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Research Article

FEASIBILITY OF LATE AGE SILKWORM REARING IN POLY-HOUSE UNDER TEMPERATE CLIMATIC CONDITIONS OF KASHMIR REGION

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ABSTRACT

Sericulture is practiced in Kashmir valley since centuary back and contributing high quality of bivoltine silk. Since last few years, it is observed that silkworm rearing is restricted to only poor farmers. Further, the silkworm rearing is being conducted under space stress conditions in rearing cum dwelling houses especially in 5th stage which lead to the poor quality of cocoons. In the present paper, an attempt has been made to fabricate/ design poly-house in which silkworm rearing was conducted and the farmers has over come from space problems during final stage of rearing. Suitability of locally available material for shelve preparation and appropriate time of shoot feeding in 5th stage has also been studied. Results obtained from the study clearly indicate that silkworm rearing could be conducted in poly-house in fifth stage and the quality of cocoons was at par with pucca constructed rearing house. Mulberry twigs can be utilized for rearing bed (shelf) preparation and from 1st day, after two feeding in 5th stage, shoot feeding could be started.

INTRODUCTION

Jammu and Kashmir is the traditional state of mulberry sericulture and contributes high quality of bivoltine silk to the country. Work on different aspects to bring the technological improvement at farmer's level which includes evolution of silkworm breeds/races (1), innovation of low cost incubation chambers, low cost rearing houses, mountage and harvesting technology (2,3and4) as well as silkworm disease control measures have been carried out at different research centers/stations. Studies on effect of overcrowding of silkworm on cocoon crop, missing larvae percentage during different larval stages due to bed cleaning were also carried out. This has made Indian sericulture worthwhile to practice at large scale, generating higher profit and better employment chances than most of the other agricultural crops under tropical conditions.

In recent years, the cocoon production in Kashmir province has decresed due to tight competitions with other cash crops ie., horticulture, agriculture etc. Hence, the sericulture industry is restricted to very poor people residing in interior places where there is no opportunity of employnment and are not linked with town and cities. It is also observed that such rearers do not have desired space for silkworm rearing during 5th and final stage of rearing. This may results poor quality of cocoons or some times partial crop loss due to diseases. Though, few works on polythene tent or poly-house for Oak tasar rearing (5 and 6) were carried out but so far no report is available on mulberry silkworm rearing in poly-house. In the present paper, an attempt has been made to fabricate/ design poly house in which mulberry silkworm rearing was carried out during 5th stage under space stress conditions, to ascertain the day of shoot feeding in the 5th stage of rearing and fabrication of low cost rearing shelves from locally available material to obtain the quality cocoons under temperate conditions of Kashmir was also studied.

Experimenmtal Section

The designed poly-house is a simple structure and was well erected with locally available material (wood). The size of the poly-house was 15' (L) x12' (W) x10' (H) (in the middle). The side walls were 8.5' high. A central beam and two side beams of 15' length as well as three beams of 12' (one front, one back and one middle) were provided to support the ceiling. Additional support was provided in the ceiling with wooden strips or available materials. Thus the main structure was erected. Poles, roof covering and side walls were fixed with iron nails. A protective mud wall (one foot high) was made around the poly-house (tent) to protect the rain water, pests and predators of silkworms entering the tent. The rearing bed (shelf) of 14'x 3.5' size was made with locally available materials at half feet above the ground level. Passage of four feet was left in the middle for movement. Half feet space was

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left on the other three sides so that rearing bed should not touch with polythene wall. More rearing space was generated by three/ four tier system of rearing bed at two feet above the lower tier of the same size. The whole structure was covered with polythene (HDP fabrics) of 200 µ thickness. Silkworm rearing was conducted during both seasons i.e. spring and autumn for two years at CSR&TI, Pampore, Kashmir as per the recommended package of practices (1 and7). Ruling silkworm hybrid of North India SH6 x NB4D2 obtained from Silkworm Breeding & Genetics section, CSR&TI, Pampore was reared throughout the study. To ascertain the appropriate time of shoot feeding, this study was also under taken. Cris-cross system of shoot feeding had been adopted.

RESULTS AND DISCUSSIONS

Leaf quality, seed quality and rearing techniques are some important factors that contribute to successful silkworm rearing. The aforesaid factors could only be realized when hygienic conditions are also maintained in addition to the manipulation of temperature and humidity to the optimum level. These measures are difficult in practice unless rearing is conducted in separate house instead of dwelling houses. In view of the above, poly-house (Fig.-01) was erected and rearing was conducted during twice in spring season and twice in autumn season.

To study the feasibility of silkworm rearing in poly-house: It is observed from results obtained from four rearing, two spring and two autumn seasons, that 5 th stage silkworm rearing could be successfully conducted in poly - house with shoot feeding/leaf feeding during spring as well as autumn seasons. The data were compared and it was found that the quality and quantity of cocoons were at par with pucca rearing house (Table-01).

Fig 1 Photograph of designed Poly-house

Treatment-1 (T1): Rearing of 5th age silkworms with mulberry shoots in poly – house.
Treatment-2(T2): Rearing of 5th age silkworms with individual mulberry leaves in poly-house.
Treatment-3(T3): Rearing of 5th age silkworms with mulberry shoots in pacca house.
Control: Rearing of 5th age silkworms with individual mulberry leaves in pacca rearing house.

Evaluation of materials for shelves preparation: The silkworm rearers have neither sufficient number of rearing trays nor rearing stands to conduct silkworm rearing. Hence, locally as well as commercially available materials were used for preparation of rearing shelves (Fig.-02). It is observed from the study that Shelves fabricated from mulberry twigs/ branches and gunny cloth have performed better than other locally and commercially available materials evaluated respectively. The data revealed that shelves prepared from gunny cloth and mulberry twigs (Fig.-03) did not have any significant difference on cocoon quality (Table-02).It may be inferred that the rearers may over cum from space stress conditions in 5th and final instar of silkworm by use of shelves fabricated from locally available materials resulting in good cocoon production as well as quality.

Fig 2 Shelve rearing in poly house

Fig 3 Shelve Prepared from Mulberry Twig

Table 1 Studies on feasibility of rearing 5th age silkworm in outdoor poly-cloth folding shed/ poly-house and its effect on cocoon production (Pooled Data of two years)

Season	Treatment	Parameters					
		Yield/10,000 larvae		Single Cocoon wt (g)	Single Shell wt(g)	SR %	5th age Larval period
		By Nos.	By wt (Kg)				
Spring	T - 01	9650	15.59	1.661	0.316	19.21	7.04
	T - 02	9530	15.10	1.635	0.314	19.20	7.04
	T - 03	9750	15.84	1.670	0.329	19.71	7.09
	Control	9780	15.92	1.666	0.324	19.47	7.09
	Mean	*9677.5*	*15.61*	*1.66*	*0.32*	*19.40*	*7.07*
	SD	*112.95*	*0.37*	*0.02*	*0.01*	*0.24*	*0.03*
Autumn	T - 01	9502	14.23	1.542	0.293	19.00	7.12
	T - 02	9360	13.91	1.533	0.285	18.56	7.11
	T - 03	9656	14.64	1.569	0.300	19.13	7.05
	Control	9666	14.49	1.554	0.297	19.09	7.04
	Mean	*9546*	*14.32*	*1.55*	*0.29*	*18.95*	*7.08*
	SD	*144.95*	*0.32*	*0.02*	*0.01*	*0.26*	*0.04*

Table 2 Studies on fabrication and evaluation of rearing shelves from locally available materials (Pooled data of two years)

Season	Treatment	Parameters				
		Yield/1000 larvae		Single Cocoon wt (g)	Single Shell wt(g)	SR %
		By Nos.	By wt (Kg)			
Spring	T - 01	9800	16.206	1.7275	0.3325	19.25
	T - 02	9714	15.950	1.6910	0.3215	19.01
	T - 03	9780	15.886	1.6555	0.3110	18.79
	T - 04	9786	16.278	1.7000	0.3245	19.15
	T - 05	9764	15.698	1.6875	0.3190	18.90
	Control	9780	15.920	1.6660	0.3240	19.47
	Mean	*9771*	*15.99*	*1.69*	*0.32*	*19.10*
	SD	*30.08*	*0.22*	*0.03*	*0.01*	*0.25*
Autumn	T - 01	9634	14.512	1.5605	0.2875	18.44
	T - 02	9500	13.972	1.5255	0.2795	18.33
	T - 03	9516	14.042	1.5125	0.2750	18.11
	T - 04	9610	14.008	1.4975	0.2720	18.17
	T - 05	9678	88.566	1.4850	0.2650	17.86
	Control	9666	14.485	1.5535	0.2965	19.09
	Mean	*9601*	*26.60*	*1.52*	*0.28*	*18.33*
	SD	*75.83*	*30.36*	*0.03*	*0.01*	*0.42*

Treatment-1 (T1): Rearing of 5th age silkworms with mulberry shoots in poly – house.
Treatment-2(T2): Rearing of 5th age silkworms with individual mulberry leaves in poly-house.
Treatment-3(T3): Rearing of 5th age silkworms with mulberry shoots in pucca house.
Control: Rearing of 5th age silkworms with individual mulberry leaves in pucca rearing house.

To ascertain the appropriate day of shoot feeding: About more than 85% leaves are being consumed by the silkworm larvae during 5th stage and huge number of manpower is being utilized to feed the larvae. Day by day, labor crisis is being observed for agricultural and other cash crops. Hence, it was also studied to ascertain the day to start shoot feeding in final instar. Data obtained from spring and autumn rearing showed that shoot feeding could be commenced from 1st day of 5th stage (after two feeding) instead of 4th day without any adverse effect on cocoon parameters (Tabel-03). Cris- cross system of shoot feeding provide proper ventilation within the rearing bed and the humidity of the rearing bed maintained for healthy growth of larvae (Fig-04).

Though, shoot feeding minimizes the frequency of bed cleaning and ultimately reduce labor cost on silkworm rearing i.e., on individual leaf plucking and bed cleaning. Thus, protected silkworm rearing is feasible under polythene shed / tent under space stress conditions as reported for Oak tasar rearing (5 and6).

Table 3 Studies to ascertain appropriate day of 5th age for commencing shoot feeding and its effect on cocoon production (Pooled data of two years)

Season	Treatment	Parameters					
		Yield/10,000 larvae		Single Cocoon wt (g)	Single Shell wt(g)	SR %	Good Cocoon % age
		By Nos.	By wt (Kg)				
Spring	T - 01	9744	15.69	1.689	0.329	19.51	94.07
	T - 02	9710	16.21	1.708	0.334	19.56	94.16
	Control	9780	15.92	1.666	0.324	19.47	95.12
	Mean	*9745*	*15.94*	*1.69*	*0.33*	*19.51*	*94.45*
	SD	*35.00*	*0.26*	*0.02*	*0.01*	*0.04*	*0.58*
Autumn	T - 01	9496	14.18	1.5605	0.298	19.10	94.59
	T- 02	9518	14.19	1.5545	0.298	18.64	94.58
	Control	9666	14.48	1.5535	0.2965	19.09	95.23
	Mean	*9560*	*14.29*	*1.56*	*0.30*	*18.94*	*94.80*
	SD	*92.46*	*0.17*	*0.00*	*0.00*	*0.26*	*0.37*

Treatment-1(T1): Shoot feeding started from 2nd day of 5th stage
Treatment-2(T2): Shoot feeding started from 4thday of 5th stage

Fig 4 Shoot feeding

CONCLUSIONS

Poly-house may be used for late age (5th stage) silk-worm rearing without any adverse effect on cocoons character and space may be increased by fabrication of rearing shelves from locally available materials. Further, shoot feeding could be started in 5th stage after bed cleaning and labor cost on individual leaf plucking and bed cleaning could be minimized to obtain quality cocoon crop on minimum expenditure as Fig.-04: Shoot feeding per the observations / suggestions recorded.

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