INTERNATIONAL JOURNAL OF PLANT PROTECTION | VOLUME 6 | ISSUE 2 | OCTOBER, 2013 | 444-448

IJPP

RESEARCH ARTICLE

Evaluation of new host plant species for ericulture

■ MANJUNATHA NAIK C.*[1] AND C. MURTHY[2]

[1]Department of Agricultural Entomology, College of Agriculture, University of Agricultural Sciences, DHARWAD (KARNATAKA) INDIA

[2]Department of Agribusiness Management, College of Agriculture, University of Agricultural Sciences, DHARWAD (KARNATAKA) INDIA

ARITCLE INFO

Received : 23.08.2013
Revised : 03.10.2013
Accepted : 15.10.2013

Key **W**ords :
Eri- silk, New host plants, Silkworm, Ericulture

***Corresponding author:**

ABSTRACT

Eri silkworm (*Samia cynthia ricini* Donovan) is polyphagous in nature and feeds on leaves of several food plants *viz.,* castor (*Ricinus communis*), It is a multivoltine in nature and reared in indoor condition. Among 23 plant species tried for ericulture, five plant species have been accepted by the eri silkworm as food plants. Out of five plant species, eri larvae had good feeding response and survivability on fountain tree, banyan tree and Indian almond, moderate response on carrot leaves and slight feeding response and survivability on jack fruit leaves.

How to view point the article : Naik, Manjunatha C. and Murthy, C. (2013). Evaluation of new host plant species for ericulture. *Internat. J. Plant Protec.*, **6**(2) : 444-448.

INTRODUCTION

Sericulture being an important agro-based industry provides employment at various levels *i.e.,* host plant cultivation, silkworm rearing, reeling, spinning and weaving have much impact on the improvement of rural economy. Eri culture is believed to have originated in the northeastern India especially Assam, which has rich biodiversity of tree species serving as host plants of eri silkworm. Mainly the tribals, landless labours and other socially and economically backward classes of the society are carrying out eri culture. Assam is the chief producer of eri silk though the castor cultivation, a major host plant of eri silkworm is very less with only 0.37 per cent. In addition to castor, it is reared on other tree species available in forest area. Payam and Kesseru trees are exploited for commercial eri silk production in northeastern region. Eri silkworm, *Samia ricini* (Donovan) feeds primarily on castor (*Ricinus communis* Linn.). However, Kesseru (*Heteropanax fragrans* Seem) is considered as another major perennial food plant. Besides these two, eri silkworm being polyphagous, feeds on several alternative host plants, *viz.,* Payam (*Evodia fraxinifolia*), Tapioca (*Manihot esculanta*), Barkesseru (*Ailanthus excelsa*) Barpat (*A. grandis*), Gulancha (*Plumeria acutifolia*), Gamari (*Gmelina arborea*), etc. Bindroo *et al.* (2007) reported 24 plant species as host of eri silkworm. While Arora and Gupta (1979) reported that eri silkworm is known to feed on more than 30 host plant species, only on few host plants developmental biology and other related aspects have been studied. Patil and Savanurmath (1994) reported that there are a number of host plants till left unexploited due to lack of technology. It is a polyphagous insect and feeds on a wide range of host plants. The eri food plants are abundantly found in natural forests in plains and hilly areas and leaves of these plants are available in one or the other season for eri silk production. Eri host plants are interchangeable at rearing during scarcity of one host. These plant species are distributed all over India in both natural as well as in cultivated forms and are generally perennial. The tribals and several weaker sections of society of the region depend mostly on forest based eri food plants for silkworm rearing as sustainable source of livlihood. Hence, screening of the best food plants is required. Accordingly present study has been conducted to screen out best food plants for rearing of eri silkworm.

MATERIAL AND METHODS

Investigations were carried out to know the growth,

development and economic cocoon parameters of eri silkworm, *Samia cynthia ricini* Boisduval on new hosts at DBT Ericulture Laboratory, Department of Agricultural Entomology, College of Agriculture, University of Agricultural Sciences, Dharwad, Karnataka.

Dharwad is a district head quarter in North Karnataka and situated at 15° 26' north latitude, 75°07' east longitude and at an altitude of 731.8 meters above mean sea level. This place lies in the transitional zone receiving an annual rainfall of 1208.5 mm distributed well over the season. This zone is characterized by two peaks of rainfall, one commencing during June-July and another during September-October. The temperature and relative humidity range from 11° to 37°C and 40 to 85 per cent, respectively. The eri silkworm rearing practices suggested by Patil and Savanurmath (1994) was followed in rearing eri silkworm for the experiment. The leaves of 23 plant species were fed to the eri silkworms at its different instars. For each host plants, 25 worms were used and replicated four times. Feeding response like no feeding, slight feeding, moderately feeding and good feeding were recorded. This experiment was conducted during November-December and January-February. After two hours of hatching, one layer of tender leaves of different host plants were spread over the eggs in such a way as to just touch the eggs. After 10 to 15 minutes, the worms crawl on the under surface of the leaves. The leaves along with larvae were then transferred to a separate tray and turned upside down so as to bring the worms above the leaves.

RESULTS AND DISCUSSION

Among 23 plant species evaluated to rear eri silkworm only five plant species *viz.*, leaves of fountain tree, banyan tree, Indian almond and carrot were found most suitable and jack fruit least suitable on which it completed the life cycle. The perusal of literature revealed that these hosts except fountain tree (Patil, 2004) were recorded for the first time on eri silkworm. Hence, the present findings neither can be compared nor discussed since such studies are wanting. However, in this chapter the results are compared and discussed with earlier reports placed on record by various workers with other hosts.

Acceptance of host plant and survivability was maximum on fountain tree, banyan tree, Indian almond and carrot leaves. It may be due to stimulant action (gustatory stimulants) and nutritional content of leaf. Non- acceptance of host may be due to antifeedant (feeding deterrent), poor phagostimulant and the presence of alkaloids in the leaf. For no feeding, it may be due to the odour (olfactory stimulants) which repelled the worms from feeding site and morphological feature of

Table 1 : Commonly available plant species selected for ericulture

Sr. No.	Common name	Botanical name	Family	Leaf character
1.	Jack fruit	*Artocarpus heterophyllus* Lam.	Moraceae	Glossy, leathery, thick
2.	Kar-Khair- (Banni)	*Acacia ferruginea* DC.	Mimosaceae	Bipinnate, thickness
3.	Bahunia	*Bauhinia purpurea* L.	Caesalpiniaceae	Cleft, oblong, papery
4.	Bamboo	*Bambusa arundinaceae* Retz.	Bambusaceae	Distichous, hairiness
5.	Yellow bamboo	*Bambusa vulgaris* L.	Bambusaceae	Leaf sheath pubescent
6.	Banyan tree	*Ficus bengalensis* L.	Moraceae	Alternate, latex content
7.	Soapnut tree	*Sapindus emarginatus*	Sapinidaceae	Oblong, small leaves
8.	Copper pod	*Peltophorum ferrugineum* Decne	Caesalpiniaceae	Bipinnate, small, thick leaves
9.	Pongamia	*Pongamia pinnata* Linn.	Fabaceae	Imparipinnate, hard
10.	Raintree	*Samanea saman* Jacq.	Mimosaceae	Pinnate, thickness
11.	Fountain tree	*Spathodea companulata* Pal.	Bignoniaceae	Broad, dark green
12.	Flamboyant tree	*Swietenia mahogoni* Marophylla	Meliaceae	Paripinate, thick
13.	Tabubia	*Tabubia argentina*	Bignoniaceae	Pubescence, thick
14.	Indian almond	*Terminalia catappa* Linn.	Combertaceae	Glabrous leaves
15.	Cassia	*Cassia auriculata* Linn.	Caesalpiniaceae	Elliptic, hard
16.	Peepal tree	*Ficus religiosa* L.	Moraceae	Broadly oblong, less latex
17.	Anjan	*Hardwickia binata* Roxb.	Fabaceae	Paripinate, hard
18.	Khirani	*Manilkara hexandra* Roxb.	Sapotaceae	Branchlets, hard
19.	Paradise tree	*Simarouba glauca* DC.	Fabaceae	Pinnate, smell
20.	Carrot	*Daucus carota* Linn.	Umbelliferae	Pinnetely, succulent
21.	Rye grass	*Acalypha gracilens* A.	Euphorbiaceae	Oblong, red colour
22.	Lantana	*Lantana camara* L.	Verbenaceae	Pinnately compound
23.	Golden shower tree	*Cassia fistula* Linn.	Caesalpiniaceae	Paripinnate, hard

leaves. Patil (2004) reported fountain tree as the new host plants of eri silkworm. The new host plants of eri silkworm recorded first time may be the substitute host plants of eri silkworm. Though Arora and Gupta (1979) listed 30 plant species as host plants of eri silkworm, banyan tree, Indian almond, carrot and jack fruit tree were not recorded earlier as the host plants of eri silkworm. The data on the common available plant species for eri culture at different instars and survival of insect are presented in Table 2.

First instar :

Survivability percentage (100%) on castor in all instars. The 23 plant species were used for the study, during the first instar and out of 23 plant species, eri silkworms accepted and survived on five plant species. Among five plant species only four plant species showed the good feeding and survivability of larvae (100%) on banyan tree, fountain tree, carrot leaves and Indian almond. Whereas, poor survivability of larvae (32.0%) was noticed on jack fruit leaves (Table 3).

In the beginning, eri silkworms fed on the leaves of banni, rain tree, soapnut tree and acalypha, for first two to three days and subsequently, all of them died. The eri silkworms did not feed on the leaves of bahunia, copper pod, pongamia, mahogany, tabubia, cassia, peepal tree, anjan, khirani, paradise tree, lantana and bamboo.

Table 2 : Survivability of eri silkworm on new host plants

Sr. No.	Host plant	Survivability percentage						
		I instar	II instar	III instar	IV instar	V instar	Mean	Feeding response
1.	*Artocarpus heterophyllus* Lam.	32.00	36.00	40.00	32.00	28.00	33.60	A (SF)
		(34.44)	(36.86)	(39.22)	(34.44)	(31.94)	(35.41)	
2.	*Acacia ferruginea* DC.	0.00	0.00	0.00	0.00	0.00	0.00	NA
3.	*Bauhinia purpurea* L.	0.00	0.00	0.00	0.00	0.00	0.00	NA
4.	*Bambusa arundinaceae* Retz.	0.00	0.00	0.00	0.00	0.00	0.00	NF
5.	*Bambusa vulgaris* L.	0.00	0.00	0.00	0.00	0.00	0.00	DF
6.	*Ficus bengalensis* L.	100.0	100.0	100.0	100.0	96.0	99.2	A (GF)
		(89.96)	(89.96)	(89.96)	(89.96)	(78.43)	(84.83)	
7.	*Sapindus emarginatus*	0.00	0.00	0.00	0.00	0.00	0.00	NA
8.	*Peltophorum ferrugineum* Decne.	0.00	0.00	0.00	0.00	0.00	0.00	DF
9.	*Pongamia pinnata* Linn.	0.00	0.00	0.00	0.00	0.00	0.00	DF
10.	*Samanea saman* Jacq.	0.00	0.00	0.00	0.00	0.00	0.00	NA
11.	*Spathodea companulata* Pal.	100.0	100.0	100.0	96.0	96.0	98.4	A (GF)
		(89.96)	(89.96)	(89.96)	(78.43)	(78.43)	(82.70)	
12.	*Swietenia mahogoni* Marophylla	0.00	0.00	0.00	0.00	0.00	0.00	DF
13.	*Tababia argentina*	0.00	0.00	0.00	0.00	0.00	0.00	DF
14.	*Terminalia catappa* Linn.	100.00	100.00	100.00	92.00	88.00	96.00	A (GF)
		(89.96)	(89.96)	(89.96)	(73.54)	(70.06)	(78.43)	
15.	*Cassia auriculata* Linn.	0.00	0.00	0.00	0.00	0.00	0.00	DF
16.	*Ficus religiosa* L.	0.00	0.00	0.00	0.00	0.00	0.00	DF
17.	*Hardwickia binata* Roxb.	0.00	0.00	0.00	0.00	0.00	0.00	DF
18.	*Manilkara hexandra* Roxb.	0.00	0.00	0.00	0.00	0.00	0.00	DF
19.	*Simarouba glauca* DC.	0.00	0.00	0.00	0.00	0.00	0.00	DF
20.	*Daucus carota* Linn.	100.00	100.00	96.00	72.00	68.00	87.20	A (MF)
		(89.96)	(89.96)	(78.43)	(58.03)	(55.53)	(69.01)	
21.	*Acalypha gracilens* A.	0.00	0.00	0.00	0.00	0.00	0.00	DF
22.	*Lantana camara* L.	0.00	0.00	0.00	0.00	0.00	0.00	DF
23.	*Cassia fistula* Linn.	0.00	0.00	0.00	0.00	0.00	0.00	DF
24.	Castor (control)	100.00	100.00	100.00	100.00	100.00	100.00	A (GF)

A – Acceptance { SF – Slight feeding, *Artocarpus heterophyllus* 0-50%; MF – Moderately feeding, *Dacus carota* 50-90%; GF – Good feeding, *Ficus benghalensis, Spathodea companulata, Indian almond* 90-100%

NA – Non-acceptance, DF – No feeding

Second instar :

Of the 23 plant species, eri silkworms accepted and survived on five plant species. Among five plant species here also the same four plant species showed the good feeding and survivability of larvae (100%). Whereas, poor survivability of larvae (36.0%) on jack fruit leaves. The non-acceptance and non-feeding on different hosts was same as in the first instar (Table 3).

Third instar:

During third instar, out of 23 plant species eri silkworm accepted and survived on five plant species. Among five plant species, only four plant species showed the good feeding and survivability of larvae (100%) on banyan tree (100%), fountain tree (100%) and Indian almond (100%). Moderately feeding carrot leaves (96.0%), whereas, poor survivability of larvae (40.0%) on jack fruit leaves. The non-acceptance and non-feeding on different hosts was same as in the first instar (Table 3).

Fourth instar:

The 23 plant species were used for the study during fourth instar and out of 23 plant species, eri silkworms accepted and survived on five plant species. Among five plant species, only four plant species showed the good feeding and survivability of larvae (100%) on banyan tree (96.0%), fountain tree (100%) and Indian almond (92.0%). Moderately feeding carrot leaves (72.0%), respectively, whereas, poor survivability of larvae (32.0%) on jack fruit leaves. The non-acceptance and non-feeding on different hosts was the same as in the first instar (Table 3).

Fifth instar:

Twenty three plant species were used for the study during fifth instar and out of 23 plant species, eri silkworm accepted and survived the larvae on five plant species. Among five plant species only four plant species showed the good feeding and survivability of larvae on banyan tree (96.0%), fountain tree (96.0%) and Indian almond (88.0%), moderately

Table 3: Weight of Eri silkworm at different instars on different host plants during (Nov.–Dec. and Jan.-Feb.)

Treatment	1st instar (wt) (g)	2nd instar (wt)(g)	3rd instar (wt)(g)	4th instar (wt)(g)	5th instar (wt)(g)	Mature larval weight (g)
Host						
Castor-(GCH-4) (H-1)	0.018 a	0.477 a	1.609 a	2.651 a	6.270 a	4.55 a
Fountain tree (H-2)	0.015 ab	0.459 abc	1.515 a	2.616 b	6.200 a	4.45 a
Banyan tree (H-3)	0.014 ab	0.448 bc	1.354 b	2.394c	6.004a	4.01 b
Indian almond (H-4)	0.013 b	0.441 c	1.347 b	2.339d	5.994 a	3.87b
Carrot (H-5)	0.017 ab	0.469 ab	1.553 a	2.098e	5.512 b	3.60 c
S. Em ±	0.002	0.002	0.007	0.0007	0.0278	0.02
C.D. at 1%	0.008	0.007	0.028	0.0026	0.1082	0.06
Season						
November-December (S1)	0.017	0.466	1.493	2.477	6.036	4.35
January-February (S2)	0.014	0.451	1.390	2.360	5.956	3.84
S. Em ±	0.0002	0.001	0.005	0.0004	0.0176	0.01
C.D. at 1%	0.0008	0.004	0.0018	0.0016	0.0684	0.04
Interaction						
H1× S1	0.019 a	0.484 a	1.658 a	2.723 a	6.285 a	4.78 a
H1× S2	0.017 abc	0.470 b	1.560 b	2.579 c	6.254 ab	4.32 b
H2× S1	0.017 abc	0.472 ab	1.642 a	2.685 b	6.248 ab	4.69 a
H2× S2	0.014 cd	0.446 d	1.388 d	2.540 d	6.153 abc	4.22 bc
H3× S1	0.015 bcd	0.453 cd	1.408 cd	2.440 e	6.020 abc	4.28 bc
H3× S2	0.012 d	0.443 de	1.301 e	2.348 g	5.988 bc	3.74 d
H4× S1	0.014 cd	0.450 d	1.401 cd	2.379 f	6.012 bc	4.18 c
H4× S2	0.012 d	0.432 e	1.293 e	2.298 h	5.975 c	3.56 e
H5× S1	0.018 ab	0.473 ab	1.650 a	2.160 i	5.645 d	3.84 d
H5× S2	0.017 abc	0.465bc	1.457 c	2.036 j	5.379 e	3.37 f
S. Em ±	0.0003	0.002	0.0010	0.0009	0.0393	0.02
C.D. at 1%	0.0011	0.009	0.0038	0.0037	0.1529	0.09

Figures in the same column with similar alphabets do not differ significantly at P = 0.01 by DMRT

feeding carrot leaves (68.0%) whereas, poor survivability of larvae (28.0%) on jack fruit leaves. The non-acceptance and non-feeding on different hosts was the same as in the first instar (Table 3).

REFERENCES

Arora, G.S. and Gupta, L.J. (1979). Taxonomic studies on some of the Indian non-mulberry silk moths (Lepidoptera : Saturniidae). *Mem. Zool. Survey India*, **16** : 1-63.

Bindroo, B. B., Singh, Tiken, N., Sahu, A. K. and Chakravorty, R. (2007). Eri silkworm host plants. *Indian Silk*, May 2007, 13-16 pp.

Patil, G. M. (2004). Organically raised *Mechelia champaca* L. a potential new host plant of eri silkworm, *Samia cynthia ricini* Biosduval Abstract of the National Seminar on prospects of organic sericulture and seri-byproduct utilization, pp. 39-52.

Patil, G.M. and Savanurmath, C.J. (1994). Eri silkworm – The poorman's friend. *Indian Silk*, **33** (4) : 41-45.