Chapter IV
RESULTS

RESULTS

4.1. Growth and biomass production of different food plants

The growth, leaves, flower and seed attributes of all the food plants were varying in time line, size, weight, etc. The biomass production ranged from 32-38 MT for Borpat, 27-31 MT for Borkesseru 20-22 MT for Kesseru and 10-12 MT for Castor. Out of three perennial food plants, the highest gestation period was 5 years for Kesseru followed by 4 years for Borpat and 3 years for Borkesseru. The germination of 80-85 % recorded in case of Borpat and Castor whereas 35-45 % for Borkesseru and 70-80% for Kesseru. The detail data on the growth parameters are presented in Table 4.

4.2 Behaviour of eri silkworm in response to different host plants

Significant variation was observed in the settling percent, i.e. the behaviour of the larvae of different maturity levels of different host plants. The silkworms were attracted towards the medium leaves of Borkesseru, but in case of all other host plants, the eri silkworm larvae attracted towards tender leaves. For settling percent, the differences in means, between host plant and maturity level and interaction between host plants and maturity was statistically significant.

4.3 Biochemical analysis of leaves of different host plants

Results obtained from biochemical analysis of leaves of host plants at different maturity level are represented in the following tables.

Table 4. Parameters on growth and biomass production of different food plants of eri silkworm

Parameters	*Ailanthus excelsa* (Borkesseru)	*Ailanthus grandis* (Borpat)	*Heteropanax fragrans* (Kesseru)	*Ricinus communis* (Castor)
Method of propagation	Seed	Seed	Seed	Seed
Period of flowering	Feb – March	Dec - Jan	Jan-Feb	July-Aug and Feb-Mar
Period of seed collection	May- June	March – April	Feb-Mar	Aug and Mar
Period of seed sowing	June – July	April – May	Feb-Mar	Aug-Sep and Mar-Apr
Planting season	Sep-Oct	Aug - Sep	Aug-Sep	-
Gestation period (months)	36	48	60	1.5
Germination period (days)	15 – 20 (18.25 ± 0.45)	45 – 55 (52.76 ± 1.02)	18-25 (20.51 ± 0.47)	15-20 (17.45 ± 0.34)
Germination (%)	35-45 (41.24 ± 0.89)	80 – 85 (82.21 ± 1.65)	70-80 (74.32 ± 1.45)	80-85 (83.67 ± 1.34)
Numbers of seeds per kg	8264 – 12048 (10471 ± 1189)	857 – 1321 (1013 ± 129)	3678 - 4254 (4011 ± 187)	1894-2023 (1971± 37)
Single seed weight (g)	0.083 - 0.121 (0.096 ± 0.012)	0.757 – 1.166 (0.987 ± 0.112)	0.271- 0.235 (0.249 ± 0.027)	0.494 – 0.528 (0.507 ± 0.010)
Average production of leaf biomass (MT/ha)	27-31 (28.24 ±1.23)	32-38 (33.45 ± 2.45)	20-22 (21.24 ± 0.57)	10-12 (11.45 ± 0.67)

Data in the parentheses indicate mean ± standard deviation.

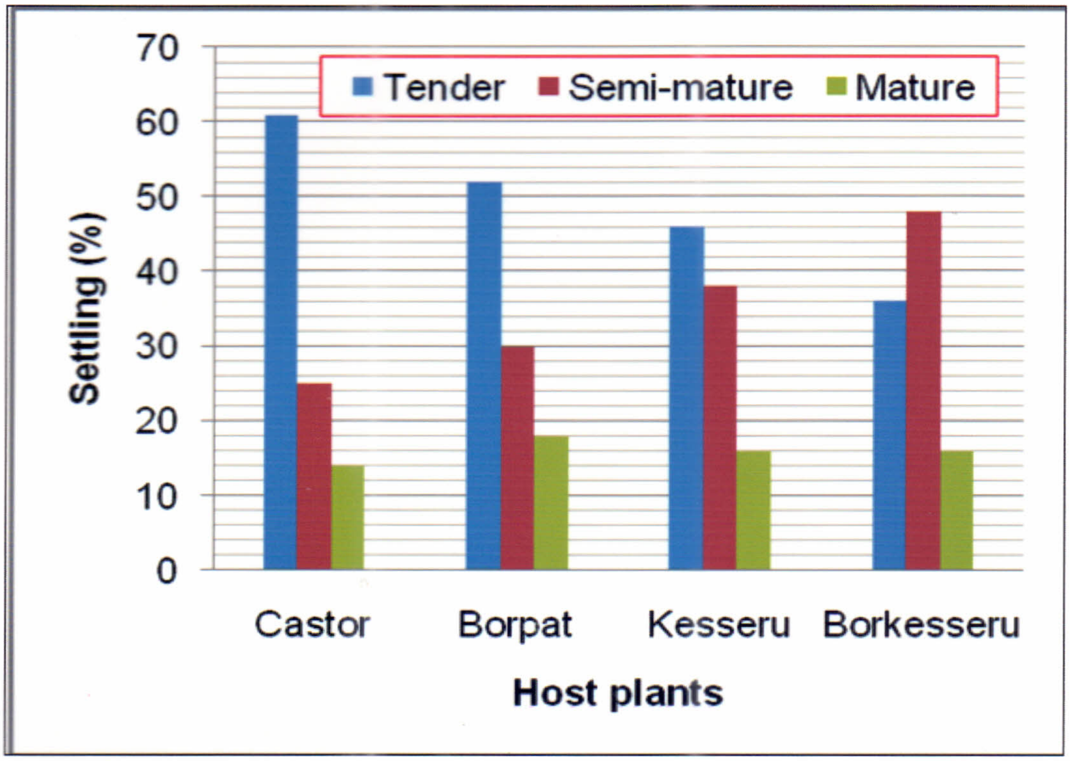

Fig 1 . Settling % of eri silkworm larvae during brushing with respect to tender (T), semi-mature (SM) and mature (M) leaves of different host plants.

Table 5. Settling % of eri silkworm larvae during brushing with respect to different maturity level of different host plants.

Host plants	**Tender**	**Semi-mature**	**Mature**	**Total**
Castor	61 (265)	25 (109)	14 (61)	100 (435)
Borpat	52 (180)	30 (104)	18 (62)	100 (346)
Kesseru	46 (104)	38 (86)	16 (36)	100 (226)
Borkesseru	36 (69)	48 (92)	16 (32)	100 (193)
Mean (Total)	**51.5 (618)**	**32.6 (391)**	**15.9 (191)**	**100 (1200)**

Data in the parentheses represent mean number of larvae.

4.3.1 Total carbohydrate content:

Data on carbohydrate content in the leaves of different host plants of eri silkworm according to type of leaves in four different seasons are presented in Table 6.

The total carbohydrate content varied significantly due to leaf type, season and host plants. The castor leaves at all maturity levels possessed significantly highest total carbohydrate contents, being seasonal means of 35.12 % in tender, 41.04 % in semi-mature and 40.09 % in mature leaves. Significantly the lowest total carbohydrate content was recorded in Borkesseru leaves at all maturity level, which was at par with Kesseru leaves in the case of tender and mature leaves. In case of Borpat and Castor, the total carbohydrate content was highest in semi-mature leaves followed by mature and tender leaves. However, the mature leaves of Borpat and Castor possessed the highest total carbohydrate content (Table 6).

4.3.2 Crude protein content:

Table 7 represents the crude protein content according to leaf type of different host plants in four different seasons.

Results revealed that, Borpat leaves were superior among all the host plants irrespective of leaf maturity and season. Its content was recorded as 14.39 % in tender, 13.64 % in semi-mature and 12.48 % in mature leaves of Borpat. The crude protein contents were in decreasing trend with the advancement of maturity levels in all food plants. The castor also recorded better crude protein content in all maturity level and in different seasons ranging from 10.64 % to 12.15 %. Significantly lowest crude protein content was recorded in Borkesseru leaves; 8.67 % in tender, 7.78 % in semi-mature and 5.23 % in mature leaves.

4.3.3 Crude fibre content:

Data on crude fibre content in the leaves of different host plants are presented in Table 8. Results showed that crude fibre content increased significantly with the advancement of leaf age irrespective of host plants. The data also reflects significant variation among the host plants as well as within the seasons at $P < 0.05$ level. The highest crude fibre content (26.45%) was recorded in the mature leaves of Kesseru followed by Borpat (25.51 %) and Borkesseru (14.47 %); whereas its content was lowest in tender leaves of castor (4.60 %).

4.3.4 Total phenol content:

Table 9 represents the total phenol content according to leaf type of different host plants in four different seasons.

A significant variation in the total phenol content in leaves of different host plants according to leaf maturity was observed. Results revealed that, mature leaf of Borkesseru contained significantly the highest total phenol content (2.49 mg/g) compared to other host plants. Whereas, it's content in semi-mature leaves of Kesseru was significantly the lowest (0.97 mg/g). In all the host plants, the highest phenol content was recorded in mature leaves followed by tender leaves. The semi-mature leaves of the host plants contained the lowest total phenol content.

Table 6. Total carbohydrate content (%) of leaves of different eri food plants during different seasons

Host Plant (Acc./Variety)	Tender					Semi-mature					Mature				
	S-1	**S-2**	**S-3**	**S-4**	**Mean**	**S-1**	**S-2**	**S-3**	**S-4**	**Mean**	**S-1**	**S-2**	**S-3**	**S-4**	Mean
Borkesseru (AE 001)	24.22	30.78	28.24	32.75	**29.75**	27.22	31.97	26.25	32.68	**29.53**	31.25	29.74	33.23	39.85	**33.52**
Borpat (AG001)	29.21	34.31	38.26	37.43	**32.30**	31.89	39.42	46.97	41.98	**40.07**	33.82	38.22	42.25	39.41	**38.43**[b]
Kesseru (HF-Mix)	27.89	32.14	29.45	28.75	**30.06**	31.87	32.45	28.92	29.99	**30.81**	30.12	31.24	33.24	38.14	**33.19**
Castor (NBR-1)	28.89	39.24	36.89	35.44	**35.12**	39.12	43.25	37.23	44.55	**41.04**	40.25	41.24	38.24	40.63	**40.09**

ANOVA	S. Ed (±)	$CD_{0.05}$
Host Plant	0.438	0.86
Season	0.447	0.88

S-1= Jan-Feb; S-2= Apr-May; S-3= Jul-Aug; S-4= Sep-Oct

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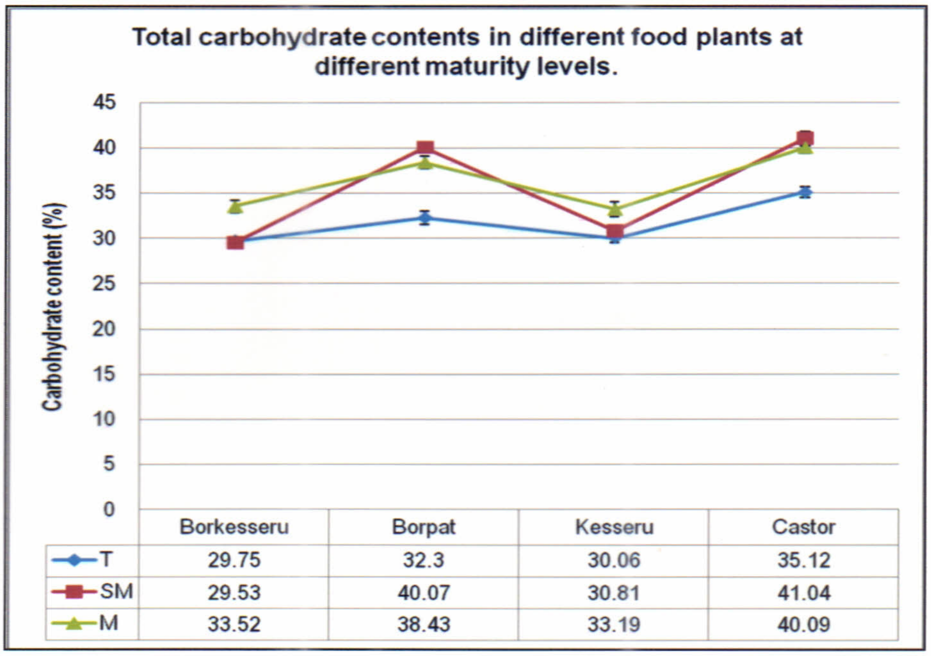


Fig.2. **Total carbohydrate content (%) of leaves of different eri food plants (seasonal mean) at different maturity levels (T=Tender, SM= Semi-mature and M= Mature)**

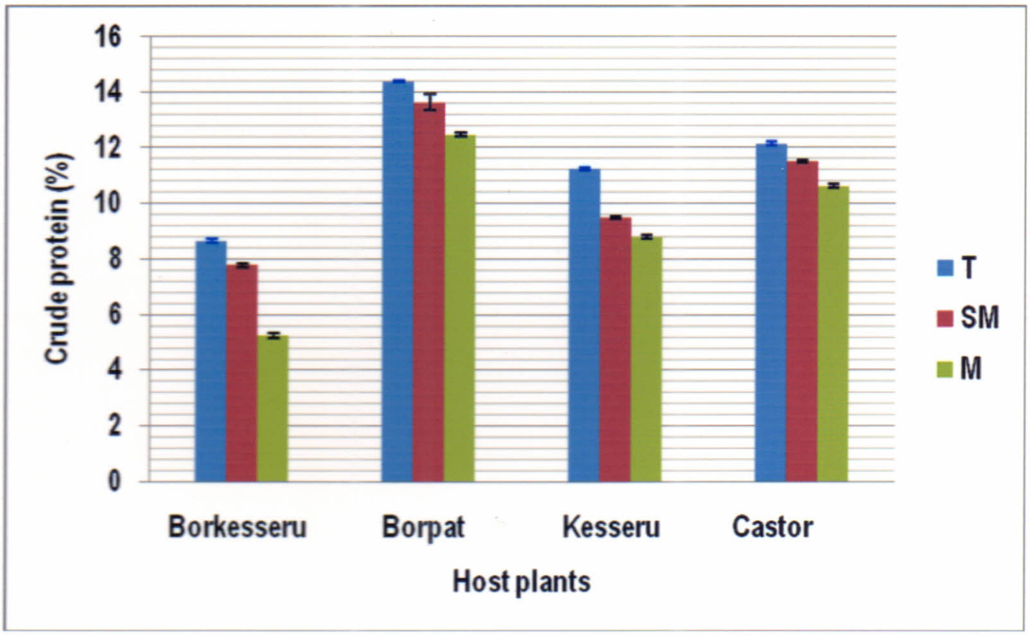


Fig. 3.**Total crude protein content (%) of leaves of different eri food plants (seasonal mean) at different maturity levels (T=Tender, SM= Semi-mature and M= Mature)**

Table 7. Total Crude protein content (%) of leaves of different eri food plants during different seasons

Host Plant (Acc./Variety)	Tender					Semi-mature					Mature				
	S-1	**S-2**	**S-3**	**S-4**	**Mean**	**S-1**	**S-2**	**S-3**	**S-4**	**Mean**	**S-1**	**S-2**	**S-3**	**S-4**	Mean
Borkesseru (AE 001)	7.75	9.67	10.02	7.24	**8.67**	6.24	8.53	9.23	7.11	**7.78**	5.22	4.3	6.12	5.26	**5.23**
Borpat (AG001)	14.25	13.42	15.67	14.22	**14.39**	13.89	12.82	14.52	13.32	**13.64**	12.34	11.8	13.43	12.32	**12.48**
Kesseru (HF-Mix)	11.42	11.83	10.49	11.25	**11.25**	9.54	9.43	8.98	9.97	**9.48**	8.74	9.05	8.76	8.65	**8.80**
Castor (NBR-1)	11.24	13.24	12.12	12.01	**12.15**	11.25	11.95	12.34	10.52	**11.52**	10.05	11	11.21	10.34	**10.64**

ANOVA	S.Ed (±)	$CD_{0.05}$
Host Plant	0.15	0.31
Season	0.11	0.22

S-1= Jan-Feb; *S-2= Apr-May;* *S-3= Jul-Aug;* *S-4= Sep-Oct*

Table 8. Crude fibre content (%) of leaves of different eri food plants during different seasons

Host Plant (Acc./Variety)	Tender					Semi-mature					Mature				
	S-1	**S-2**	**S-3**	**S-4**	**Mean**	S-1	S-2	S-3	S-4	**Mean**	**S-1**	**S-2**	**S-3**	**S-4**	Mean
Borkesseru (AE 001)	9.85	8.5	10.02	9.34	**9.43**	12.5	13.03	11.43	12.5	**12.37**	14.85	14.95	14.33	13.76	**14.47**
Borpat (AG001)	14.23	13.24	12.43	11.43	**12.83**	16.23	17.26	17.89	16.94	**17.08**	22.06	25.67	27.86	26.43	**25.51**
Kesseru (HF-Mix)	16.23	16.5	16.88	15.83	**16.36**	19.86	18.34	20.12	19.84	**19.54**	28.5	24.34	25.62	27.33	**26.45**
Castor (NBR-1)	4.58	4.57	4.67	4.59	**4.60**	5.36	5.87	5.67	6.21	**5.78[d]**	7.59	8.96	8.23	9.11	**8.47**

ANOVA	S.Ed (±)	$CD_{0.05}$
Host plant (H)	0.17	0.36
Season	0.12	0.24

S-1= Jan-Feb; S-2= Apr-May; S-3= Jul-Aug; S-4= Sep-Oct

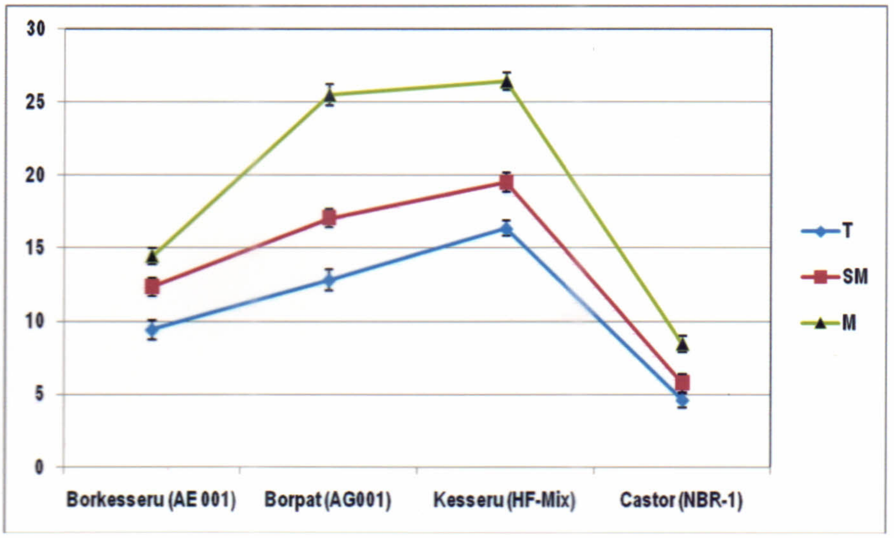


Fig.4. Crude fibre content (%) of leaves of different eri food plants (seasonal mean) at different maturity levels (T=Tender, SM= Semi-mature and M= Mature)

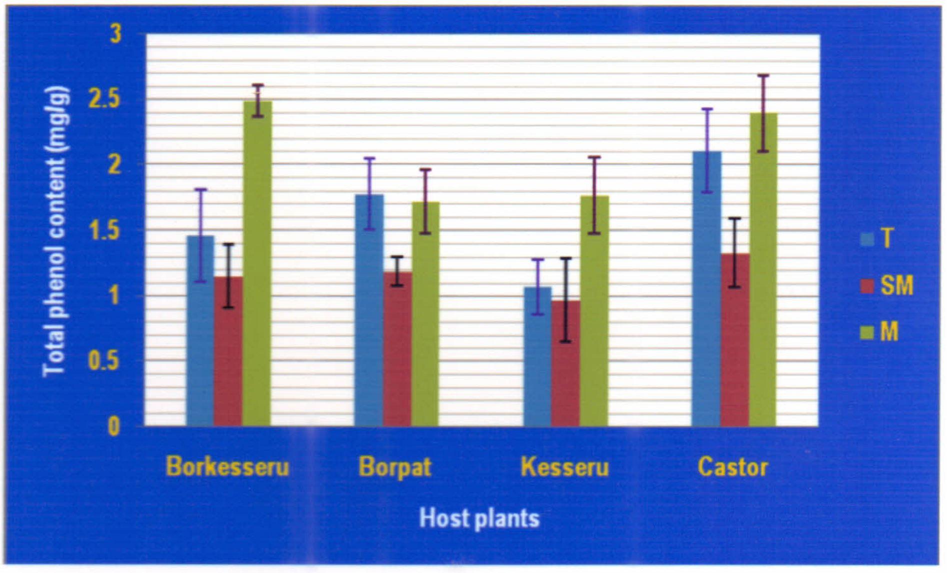


Fig.5. Total phenol content (mg/g) of leaves of different eri food plants (seasonal mean) at different maturity levels (T=Tender, SM= Semi-mature and M= Mature)

4.3.5 Tannin content:

Data on tannin content in the leaves of different host plants are presented in Table 10.

In respect of all maturity levels of leaves, tannin content were recorded significantly the highest in castor leaves. Its content was recorded 1.88% in tender, 1.33% in semi-mature and 2.40% in mature leaves of castor. The semi-mature leaves of all host plants contained the significantly the lowest tannin content compared to mature and tender leaves. It was recorded the lowest tannin content in all types of Kesseru leaves (0.33 % in tender, 0.35% in semi-mature and 0.41% in mature leaves).

4.3.6 β-sitosterol content:

Data on β-sitosterol content in the leaves of different host plants are presented in Table 11.

Results showed that β-sitosterol content increased significantly with the advancement of leaf age irrespective of host plants except in the castor and Borpat in which the content increased from tender to semi-mature leaves and again decreased in the case of mature leaves. In the case of Borpat, the highest β-sitosterol content was recorded during summer season (Jul-Aug) in all the leaf types. Semi-mature leaves of Borpat possessed significantly highest β-sitosterol content (69.63 mg/g) followed by semi-mature leaves of castor (66.58 mg/g), mature leaves of castor (45.95 mg/g) and mature leaf of Borpat (44.50 mg/g). In the case of tender leaves, the castor possessed significantly the highest β-sitosterol content (36.40 mg/g) followed by Borpat (31.43 mg/g).

4.3.7 Crude fat content:

The data representing seasonal variation as well as variation among the food plants in crude fat content are presented in Table 12.

Significantly the highest crude fat content was recorded in all types of leaves of Castor which was at par with Borpat in case of tender and semi-mature leaves. The crude fat content decreased with the advancement of leaf age irrespective of type of host plants. In the case of tender leaves, the highest crude fat content was recorded in Castor (8.10%) followed by Borpat (7.60%) and Borkesseru (7.46%). The lowest crude fat content (5.10%) was found in mature leaves of Borkesseru, which was at par with mature leaves of Kesseru.

4.3.8 Chlorogenic acid content:

Table 13 represents the Chlorogenic acid content according to leaf type of different host plants in four different seasons.

Results revealed that, the highest chologenic content in the case of tender leaves recorded in Borkesseru (1.27%), which was at par with Kesseru (1.25%). The lowest content of the Chlorogenic acid estimated in Borpat (0.40%), which was statistically at par with Castor (0.44%). Similar observations were also made in the case of Semi- mature leaves. Significantly highest Cholorogenic acid content among the mature leaves of different food plants was in Borkesseru leaves (1.79%), followed by Castor (1.04%), Kesseru (0.92%) and Borpat (0.43%). Hence, the data reflect that Borpat contained the lowest level of Chlorogenic acid irrespective of maturity levels of leaves.

Table 9. Total phenol content (mg/gm) of leaves of different eri food plants during different seasons

Host Plant (Acc./Variety)	Tender					Semi-mature					Mature				
	S-1	**S-2**	**S-3**	**S-4**	**Mean**	**S-1**	**S-2**	**S-3**	**S-4**	**Mean**	**S-1**	**S-2**	**S-3**	**S-4**	Mean
Borkesseru (AE 001)	1.41	1.42	1.56	1.46	**1.46**	1.14	1.16	1.22	1.07	**1.15**	2.44	2.46	2.67	2.38	**2.49**
Borpat (AG001)	1.98	1.78	1.34	2.01	**1.78**	1.12	1.24	1.26	1.14	**1.19**	1.65	2.01	1.45	1.78	**1.72**
Kesseru (HF-Mix)	0.98	0.97	1.24	1.08	**1.07**	0.86	0.88	0.89	1.23	**0.97**	1.87	1.34	1.97	1.89	**1.77**
Castor (NBR-1)	2.34	1.57	2.31	2.22	**2.11**	1.34	1.24	1.42	1.33	**1.33**	2.16	2.45	2.12	2.87	**2.40**

ANOVA	S.Ed (±)	$CD_{0.05}$
Host plant (H)	0.06	0.13
Season	0.04	0.07

S-1= Jan-Feb; S-2= Apr-May; S-3= Jul-Aug; S-4= Sep-Oct

Table 10. Tannin content (%) of leaves of different eri food plants during different seasons

Host Plant (Acc./Variety)	Tender					Semi-mature					Mature				
	S-1	**S-2**	**S-3**	**S-4**	**Mean**	**S-1**	**S-2**	**S-3**	**S-4**	**Mean**	**S-1**	**S-2**	**S-3**	**S-4**	Mean
Borkesseru (AE 001)	0.63	0.61	0.59	0.69	**0.63**	0.48	0.49	0.54	0.49	**0.50**	0.56	0.54	0.58	0.54	**0.56**
Borpat (AG001)	1.24	1.15	1.34	1.14	**1.22**	0.39	0.44	0.43	0.41	**0.42**	0.48	0.45	0.43	0.49	**0.46**
Kesseru (HF-Mix)	0.3	0.34	0.32	0.35	**0.33**	0.38	0.33	0.34	0.36	**0.35**	0.41	0.34	0.45	0.45	**0.41**
Castor (NBR-1)	1.42	1.57	2.31	2.22	**1.88**	1.34	1.24	1.42	1.33	**1.33**	2.16	2.45	2.12	2.87	**2.40**

ANOVA	S.Ed (±)	$CD_{0.05}$
Host plant (H)	0.041	0.092
Season	0.031	0.063

S-1= Jan-Feb; *S-2= Apr-May;* *S-3= Jul-Aug;* *S-4= Sep-Oct*

Table 11. β-sitosterol content (mg/g) of leaves of different eri food plants during different seasons

Host Plant (Acc./Variety)	Tender					Semi-mature					Mature				
	S-1	**S-2**	**S-3**	**S-4**	**Mean**	**S-1**	**S-2**	**S-3**	**S-4**	**Mean**	**S-1**	**S-2**	**S-3**	**S-4**	Mean
Borkesseru (AE 001)	21.52	26.52	21.98	25.68	**23.93**	36.76	35.3	33.96	37.21	**35.81**	41.21	38.38	37.42	37.38	**38.60**
Borpat (AG001)	31.34	25.8	39.1	29.1	**31.34**	63.5	70.90	72.9	71.2	**69.63**	42.3	44.4	46.3	45	**44.50**
Kesseru (HF-Mix)	24.22	25.45	25.92	25.88	**25.37**	36.76	34.25	34.96	36.12	**35.52**	40.23	39.75	37.25	39.25	**39.12**
Castor (NBR-1)	34.25	37.48	35.28	38.6	**36.40**	62.2	68.5	71.4	64.23	**66.58**	45.63	46.23	44.12	47.8	**45.95**

ANOVA	S.Ed (±)	$CD_{0.05}$
Host plant (H)	1.23	2.56
Season	0.62	1.35

S-1= Jan-Feb; S-2= Apr-May; S-3= Jul-Aug; S-4= Sep-Oct

Table 12. Crude fat (%) of leaves of different eri food plants during different seasons

Host Plant (Acc./Variety)	Tender					Semi-mature					Mature				
	S-1	**S-2**	**S-3**	**S-4**	**Mean**	**S-1**	**S-2**	**S-3**	**S-4**	**Mean**	**S-1**	**S-2**	**S-3**	**S-4**	Mean
Borkesseru (AE 001)	7.84	7.45	7.32	7.23	**7.46**	6.45	6.32	6.12	6.04	**6.23**	6.24	4.52	4.44	5.21	**5.10**
Borpat (AG001)	7.52	7.84	7.12	7.92	**7.60**	6.45	6.21	6.62	6.12	**6.35**	5.62	5.42	5.40	5.46	**5.48**
Kesseru (HF-Mix)	6.44	6.24	6.23	6.32	**6.31**	6.03	5.45	5.98	6.24	**5.93**	5.21	5.13	5.21	5.12	**5.17**
Castor (NBR-1)	8.05	8.12	8.21	8.01	**8.10**	7.23	7.45	7.33	7.11	**7.28**	6.96	7.01	6.89	6.84	**6.93**

ANOVA	S. Ed (±)	$CD_{0.05}$
Host plant (H)	0.42	0.98
Season	0.27	0.55

S-1= Jan-Feb; S-2= Apr-May; S-3= Jul-Aug; S-4= Sep-Oct

Table 13. Chlorogenic acid (%) of leaves of different eri food plants during different seasons

Host Plant (Acc./Variety)	Tender					Semi-mature					Mature				
	S-1	**S-2**	**S-3**	**S-4**	**Mean**	**S-1**	**S-2**	**S-3**	**S-4**	**Mean**	**S-1**	**S-2**	**S-3**	**S-4**	Mean
Borkesseru (AE 001)	1.18	1.26	1.33	1.31	**1.27**	1.04	1.05	1.12	1.23	**1.11**	1.73	1.78	1.82	1.81	**1.79**
Borpat (AG001)	0.37	0.43	0.44	0.36	**0.40**	0.68	0.71	0.81	0.78	**0.75**	0.41	0.39	0.45	0.48	**0.43**
Kesseru (HF-Mix)	1.24	1.12	1.31	1.34	**1.25**	1.89	2.01	1.92	1.87	**1.92**	0.87	0.88	0.92	1.01	**0.92**
Castor (NBR-1)	0.34	0.38	0.41	0.44	**0.39**	0.56	0.59	0.62	1.11	**0.72**	0.87	0.89	0.94	1.44	**1.04**

ANOVA	S. Ed (±)	$CD_{0.05}$
Host plant (H)	0.041	0.083
Season	0.032	0.064

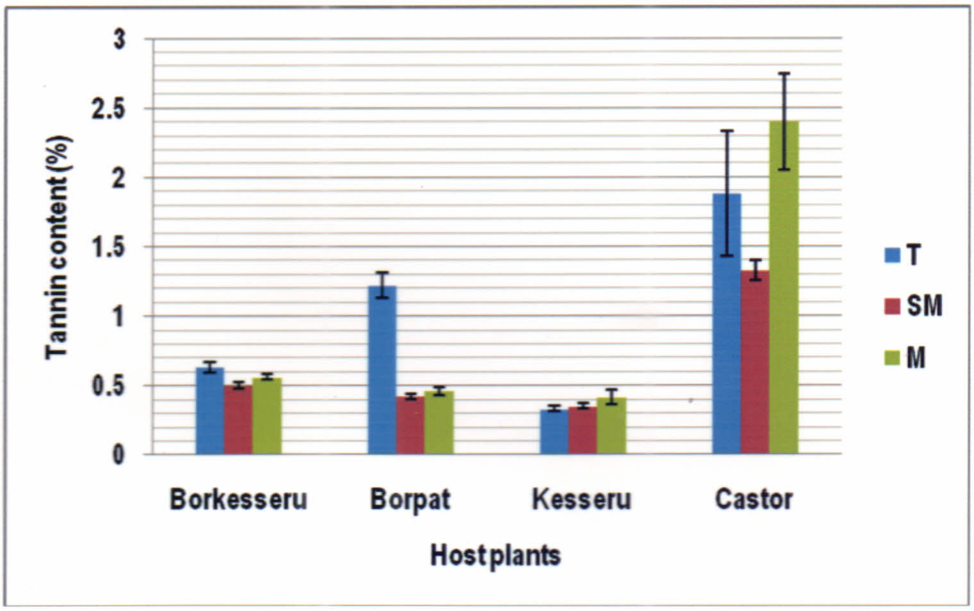


Fig. 6. **Tannin content (%) of leaves of different eri food plants (seasonal mean) at different maturity levels (T=Tender, SM= Semi-mature and M= Mature)**

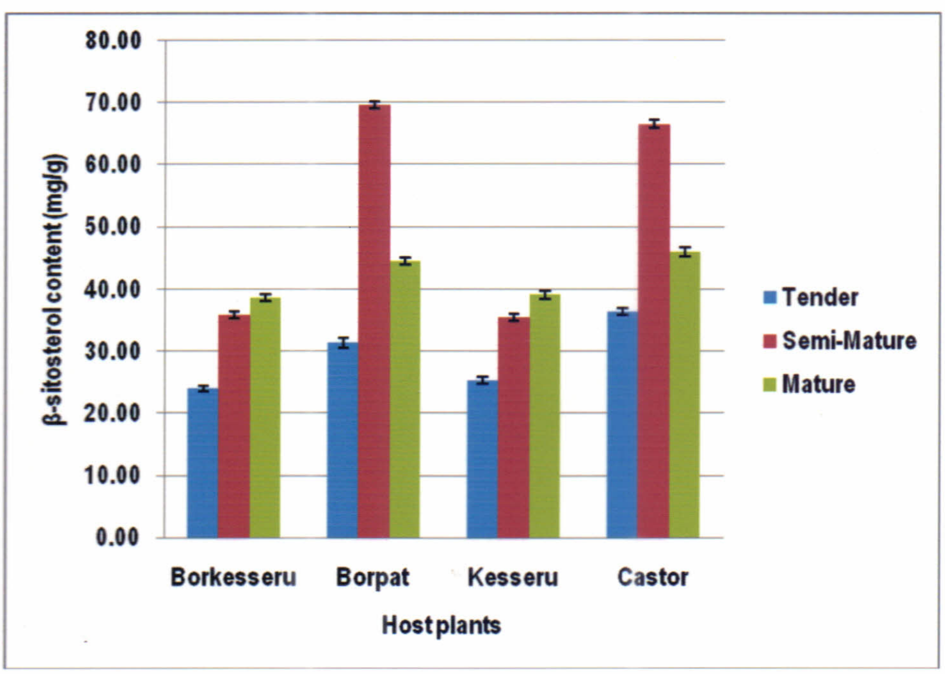


Fig.7 **.β-sitosterol content (mg/g) of leaves of different eri food plants (seasonal mean) at different maturity levels (T=Tender, SM= Semi-mature and M= Mature)**

4.3.9 Phytic acid content:

Data on the Phytic acid content of different eri food plants in respect of different maturity level as well as seasons are presented in Table 14.

Data revealed that the phytic acid content increased with the advancement of leaf age in all the selected food plants of eri silkworm. The significantly the highest phytic acid content recorded in Castor leaves viz. 2.14 mg/g, 3.22 mg/g and 4.08 mg/g for tender, semi-mature and mature leaves, respectively. The same were followed by Borpat (1.87 mg/g, 2.46 mg/g and 2.84 mg/g for tender, semi-mature and mature leaves, respectively). The lowest phytic acid content recorded in all types of Kesseru leaves such 1.29 mg/g, 1.67 mg/g and 2.17 mg/g for tender, semi-mature and mature leaves, respectively (Table 14).

4.3.10 Lignin content:

Table 15 represents the Lignin content according to leaf type of different host plants in four different seasons.

Results revealed that, Borpat leaves were superior among all the host plants irrespective of season in respect of lignin content (11.07% in tender, 15.11% in semi-mature and 16.95% in mature leaves). Significantly lowest tannin content in tender, semi-mature and mature leaves was obtained from Castor (4.40%, 4.99% and 5.83%, respectively).

4.3.11 Study on trypsin inhibitor activity of host plants:

Trypsin inhibitor activity is presented in the Table 16 and figure.8.

It showed that, trypsin inhibitor activity was significantly highest in the tender leaves of all host plants, which decreased with the advancement of leaf age except semi-mature leaves of Borkesseru. Trypsin inhibitor activity was maximum in tender leaves of Kessru (79.45 unit per mg protein) followed by that of tender leaves Borpat (74.23 unit per mg protein) and tender levaes of Castor (73.85 unit per mg protein) which were at par. In case of semi-mature leaves, this was found highest in Borkesseru leaves (70.45 unit per mg protein) followed by Kesseru (49.93 unit per mg protein) which were significantly higher over other food plants. In case of mature leaves, the highest activity recorded in Kesseru leaves followed by Castor, Borkeseru and Borpat.

Table 14. Phytic acid (mg/g) of leaves of different eri food plants during different seasons

Host Plant (Acc./Variety)	Tender					Semi-mature					Mature				
	S-1	**S-2**	**S-3**	**S-4**	**Mean**	**S-1**	**S-2**	**S-3**	**S-4**	**Mean**	**S-1**	**S-2**	**S-3**	**S-4**	Mean
Borkesseru (AE 001)	1.41	1.34	1.39	1.48	**1.41**	2.01	2.15	2.34	2.06	**2.14**	2.12	2.32	2.41	2.39	**2.31**
Borpat (AG001)	1.82	1.76	1.92	1.98	**1.87**	2.34	2.38	2.62	2.49	**2.46**	2.78	2.83	2.92	2.82	**2.84**
Kesseru (HF-Mix)	0.99	1.24	1.52	1.42	**1.29**	1.32	1.65	1.84	1.87	**1.67**	2.01	2.22	2.34	2.11	**2.17**
Castor (NBR-1)	1.96	1.99	2.04	2.57	**2.14**	2.89	2.97	3.04	3.99	**3.22**	4.01	4.11	4.21	3.98	**4.08**

ANOVA	S.Ed (±)	$CD_{0.05}$
Host plant (H)	0.03	0.07
Season	0.012	0.024

S-1= Jan-Feb; S-2= Apr-May; S-3= Jul-Aug; S-4= Sep-Oct

Table 15. Lignin content (%) of leaves of different eri food plants during different season

Host Plant	Tender					Semi-mature					Mature				
(Acc./Variety)	**S-1**	**S-2**	**S-3**	**S-4**	**Mean**	**S-1**	**S-2**	**S-3**	**S-4**	**Mean**	**S-1**	**S-2**	**S-3**	**S-4**	Mean
Borkesseru (AE 001)	8.56	8.62	8.92	9.02	**8.78**	11.02	11.23	11.56	11.85	**11.42**	13.25	13.62	13.85	14.69	**13.85**
Borpat (AG001)	10.67	10.87	11.21	11.52	**11.07**	14.21	15.05	15.15	16.02	**15.11**	16.32	16.89	17.25	17.34	**16.95**
Kesseru (HF-Mix)	7.17	7.42	7.89	7.98	**7.62**	9.21	9.85	10.05	10.56	**9.92**	11.23	11.52	11.56	11.53	**11.46**
Castor (NBR-1)	4.23	4.56	4.56	4.23	**4.40**	4.86	4.96	5.06	5.08	**4.99**	5.56	5.87	5.92	5.95	**5.83**

ANOVA	S.Ed (±)	$CD_{0.05}$
Host plant (H)	0.74	1.42
Season	0.52	1.02

S-1= Jan-Feb; *S-2= Apr-May;* *S-3= Jul-Aug;* *S-4= Sep-Oct*

Table 16. Trypsin inhibitor activity (units/mg protein) in the leaves of host plants of different maturity level

Name of host plants	Maturity level	Trypsin inhibitor activity (nmole/mg/min)
Borpat	Tender	74.23
	Semi-mature	45.42
	Mature	36.16
Borkesseru	Tender	65.32
	Semi-mature	70.45
	Mature	36.16
Kesseru	Tender	79.45
	Semi-mature	49.93
	Mature	45.13
Castor	Tender	73.85
	Semi-mature	42.25
	Mature	38.15
S. Ed. (±)		3.58
$CD_{0.05}$		7.34

Figures with common alphabets do not differ significantly

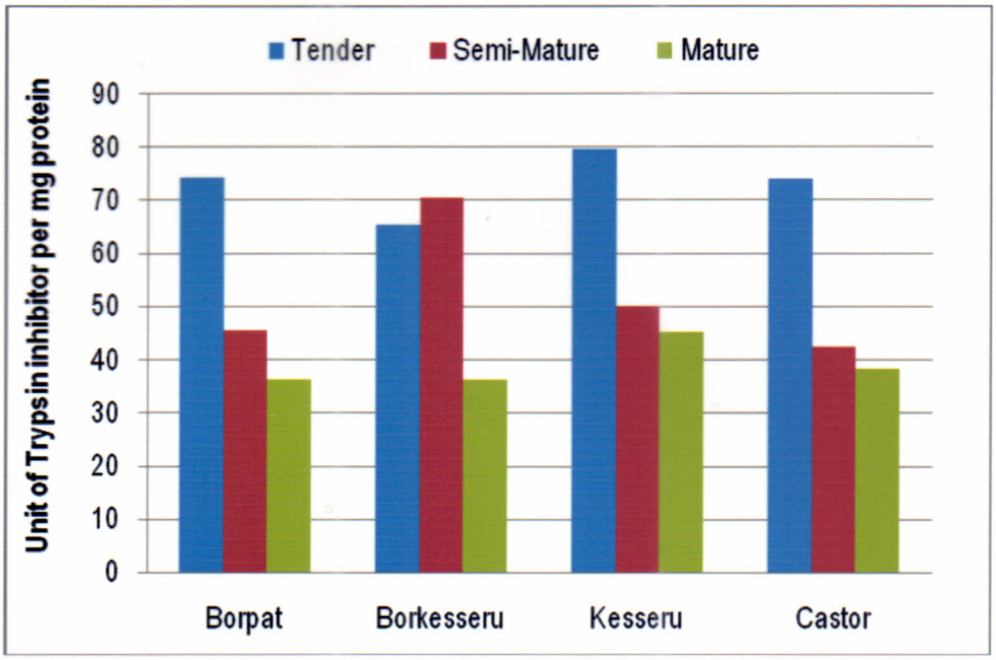


Fig. 8. Histogram showing unit of trypsin inhibitor derived from tender, medium and mature leaves of eri host plants.

4.4 Rearing performance of eri silkworms on different host plants during different seasons

The studies conducted to assess the rearing performance of eri silkworm feeding different combinations of food plants during four seasons to find out either the best food plant or combination of food plants considering the three broad aspects or indicators such (a) Economic parameters of rearing eri silkworm larva (b) Grainage indicators and (c) Post-cocoon parameters. The results of the studies are enumerated below:

4.4.1 Economic parameters of eri silkworm rearing

4.4.1.1 Larval duration

The lowest larval period (18.33 ± 0.58 days) was observed during July-August crop in the treatment of feeding with Castor (I-II instar) and subsequent feeding with Borpat (III-V instar) i.e. T_2 , which was at par with treatment of feeding Borpat from brushing till spinning (T_1). The highest larval period of 42.33 days was recorded in the case of Kesseru feeding from brushing till spinning (T_5) during January-February crop (Table 18). The similar trend was also observed in the case of data representing seasonal mean of larval duration during the year 2012 (Table 17 and Fig.9). The lowest mean larval period was observed in T_2 (23.08 ± 0.69 days) which was statistically at par with T_1 (24.75 ± 0.96 days) and T4 (26.59 ± 0.54 days). The highest seasonal mean of larval period was recorded in T_5 (29.92 ± 0.92 days) which was at par with T3 (feeding eri silkworm with Borkesseru from brushing till spinning) and T_6 (feeding eri silkworm with Castor in 1st and 2nd instars and subsequently with Kesseru till spinning).

4.4.1.2 Mature larval weight

The data on mature larval weight recorded in respect of different seasons and food plants are presented in Table 17.

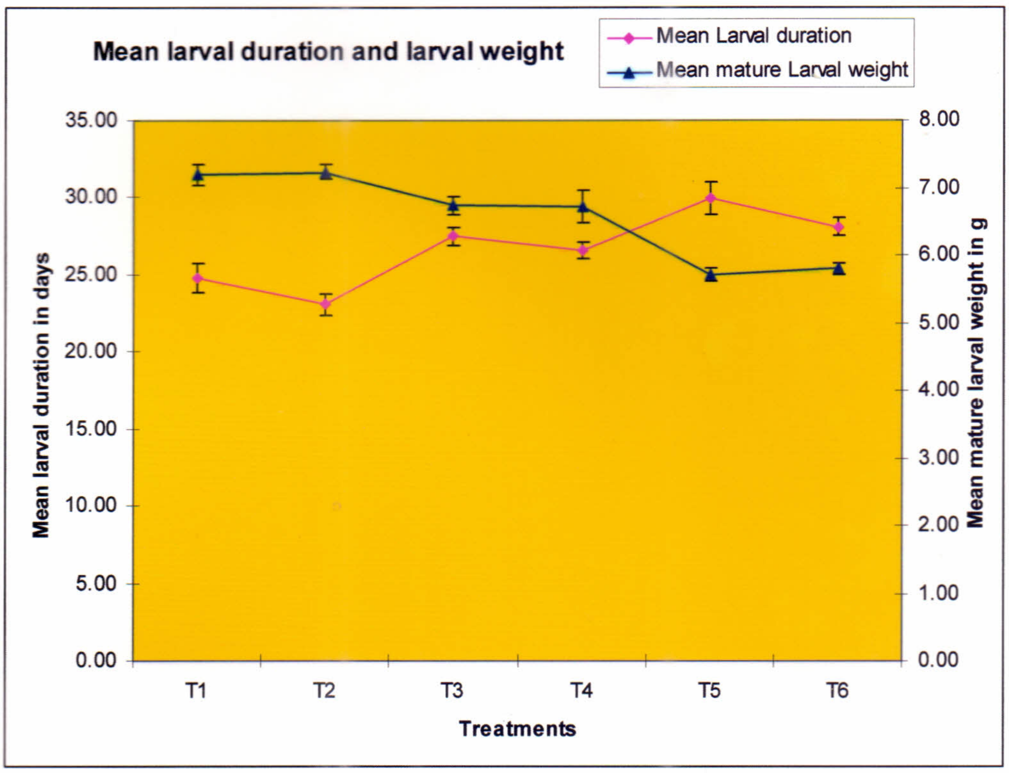
The results revealed that the highest mature larval weight was recorded in T_2 (7.61 ± 0.09 g) during September- October season followed by in T_1 during September-October season (7.48 ± 0.07 g) and July-August season (7.38 ± 0.23 g), which were found statistically at par. The lowest mature larval weight recorded in the treatment eri silkworm feeding with Kesseru leaves from brushing till spinning i.e., T_5 (5.71 ± 0.09 g), which was at par with the treatment in which eri silkworm fed castor in first and second instars and subsequently fed with Kesseru till spinning i.e., T_6 (5.44 ± 0.08 g).

Significantly the highest seasonal mean larval weight was recorded in T2 (7.24 ± 0.11 g) followed by T1 (7.20 ± 0.16 g) and T3 (6.74 ± 0.14 g), which were statistically at par. The lowest seasonal mean larval weight was also recorded in T_5 (Table 17 and Fig. 9)

4.4.1.3 Single cocoon weight

Data on single cocoon weight of eri silkworm feeding different treatments i.e., different food plants in different seasons are presented in Table 18.

The significant highest single cocoon weight was recorded in T_2 during July-August season (4.04 ± 0.27 g) followed by in T_1 (3.65 ± 0.25 g) during July-August season which is statistically at par. Similar trend was also observed during January-February and April- May seasons. During September-October season, the treatment T_1 was found superior among all other treatments. The seasonal mean of single cocoon weight was highest in T_2 (3.37 ± 0.20 g) followed by T_1 (3.11± 0.14 g) and T4 (2.86 ± 0.17 g). The data revealed that Borpat alone or in combination with Castor is the best treatment for eri silkworm rearing. The Borpat in combination with Castor also performed well throughout the year (Fig.10).



T_1: *Ailanthus grandis* (I-V instar larva); T_2: Castor (I-II instar larva) + *A. grandis* (III-V instar larva); T_3: *A. excelsa* (I-V instar larva); T_4: Castor (I-II instar larva) + *A. excelsa* (III-V instar larva); T_5: Kesseru (I-V instar larva); T_6: Castor (I-II instar larva) + Kesseru (III-V instar larva)

Fig. 9. Seasonal mean of larval duration and weight of eri silkworm feeding different combinations of food plants.

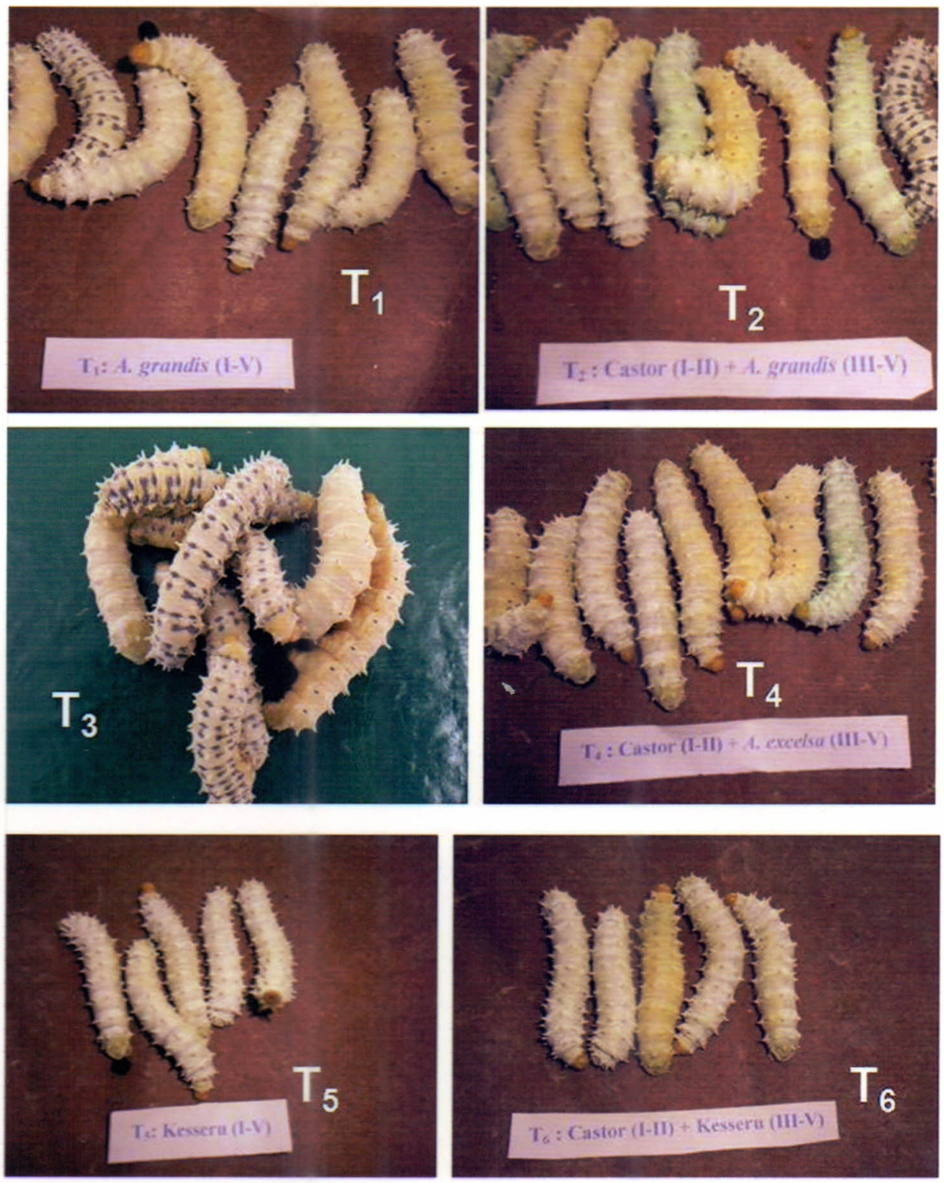


Plate 8 . Mature larva of eri silkworm feeding different combinations of food plants (treatments)

Table 17. Seasonal variation in larval duration and weight of eri silkworm feeding different combinations of food plants

Treatments	Larval duration (days)					Mature larval weight (g)				
	Jan-Feb	Apr-May	Jul-Aug	Sep-Oct	Mean	Jan-Feb	Apr-May	Jul-Aug	Sep-Oct	Mean
T_1	35.33 ± 1.53	23.67 ± 1.15	19.33 ± 0.58	20.67 ± 0.58	24.75 ± 0.96	6.80 ± 0.23	7.13 ± 0.11	7.38 ± 0.23	7.48 ± 0.07	7.20 ± 0.16
T_2	31.00 ± 1.00	22.67 ± 0.58	18.33 ± 0.58	20.33 ± 0.58	23.08 ± 0.69	6.98 ± 0.13	7.14 ± 0.10	7.21 ± 0.10	7.61 ± 0.09	7.24 ± 0.11
T_3	38.33 ± 0.58	25.67 ± 0.58	22.67 ± 0.58	23.33 ± 0.58	27.50 ± 0.58	6.55 ± 0.11	6.43 ± 0.18	6.88 ± 0.10	7.08 ± 0.15	6.74 ± 0.14
T_4	36.67 ± 0.58	24.67 ± 0.58	22.00 ± 1.00	23.00 ± 0.00	26.59 ± 0.54	6.74 ± 0.39	6.55 ± 0.19	6.65 ± 0.32	6.95 ± 0.07	6.72 ± 0.24
T_5	42.33 ± 1.53	27.00 ± 1.00	24.33 ± 0.58	26.00 ± 1.00	29.92 ± 1.03	5.83 ± 0.07	5.79 ± 0.11	5.87 ± 0.12	5.36 ± 0.06	5.71 ± 0.09
T_6	39.67 ± 0.58	25.33 ± 0.58	23.00 ± 0.00	24.33 ± 1.00	28.08 ± 0.54	5.92 ± 0.10	5.95 ± 0.03	5.91 ± 0.12	5.44 ± 0.08	5.81 ± 0.08
SE	2.31	1.71	1.37	1.55	1.74	0.43	0.29	0.40	0.22	0.34
CD at 5%	5.03	3.73	2.98	3.37	3.78	0.95	0.62	0.87	0.47	0.73

Data represents mean ± standard deviation

T_1: *Ailanthus grandis* (I-V instar larva); T_2: Castor (I-II instar larva) + *A. grandis* (III-V instar larva); T_3: *A. excelsa* (I-V instar larva); T_4: Castor (I-II instar larva) + *A. excelsa* (III-V instar larva); T_5: Kesseru (I-V instar larva); T_6: Castor (I-II instar larva) + Kesseru (III-V instar larva)

Plate .9 . Feeding of late stage eri silkworm on Borpat

Plate .10 . Feeding of late stage eri silkworm on Borkesseru

Plate .11 . Feeding of late stage eri silkworm on Kesseru

Plate 12 . Feeding of early stage eri silkworm on Castor

4.4.1.4 Single shell weight

Table 18 also indicates the data on single shell weight of eri silkworm feeding different food plants during different seasons.

The highest single shell weight was recorded in T_2 during July-August season (0.52 ± 0.04 g) followed by T_2 during April- May season (0.44 ± 0.01 g). The treatment T_1 was found equally good during July-August (0.41± 0.04 g) and April-May (0.42 ± 0.01 g) seasons. During September-October season, the highest single cocoon weight was recorded in T_1 (0.39 ± 0.02 g) and in T_4 (0.39 ± 0.03 g). The data on seasonal mean of single shell weight also revealed that T_2 is the best treatment (0.42 ± 0.03 g) followed by T_1 (0.38 ± 0.02 g) (Fig.11).

4.4.1.5 Shell Ratio (%)

Table 18 also indicates the data on shell ratio of eri silkworm feeding different food plants during different seasons.

The data revealed that shell ratio of eri cocoon feeding different food plants were non-significant except during September-October season. During September-October season, the highest shell ratio (%) was recorded in the treatment T_5 (13.48 ± 0.08) followed by T_6 (13.23 ± 0.20) and T_1 (12.70 ± 0.17). The seasonal mean of shell ratio (%) was also found non-significant among the different treatments with best result in T_5 (13.09 ± 0.13).

4.4.1.6 Cocoon yield per dfl

The data on cocoon yield per disease free laying (dfl) of eri silkworm feeding different food plants during four different seasons are presented in Table 19.

The highest cocoon yield per dfl (numbers) was recorded in the treatment T_2 compared to other treatments irrespective of seasons. The significant variations among the treatments were observed during July-August season. The significant highest yield was found in T_2 (278 ± 11) followed by T_1 (263 ± 11) during July- August season. The lowest yield was recorded in the treatments T_3, T_5 and T_6. The similar trends were also observed during January- February, April-May and September-October seasons (Fig. 12).

4.4.1.7 Effective rate of rearing (%)

Table 20 indicates the data on effective rate of rearing (ERR) of eri silkworm feeding different food plants during four different seasons.

The highest ERR (%) was recorded in the treatment T_2 compared to other treatments irrespective of seasons. The significant variations among the treatments were observed during July-August season. The significant highest ERR (%) was recorded in T_2 (90.15 ± 3.41) followed by T_1 (85.28 ± 3.76) during July- August season which were statistically at par. The lowest yield was recorded in the treatments T_5, T_6 and T_3 of 77.38 ± 1.98, 77.38 ± 1.98 and 80.19 ± 5.55, respectively (Fig.13.)

4.4.1.8 Cocoon shell yield per 100 dfl

The data on cocoon shell yield per 100 dfls (Kg) of eri silkworm feeding different food plants during four different seasons are presented in Table 21.

The highest cocoon shell yield per 100 dfls of 14.36 ± 1.44 Kg, 11.63 ± 0.77 Kg and 8.98 ± 0.83 Kg was recorded in the treatment T_2 during July-August, April-May and January-February season, respectively which were at par with T_1. It was found the highest during September-October (9.98 ± 0.66 Kg) which was at par with T_4 (9.67 ± 0.94 Kg) and T_2 (9.05 ± 1.52 Kg). The lowest cocoon shell yield of 6.31 ± 1.01 Kg was recorded in T5 during January-February season and similar trend was also observed in other seasons (Fig.14).

T_1

T_2

T_3

T_4

T_5

T_6

Plate 13 . Cocoons of eri silkworm feeding different combinations of food plants (treatments)

Table 18. Cocoon characters of eri silkworm feeding different combinations of food plants during different seasons.

Treatments	Single cocoon weight (g)					Single shell weight (g)					Shell ratio (%)				
	Jan-Feb	Apr-May	Jul-Aug	Sep-Oct	Seasonal mean	Jan-Feb	Apr-May	Jul-Aug	Sep-Oct	Seasonal mean	Jan-Feb	Apr-May	Jul-Aug	Sep-Oct	Seasonal mean
T_1	2.51 (0.09)	3.18 (0.08)	3.65 (0.25)	3.11 (0.12)	3.11 (0.14)	0.31 (0.02)	0.42 (0.01)	0.41 (0.04)	0.39 (0.02)	0.38 (0.02)	12.49 (0.22)	13.20 (0.13)	11.24 (0.16)	12.70 (0.17)	12.41 (0.16)
T_2	3.08 (0.07)	3.37 (0.18)	4.04 (0.27)	3.00 (0.28)	3.37 (0.20)	0.35 (0.04)	0.44 (0.01)	0.52 (0.04)	0.35 (0.04)	0.42 (0.03)	11.41 (0.57)	13.18 (0.06)	12.92 (0.15)	11.16 (0.14)	12.17 (0.15)
T_3	2.26 (0.32)	2.34 (0.10)	2.48 (0.16)	2.63 (0.26)	2.43 (0.21)	0.29 (0.07)	0.31 (0.02)	0.32 (0.03)	0.30 (0.01)	0.31 (0.03)	12.90 (0.22)	13.39 (0.20)	12.85 (0.19)	11.37 (0.04)	12.63 (0.14)
T_4	2.92 (0.07)	2.78 (0.18)	2.78 (0.30)	2.94 (0.11)	2.86 (0.17)	0.33 (0.03)	0.35 (0.02)	0.35 (0.02)	0.39 (0.03)	0.36 (0.03)	11.42 (0.43)	12.50 (0.11)	12.58 (0.07)	13.17 (0.27)	12.42 (0.18)
T_5	2.04 (0.11)	2.82 (0.04)	2.39 (0.24)	2.40 (0.24)	2.41 (0.16)	0.27 (0.05)	0.33 (0.02)	0.33 (0.01)	0.32 (0.02)	0.31 (0.03)	13.37 (0.45)	11.57 (0.50)	13.92 (0.04)	13.48 (0.08)	13.09 (0.13)
T_6	2.56 (0.25)	2.74 (0.04)	2.63 (0.13)	2.45 (0.10)	2.60 (0.11)	0.30 (0.01)	0.33 (0.03)	0.33 (0.02)	0.32 (0.02)	0.32 (0.02)	11.81 (0.04)	12.02 (0.75)	12.56 (0.15)	13.23 (0.20)	12.41 (0.18)
SE	0.14	0.09	0.18	0.13	0.14	0.03	0.01	0.02	0.02	0.02	0.74	0.64	1.06	0.59	0.76
CD at 5%	0.30	0.20	0.39	0.29	0.30	0.06	0.02	0.04	0.04	0.04	NS	NS	NS	1.29	NS

Data in parentheses indicate standard deviation.

T_1: *Ailanthus grandis* (I-V instar larva); T_2: Castor (I-II instar larva) + *A. grandis* (III-V instar larva); T_3: *A. excelsa* (I-V instar larva); T_4: Castor (I-II instar larva) + *A. excelsa* (III-V instar larva); T_5: Kesseru (I-V instar larva); T_6: Castor (I-II instar larva) + Kesseru (III-V instar larva)

Table 19. Cocoons production per disease free laying (dfl) of eri silkworm feeding different combinations of food plants during different seasons.

Treatments	Cocoon production per dfl (Nos.)			
	Jan-Feb	Apr-May	Jul-Aug	Sep-Oct
T_1	250 ± 14	257 ± 12	263 ± 12 ^{ab}	254 ± 8
T_2	255 ± 13	262 ± 18	278 ± 11 ^{a}	255 ± 13
T_3	229 ± 6	236 ± 8	247 ± 17 ^{cd}	224 ± 19
T_4	242 ± 6	253 ± 7	260 ± 4 ^{bc}	250 ± 6
T_5	232 ± 17	246 ± 10	238 ± 6 ^{cd}	241 ± 12
T_6	237 ± 5	251 ± 29	241 ± 11 ^{cd}	246 ± 9
SE	7.06	10.09	6.92	7.44
CD at 5%	NS	NS	15.08	NS

Data represents mean ± standard deviation. Data represents with same alphabet does not differ significantly at p=0.05 level.

T_1: *Ailanthus grandis* (I-V instar larva); T_2: Castor (I-II instar larva) + *A. grandis* (III-V instar larva); T_3: *A. excelsa* (I-V instar larva); T_4: Castor (I-II instar larva) + *A. excelsa* (III-V instar larva); T_5: Kesseru (I-V instar larva); T_6: Castor (I-II instar larva) + Kesseru (III-V instar larva)

Table 20. Effective rate of rearing (%) of eri silkworm during different seasons feeding different combinations of food plants.

Treatment	Jan-Feb	Apr-May	Jul-Aug	Sep-Oct
T_1	81.17 ± 4.51	83.44 ± 3.90	85.28 ± 3.76 ^{ab}	82.36 ± 2.46
T_2	82.90 ± 4.09	85.17 ± 5.99	90.15 ± 3.41 ^{a}	82.79 ± 4.22
T_3	74.24 ± 1.79	76.73 ± 2.52	80.19 ± 5.55 ^{cd}	72.62 ± 6.01
T_4	78.68 ± 2.09	82.25 ± 2.35	84.42 ± 1.42 ^{bc}	81.06 ± 2.09
T_5	75.22 ± 5.60	79.76 ± 3.27	77.38 ± 1.98 ^{cd}	78.25 ± 3.95
T_6	76.84 ± 1.67	81.49 ± 9.35	78.14 ± 3.65 ^{cd}	79.87 ± 2.77
SE	2.29	3.28	2.25	2.42
CD at 5%	NS	NS	4.89	NS

Data represents mean ± standard deviation. Data represents with same alphabet does not differ significantly at p=0.05 level.

T_1: *Ailanthus grandis* (I-V instar larva); T_2: Castor (I-II instar larva) + *A. grandis* (III-V instar larva); T_3: *A. excelsa* (I-V instar larva); T_4: Castor (I-II instar larva) + *A. excelsa* (III-V instar larva); T_5: Kesseru (I-V instar larva); T_6: Castor (I-II instar larva) + Kesseru (III-V instar larva)

Table 21. Cocoon shell yield per 100 dfls (kg) of eri silkworm feeding different combinations of food plants during different seasons.

Treatment	Jan-Feb	Apr-May	Jul-Aug	Sep-Oct
T_1	7.84 ± 0.81 ^{ab}	10.75 ± 0.14 ^{ab}	10.73 ± 1.11 ^{cd}	9.98 ± 0.66 ^{a}
T_2	8.98 ± 0.83 ^{a}	11.63 ± 0.77 ^{a}	14.36 ± 1.44 ^{a}	9.05 ± 1.52 ^{ab}
T_3	6.67 ± 1.39 ^{bc}	7.37 ± 0.26 ^{de}	7.81 ± 1.04 ^{ef}	6.66 ± 0.88 ^{cd}
T_4	8.10 ± 0.90 ^{ab}	8.75 ± 0.67 ^{cd}	8.97 ± 0.30 ^{de}	9.67 ± 0.94 ^{ab}
T_5	6.31 ± 1.01 ^{cd}	8.02 ± 0.57 ^{de}	7.87 ± 0.42 ^{ef}	7.76 ± 0.58 ^{bc}
T_6	7.09 ± 0.19 ^{bc}	8.31 ± 1.52 ^{de}	7.94 ± 0.71 ^{ef}	7.98 ± 0.84 ^{bc}
SE	0.59	0.50	0.72	0.60
CD at 5%	1.27	1.09	1.47	1.31

Data represents mean ± standard deviation. Data represents with same alphabet does not differ significantly at p=0.05 level.

T_1: *Ailanthus grandis* (I-V instar larva); T_2: Castor (I-II instar larva) + *A. grandis* (III-V instar larva); T_3: *A. excelsa* (I-V instar larva); T_4: Castor (I-II instar larva) + *A. excelsa* (III-V instar larva); T_5: Kesseru (I-V instar larva); T_6: Castor (I-II instar larva) + Kesseru (III-V instar larva).

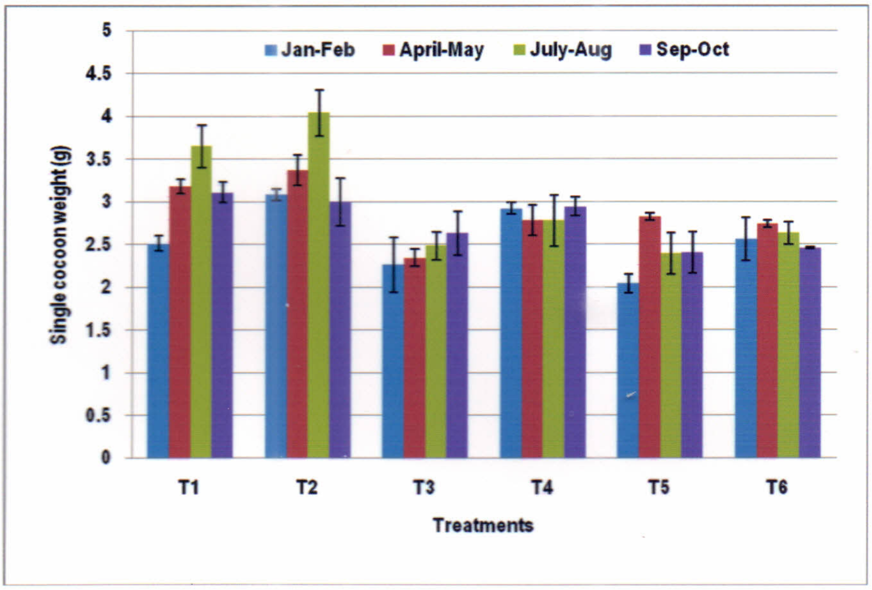


Fig.10. Single cocoon weight (g) of eri silkworm feeding different combinations of food plants during different seasons.

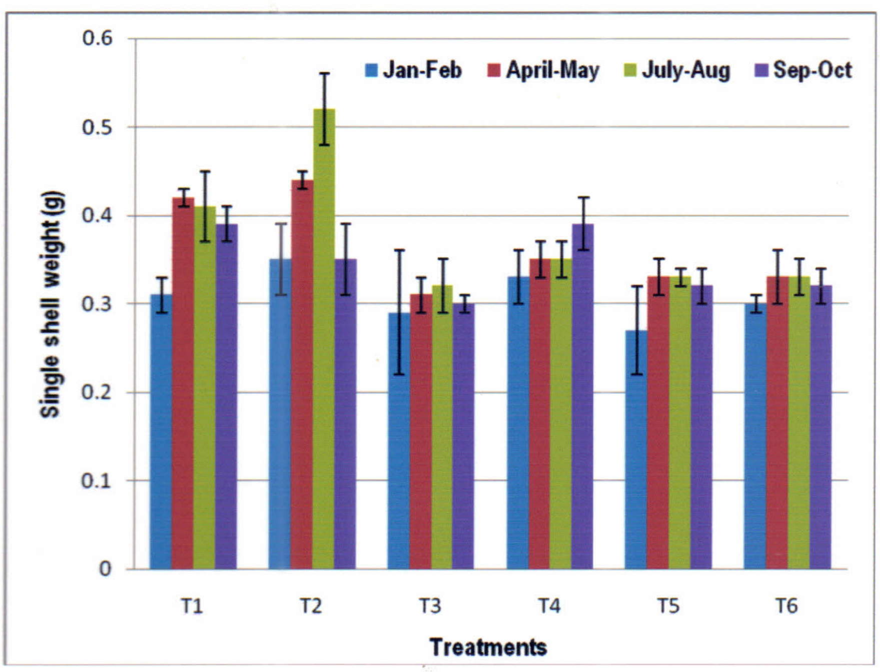


Fig. 11. Single shell weight (g) of eri silkworm feeding different combinations of food plants during different seasons.

T_1: *Ailanthus grandis* (I-V instar); T_2: Castor (I-II instar) + *A. grandis* (III-V instar); T_3: *A. excelsa* (I-V instar); T_4: Castor (I-II instar) + *A. excelsa* (III-V instar); T_5: Kesseru (I-V instar); T_6: Castor (I-II instar) + Kesseru (III-V instar).

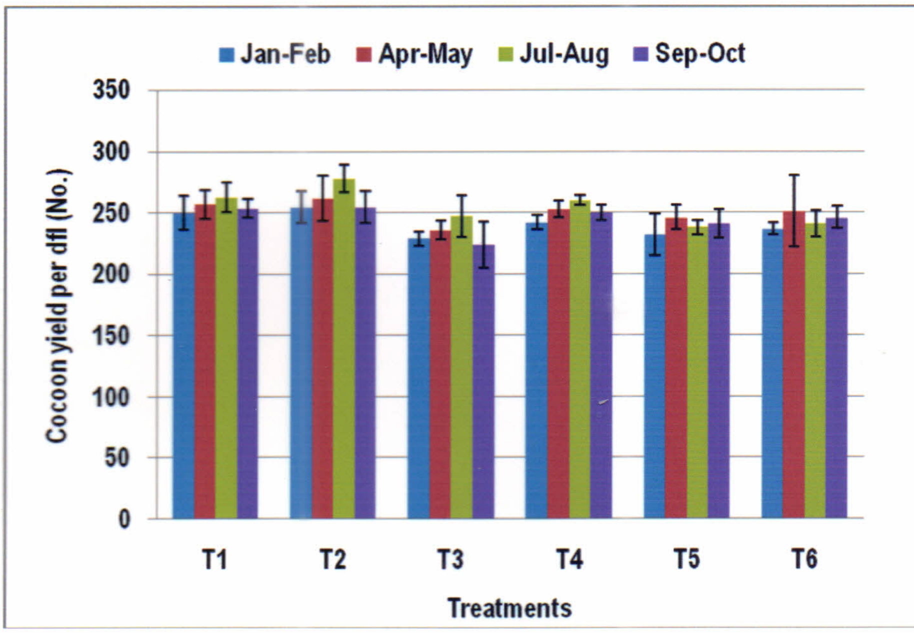


Fig.12. Cocoon yield per dfl (No.) of eri silkworm feeding different combinations of food plants during different seasons.

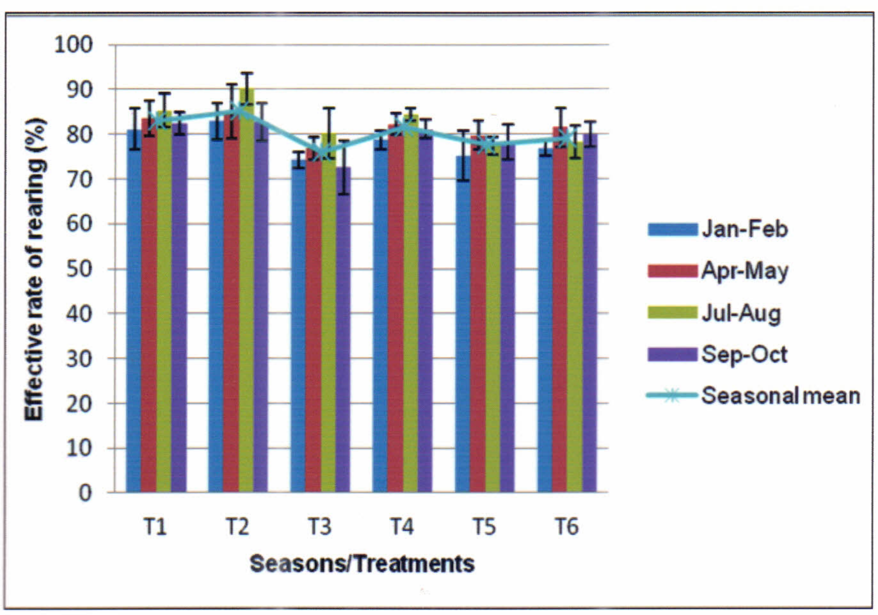


Fig. 13. Cocoon yield per dfl (No.) of eri silkworm feeding different combinations of food plants during different seasons.

T_1: *Ailanthus grandis* (I-V instar); T_2: Castor (I-II instar) + *A. grandis* (III-V instar); T_3: *A. excelsa* (I-V instar); T_4: Castor (I-II instar) + *A. excelsa* (III-V instar); T_5: Kesseru (I-V instar); T_6: Castor (I-II instar) + Kesseru (III-V instar).

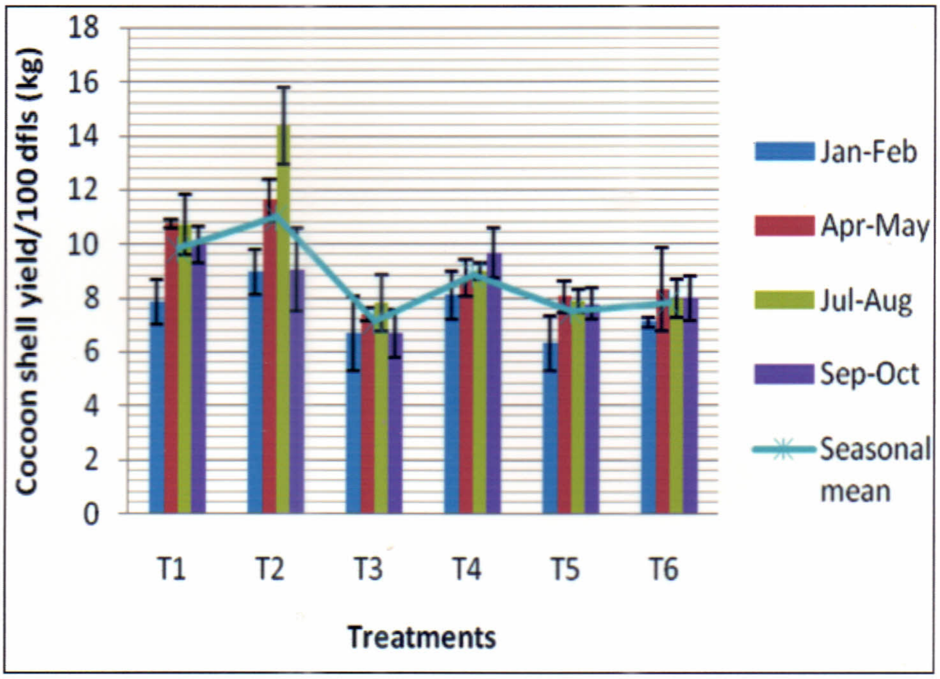


Fig. 14. Cocoon shell yield per 100 dfls (Kg) of eri silkworm feeding different combinations of food plants during different seasons

T_1: *Ailanthus grandis* (I-V instar); T_2: Castor (I-II instar) + *A. grandis* (III-V instar); T_3: *A. excelsa* (I-V instar); T_4: Castor (I-II instar) + *A. excelsa* (III-V instar); T_5: Kesseru (I-V instar); T_6: Castor (I-II instar) + Kesseru (III-V instar).

Plate .14 . Rearing of eri silkworm (early and late ages) on Borkesseru

Plate. 15 . Rearing of eri silkworm (early and late ages) on Borpat

4.4.2 Grainage performance of eri silkworm

The studies were conducted to assess the grainage i.e., seed production performances of eri silkworm feeding different combinations of food plants. The data on different parameters such as moth emergence (%), fecundity, hatchability (%), and cocoon: dfl ration, etc. are presented in Table 22, 23 and 24.

4.4.2.1 Moth emergence (%)

The data in respect of moth emergence (%) of eri silk feeding different food plants are presented in Table 22.

The data revealed that the highest moth emergence of eri silk was recorded in the treatment T_2 (93.72%) followed by T_1 (92.72 %) and T_4 (90.63%). The lowest moth emergence was found in T_3 (84.00 %) and T_5 (84.34%).

4.4.2.2 Cocoon: dfl ratio

The table 22 also indicates the cocoon: dfl ratio of eri silk feeding different food plants. The results indicated that the best cocoon: dfl ratio was observed in the treatment T_2 (2.65:1) followed by T_1 (3.08:1). The poorest cocoon: dfl ratio was observed in T_3 (3.97:1).

4.4.2.3 Fecundity (Nos.)

The data in respect of fecundity of eri silk feeding different food plants are presented in Table 23.

The result indicated that significant highest fecundity was recorded in T_2 irrespective of seasons. During January-February season, the highest fecundity of 359 was recorded in T_2 which was at par with T_4 (352). There was no significant variation among all other treatments in terms of fecundity ranging from 341 to 345. The similar trend was also observed in April-May and July-August seasons. The highest fecundity of 373 was recorded in T2 during September-October season and similar trend were also observed in case of data of seasonal mean (Fig.15).

4.4.2.4 Hatchability (%)

Table 24 represents the data on Hatchability (%) of eri silk feeding different food plants in four seasons.

The highest hatchability of eri silkworm eggs recorded in the treatment T_2 irrespective of season ranging from 87.3 % to 95.5%. The data on seasonal mean also indicated that the significant variations in the parameter which was 92.45 ± 3.77 %, 86.35 ± 1.45 % and 86.25 ± 1.60% in T_2, T_1 and T_6, respectively.

4.4.3 Assessment of post cocoon parameters

The data on post cocoon parameters of eri silk feeding different food plants is presented in Table 25 and Fig.16.

4.4.3.1 Boil off loss

The significant highest boil off loss (%) was recorded in the treatment T_5 i.e., 17.65 ±0.32 %, which was at par with T_6 (14.25 ± 0.32 %). The lowest boil off loss was found in T_2 (11.50 ± 0.31 %), which was at par with rest of the treatments of the experiments.

4.4.3.2 Waste (%)

The significant highest silk waste (%) was recorded in the treatment T_5 i.e., 4.52 ± 0.05 %, which was at par with T_6 (3.80 ± 0.04 %). The lowest waste (%) was found in T_2 (1.80 ± 0.02 %), which was at par with rest of the treatments of the experiments.

4.4.3.3 Spun silk recovery (%)

The data revealed that the highest spun silk recovery or yarn recovery of 86.70 ± 1.12 % was found in the treatment T_2 followed by in T_1 (82.10 ± 1.12 %) and T_3 (80.60 ± 1.31 %), which were statistically at par ($p<0.05$).

Table 22. Grainage performance of eri silk feeding different combinations of food plants

Treatments	Seed cocoons kept (No.)	Emergence of moth (Number)			Emergence of moth (%)	Un-emerged cocoon (No.)	Total coupling obtained (No.)	Poor egg (No.)	Total dfls obtained (No.)	Cocoon: dfl ratio
		Male	Female	Cripple						
T_1	3200	1735	1232	157	92.72	76	1121	82	1039	3.08:1
T_2	3200	1689	1310	146	93.72	55	1272	65	1207	2.65:1
T_3	3200	1605	1083	394	84.00	118	901	95	806	3.97:1
T_4	3200	1672	1228	204	90.63	96	1042	87	955	3.35:1
T_5	3200	1567	1132	386	84.34	115	956	98	858	3.73:1
T_6	3200	1633	1206	256	88.72	105	1097	87	1010	3.17:1

Data represents mean of four seasons during 2014.

T_1: *Ailanthus grandis* (I-V instar larva); T_2: Castor (I-II instar larva) + A. grandis (III-V instar larva); T_3: A. excelsa (I-V instar larva); T_4: Castor (I-II instar larva) + *A. excelsa* (III-V instar larva); T_5: Kesseru (I-V instar larva); T_6: Castor (I-II instar larva) + Kesseru (III-V instar larva)

Table 23. Fecundity (Nos.) of eri silk feeding different combinations of food plants

Treatment	Jan-Feb	Apr-May	Jul-Aug	Sep-Oct	Seasonal mean
T_1	341	356	332	359	347
T_2	359	362	345	373	360
T_3	345	335	324	332	334
T_4	352	345	330	341	342
T_5	343	333	312	342	333
T_6	345	342	320	356	341
SE.d ±	6.75	11.50	11.32	14.92	9.91
$CD_{0.05}$	11.75	20.01	19.67	25.96	17.24

T_1: *Ailanthus grandis* (I-V instar larva); T_2: Castor (I-II instar larva) + A. grandis (III-V instar larva); T_3: A. excelsa (I-V instar larva); T_4: Castor (I-II instar larva) + *A. excelsa* (III-V instar larva); T_5: Kesseru (I-V instar larva); T_6: Castor (I-II instar larva) + Kesseru (III-V instar larva)

Table 24. Hatchability (%) of eri silk feeding different combinations of food plants

Treatments	Jan-Feb	Apr-May	Jul-Aug	Sep-Oct	Mean ± SD
T1	85.0 (1.50)	86.0 (1.32)	88.4 (1.50)	87.0 (1.47)	86.35 ± 1.45
T2	87.3 (5.50)	95.5 (3.00)	95.0 (2.50)	92.0 (4.00)	92.45 ± 3.77
T3	80.5 (1.60)	84.0 (1.45)	82.7 (1.50)	83.0 (1.38)	82.55 ± 1.48
T4	81.1 (2.42)	85.0 (2.56)	84.4 (2.36)	86.6 (2.16)	84.25 ± 2.31
T5	83.0 (2.50)	86.0 (2.56)	84.5 (2.65)	80.3 (2.02)	83.24 ± 2.43
T6	85.3 (1.45)	87.5 (1.56)	85.2 (2.15)	88.4 (1.22)	86.25 ± 1.60
SE.d. (±)	2.63	4.17	4.48	4.11	3.58
$CD_{0.05}$	5.23	8.45	8.76	8.26	7.48

Data in the parentheses indicate standard deviation.

T_1: *Ailanthus grandis* (I-V instar larva); T_2: Castor (I-II instar larva) + A. grandis (III-V instar larva); T_3: A. excelsa (I-V instar larva); T_4: Castor (I-II instar larva) + *A. excelsa* (III-V instar larva); T_5: Kesseru (I-V instar larva); T_6: Castor (I-II instar larva) + Kesseru (III-V instar larva)

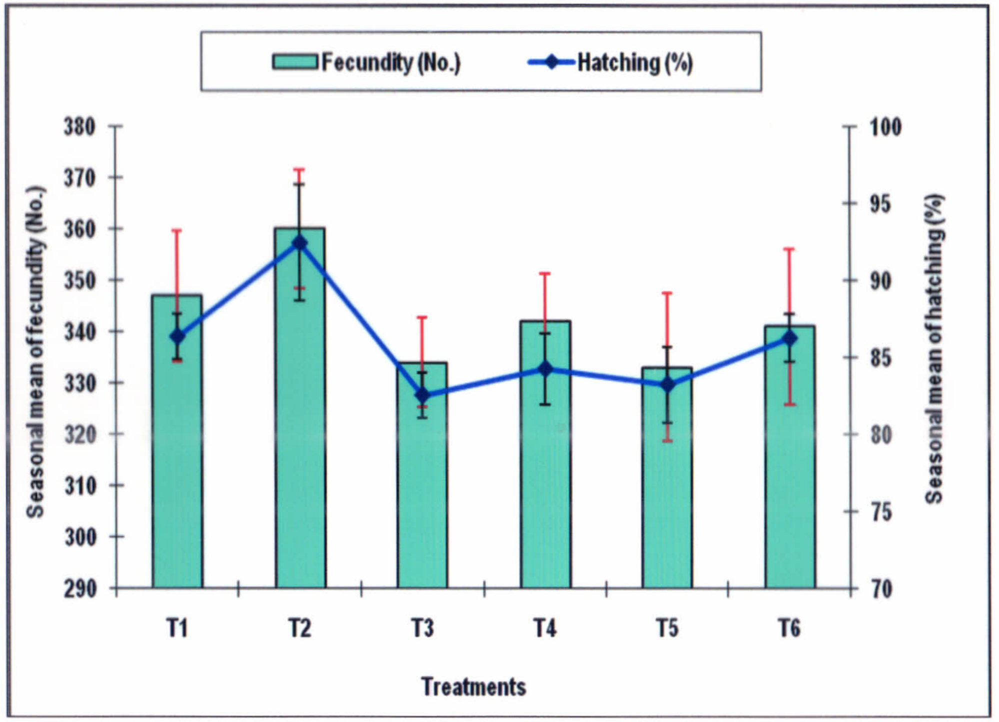


Fig . 15. Seasonal mean of fecundity (numbers) and hatchability (%) of eri silk feeding different combinations of food plants

T_1: *Ailanthus grandis* (I-V instar larva); T_2: Castor (I-II instar larva) + A. grandis (III-V instar larva); T_3: A. excelsa (I-V instar larva); T_4: Castor (I-II instar larva) + *A. excelsa* (III-V instar larva); T_5: Kesseru (I-V instar larva); T_6: Castor (I-II instar larva) + Kesseru (III-V instar larva)

Plate .16. Grainage operations of eri silkworm

Table 25. Post-cocoon parameters of eri silk feeding different combinations of food plants

Characters	T_1	T_2	T_3	T_4	T_5	T_6	SE.d. (±)	$CD_{0.05}$
Boil off Loss (%)	13.98 (0.52)	11.50 (0.31)	12.75 (0.25)	12.50 (0.12)	17.65 (0.32)	14.25 (0.12)	2.15	3.72
Spun silk recovery (%)	82.10 (1.24)	86.70 (1.12)	80.60 (1.31)	79.00 (1.45)	68.45 (2.23)	72.20 (2.14)	6.71	11.68
Waste (%)	2.23 (0.03)	1.80 (0.02)	2.52 (0.03)	2.10 (0.02)	4.52 (0.05)	3.80 (0.04)	1.08	1.88

Data in parentheses indicate standard deviation.

T_1: *Ailanthus grandis* (I-V instar larva); T_2: Castor (I-II instar larva) + A. grandis (III-V instar larva); T_3: A. excelsa (I-V instar larva); T_4: Castor (I-II instar larva) + *A. excelsa* (III-V instar larva); T_5: Kesseru (I-V instar larva); T_6: Castor (I-II instar larva) + Kesseru (III-V instar larva)

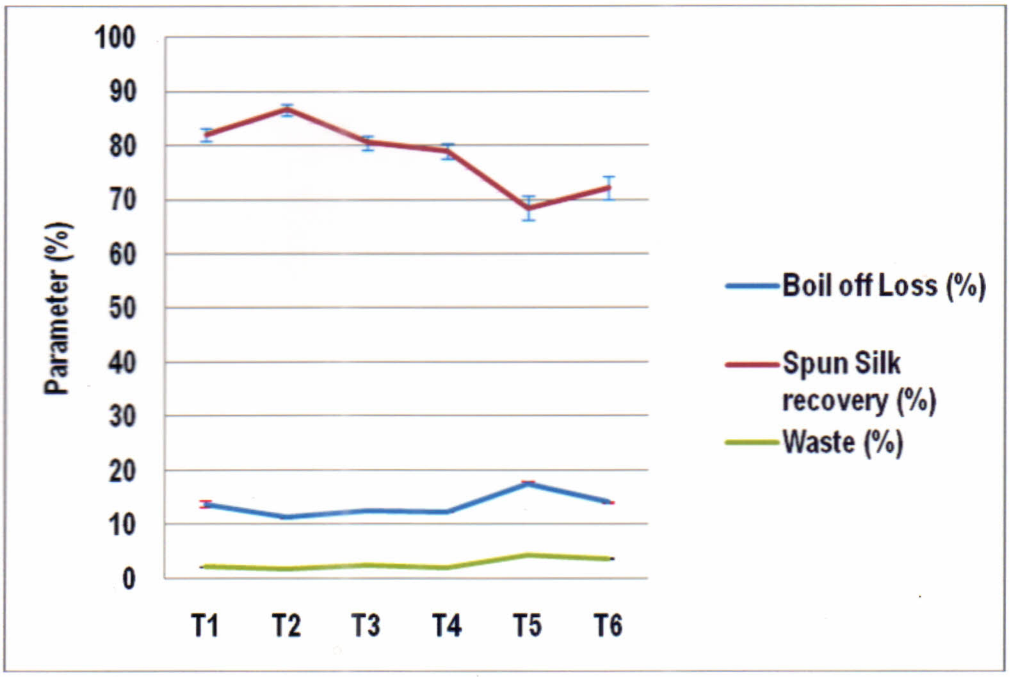


Fig. 16 . Post-cocoon parameters of eri silk feeding different combinations of food plants.

T_1: *Ailanthus grandis* (I-V instar larva); T_2: Castor (I-II instar larva) + A. grandis (III-V instar larva); T_3: A. excelsa (I-V instar larva); T_4: Castor (I-II instar larva) + *A. excelsa* (III-V instar larva); T_5: Kesseru (I-V instar larva); T_6: Castor (I-II instar larva) + Kesseru (III-V instar larva)

Plate.17. Yarn of eri silk

4.5 Field trial

Considering the better performance of Borpat (*A. grandis*) in the present study, it was suggested to conduct trial rearing in the farmers' field to assess the acceptability and viability of the output of the study among eri farmers.

Accordingly, field survey conducted to identify the potential areas considering the availability of natural plantation of Borpat in forest & nearby areas. Districts in the foothills of Arunachal Pradesh (Tinsukia and Sonitpur in Assam and Papumpare in Arunachal Pradesh) were indentified for initial study and Tinsukia district was considered for conducting the trial as sufficient natural plantation of the tree were available in the forest and backyard of the farmers. Farmers were rearing the eri silkworm only once or twice in year and rearing capacity was 5-10 dfl per crop. The farmers' were unaware about utilization of Borpat in ericulture.

Hence, an awareness meet conducted to create awareness for conservation of *Ailanthus* tree and utilize the same in eri silk sectors on 17th April 2014 at Barekuri, Tinsukia district. During first week of May 2014, 2640 dfls (seeds) of eri silkworm distributed for conducting trial rearing among 294 women farmers.

The results revealed that the hatchability, mature larval weight, cocoon yield per dfl (No.), cocoon yield per dfl (g), ERR (%), single cocoon weight (g), single shell weight (g) and shell ratio (%) as 86.35%, 9.28 g, 275, 987 g, 88.94%, 3.58 g, 0.47 g and 13.07%, respectively. It was also observed that rearing performances in respect of all these parameters such as mature larval weight, signle shell weight, single cocoon weight, effective rate of rearing (ERR) and shell ratio (%), etc. were better than laboratory data obtained during experiment (Table 26).

Plate.18. Natural plantation of Borpat at Barekuri village of Tinsukia district (Assam)

Plate.19. Field visits and awareness programme on utilization of Borpat (*Ailanthus grandis*) conducted at Barekuri village of Tinsukia district (Assam)

Plate.20. Rearing of eri silkworm feeding Borpat at Barekuri village of Tinsukia district (Assam)

Table 26. Rearing performance of eri silkworm feeding Borpat (*Ailanthus grandis*) in farmers' field during May 2014

	Leader of SHG/Village	No. of Farmers	No. of dfls	Fecundity (No.)	Hatching (%)	Wt. of single mature larva (g)	Pupation (%)	Cocoon yield per dfl (No.)	Cocoon yield per dfl (g)	ERR (%)	Single cocoon wt. (g)	Single shell wt. (g)	SR (%)
1	Purnima Chutia, Purani matapung	15	120	356	87	9.2	93	289	1040	93.31	3.60	0.57	15.94
2	Nitumoni Chutia, Digalsaku gaon	15	150	356	87	9.5	92	286	1012	92.34	3.54	0.52	14.69
3	Juli Gohain, Namatapung Gaon	15	120	356	87	9.4	93	275	1031	88.79	3.75	0.42	11.20
4	Pratibha Chutia, Hatijan Gaon	15	120	356	87	9.2	95	263	876	84.92	3.33	0.43	12.91
5	Champa Chutia, Borgaon,	15	120	356	87	9.3	96	287	973	92.66	3.39	0.51	15.04
6	Manju Sarak, Jaoikhuwa	12	120	356	87	9.5	93	289	997	93.31	3.45	0.46	13.33
7	Jiliki Baruah, Digalsaku-2 gaon	15	120	356	87	9.6	97	272	949	87.82	3.49	0.41	11.75
8	Minu Baruah, Namatapunj-2	8	120	356	87	8.9	91	287	967	92.66	3.37	0.51	15.13
9	Rupanjali Chutia, Bebejia gaon	15	120	356	87	9.1	96	276	983	89.11	3.56	0.47	13.20
10	KuhumiChutia, Puranimatapung-2	10	120	356	87	9.3	92	267	983	86.21	3.68	0.49	13.32
11	Lilavati Borah, Dulijan gaon	15	120	356	87	8.6	97	269	963	86.85	3.58	0.50	13.97
12	Rupashree Gohain, Missimikata gaon	12	120	356	87	8.9	90	277	1022	89.44	3.69	0.45	12.20
13	Sonuki Chutia, Matapung	15	120	356	87	9.7	96	268	973	86.53	3.63	0.47	12.95
14	Mileswari Chutia, No.3 Puranimatapung	15	120	356	87	9.5	97	283	1047	91.37	3.70	0.45	12.16
15	Phulama Chutia, Digalsaku	15	150	356	87	9.7	96	278	998	89.76	3.59	0.39	10.86
16	Krishna Borgohain, Matapung	15	120	356	87	8.6	91	269	979	86.85	3.64	0.52	14.29
17	Amila Gohain, Hatijan-2	13	120	356	87	9.0	90	267	902	86.21	3.38	0.39	11.54
18	Pabitri Chutia, Borgaon-2	15	150	356	87	9.7	96	278	1020	89.76	3.67	0.45	12.26
19	Pratima Moran Chutia, Bebejia	14	120	356	87	9.8	93	283	1050	91.37	3.71	0.44	11.86
20	Ranjita Chutia, Dulihjan	15	150	356	87	8.4	95	277	1086	89.44	3.92	0.51	13.01
21	Tarali Gohain, Missimikota	15	120	356	87	8.9	97	245	877	79.10	3.58	0.46	12.85
	Mean/Total	**294**	**2640**	**356**	**87**	**9.2**	**94**	**275**	**987**	**88.94**	**3.58**	**0.47**	**13.07**
	Benchmark (Lab data of T_1)	-	-	**347**	**86.35**	**7.13**	-	**257**	**817**	**83.44**	**3.18**	**0.42**	**10.79**