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Evaluation of some productive hybrids of *Bombyx mori* L. suitable for the autumn seasons in the rainfed condition of Assam, India.

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Abstract

Three mulberry silkworm breed viz.CSR2 X CSR4(EIV52.55673),APS45 x APS12(EIV51.27833)andGEN3 X GEN2(EIV50.01986) has been identified as the most promising for commercial exploitation in agroclimatic condition of North eastern region of India by uemploying the *Evaluation index method.*. In India ,in recent times,the *Evaluation index method* for a particular trait or character is widely used by the silkworm breeders and a cumulative score of all the characters ranks the hybrids based on higher score.The sum of index values with regard to all the characters allotted to an hybrid indicates the hybrid's worth. During the present study, by employing the *Evaluation index method* six bivoltine hybrids were evaluated based on their performance at 24±3^{0}C and 25±5^{0}C and 79±2% relative humidity. The hybrids were ranked as per the cumulative score and the value of a particular trait in a particular hybrid were compared with the ranking.

Keywords: Bivoltine hybrids, *Bombyx mori*, mulberry silkworm, promising, rearing.

1. Introduction

The North Eastern region of India experienced four seasons viz., Spring , Autumn, Winter & Summer. Average annual rainfall is 6250 mm.The period from December to February is winter season,March to May is Spring season , June to August is Summer season and September to November is Autumn season. The relative humadity ranges from 38 to 98%. The temperatures ranges from 5°C and 38°C, respectively. The climatic condition of Assam is temperate humid.

Climate influence the living organisms profoundly (Uvarov,1931) and silkworm ,Bombyx mori L. is no exception. Tazima (1958) reported that due to repeated rearing in Karnataka state C. Nichi,a bivoltine race has lost several quantitative characters including voltinism but hybrids of Pure Mysore and C. Nichi have become popular among farmers.

The information's on the works of the phonological aspects in other groups of insects (Wiggolesworth,1972; King ,1975;Ali,1982;Congdon *et al*.,,1983;Cunnington,1985; Ranga Rao *et al*.,1989, Johansen,1997). Reference to such studies in mulberry silkworm can be made to Yokoyama and Takashima, 1952; Krishnaswami *et al*.,1971;Tikoo *et al*.,1975; Rahman *et al*.,1980; Mathur *et al*.,1995). Phonological studies in non-mulberry silkworm have been made by Yamazaki, 1939; Hodai,1949; Choudhury,1981, Regniere *et al*., 1989, Sinha and Choudhury, 1992 and others. The multiracial character of tasar silkworm *A.mylitta*, adoptable to various eco-climatic conditions has been studied by Jolly (1968). Very recently (after1994) few high yielding bivoltine races (CSR-2,CSR4,CSR5)and their hybrids evolved at Mysore have been performed well ,particularly during October-February season in Karnataka and Kashmir region. Begum *et al*., (2000) opinioned that due to varied climatic conditions in India different breeds evolved are reared in different seasons.

So, considering the agro climatic condition of Assam which influenced by soil ,climate and other edaphic factors three promising bivoltine mulberry hybrids were studied in the Autumn commercial crop season which falls under favourable season. The autumn season of Assam considered to be most congenial for mulberry silkworm rearing in Assam for higher yield. Thus ,the present study was under taken to study the quantitative performance of three promising bivoltine hybrid, *Bombyx- mori*,L.

2. Materials and methods

Six promising bivoltine mulberry *Bombyx-*

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mori,L. hybrids APS45 x APS12 , CSR46 x CSR47, Gen3 x Gen2, SLD4 x SLD8, CSR2 x CSR4 , and APS105 x APS 126 were studied for its quantitative and qualitative characters were studied for Autumn commercial seasons.

During the process about 4000 silkworm (*Bombyx-mori* L.) larvae have been brushed for each hybrid and after III moult exactly 2500 larvae retained in each replication and divided into five replications consisting 500 larvae.The study was carried out at room temperature condition (25±2æ%c and 75-80 % RH). Data were recorded for fecundity, hatching, larval weight, effective rate of rearing(ERR),cocoon weight, cocoon shell weight, cocoon shell percentage, ,Yield/ 100 dfls., filament length, filament weight , filament size, Reliability, Raw silk (%), neatness, boil- off following the standard rearing technology as suggested by Krishnaswami (1978).Twenty five (25) females and 25 males cocoons taken randomly from each replication for assessing cocoon weight , shell weight and shell percentage. Matured silkworms were mounted on bamboo mountages and cocoons were harvested on 7th day after mounting. After harvest, rate of perfect pupation of each cocoon have been checked verified & recorded. The remaining good cocoons (replication wise) have been weighted (for green cocoon weight) stifled inaccordance with the approved/recommend scheduled temperatures and reeling assessment has been done. Finally, Evaluation index was calculated as per Mano *et. al.*, (1992). The index score in different score in different characters or traits thus denotes the performance of a hybrid combinations with relatively higher index value were considered to have greater economic value.

3. Results and discussion

The mean *evaluation index* pertaining to the fifteen quantitative traits of six promising hybrids of mulberry silkworm are presented in table 1.

Each breed showed superiority in certain traits only. The highest mean of fecundity and boil-off were exhibited by the hybrid APS105 x APS 126. The highest mean hatching percentage, effective rate of rearing by weight and mean single cocoon weight were shown by the hybrid CSR2 x CSR4.

The highest mean effective rate of rearing by number and mean shell weight and mean shell ratio and reelability percentage were shown by CSR46 x CSR47. The hight mean filament length in meter and mean highest raw silk (%) ,filament size (D) are shown by hybrids Gen3 x Gen2 and APS45 x APS12 respectively. Table (2) and. Table (3)shows the Rearing and reeling performance Bi x Bi Hybrids during Autumn Commercial Season respectively.

Table-1 : Evaluation Index Value of Bi x Bi.hybrid:

SL. No.	Hybrid	EI value for Fecundity	EI value for Hat%	EI value for ERR(No.)	EI value for ERR9Wt.	EI value for Sg.C.wt(g)	EI value for Sg.S.wt(g)	EI value for SR%	EI value for Yield/100 DFLs.
1	SLD4 × SLD8	39.808153	27.738	35.78137	37.86245	50.09174	49.75485	50	37.96945
2	GEN3 × GEN2	45.80336	53.2064	38.13942	37.89963	56.69725	52.54897	46.75	38.00539
3	CSR2 × CSR4	59.592326	55.55217	59.01438	62.10037	62.75229	52.99015	42.125	61.40162
4	APS105 × APS126	67.386091	53.17593	48.44038	45.33957	33.66972	42.99015	37	45.19317
5	APS45 × APS12	40.407674	54.88195	59.18813	57.41636	40.6422	46.66662	56	56.87332
6	CSR46 × CSR47	47.002398	55.46078	59.43635	61.24535	56.23853	55.04897	68	60.57502

SL. No.	Hybrid	EI value for Filament Length(M)	EI value for Filament Wt.(cg)	EI value for Filament size(D)	EI value for Reelability (%)	EI value for Raw Silk%	EI value for neatness %	EI value for Boil-off
1	SLD4 × SLD8	53.73521	38.81944	59.64444	42.2252	43.06911	38.23529	41.41618
2	GEN3 × GEN2	65.77091	65.34722	49.42222	45.22788	48.23171	52.94118	54.30636
3	CSR2 × CSR4	42.73708	44.82639	56.08889	34.90617	45.34553	67.64706	51.44509
4	APS105 × APS126	40.3507	52.04861	31.64444	55.8445	36.80894	38.23529	66.6763
5	APS45 × APS12	39.00187	45.10417	59.64444	60.48257	64.04472	52.94118	34.9422
6	CSR46 × CSR47	58.40423	53.95833	43.64444	62.14477	62.5	52.94118	52.51445

Hybrid	Total Evaluation Value (EI)	Average	Rank
SLD4 × SLD8	646.1509	43.07673	
GEN3 × GEN2	750.2979	50.01986	(III)
CSR2 × CSR4	788.3509	52.55673	(I)
APS105 × APS126	692.7155	46.18103	
APS45 × APS12	769.1749	51.27833	(II)
CSR46 × CSR47	720.5398	48.03599	

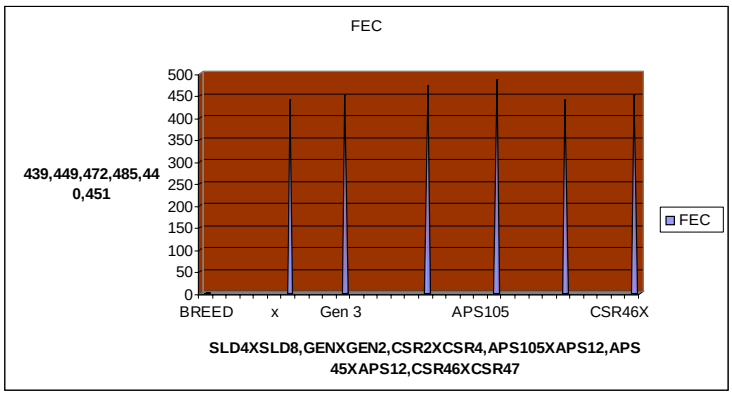

Fig.1 : Graphical presentation on fecundity:

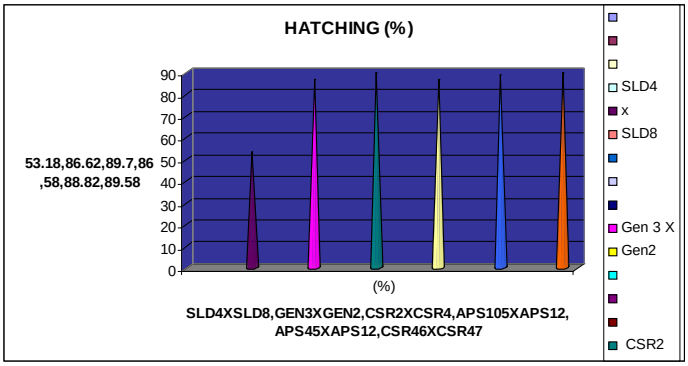

Fig.2 : Graphical presentation on Hatching %

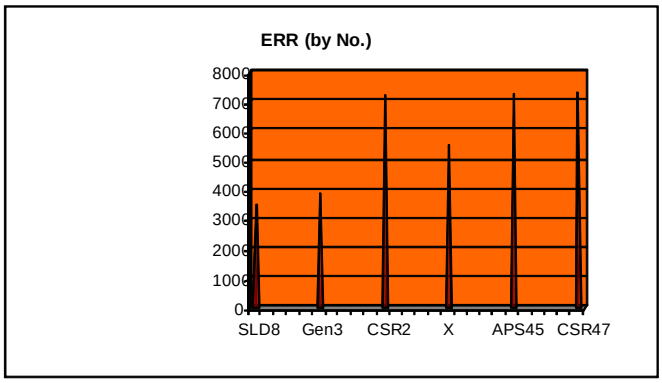

Fig.3 : Graphical presentation on ERR(by No.)

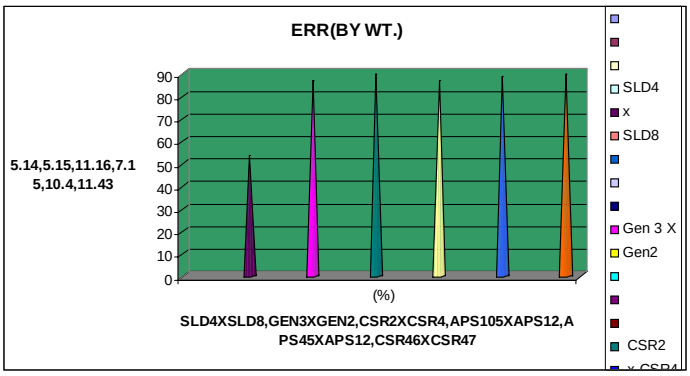

Fig.4 : Graphical presentation on ERR(by wt.)

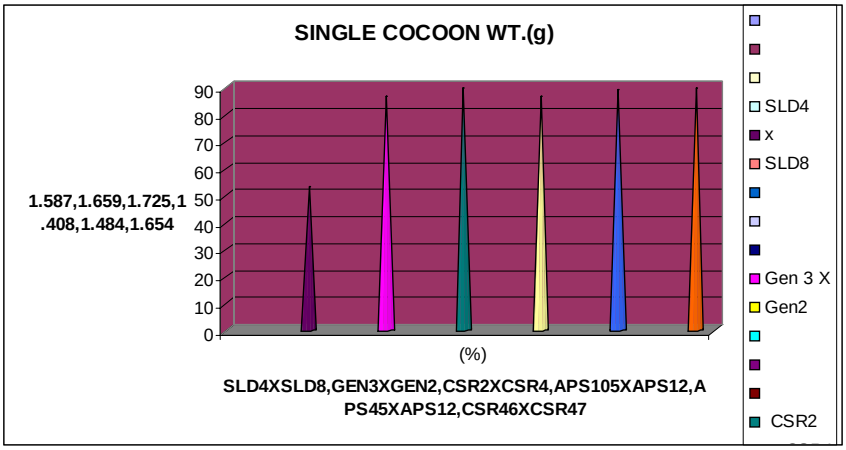

Fig.5 : Graphical presentation on Single cocoon wt.(g)

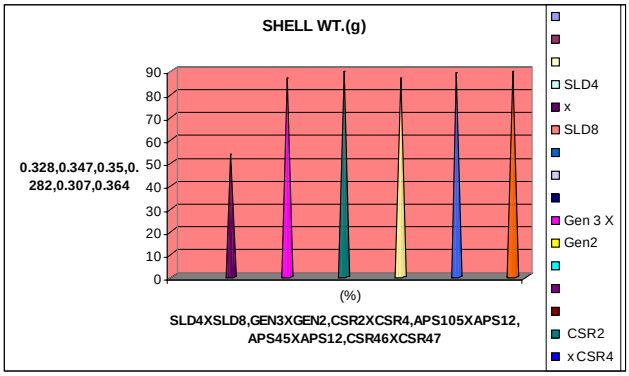

Fig.6 : Graphical presentation on Single shell wt.(g)

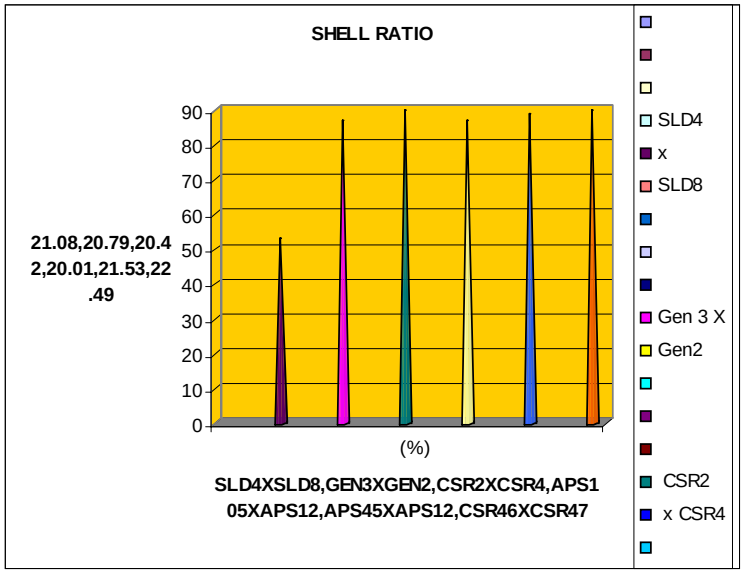

Fig.7 : Graphical presentation on Single shell ratio

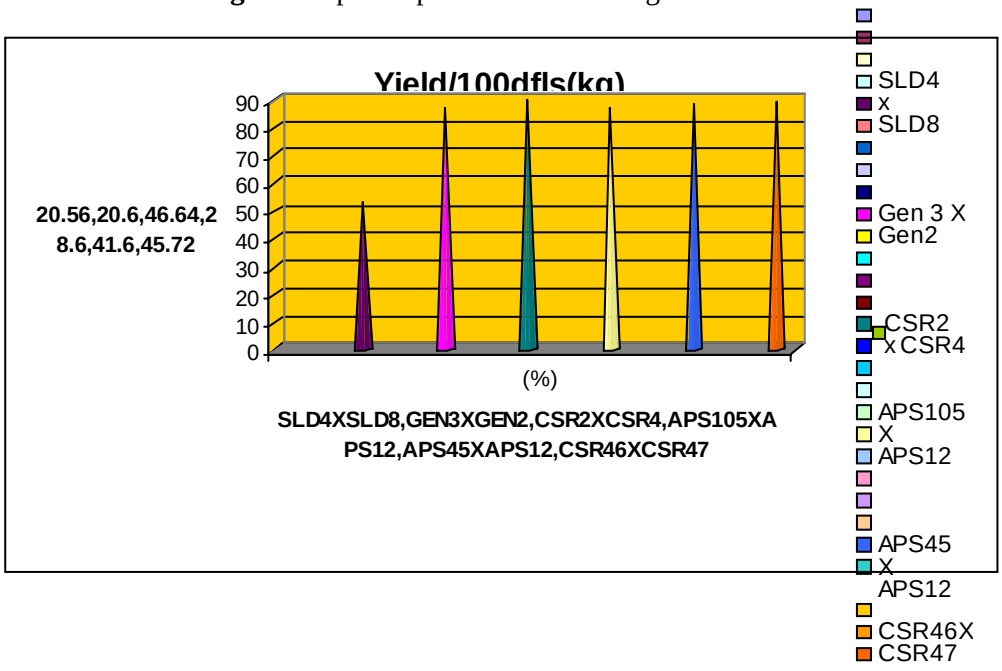

Fig.8 : Graphical presentation on Single Yield/100dfls(kg)

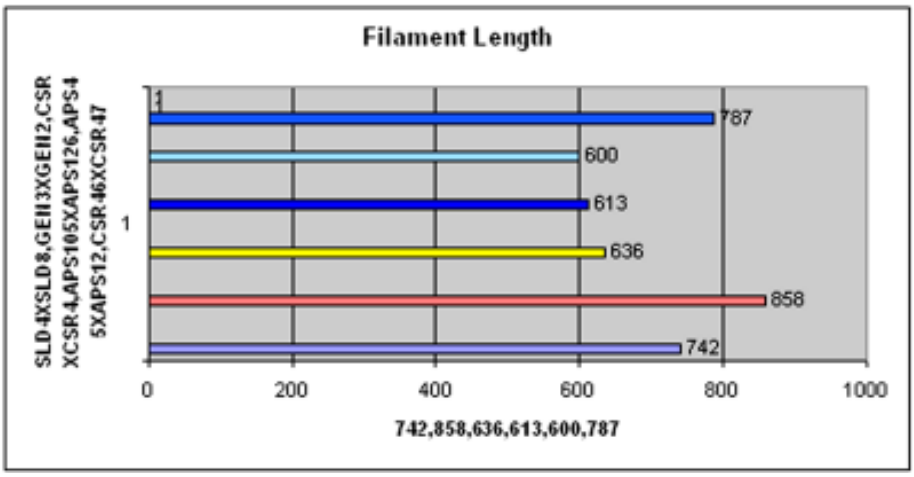

Fig.9 : Graphical presentation on Single Filament length(m)

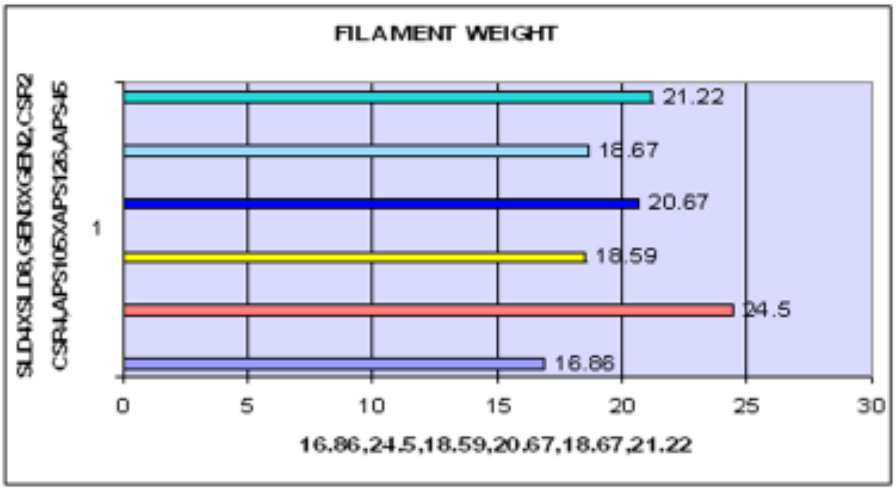

Fig.10 : Graphical presentation on Single Filament weigth

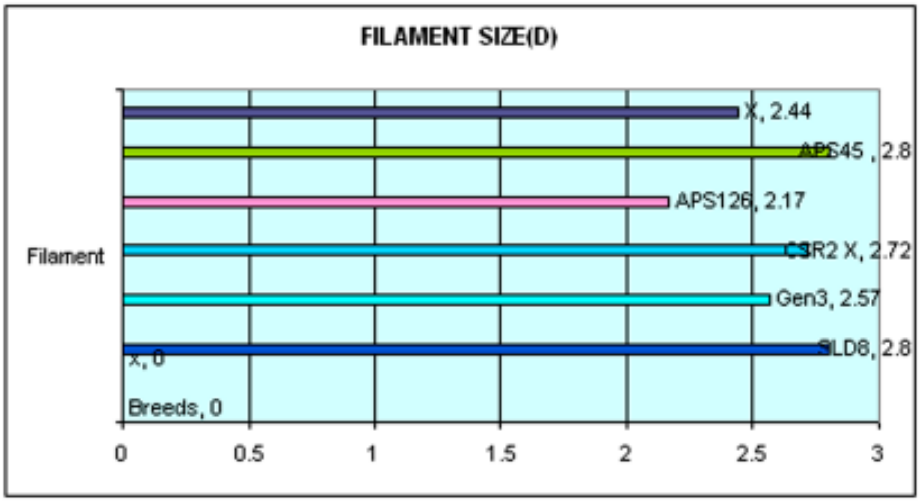

Fig.11 : Graphical presentation on Single Filament size

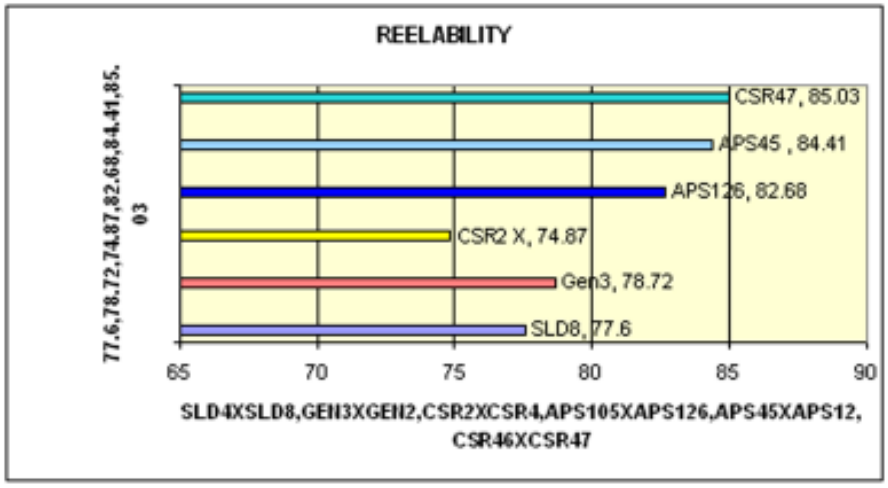

Fig.12 : Graphical presentation on Single Filament Reelability

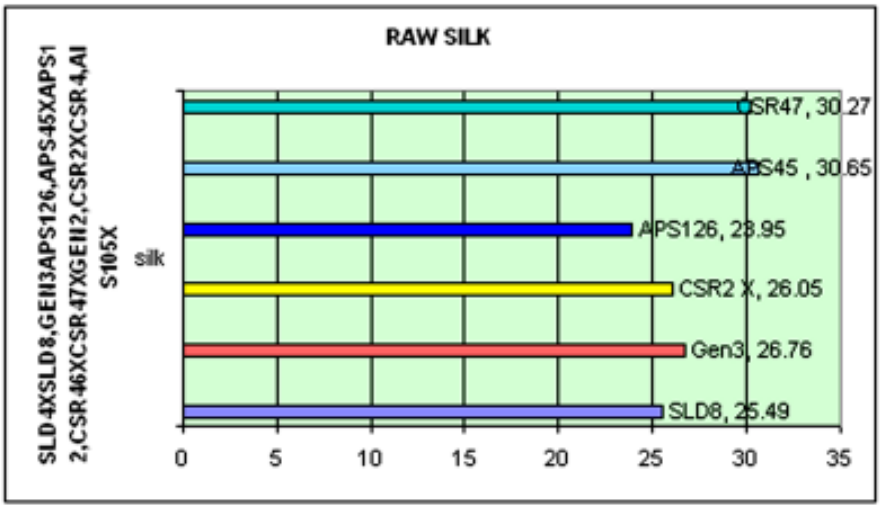

Fig.13 : Graphical presentation on Raw silk

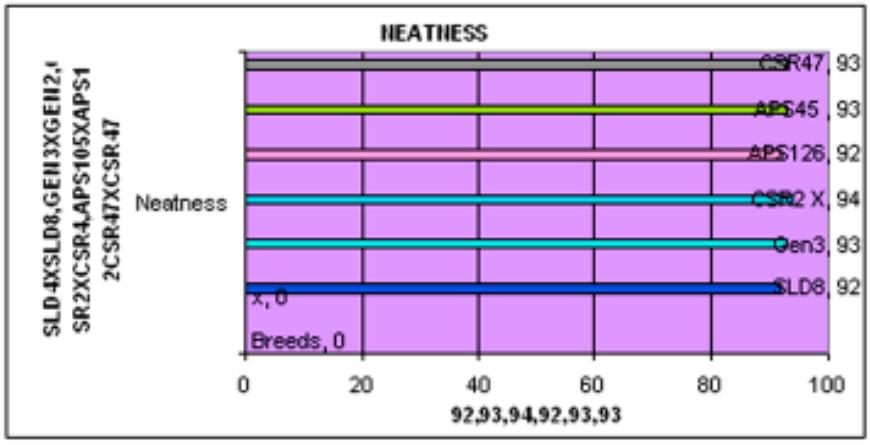

Fig.14 : Graphical presentation on Neatness

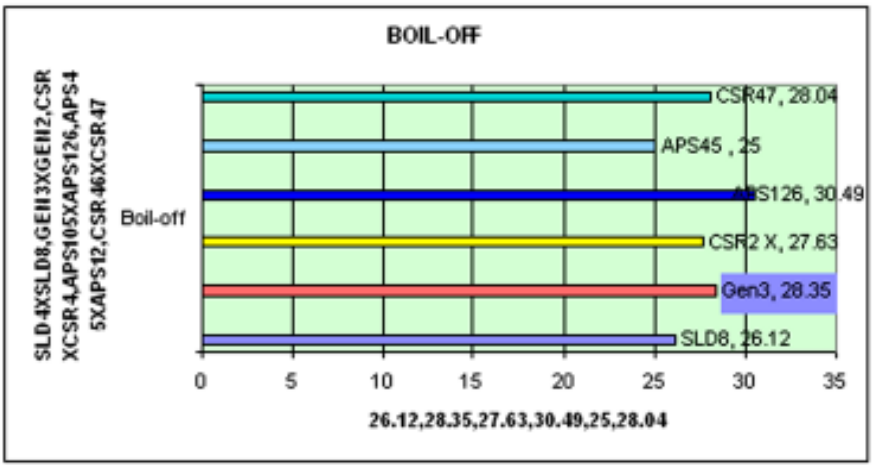

Fig.15 : Graphical presentation on Single Boil-off

Table 2 : Rearing performance Bi x Bi Hybrids during Autumn Commercial Season

Sl.No.		Fecundity (Nos.)	Hatching (%)	ERR (by No.)	ERR by wt. (g)	Single Cocoon weight(g)	Single Shell weight(cg)	Shell ratio(%)	Yield/ 100dfls (kg)
1	APS45 × APS12	440	88.82	7280	10.4	1.484	0.307	21.53	41.64
2	CSR46 × CSR47	451	89.58	7320	11.43	1.654	0.364	22.49	45.72
3	GEN 3 × GEN 2	449	86.62	3888	5.15	1.659	0.347	20.79	20.6
4	SLD 4 × SLD 8	439	53.18	3508	5.14	1.587	0.328	21.08	20.56

5	CSR2 × CSR4	472	89.7	7252	11.66	1.725	0.35	20.42	46.64
6	APS105 × APS126	485	86.58	5548	7.15	1.408	0.282	20.01	28.6
	Average	**456**	**82.41333**	**5799.333**	**8.488333**	**1.586167**	**0.329667**	**21.05333**	**33.96**
	SD	**18.52566**	**14.38842**	**1765.311**	**3.050058**	**0.119468**	**0.030598**	**0.877603**	**12.205**
	CV%	**4.062**	**17.45968**	**30.4399**	**35.93**	**7.531868**	**9.281487**	**4.168476**	**35.92**

Table 3 : Reeling performance Bi x Bi Hybrids during Autumn Commercial Season.

Sl. No.	Breed	Filament Length (M)	Filament Weight (cg)	Filament size (D)	Reelability (%)	Raw Silk (%)	Neatness (%)	Boil-off
1	APS45 × APS12	600	18.67	2.8	84.41	30.65	93	25
2	CSR46 × CSR47	787	21.22	2.44	85.03	30.27	93	28.04
3	GEN3 × GEN2	858	24.5	2.57	78.72	26.76	93	28.35
4	SLD4 × SLD8	742	16.86	2.8	77.6	25.49	92	26.12
5	CSR2 × CSR4	636	18.59	2.72	74.87	26.05	94	27.63
6	APS105 × APS126	613	20.67	2.17	82.68	23.95	92	30.49
	Average	**706**	**20.0850**	**2.5833**	**80.5517**	**27.1950**	**92.83**	**27.6050**
	SD	**105.590**	**2.67434**	**0.24663**	**4.09440**	**2.69555**	**.753**	**1.90049**
	CV%	**14.95**	**13.31**	**9.54**	**5.08**	**9.91**	**0.811**	**6.88**

Thus, analysis of the growth and economic traits of cocoon (during Autumn commercial season) revealed that three mulberry silkworm breed viz.CSR2 X CSR4(EIV52.55673),APS45x APS12 (EIV51. 27833) and GEN3 X GEN2(EIV50.01986) are the most promising for commercial exploitation in agroclimatic condition of North eastern region of India.

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