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REARING PERFORMANCE OF OAK TASAR SILKWORM, *ANTHERAEA FRITHI* MOORE ON DIFFERENT HOST PLANTS DURING SPRING AND AUTUMN SEASON IN MANIPUR, INDIA

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ABSTRACT

The studies on rearing performance of *Antheraea frithi*, a wild silk moth of oak tasar was conducted by feeding with three different host plants *viz*., *Lithocarpus dealbata, Quercus serrata and Q. griffithii* during spring (April-May) and autumn (September-October) seasons. The rearing was done outdoor and it was observed that *L. dealbata* is better than *Q. serrata* and *Q. griffithii* for rearing of *A. frithi* during spring and autumn season in Manipur. Economic parameters such as cocoons per dfl (42 nos.), cocoon weight (4.50g), shell weight (0.52g) and shell ratio (11.55%) were recorded higher during spring crop when worms fed with *L. dealbata* foliage followed by worms reared on *Q. serrata* with cocoons per dfl (17.66nos.), cocoon weight (3.20g), shell weight (0.30g) and shell ratio (9.37%) during spring crop. The shortest average larval period of 33 days ranging 32 to 34 days was recorded when the worms feed on *L. dealbata* foliage in both the seasons.

Keywords : *Antheraea frithi*, *Lithocarpus dealbata, Quercus serrata and Q. griffithii,* wild silkmoth.

Introduction

The forest fauna of the sub- Himalayan belt of India is the natural abode of a large variety of sericigenous insects (Jolly *et al*., 1976; Chaudhury, 1981; Jolly, 1985; Sarkar, 1988; Thangavelu, 1991; Baruah *et al.,* 2000; Singh *et al*., 2000; Singh and Maheswari, 2003). The wild silkmoths play an important role in the conservation and utilization of biodiversity as reported by Frankel (1982), Peigler (1993, 1999) and Kioka (1998). Out of the thirty five recorded *Antheraea* species (Crotch, 1956), thirtyone species have been recorded in the Indo-Australian biographic region (Seitz, 1933). Among these *Antheraea* species many species feed on oak foliages (Singh *et al*., 2000). Among the various wild silk moths reported in India, only four are commercially exploited for production of silk (Jolly *et al*., 1976). Many important genetic resources of sericigenous insects may become extinct due to destruction of their habitatexposure to various pests and predators, pesticidal poisoning and adverse climatic condition. Itis highly imperative to tap the other important wild genetic resources to boost the Vanya silk production. *Antheraea frithi* is one of the oak feeding wild silk moths found in the forest of North–Eastern India, which can be exploited for production of Oak tasar silk. There are certain reports on the taxonomy and distribution of wild silkmoths (Peigler 1993, 1999; Thangavelu, 1991) however, reports on rearing of wild silkworms are very few. During the survey and exploration, it is revealed that *Antheraea frithi* cocoons and feeding larvae are found on *Lithocarpus dealbata, Quercus serrata and Quercus griffithii.* Hence, the present study was under taken to find out a preferred host plant for probable commercial exploitation.

Materials and Methods

Seed cocoons of *Antheraea frithi* were collected from the forest of Senapati District of Manipur. The collected seed cocoons were consigned for conducting grain age in the Laboratory of Regional Sericultural Research Station, Imphal. The emerged moths were allowed to couple for 13-15 hours inside bamboo basket covering black cloth. The decoupled moths were kept inside bamboo monia or nylon netted bags (8" x 6") for 72 hours. The prepared disease free layings (dfls) were incubated at 22 ± 2^0C and RH 70-80% which is as per the method of Jiang *et al.,* 1992 with slight modification. The eggs were disinfected in 3% formalin for 10 minutes followed by washing in plain water before incubation. Another second disinfection and washing were also employed in the same concentration just before two days of hatching.

The rearing field was well cleaned and disinfected by sprinkling with mixture of lime and bleaching powder (9:1) before 7-10 days of brushing. The eggs are spread in a thin layer when the hatching is started and exposed to light. A few twigs of the three different host plants *viz*., *L. dealbata, Q. serrata and Q. Griffithii* were placed separately on the hatched larvae. The worms crawl over the leaves within half an hour and then the twigs were directly shifted in outdoor on the foliage of the respective host plants. The bags or boxes containing eggs may be directly shifted on branches when the hatching started so that the worms can crawl over the leaves. The rearing was conducted on the foliages of *L. dealbata, Q. serrata and Q. Griffithii* in outdoor under net cover in two seasons *i.e*., April-May and September-October for three consecutive years. There were three replications in each

treatment. While transferring of the worms, the branches with the worms are cut with the help of a secateure and shifted to another bush having quality foliage. Worms are not touches by hand as far as practicable. Utmost care is taken while transferring of worms from one bush to another because the worm gets injured or vomited by the slight touch or disturbance. Transfer of worms is always carried out in the morning and evening hours only. As in other silkworms the worms are not disturbed during the time of moulting. If any diseased or death worms are observed in the field, it was removed immediately by forceps and dipped in bleaching powder solution and buried under soil. Harvesting of cocoons was done after 6-7 days of spinning.

Results and Discussion

The results obtained from the economic characters such as larval duration, effective rate of rearing, cocoon per dfl, single cocoon weight, single shell weight, shell ratio and fecundity and hatching of Oak feeding wild silk moth, *A. frithi* reared on the foliages of *L. dealbata, Q. serrata and Q. Griffithii* during spring and autumn season are presented hereunder.

Larval Development: Hatching of eggs takes place after 9-10 days when the eggs are incubated at 22 ± 2^0C and RH 70-80%. The worms started hatching early in the morning (5am) till about 12 noon and continued up to 3rd days. The larva prefers tender leaves to mature and hard leaves irrespective of the instars. Just after hatching the larvae crawl in search of food and are in the habit of eating bits of egg shell when hatched. It is desirable to providetender leaves to the chawki worms while semi-mature and succulent mature leaves should be provided during 4th and 5th instars respectively for healthy growth of the larvae. Like *A. proylei* larvae, it feeds the entire leaves including the midrib. The larva stops feeding at the slight disturbance.

The results on larval duration presented in Table-1 and 2 revealed that, during spring crop the minimum larval duration of 33 days was observed when the worms are feed on *L. dealbata* followed by *Q. griffithii* (39 days) and *Q. serrata* (42 days). During autumn crop also the shortest larval period of 34 days was recorded on *L. dealbata* followed by *Q. griffithii* and *Q. serrata* and there is no much more difference between spring and autumn season.

Table 1 : Rearing performance of *A. frithi* during Spring (April-May) crop on different food plants.

Host	Larval Duration (Day)	Effective rate of rearing (%)	Cocoon per dfl (No.)	Single cocoon weight (g)	Single shell weight (g)	Shell ratio (%)	Fecundity (No.)	Hatching (%)
L. dealbata	33	29.21	42	4.50	0.52	11.55	190	82
Q. griffithii	39	12.34	18	3.20	0.30	9.37	75	68
Q. serrata	42	10.89	13	3.10	0.27	8.71	58	65
Mean	38	17.48	24.33	3.6	0.36	9.87	107.66	71.67
SD	4.58	10.18	15.50	0.78	0.13	1.48	71.80	9.07
CV9%)	0.12	0.58	0.64	0.22	0.37	0.15	0.66	0.13

Table 2 : Rearing performance *A. frithi* during Autumn (September-October) crop on different food plants.

Host	Larval Duration (Day)	Effective rate of rearing (%)	Cocoon per dfl (No.)	Single cocoon weight (g)	Single shell weight (g)	Shell ratio (%)	Fecundity (No.)	Hatching (%)
L. dealbata	34	26.45	41	4.48	0.50	11.16	180	79
Q. griffithii	42	8.05	12	3.10	0.28	9.03	70	67
Q. serrata	43	6.34	09	2.95	0.23	7.79	52	63
Mean	39.66	13.61	20.66	3.51	0.33	9.32	100.66	69.67
SD	4.93	11.15	17.67	0.84	0.14	1.70	69.29	8.32
CV9%)	0.12	0.82	0.85	0.24	0.42	0.18	0.69	0.12

Cocoon yield and survivability: The data in Table 1 and 2 reveals that the effective rate of rearing was superior during spring and autumn season with 29.21% and 26.45 % respectively on *L. dealbata*. However, it was lowest 10.89% and 6.34% during spring and autumn season respectively on *Q. serrata.* The result of the rearing in three consecutive years revealed that the average cocoon yield varies from 13 cocoons per dfl on *Q. serrata* to 42 cocoons per dfl on *L. dealbata* during Spring crop (Table-1).During autumn crop, cocoon yield ranges from 09 cocoon per dfl on *Q. serrata* to 41 cocoons per dfl on *L. dealbata* (Table-2). The variations of cocoon yield are mainly attributed due to the variation of the host plant on which the silkworm was rearedand between the season the average cocoon yield is more or less same.

Cocoon parameters: The mature larvae form cocoon on the tree itself by making a hammock. The cocoon has a peduncle 2.0 to 7.0 cm in length and less flossy. The average single cocoon weight was highest (4.50g) on *L. dealbata* followed by *Q. griffithii* (3.20g) and *Q. serrata* (3.10g) during spring crop and the result is more or less same during autumn crop also as shown in Table-1 and 2. The result revealed that the average single shell weight was superior both in spring and autumn with 0.52g and 0.50g respectively when the worms feed on *L. dealbata* followed by the *Q. griffithii* and *Q. serrata* (Table 1 and 2). It is observed that the cocoon parameters are almost similar in both the seasons of the three years of rearing.

Fecundity and hatching: The average fecundity was ranged from 58 eggs to 190 eggs during spring crop and 52 eggs to 180 eggs during autumn crop. The highest average fecundity of 190 eggs was recorded during spring crop from the worms which was reared on *L. dealbata* and the lowest was

observed from those worms which were reared on *Q. serrata* during autumn crop (52 eggs).The percent hatching was superior (82%) on *L. dealbata* followed by *Q. griffithii* (68%) during spring crop which at par with autumn crop. However, lowest hatching per cent was observed on *Q. serrata* (Table 1 and 2).

Present study shows that *A. Frithi* may be utilized for production of Vanya silk by feeding *L. dealbata* as primary food plant. Further, in India Vanya silkmoths are on the verge of extinction mainly due to the deforestation and environmental pollution. Biodiversity conservation is increasingly recognized as a fundamental component of sustainable development of natural resources by protecting and using biological resources in ways that do not diminish the world's variety of genes and species or destroy important habitat and ecosystem. *Antheraea frithi* comprises a significant component of Vanya silkmoth genetic diversity that cannot be ignored in the assessment conservation and utilization of biodiversity. It may be possible to evolve robust breeds having wide adaptability from *A. frithi* through advanced breeding techniques which will certainly help Vanya silk production and save the ecosystem. Further genetic studies of this silkworm are needed. Much attention should be paid to conserved this wild silkmoth in the natural habited in collaboration with Central Silk Board, State Sericulture Department and the Forest Department.

References

Baruah, B.; Duarahand, D. and Chakraborty, D. (2000). Performance of wild silkmoths. *Int. J. Wild Silkmoths & Silk,* 5: 376-378.

Chaudhury, S.N. (1981). *Muga silk industry.* Director of Sericulture and Weaving, Govt. of Assam (India).

Cortech, W.J.B. (1956). A silk moth rearers handbook. *Amat Entomol. Soc.;*12: 165pp. (1969 reprint).

Jiang, Z.; Changle, C.; Yongquing, C.; Yuqingand, Z. and Yujin, D. (1992). Identification and purification of vitellin from the Chinese oak silkworm *Antheraea pernyi* and its changes during oogenesis and embryogenesis. *Wild Silkmoth,* 125-133.

Jolly, M.S. (1985). Species differentiation in the genus *Antheraea. Sericologia,* 25: 84-94.

Jolly, M.S.; Sonwalkar, T.; Senand, S.K. and Prasad, G.K. (1976). Non-mulberry silks. *Sericultural Manual, FAO,* United Nations, Rome.

Kioka, E.N. (1998). Biodiversity of wild silkmoths (Lepidoptera) and their potential for silk production in east Africa. *Ph.D. Thesis*, *Knyatta University, Nairobi, Kenya*.

Peigler, R.S. (1993). Wild silks of the world. *Amer. Entomol.;* 39(3) :151-160.

Peigler, R.S. (1999). Taxonomy, distribution and sericultural potential of the American species of *Antheraea* (Saturnidae). *Bull. Ind. Acad. Seric.;* 3(1) : 1-9.

Sarkar, D.C. (1993). Eri-culture in India. *Published by Central Silk Board, Bangalore (India).*

Seitz, A. (1933). The macrolepidopoptera of the world palearctic fauna. *Stuttgart. Alfred Kernal,* 10: 509-516.

Singh, K.C.; Singh, N.I.; Keisa, T.J. and Singh, Y.R. (2000). Conservation and utilization of Indian oak fed *Antheraea* fauna. *Int. J. Wild Silkmoths and Silk.,* 5 : 330-331.

Singh, R.N. and Maheswari, M. (2003). Conservation and utilization of sericigenous insects in North East Region of India. *Sericologia,* 43(1): 1-15.

Thangavelu, K. (1991). Recent studies in tasar and other wild silkmoths. *Wild silkmoth,* 20-29.