Uttar Pradesh J. Zool. 12 (2) : 133-139, 1992 ISSN 0256-971X

VARIATION IN THE PERFORMANCE OF SOME INDIGENOUS MULTIVOLTINE MULBERRY SILKWORM BREEDS OF *BOMBYX MORI* L. IN TWO ENVIRONMENTS

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A total of 8 indigenous multivoltine silkworm breeds have been reared during two favourable and two unfavourable seasons per year from 1988 to 1991 to evaluate the essence of economic triats of different breeds on varied environmental conditions. Statistical analysis of the rearing performance (ANOVA) reveal that the indigenous breeds NISTID possess high survival; TAMILNADU (W) has better ERR.WT., SCW, SSW and SR%; MORIA has longest FIL.LENG. and fine DN.; SARUPAT(W) has highest WT. of ML. which clearly indicate that these breeds can be utilised as better breeding materials for further hybridization studies.

INTRODUCTION

Maintenance of genetic stocks is the primary requisite of sericulture industry for commercial exploitation of mulberry silkworm *Bombyx mori* L. (Chikusi, 1972). Since the silkworm has been domesticated for many centuries, they are, by nature, quite delicate and sensitive to the environmental factors like temperature, humidity and photoperiod which, to a great extent, affect the expression of quantitative characters (Sakaguchi, 1978). A specific difference of environment may have a great effect on some genotypes than on others or there may be a change in the ranking of genotypes when measured in diverse environments. This interplay of genetic and non-genetic effect on the phenotypic expression is called genotype environment (GE) interaction (Jain, 1982).

Therefore, the production of cocoon crops require optimum environmental conditions at the time of rearing for reaping good quantity of cocoons with high silk contents (Krishanaswamy, 1978). India, being a vast country, experience very wide range of fluctuation in agroclimatic conditions which can certainly be tolerated by indigenous multivoltine breeds with high survival as compared to improved multivoltine or bivoltine silkworm breeds (Subba Rao *et al.*, 1989; Jayaswal *et al.*, 1990; Goldsmith, 1991).

In West Bengal too, the climatic conditions facilitate the rearings of multivoltine silkworm breeds that can sustain with high temperature and excess humidity in the tropics of the province. Rearing of indigenous multivoltine silkworm breeds and their hybrids are in practice (Sidhu, 1967; Sengupta *et al.*, 1971 & 1974; Noamani *et al.*, 1990) since time immemorial.

A comparative study of 8 indigenous breeds *viz.* NISTARI, NISTARI (P), NISTID, SARUPAT (W), MORIA, PURE MYSORE, TAMILNADU(W) and RAJ was made during favourable and unfavourable seasons to ascertain the efficacy of the gene interaction of different breeds with environmental conditions of different seasons for the expression of economic triats which may further lead to pure line selection and other breeding plans.

MATERIAL AND METHODS

A list of 8 indigenous breeds, their origin/source and salient morphological characters is detailed below :

Name of Breed	Origin/Source	Cocoon characters	
		Colour	Shape
NISTARI	West Bengal	Yellow	Spindle
NISTARI [P]	West Bengal	Yellow	Spindle
NISTID	West Bengal	Yellow	Spindle
SARUPAT [W]	Assam	White	Spindle
MORIA	Assam	White	Ellipticle
PURE MYSORE	CSR & TI, Mysore	Light green	Spindle
TAMILNADU [W]	Tamil Nadu	White	Spindle
RAJ	Bangladesh	White	Spindle

As such, rearing of all these breeds were conducted following the rearing technology suggested by Krishnaswamy (1978 & 1979). 10 Dfls of each of the breeds were brushed *en masse* and after 2nd moult larvae were distribiuted in 3 replications, each with 300 worms. In West Bengal, silkworms are reared during favourable seasons (October to March) and in unfavourable seasons (April to September) (Jayaswal *et al.*, 1990). During former period the silkworm genes are fully expressible for better quantitative and qualitative characters whereas in the later season, the interaction of genes become passive and thus resulting into poor performance. Hence, two favourable - January to February (Flagun) and Novermber to December (Agrahaian) and two unfavourable - May to June (Jaistha) and August to September (Bhadra) indentical seasons have been considered consecutively from 1988 to 1991.

Observations were recorded for weight of 10 mature larvae in grams (WT. 10 ML.), effective rate of rearing per 10,000 larvae by number (ERR. No.) and by Weight (ERR. WT.) in grams, average single cocoon weight in grams (SCW), average single shell weight in grams (SSW), cocoon-shell ratio in per cent (SR. %), average filament length in metres (FIL.LENG.) and denier (DN).

RESULTS AND DISCUSSION

Analysis of varience (ANOVA) for statistical significance of various characters in 8 breeds during two seasons are discussed below. Significant difference was found for all the characters within seasons and within breeds . Interaction between seasons and breeds was significant in all except SCW, SSW and FIL.LENG.

WT. 10 ML. : Significant difference was recorded for WT. 10 ML. among breeds, inbetween the seasons and seasons x breeds ($P \leq 0.05$). Highest larval weight was recorded in SARUPAT(W) (25.6 g) followed by MORIA (24.9 g). The minimum larval weight was noticed in PURE MYSORE (17.1 g).

ERR No. & WT. : Highest survival No. was recorded in NISTID (8792) and by WT. in TAMILNADU(W) (8810.94 g). Both the characters are significant at 1% level. Minimum ERR. No. was noted in PURE MYSORE (6675) and WT. in MORIA (7360.13 g).

Cocoon characters : Remarkable breeding difference and seasonal differences were recorded at 1% level. High SCW, SSW and SR.% were observed as 1.072 g, 0.153 g and

Table I. Mean rearing performance of 8 multivoltine silkworm breeds.

BREED	WT. 10 ML.	ERR. NO.	ERR. WT.	SCW	SSW	SR. %	FIL. LENG	DENIER
NISTARI	20.1	8199	7399.44	0.899	0.112	12.50	366.5	1.98
NISTARI (P)	20.4	8699	7929.06	0.901	0.109	12.08	403.3	1.86
NISTID	20.9	8792	8401.94	0.949	0.111	11.75	404.4	1.96
SARUPAT (W)	25.6	8079	8691.19	1.068	0.145	13.63	530.2	2.02
MORIA	24.9	7340	7360.13	1.024	0.139	13.61	558.4	1.72
PURE MYSORE	17.1	6675	5668.56	0.832	0.098	11.76	382.9	1.76
TAMILNADU (W)	24.1	8326	8810.94	1.072	0.153	14.26	553.8	1.90
RAJ	24.4	7488	7571.06	1.040	0.144	13.76	493.6	1.98
CD ($P \leq 0.05$)	1.572	970.916	996.674	0.063	0.012	0.931	41.452	0.175
SE	0.794	490.362	503.371	0.032	0.000	0.470	20.935	0.089

Table II. Rearing performance of 8 multivoltine breeds during favourable and unfavourable seasons.

BREED	WT. 10ML.	ERR. NO.	ERR. WT.	SCW	SSW	SR. %	FIL. LENG	DENIER
FAVOURABLE SEASON								
NISTARI	21.8	8970	8711.00	0.974	0.127	13.18	361.3	1.99
NISTARI (P)	21.3	9159	8800.63	0.928	0.113	12.23	404.3	1.90
NISTID	21.9	9251	9401.50	1.009	0.115	11.42	394.3	2.11
SARUPAT (W)	28.2	8834	10934.63	1.188	0.165	13.93	567.8	2.09
MORIA	26.6	8408	8974.63	1.105	0.147	13.30	544.0	1.95
PURE MYSORE	18.1	7858	6903.13	0.874	0.105	11.95	375.0	1.81
TAMILNADU (W)	26.7	9013	10512.00	1.187	0.172	14.48	625.8	2.00
RAJ	26.8	8743	9297.50	1.123	0.165	14.75	492.4	2.16
UNFAVOURABLE SEASON								
NISTARI	18.4	7428	6087.88	0.823	0.098	11.82	371.8	1.98
NISTARI (P)	19.5	8238	7057.50	0.875	0.105	11.93	402.3	1.83
NISTID	19.9	8332	7402.38	0.889	0.108	12.08	414.1	1.81
SARUPAT (W)	23.1	7323	6447.75	0.948	0.126	13.32	492.6	1.95
MORIA	23.2	6272	5745.63	0.943	0.132	13.91	572.8	1.49
PURE MYSORE	16.1	5491	4434.00	0.789	0.091	11.57	390.8	1.70
TAMILNADU (W)	21.5	7638	7109.88	0.956	0.134	14.04	481.9	1.80
RAJ	22.0	6234	5844.63	0.957	0.123	12.77	494.8	1.79
CD ($P \leq 0.05$)	2.224	1373.08	1409.51	NS	NS	1.316	NS	0.248

Table III. Characterwise performance of silkworm breeds in two seasons.

SEASON	WT. 10 ML.	ERR. NO.	ERR. WT.	SCW	SSW	SR. %	FIL. LENG	DENIER
FAVOURABLE	23.9	8780	9191.88	1.049	0.139	13.15	470.6	2.00
UNFAVOURBALE	20.5	7120	6266.20	0.898	0.114	12.68	452.6	1.79
CD ($P \leq 0.05$)	0.786	485.458	498.337	0.0310	0.006	0.465	20.726	0.088

14.26%, respectively in TAMILNADU(W) alone. The minimum SCW (0.832 g)and SSW (0.098 g) were noted in PURE MYSORE. The least SR.% was noted in NISTID (11.75%).

Yarn characters : The post cocoon characters pertaining to quality of fibers are also important for the evolution of breeds (Dutta, 1984). The longest FIL.LENG. (558.4 metres) and finest DN (1.72) were noticed in MORIA. The shortest FIL.LENG. in NISTARI (366.5 metres) and highest DN in SARUPAT (W) (2.02) were recorded.

Table I shows that SARUPAT (W), MORIA, TAMILNADU(W) and RAJ were performing better than the rest for cocoon characters like WT. 10 ML., SCW, SSW, SR.% and FIL.LENG; whereas SARUPAT (W), NISTARI, RAJ, NISTID AND TAMILNADU(W) were better for DN; NISTID, NISTARI, NISTARI(P) and TAMILNADU(W) showed better performance for ERR. No.; TAMILNADU(N), SARUPAT(N) and NISTID were better for ERR. WT.

During favourable season, SARUPAT(W) showed high values for WT. 10 ML., ERR. WT. and SCW; TAMILNADU(W) for SSW, SR.% and FIL.LENG.; NISTID for ERR. No. and PURE MYSORE for DN (Table II). During unfavourable season, MORIA performed better than other breeds for WT. 10 ML., FIL.LENG. and DN; NISTID for ERR. No. and ERR. WT.; TAMILNADU(W) for SSW, & SR.% and RAJ for SCW (Table II). Favourable season is found to be better in all character but for denier as compared to unfavourable season (Table III).

The over all performance thus shows that indigenous breed NISTID possessed high survival; TAMILNADU(W) contain better ERR. WT., SCW, SSW and SR.%; MORIA has longest FIL.LENG.and fine DN and SARUPAT(W) has more weight for mature larvae. Therefore, NISTID, TAMILNADU(W), SARUPAT(W) and MORIA can be exploited as useful breeding material either in pure form or for hybridization studies.

ACKNOWLEDGEMENTS

Authors are thankful to all the Staff members of Silkworm Breeding and Genetics Section of CSR&TI, Berhampore for helping in conducting the rearings.

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