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Host Plants Relationship in terms of Cocoon Colour and Compactness of Eri Silkworm (*Samia ricini*)

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ABSTRACT: North-eastern region of India is a homeland of about a dozen of sericigenous insects. Eri silkworm is a polyphagous species, which feeds on host leaves mainly of family Euphorbiaceae, Araliaceae, Apocynaceae and Simaroubiceae. Castor (*Ricinus communis* L.) and Kesseru (*Heteropanax fragrans* Seem.) are the major food plants of eri silkworm. There are several secondary host plants also *viz*., tapioca (*Manihot esculenta*), Barpat (*Ailanthus grandis* Baiu.), Barkesseru (*Ailanthus excelsa* Roxb), Payam (*c*Hook.) etc. which are used for rearing of eri silkworms during the scarcity of primary host plants. Though castor is the main host plant of eri silkworm, but it is mainly annual in nature and has to be grown a fresh every six months. Castor leaf is not available throughout the year. The alternate host plants available in the region for continuous rearing of eri silkworm are essential. In the present study, cocoon colour and compactness parameters of eri silkworm *Samia ricini* Boisduval has been undertaken feeding on kesseru and tapioca leaves.

Keywords: *Manihot esculenta, Manihot esculenta, Heteropanax fragrans, Ailanthus* spp., *Samia ricini*, cocoon color, cocoon compactness

INTRODUCTION

Sericulture is an agro-based industry which includes raising of host plants, rearing of silkworm, production of silk yarn. Sericulture requires low investment, gives quick return, provides employment opportunities and earns foreign exchange. Sericulture is broadly divided into two sectors- mulberry and non-mulberry. Among the non-mulberry silkworm species, only eri silkworm is completely domesticated and reared indoor. It is a multivoltine insect completing six to seven generations in a year. The word 'Eri' is derived from the Sanskrit term "Eranda" which refers to the castor plant and also known as Ahimsa Silk. Ericulture is an age-old tradition and culture of weaker sections of the society particularly in NE India. Apart from North-eastern region ericulture is also practiced in the States of West Bengal, Bihar , Orissa, Jharkhand and Andhra Pradesh. Recently its culture has been spread to Uttarakhand, , Chhattisgarh, , Maharashtra, Gujarat, UP etc. Ericulture though relatively a less remunerative occupation but it has its own advantages. Eri silkworms require comparatively minimum care as they are easy to handle. India produces 3,116 MT of eri silk during 2012-2013.

North-eastern region of India is a homeland of about a dozen of sericigenous insects (Chowdhury, 1982). Eri silkworm is a polyphagous species, which feeds on host leaves mainly of family Euphorbiaceae, Araliaceae, Apocynaceae and Simaroubiceae. Castor (*Ricinus communis* L.) and Kesseru (*Heteropanax fragrans* Seem.) are the major food plants of eri silkworm. There are several secondary host plants also *viz*., tapioca (*Manihot esculenta*), Barpat (*Ailanthus grandis* Baiu.), Barkesseru (*Ailanthus excelsa* Roxb), Payam (*Evodia flaxinifolia* Hook.) etc. which are used for rearing of eri silkworms during the scarcity of primary host plants.

Usually after the emergence of the moths, the cocoons are used for producing spun yarn. The rearer can easily preserve the cocoons till a reasonable price is offered. It is advantageous to producers. The fibre is usually spun and woven by the growers. It provides light work for women in their own household activities. All operations from rearing of silkworm, spinning of yarn to weaving are done mostly by women folk. Thus, ericulture has attracted maximum attention of the rural people in North-eastern region of India and it is practiced as spare time occupation by the women folk.

Eri silk is widely used for preparing warm clothing like 'Eri chadar', quilts and scarves, but other products like kurtas, maxis, dokhans etc. are also available. Eri fabrics warm and more durable than mulberry silk. It is also resistant to perspiration, dust etc. Further, the texture improves by use and wash and the colour also become brighter. Ericulture is believed to have originated in the North-eastern India especially Assam. North – eastern region of India produces more than 90 per cent of eri silk. Assam produces more than 50 per cent of eri silk of the world.

Though castor is the main host plant of eri silkworm, but it is mainly annual in nature and has to be grown a fresh every six months. Castor leaf is not available throughout the year. The alternate host plants available in the region for continuous eri silkworm rearing is essential. In the present study, Cocoon colour and compactness parameters of eri silkworm *S. ricini* Boisduval has been undertaken feeding on kesseru and tapioca leaves

MATERIALS AND METHODS

A. Selected host plants

Castor (*Ricinus communis* L.) being the primary host plant of eri silkworm and two host plants *viz*., kesseru (*Heteropanax fragrans* Seem.) and tapioca (*Manihot esculenta*) were selected for undertaking present investigation. These three host plants were selected for rearing of eri silkworm (Figs. 1-3).

Rearing season: Rearing of eri silkworm was conducted during autumn (Oct-Nov) season, 2010.

Source of seed: The healthy white variety seeds (cocoons) of eri silkworm were collected from Central Muga Eri Research and Training Institute, Lahdoigarh, Assam for conducting experiment.

Preparation of disease free layings and incubation: The cocoons were preserved for emergence of moths. The disease free layings were prepared by examining the smear of the mother moth under the microscope after two days of deposition of eggs. The eggs were subjected to surface sterilization with 2% formalin solution for five minutes and washed with clean tap water. After washing the eggs were air dried and incubated at room temperature till hatching.

Rearing of Eri Silkworm (Figs. 4-6): Standard rearing techniques of eri silkworm as suggested by Chowdhury (1982) was followed. The rearing room and rearing appliances were disinfected with 2% formalin solution before rearing of the worms. Castor (*Ricinus communis* L.), kesseru (*Heteropanax fragrans* Seem.) and tapioca (*Manihot esculenta),* these three host plants were used for rearing of eri silkworm larvae under laboratory condition from first to fifth instar. Each treatment has five replications consisting 100 larvae for each host plant. With the help of feather the newly hatched larvae were fed with tender leaves of each host plant *viz.*, castor (*Ricinus communis* L.), kesseru (*Heteropanax fragrans* Seem.) and tapioca (*Manihot esculenta*). The larvae were fed with medium to mature leaves with the advancement of age of the larvae. The larvae were fed four times per day (6 am, 11 am, 3 pm, 8 pm) except during moulting period. With the advancement of ages the quantity of food was increased to fulfil there requirement. Wet foam pads were placed around the four sides of the rearing trays and covered with a perforated paraffin paper to maintain adequate humidity. Bed cleaning was done regularly.

Matured larvae were mounted to suitable ('chandraki' (bamboo mountage) for spinning of cocoon. The larvae were mounted treatment wise in separate mountages. After completion of spinning the cocoons were harvested from the mountages and taken for assessment.

Cocoon colour (% of respondents): The colour of the cocoon was evaluated as per I.S method (2939-1964). A performa was prepared to visually analyse the sample. Samples were selected randomly to judge and to evaluate the colour of cocoons.

Compactness (% of respondents): Compactness of the cocoon was evaluated as per I.S method (2939-1964). A performa was prepared to analyze the sample. Samples were selected randomly to judge and to evaluate the compactness of cocoons.

RESULT AND DISCUSSION

Cocoon colour (% of respondents) (Figs. 7, 8): The three different cocoons samples were marked as A (white), B (bright white), C (creamy white) and D (dull white). Data represented in Table 1 showed that castor cocoons were rated to be C (creamy white) by 47 per cent, A (white) by 30 per cent, B (bright white) by 15 per cent and rest 8 per cent rated as D (dull white). Cocoons produced from tapioca leaves fed larvae were rated to be C (creamy white) by 50 per cent, A (white) by 40 per cent and B(bright white) by 10 per cent and no respondents rated for D (dull white). Kesseru cocoons were rated as C (creamy white) by 60 per cent, A (white) by 20 per cent, B (bright white) by 15 per cent and rest 5 per cent rated as D (dull white).

Compactness (% of respondents): Compactness of different cocoons samples were marked as A (hard), B (moderate), C (soft) and D (very soft) are shown in Table 2. It was revealed that the castor cocoons were rated as B (moderate) by 75 per cent, C (soft) by 15 per cent and A (hard) by 10 per cent and no respondent rated for D (very soft). Tapioca cocoons were rated as B (moderate) by 60 per cent, A (hard) by 20 per cent, C (soft) by 20 per cent no respondents rated for D (very soft). Kesseru cocoons were rated as B (moderate) by 45 per cent, A (hard) by 40 per cent, C (soft) by 35 per cent and no respondents rates for D (very soft).

Colour of cocoons depends on pigments absorbed from leaves of the host plants. The colour is a racial character and it is due to the presence of pigments in the sericin layer of the bave. The present investigation revealed that colour was significantly influenced by different food plants. Majority of respondents rated the tapioca fed cocoon as white followed by castor and Kesseru. Similarly tapioca and Kesseru fed cocoons were rated as creamy white followed by castor. Chowdhury (1984) reported that the variation in colour is due to the impermeability of cell wall and silk gland as a result of which pigments pass out along with the excrements. Saikia (2008) also observed highest white coloured cocoon on Barkesseru followed by Barpat and castor.

Fig. 1-8. 1. Castor (*Ricinis communis* L.); 2. Kesseru (*Heteropanax fragrans* Seem); 3. Tapioca (*Manihot esculenta*); 4. First instar feeding on castor leaves; 5. First instar feeding on Kesseru; 6. First instar feeding on Tapioca; 7. Cocoons obtained from Castor, kesseru and Tapioca; 8. Obtained silk from Castor, kesseru and Tapioca.

Table 1. Effect of host plants on cocoon colour of eri silkworm.

Host plants	Colour (% of respondents)			
	White (A)	Bright white (B)	Creamy white (C)	Dull white (D)
Castor	30	15	47	8
Tapioca	40	10	50	-
Kesseru	20	15	60	5

Table 2. Effect of host plants on cocoon compactness of eri silkworm.

Host plants	compactness (% of respondents)			
	Hard (A)	Moderate (B)	Soft (C)	Very soft (D)
Castor	10	75	15	-
Tapioca	20	60	20	-
Kesseru	40	45	35	-

The extent of tightness or firmness indicates the shell texture and hardness of cocoons. Good quality cocoons are firm, compact and slightly elastic. It was revealed that host plants had significant effect on the compactness of cocoons. The cocoon spun by the eri silkworm fed on castor leaves were rated as more moderate followed by tapioca and Kesseru. Cocoons obtained from the eri silkworms fed on castor leaves were rated as more moderate followed by tapioca and Kesseru. Cocoons obtained from the eri silkworm fed on Kesseru leaves were rated as more hard followed by tapioca and castor. Result of this investigation supported by Saikia (2008) observed highest moderate cocoons on Barkesseru followed by castor and Barpat.

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