K) *i.e.* 45.50 Kg/100 DFLs respectively. The factors mainly observed for yield variation is that, the quantity of seed received per 50 DFLs and hatching percentage (Table 2). Visual observation of larvae resulted plain and marked in case of SSPC, Udhampur & DOS source (J&K) and marked in SSPC source (Vijayapura, KA).

Although, the spring season is congenial for silkworm rearing, ambient temperature has significant influence on the physiology and ecology of insects including growth, development, and susceptibility to pathogens. Higher temperature is a significant predisposing factor for the onset of bacterial and viral diseases in silkworm rearing. Unlike South India, sufficient commercial seed is not produced from J & K. As such seed is procured from south India. These hybrids are susceptible to disease when the ambient temperature fluctuates in the rearing environment. Further, in North India, sericulture is practiced by marginal and sub marginal farmers as a subsidiary occupation [7].

The cocoon productivity in North India is 34.17 Kg/ounce at commercial level and the average renditta is 9.5 Kg, while it is 6.5 Kg at national level [3]. On the basis of review of RSRS, Jammu report 2014-15, the seed which is procured from the NSSO, Bengaluru has an average yield of about 41.93 Kg/ 100 DFL's which is better than the other sources *viz.*, SSPC, Udhampur (37.91 Kg/ 100 DFL's) and State Dept of J & K (32.63 Kg/ 100 DFL's) respectively. The difference in the productivity level in different hybrid sources of seed varies from 8-10 Kg per 100 DFL's. Similar research evidences showed that, the major crop conducted during spring season with cocoon productivity of 30-40 Kg's/100 DFL's and the second crop during autumn season with 20-25 Kg's/100 DFL's [2].

Studies on the performance of Indian silk industry in the global scenario, and analyzed the strengths and problems of Indian silk industry. It was suggested that the measures like the encouragement of additional technological and economic research in the various aspects of sericulture, standardization and quality control of silk and silk products, provision of quality seeds, imparting knowledge among the farmers regarding farm disease and rationalization of marketing and stabilization of prices of silk cocoons and raw silk, it could expand rapidly than ever before [1].

The silkworm seed is the sheet anchor of sericulture industry. The commercial production of silkworm cocoons and in turn maintenance of quality cocoon production to tally depends upon the quality of silkworm seed. In fact, the survival, success, development and sustenance of sericulture industry depends on the sound silkworm seed. No doubt the government for maintaining the quality standards of seed, plays a predominant role in seed production, keeping in view the fact that dependence for silkworm seed on outside agencies involves considerable cost and impedes the development of the industry besides inviting problems in connection with timely availability and supply of seed as well as uncertainty of its quality and performance. It is by producing and rearing quality silkworm seed that productivity of seed has increased. But despite improving the quality of seed, it was observed; during the field study that most of the rearers are not satisfied with the use of local varieties of seeds and it is the quality of seed that explains why the farmers are showing lack of interest towards the practice of silkworm rearing [4].

**Table 1:** Data showing performance of double hybrid (FC1×FC2) from different sources of seed reared during spring season (2017)

Source of Seed	No. of DFLs received	Wt. of seed received (g.)	Hatching (%)	10 larval Wt. (g.)	5 <sup>th</sup> stage larval duration (Days:h)	Total larval duration (Days:h)	Total Yield/50 DFLs (Kg.)	SCW (g.)	SSW (g.)	SR (%)	Total Yield/100 DFLs (Kg.)
SSPC, Vijayapura	50.00	18.06	92.97 (28.92)	53.33	5:19	24:05	30.16	1.749	0.400	22.87 (14.34)	60.32
DOS, Jammu	50.00	11.14	85.94 (27.69)	45.00	5:19	24:05	17.94	1.711	0.375	21.91 (14.03)	35.88
SSPC, Udhampur	50.00	16.36	88.54 (28.17)	41.00	6:19	25:05	15.43	1.629	0.365	22.40 (14.20)	30.86
CD @ 5 (%)			0.07	5.61	-	-	0.17	0.29	0.08	0.24	0.34
Se.m±			0.25	3.99	NS	NS	0.26	5.81	6.99	1.72	0.26
CV (%)			0.01	1.09	-	-	0.03	0.05	0.01	0.04	0.06

**Note:** Values in parentheses are statistically transformed values; NS-Non-significant

**Table 2:** Data showing performance of double hybrid (FC1×FC2) from different sources of seed reared during spring season (2018)

Source of seed	No. of DFLs received	Wt. of seed received (g.)	Hatching (%)	10 larval Wt. (g.)	5 <sup>th</sup> stage larval duration (D: h)	Total larval duration (D: h)	Total Yield/50 DFLs (Kg)	SCW (g.)	SSW (g.)	SR (%)	Total Yield/100 DFLs (Kg)
SSPC, Vijayapura	50.00	18.00	93.44 (75.24)	58.00	6:10	26:05	46.00	2.28	0.48	21.05 (27.27)	92.00
SSPC, Udhampur	50.00	17.15	90.00 (71.55)	51.67	6:07	25:02	27.50	1.82	0.39	21.43 (27.40)	55.00
DOS, Jammu	50.00	12.96	86.00 (68.00)	50.00	6:10	25:05	22.75	1.79	0.35	19.55 (26.23)	45.50
CD @ 5 (%)			3.19	1.79	0.002	0.02	1.55	0.07	0.02	0.49	1.33
Se.m±			0.90	0.50	0.001	0.006	0.43	0.02	0.007	0.14	0.37
CV (%)			2.18	1.65	0.01	0.03	2.37	1.82	2.96	0.90	1.02

**Note:** Values in parentheses are statistically transformed values; NS-Non-significant

## Conclusion

There may be multiple factors for overall success of cocoon crop, however study reveals that if other factors are considered, major contributing for yield variation under the subtropical condition of Jammu (J&K) are seed quantity i.e. Wt. of silkworm seed for a unit of 100 dfls and true hybrid character of silkworm seed supplied to rearers.

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