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Erisilkworm (*Philosamia ricini*) Rearing & Comparative Analysis of its Economic Parameters Based on Different Food Plants in Deosal village, Mayong Block, Morigaon District, Assam, India

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Abstract: ***North-East India is famous for natural silk like Eri, Muga, Mulberry & Tasar. This region provides favorable conditions to these valuable silk insects. Eri silkworm is one of the domesticated silkworm races under self rearing in Assam. The present study was carried out at Deosal village, Mayong Block, Morigaon District, Assam, India during 2016-17.Geographically it is situated at 26°07'40.8'' N Latitude, 092°15'08.6'' E Longitude & altitude of 62 m(MSL).The observation was recorded through primary data on participatory profiles in host plant cultivation & management, rearing of silkworms, spinning of spun yarn, etc were collected randomly from 10 household actively associated in erisilkworm rearing through personal contact method using pre-structured interview schedule. The specimen of egg, larvae, cocoon & moths are collected for morphological characterization. We have found that highest larval length in mature larvae is 9 cm & weight is 8.940 gm (Ricinus communis Linn & Heteropanax fragrans fed). Pupal weight is found to be highest in 3.2 gm in Heteropanax fragrans Roxb & Alpinia allughos fed larvae. Cocoon is of two colours- white & brick red. Shell ratio(%) is highest in Castor fed larvae i.e 21.05%. the families involved in ericulture in Deosal area belong to lower section of the society in terms of both income & education. Castor (Ricinus communis) is found to be one of the constraints in eri silkworm rearing among the rearers.***

Keywords: Castor, Cocoon, Larva, *Philosamia ricini*, Shell ratio

1. Introduction

North East India is rich in Seri biodiversity being a natural abode for a number of sericigenous insects and their host plants (Sarmah et al.,2015). Assam, the gateway of India is famous for natural silk, particularly for Muga and Eri silk (Saikia,2011). Sericulture is the cultivation of silk through rearing of commercial silkworms. It is an agro-based industry that involves cultivation of food plants for silkworms for production of cocoons, reeling & spinning of cocoons for production of yarn, etc for value added benefits such as processing & weaving. Eri silkworm, *Philosamia ricini*, is one of the most exploited, domesticated & commercialized non mulberry silkworms. It has many generations per year & feeds on several host plant species (Singh & Das, 2006; Chakravorty & Neog,2006; Bindroo et al.,2007. It is known by different names eri silk, endi silk & vanya silk of India (Singh et al.,2003). It is domesticated & can be reared indoors (Joshi, 1992). Among all the host plants, Castor (Ricinus communis Linn) is the most preferred host plant for erisilkworm (Sannapa et al., 2004; Kumar & Elangovan, 2010). Erisilkworm rearing is also practiced in few districts of the neighboring states mainly Meghalaya, Nagaland, Manipur, Mizoram and Arunachal Pradesh. Presently, eri culture is spreading in different non-traditional states like, Andhra Pradesh, Tamil Nadu, Karnataka, Gujarat, Jharkhand, Chhattisgarh etc Ericulture is purely a traditional and a leisure time occupation limited to meet partly the sericulture family's clothing and food need. Among tribal people of the region, eri pupa is a delicacy. It still remains as backward venture of poor rural people and often lag behind in technology adoption mainly due to their poor living condition (Sarmah et al.,2012). The research lay emphasis on the lifecycle of erisilkworm & comparison of the production based on different host plants. The socio-economic status of the rearers was also enquired. Identification of marketing issues related to sale of eri cocoon & different constraints in rearing of eri silkworm.

2. Literature Review

Erisilkworm a non-mulberry silkworm produce white silk called endi silk. The relevant information available on life cycle, larval duration, weight of larva, weight of single cocoon shell, weight of whole cocoon, shell ratio(%), pupal weight, food plants, social status & role of women involved in silkworm rearing are used as base for planning & execution of the present study are reviewed in this chapter under following heads:- Shifa et al. (2015) worked on the *Samia Cynthia ricini* B in Ethiopia in which they found statistical significant silkworm characteristic ranges in different locations which include egg hatchability (62.61% to 89.00%), larval duration (20.67 days to 25.83 days), total life cycle (50.49 to 74.00 days), single weight of larvae (4.427gm to 8.155gm), Effective Rate Of Rearing (60.11% to 93.67%), single cocoon weight (1.848gm to 2.903gm), single shell weight (0.251gm to 0.418 gm) & silk ratio (13.06 to 15.05%). Shifa et al. (2014) in Ethiopia, found that erisilk production & productivity depends highly on feeds consumed by erisilkworms (*Samia Cynthia ricini* B.) which will be a function of feed sources. G & G (2014) studied the economic traits of eri silkworm in relation to seasonal variations in Andhra Pradesh which revealed that post-cocoon parameters were highest during winter with

occasional variations providing an insight into the physiological strategy of survival adopted by this silkworm species during winter(18º - 28ºC). From their studies it is seen that the cocoon weight, pupal weight, shell(weight & ratio) were highest in the winter followed by rainy & lowest in the summer seasons. Singh et al. (2012) worked on the comparative rearing performance of erisilkworm eco-races/strains & efficacy of rearing on various host plants identifying their utilization & strategies for conservation of bioresources as they are the sources of livelihood for several communities of the north-east India. Their study revealed castor as the best food plant when compared to other host plants in all the seasons while the overall performance of castor showed higher. Mech & Ahmed (2012) studied the participatory profiles of women in ericulture in Udalguri district of BTC, Assam, India which showed that participation of women in host plant cultivation & management was not significant (3.8%) but in silkworm rearing, cocoon harvesting, marketing & spinning of spun yarn the participations of women was very high (72.1%).

3. Materials & Method

Study area: The present investigation entitled "Eri silkworm (*Philosamia ricini*) rearing and comparative analysis of its economic parameters based on different food plants in Deosal village, Mayong Block, Morigaon District, Assam, India." This area produces huge quantity of eri cocoon annually. Based on the concentration of eri rearers, the village is selected. Geographically it is situated at 26°07'40.8" N Latitude, 092°15'08.6" E Longitude & altitude of 62 m (MSL). The site is surrounded by beautiful forests & diverse ecological systems like rivers & wetlands (beels) of indigenous plains of Morigaon & also covering a good measurable cultivable land.

Methodology: The observation was recorded through primary data on participatory profiles in host plant cultivation & management, rearing of silkworm, spinning of spun yarn, decision making in different activities of men & women, etc were collected randomly from 10 household actively associated in erisilkworm rearing through personal contact method using the pre-structured interview schedule. From the pulled data, socio-economic profiles of the women participated in rearing are tabulated (Mech & Ahmed 2012; Singh *et al.*, 2014). The specimen of egg, larvae, cocoon & moths are collected for morphological characterization of erisilkworm found in Deosal, Jagiroad (Kalita & Dutta 2014). Egg count was done before hatching & cocoons are collected or harvested after 6th day of formation (Shifa *et al.*, 2014). Following formula is used to analyze silk shell ratio (%) calculations-

$$\text{shell ratio} = \frac{\text{weight of the cocoon shell}}{\text{weight of the whole cocoon}} \times 100$$

(Shifa et al.,2015; Sharma et al.,2015)

4. Results & Discussion

Data recorded on morphological features of eri insect (*Philosamia ricini*) found in Deosal are given in Table 1. In the study, we found cream colored yolk, body color of larva yellow/cream/blue/green with thorny skin, white & brick red cocoon with no peduncle, having a brown pupa inside it & chocolate colored wings in the moth are in agreement with the data found by G & G (2014). These characteristics of egg, larva, pupa, cocoon & adult moth are with close conformity with Kalita & Dutta (2014). The findings recorded on eri insect's host plants are highlighted in the Table 2. *Ricinus communis* L (castor) is of two types-red & green . Castor is the primary & *Heteropanax fragrans* R (kesseru) is the alternative host plant which is also reported by Sarkar et al., 2015. The data on the comparison of the weight of cocoon shell, whole cocoon, pupal weight, shell ratio (%) & larval weight on the basis of 3 different host plants (castor, kesseru, *Alpinia allughos*) are shown in the table 3. Cocoon shell weight, shell ratio of kesseru fed & castor are 0.520 gm; 18.18% & 3.46 gm; 90.10% respectively. Sharma et al.,2015 reported that cocoon shell weight in kesseru fed larvae is 0.51gm & shell ratio % is 12.59 & in castor 0.51gm (single shell weight) & 14.82% (shell ratio%). Cocoon traits like maximum weight was found in Ricinus & Alpinia fed i.e 4.253 gm & minimum weight was seen in kesseru fed i.e 2.530 gm. These values are more than the data recorded by Shifa et al.,2015. Mature larval weight was highest in castor & kesseru fed larvae i.e 8.940 gm. But in case of Kumar & Elangovan,2010, larval weight was highest in castor fed (7.38 gm) in comparison to tapioca (*Manihot esculenta*), i.e 6.45 gm, jatropha (5.05 gm) & *Carica papaya* (5.55gm) food plants. Average temperature found to be 21-31° C which is similar to the findings of Sharma et al.,2015 & Shifa et al.,2015 (17-18° C).Total life cycle duration in winter is almost one month (25-30 days) & in summer is 15-20 days. This findings are in agreement with the data reported by Kalita & Dutta 2014 & Shifa et al.,2015 i.e 19-25 days & 20-25 days respectively. Broods per family & income per family was found to be highest in Pakhila Pumah i.e 10 broods & 60000 rupees respectively. The rearers get the eggs from the government. The selling price of one cocoon upto December 2016 was 0.75 paise & from January 2017, the price increased to rupee 1. Cash transaction was done earlier but from February 2017, Bank transaction is in action. These data are in close conformity with the data recorded by Saikia 2011. Women play significant role in weeding, host plant leaves collection, rearing etc. The families involved in ericulture generally belong to the weaker section of the society in terms of income & education. These results are in agreement with the results of Mech & Ahmed 2012. The decline in rearing of many broods is due to scarcity of castor leaves which is also supported by De & Das 2010.

5. Conclusion

Hence it may be concluded from the experiment conducted to study the erisilkworm rearing that the rural sentiments are attached with the eri silkworm rearing. The villagers are trained & the only serious limitation is the scarcity of castor leaves. Therefore castor needs to be planted extensively through ideal programmes proposed by government (state & central) for better growth of eri silkworm in the Deosal village.

6. Future Scope

Erisilkworm rearing is one of the essential & age old practice of silk rearing in North East India since time immemorial. It plays an important role in overall status of the women & rural society. The standard of living of the people of a village is depending upon the production of silk for weaving clothes, pupa for consumption by the tribal communities. High income from silk fabrics flows back to cocoon growers in the villages & they share this income with other people like the suppliers etc.

References

[1] Bindroo, B.B., Singh, N.T., Sahy, A.K. & Chakravorty, R. (2007): Erisilkworm host plants.Indian silk.5, Pp 13-16.
[2] Chakravorty, R. & Neog, K.(2006): Food plants of erisilkworm *Samia ricini* (Donovan) their rearing performance & Prospects for exploitation. Leeds paper of national workshop on eri food plants, held at Guwahati, 11th-12th October.
[3] Gogoi,R.,& Gogoi S.,(2014). Studies on the economic traits of eri silkworm *Samia Cynthia ricini*, in relation to seasonal variations. International Journal of advanced research volume 2,Issue2, Pp 315-322.
[4] Joshi, K.L.(1992). Evaluation of diets for larvae of the erisilkworm, *Samia Cynthia ricini* (Lepidoptera:Saturniidae). Ind.J.Seric, 31:49-51.
[5] Kalita,T., & Dutta, K.,(2014):Biodiversity of sericigenous insects in Assam & their role in employment generation. ISSN2320-7078 JEZS;2(5): Pp 119-125.
[6] Kumar, R.,Elangovan,V.(2010): Assessment of the volumetric attributes of eri silkworm (Philosamia ricini) reared on different hosts plants. IJSN.,VOL.1(2):156-160.
[7] Mech, D. & Ahmed S.A (2012):Participatory profiles of women in ericulture in assam state of India.European Journal of Applied Sciences 4(4): Pp 177-181.
[8] Saikia, N.J.(2011): Supply chain linkages & constraints in natural silk sector of Assam:A study of muga & eri silk. Excel International Journal of Multidisciplinary Management studies. Vol 1 Issue, ISSN 2249-8834.
[9] Sannappa, B.R., Naika, R.G., & Siddagangaiah.(2004): Ericulture adventure for rural betterment. J.Currrent Science.5:137-140.
[10] Sarkar, N.B.,Sarmah, C.M. & Giridhar, K.(2015): Grainage performance of erisilkworm *Samia ricini* (Donovan) fed on different accession of castor food plants. International journal of ecology & ecosolution vol.2(2), Pp.17-21.
[11] Sarmah, M.C., Sarkar, B.N., Ahmed S.A., Giridhar, k.(2015): On performance of C2 breed of erisilkworm, *Samia ricini* (Donovan) in different food plants. Entomol Appl. Lett, 2(1): Pp 47-49.
[12] Shifa, K., Terefe, M., Ahmed, I.,Tilahun, A., Menbere, S., Biratu, K.& Bogale, A.(2015): Evaluation of different strains of Erisilkworms (*Samia Cynthia ricini* B.) for their adaptability &silk ratio in Ethiopia.Sci. Technol.Arts Res.J., 4(3): Pp. 93-97.
[13] Shukla, R.(2012): Economics of Rainfed Sericulture-A study in the district of Udaipur in Rajasthan, India. J.Agril. Res, 37(1): Pp 49-54.
[14] Singh, B.K. & Das, P.K.(2006): Prospects & problems for development of ericulture in non-traditional states. Proceeding of regional seminar on Prospects & Problems of sericulture an economic enterprise in N-W India. Held at Dehradun 11th-12th Nov, Pp. 312-315.
[15] Singh, R.N., Maheswami, M.(2003):Conservation & Utilization of Sericigenous insects in North East Region of India. Sericologia; 43(1): 1-15.

Life cycle of eri silkworm

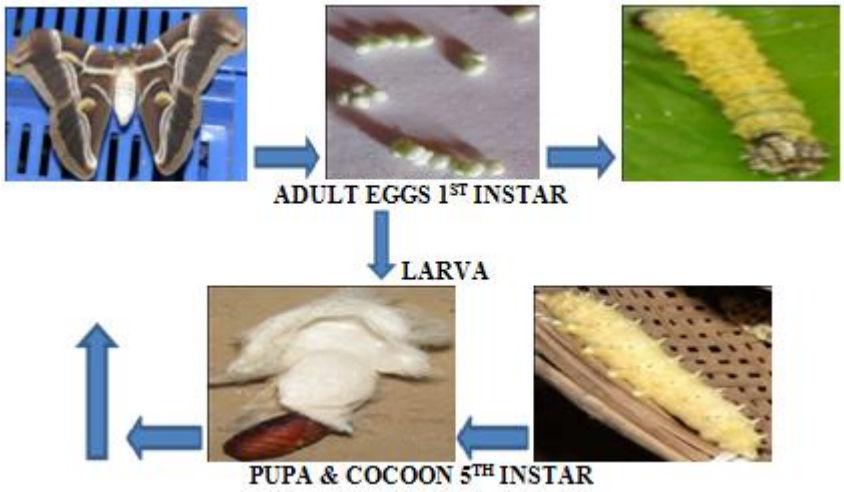

Table 1: Morphological features of Philosamia ricini

Egg	Colour of shell	White
	Colour of yolk	Cream
	Shape	Oval
larva	Colour	Yellow, cream, green, blue, white, spotted
	length of matured	9cm
Pupa	Colour	Dark red
	Shape	Oval
Cocoon	Shape	Oval; No peduncle
	Colour	Brick red & white
Adult (moth)	Colour	Black

Table 2: Eri silkworm & its host plants

Family	Name of silkworm	Host plant	
Saturniidae	*Samia ricini*	Common name	Scientific name
		Castor	*Ricinus communis* Linn.
		Kesseru	*Heteropanax fragrans* Seem.
		Torapat	*Alpinia allughos*
		Tapioca	*Manihot utilissima* Phol.

Table 3: Comparison of the weight (cocoon shell, whole cocoon, pupal) & shell ratio (%) on the basis of 3 different host plants

Economic traits	castor	Castor +alpinia	Kesseru
Cocoon shell (gm)	0.32-3.46	0.324-0.666	0.310-0.520
Whole cocoon (gm)	2.96-3.84	3.169-4.253	2.530-3.270
Pupal wt(gm)	0.31-3.15	2.734-3.874	2.250-2.910
Shell ratio(%)	9.63-90.10	1.56-15.6	10.7-18.18

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