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THE PROSPECT OF MULBERRY SERICULTURE IN ORISSA : USE OF BIVOLTINE FOUNDATION CROSS AS BIVOLTINE P_1 SEED COCOON FOR PRODUCTION OF MULTI x BIV COMMERCIAL HYBRIDS

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The present study was undertaken with an object to find out the suitable Silkworm Bivoltine breed/hybrid for rearing during August-September Season in Southern part of Orissa. August-September season is one of the major commercial crop in this area and also Agrahayani P_1 Seed Crop rearing of West Bengal, at the same time this season is very much unfavorable for silkworm rearing with the pure Bivoltine breeds due to heavy and continuous rain and in most of the years, the rearing was either failed or washed out. Cunninghum (1984) advocated that the hybrids can over come the environmental traces due to heterozygous superiority. In this study, one bivoltine hybrid *viz.* SK_6 x SK_7 have been selected on the basis of the above reference and results of the trials. Both parents are hardy as well as their hybrids performs fair. Annual requirement of Bivoltine Seed Cocoon in West Bengal is more than an 1 Crore. Keeping in view, the said hybrid can be reared during August-September season to meet the requirement of West Bengal. SK_6x SK_7 was reared Foundation Cross (FC) as Seed instead of commercial rearing and the farmers income for their product has increased about 2 fold, thereby improving their socio-economical status. In 2008 under taken the present study and reared consecutively for 3 years in the Southern part of Orissa, both at farm and farmer's level. The yield per 100 dfls ranges from 25 kgs. to 60 kgs. August-September season is the Agrahyani P_1 Seed Rearing of West Bengal. The Seed cocoon produced is being supplied to the SSPCs of West Bengal, where the male components are used for commercial seed production for Agrahyani Commercial Crop of W.B. The details of the performance are discussed in this paper.

Key words : Bivoltine, silkworm, foundation cross, trial, hybrid vigour, P1 seed production .

INTRODUCTION

Silk is traditionally the heritage of Orissa from the age old times. But Orissa is the Non-traditional state in Mulberry Sericulture and altogether is being practiced in 12 districts mostly by the weaker and backward section of the society. A total of 1094 SC/ST families are involved in mulberry sericulture activities. The climate & topography in some of the areas of the state is suitable for mulberry sericulture. There are scopes for developing the mulberry sericulture in Orissa. The 90 percentage of mulberry cultivation is under rainfed condition.

There are 4 nos. Commercial Crops being reared in the state namely May-June, August - September, October-November, and February - March. Out of the 4 crops August - September and October -November are the major crops in the state. But August -September is very much adverse for mulberry silkworm rearing due to heavy and continuous rain mainly due to depression, thus this crop is very much risky crop. As per the data/records available, it is either failure or wash-out crop due to rain, if reared with any bivoltine pure race.

The evaluation and choice of parents is an important part of heterosis breeding programmes for any crop improvement. Where the germplasm collection is large, it becomes difficult to identify parental stocks (Holden, 1984) and it is difficult to compare all possible breeds and crosses in the lab. or in the field level. We selected bivoltine F_1hybrid as the male parents of Multi. x bivo. commercial hybrid in our experiments for several reasons. First is their better tolerance and increased vigour in comparison to pure bivoltine parents, as suggested by Das *et al.* (1994) and Pal *et al.* (2010). Secondly, it is easier for farmers of the tropical belts to rear a bivoltine F_1 foundation hybrid than a purebred bivoltine as the male parent of Multivoltine x bivoltine commercial hybrid for the seed crop to produce a commercial Multivoltine x bivoltine hybrid. Thirdly, the hybrid (FC) cocoons will be sold as seed cocoons and the price will be more than 2 fold higher than commercial cocoons.

In the year 2008, we planned to rear hardy Bivoltine hybrids (Foundation Cross) and the cocoons so produced may be utilized as Male Parent for the preparation of Multivoltine x Bivoltine commercial hybrid for the commercial season *i.e.* Agrahyani (Nov.) in West Bengal. Accordingly the rearing was undertaken and performed very well.

There is heavy demand of Agrahyani P_1 Bivoltine seed cocoons in West Bengal. To meet the demand of Agrahayani P_1 Bivoltine Seed for West Bengal, P_1 rearing was undertaken at Farm and Farmer's level. The performance of rearing was encouraging and supplied Seed Cocoons to the SSPCs' of West Bengal more than 3,00,000 and 15,00,000 cocoons during 2009-2010 and 2010-2011, respectively.

MATERIALS AND METHODS

Two bivoltine races have been selected viz., SK_6 and SK_7 following the technique advocated by Chattopadhyay *et al.* .(1994); Ghosh *et al*, (1995, 1996 & 2000) and Sen *et al.* (1996) and their cross SK_6 x SK_7 was reared during August-September, 2008; 2009 and August-September, 2010 at Centre for Sericulture Development, Ramagiri Orissa. During August-September, 2009 reared at both Farm and Farmers' level during all the above mentioned season. During August-September, 2010, a large scale rearing was under taken with 11,300 Dfls' at both Farms and Farmers" level in the area of Ramagiri, Chandragiri, Koraput and Kashipur area of Orissa following the standard rearing technology (Krishnaswamy, 1978 & 1979). 11,300 Dfls' was reared upto IInd moult and supplied to the farmers on the 2nd day of IIIrd stage as per capacity of respective farmer.

Observations were recorded for Fecundity, Hatching %, Larval Period, Survial Percentage, Yield per 10,000 worms brushed by No. and Weight (kgs.), Single Cocoon & Shell Weight (gm.), S.R. % and Pupation Percentage, Actual No. & Weight and No. of Cocoons per kg.

RESULTS AND DISCUSSION

The bivoltine foundation cross (FC) *viz.* SK_6 x SK_7 performance was recorded during August-September (Agrahayani P_1 of West Bengal) rearing season at the Centre of

Table I : At farm level : Rearing performance of (P1 seed crop) Bivoltine (FC).

ons : Aug-Sept.	Only of Dfls Brushed	Hatch-ing Date	Only of Dfls	Ave. Fecun-dity	% of Hatch-ing	No. of worms Brushed	Larval Period (days)	Total yield in By No.	Total yield in By Wt (kg)	Yield/1000 By No.	Yield/1000 By Wt (kg)	Yield/100Dfls By No.	Yield/100Dfls By Wt. (kg)	Coco'n Wt. (gm)	Snell Wt. (gm)	Shell (%)	Pupa-Tion Rate	Coco'n Per (kg)
	2008																	
1	300	29.8.08	300	400	75.00	90000	24	57256	76.00	6362	8.444	19085	25.333	1.4200	0.247	17.39	90.00	706
	2009																	
2	300	30.8.09	300	403	74.00	89466	24	58040	74.80	6487	8.362	19347	24.933	1.480	0.269	18.18	90.00	708
	2010																	
3	R 300	5.09	300	400	73.00	87600	23	61324	91.00	7000	10.388	20441	30.333	1.592	0.282	17.71	90.00	628
	P 200	2.00	300	420	91.00	76440	24	40927	69.25	5354	9 .059	20463	34.625	1.650	0.302	18.30	90.00	591
	N 50	3.20	50	415	95.00	19743	24	15440	23.50	7832	11.921	30879	47.000	1.500	0.285	19.00	90.00	657
	K 50	40	50	430	96.00	20640	24	19200	30.00	9302	14.535	38400	68.000	1.560	0.296	18.97	90.00	640

CSD R : Ramagiri; MDF P : Patangi; MDF N : Narenga; RSRS K : Koraput.

Table II : At farmers level : Rearing performance of (P1 seed crop) Bivoltine (FC).

Season Aug-Sept.	Only of Dfls. Breed	Date of Hatch-ing	Only of DFLs Harv'ted	Ave - Fecu-ndity	% of Hatch-ing	Larval period (days)	Total yield in By No.	Total yield in By wt (Kg)	Yield 100 Dfls By No.	Yield 100 Dfls By wt (Kg0	Coc'ns Wt (gms)	Shell Wt.. (gms)	Shell (%)	Pupa-tion Rate	Coc'ns Per (Kg)
2009															
	1050	30.8.09	1050	425	90.00	23	275759	376.50	26263	35.857	1.410	0.250	17.73	90.00	708
2010															
	10100	05.9.10	10100	400	89.00	23	1533350	2359.00	15182	23.356	1.592	0.282	17.71	90.00	628

Sericulture Development since 2008 and at Mulberry Demonstration Farms *viz.* Patangi & Naranga and R.S.R.S, Koraput and the data is presented in Table I. The data reveals that maximum Dfls' reared (300) at the Centre for Sericulture Development, Ramagiri for all the 3 years, in respect of E.R.R. No. (6362), E.R.R. Wt. (8.444 kgs), Yield per 100 Dfls' 25.00 kgs.) in 2008; E.R.R. No. (6487), E.R.R. Wt. (8.361 kgs), Yield per 100 Dfls' 24.933 kgs.) in 2009 and E.R.R. No. (7000), E.R.R. Wt. (10.388 kgs), Yield per 100 Dfls' 30.333 kgs.) in 2010. During 2010, 3 other centres *viz.* Mulberry Demonstration Farms viz Patangi and Naranga and R.S.R.S, Koraput, the rearing was under taken along with CSD, Ramagiri, the highest E.R.R. No. (9302), E.R.R. Wt. (14.535 kgs.), Yield per 100 Dfls' 60.00 kgs. were recorded at R.S.R.S., Koraput followed by M.D.F., Naranga for E.R.R. No. (7832), E.R.R. Wt. (11.921 kgs.), Yield per 100 Dfls' 47.00 kgs.) during August-September, 2010. But the pupation percentage was 90 in all cases and highest No. of cocoon per kg. is 708 in 2009 at CSD, Ramagiri.

The results of the trials given at Farmers level at Ramagiri, Chandragiri and Koraput of Orissa during August-September season for the year 2009 and 2010 is presented in Table - 2. In 2009, yield per 100 Dfls' 35.857 kgs. and with 90 percent pupation and maximum No. of cocoon per kg. 708 were recorded. During 2010, the trial has been given with 10,100 Dfls' among the 231 farmers during the same season but the average yield per 100 Dfls' was recorded 23.356 kgs., which is a bit low than the previous year due to tremendous adverse climatic condition and but pupation rate were recorded above 90 percentage.

The cocoons produced during above mentioned years were procured as seed cocoon at the rate of Bivoltine seed cocoon and supplied to SSPCs', DOS and L.S.P.s' of West Bengal as P_1 Bivoltine seed of Autumn (Agrahayani) commercial crop of West Bengal. Thus farmers of Orissa have earned more than 2 fold for their cocoons as compared to commercial cocoon rate.

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