

## **Peduncle inheritance behavior in *Antheraea mylitta*. D - An interesting observation.**

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### **Introduction:**

India is the only country, which commercially exploits the wild/semi-wild sericigenous insect producing vanya silk with separate entities i.e., tasar, eri and muga. In tasar tropical and temperate one is being commercially exploited in different state sub-continent. The tropical tasar is produced by *Antheraea mylitta*.D (Lepidoptera-saturniidae) which is documented as highly heterogeneous population and constitutes wide spectrum of geographic specific eco-race distributed in fauna in traditional tasar producing state.

*Antheraea* genus in general and *mylitta* species in particular is taxonomically characterized for forming peduncle in aerial shoots of host plants. The peduncle may be classified on the basis of its length as small, medium and long ones with variable no. of rings (1-3). Occurrence of papery, rudimentary peduncle in *A. roylei*, *proyeli*, *assamensis*, *perneyi*, *yamamai* and *attacus atlas* etc., the peduncle in *A. mylitta* is well formed comprising ring, stalk of variable length and connecting base. Some references on preliminary observations is being recorded in the form average length of peduncle and presence of no. of rings while conducting the survey of tasar producing flora and fauna in the country and recording variable eco races with racial characterization by earlier workers (Jolly—1967). The list of eco-races was further enriched in due course of time and presently there are references of availability of 44 eco-races.

As in sericulture nothing is allowed to be wasted, the peduncle is useful source converting coarse yarn (noil) and fabric made out of it is fascinating for export as internal furnishing material, generating valuable foreign exchange.



In present communication attempt is being made to document some interesting observation on occurrence and inheritance of peduncle while conducting inter eco-racial hybridization program for developing breeder stock at CTSSS, Kargi road, Kota, Bilaspur, C.G. It also warrants necessity to undertake systematic genetical studies on inheritance of peduncle behavior in different eco races and importance of presence of peduncle in physiological behavior of insect with respect to voltinism, emergence behavior etc.,

### **Material an method :**

During 2010-11 a hybridization program was initiated with aiming to develop breeder stock of Daba cultivar (bivoltine and trivoltine) and for the purpose raily cocoons were collected in first and second crop grainage. The Daba cultivar is being collected from the P3 stock of bivoltine and trivoltine of Central Tasar Silkworm Seed Station, Kargi Road, Kota, C.G. as a resource parent to make the crosses and its reciprocal. The seed was prepared as per standardized technology of this station and rearing were conducted in 3 year old systematic plantation (square system) of *Terminalia*

sps. with 6'X6' spacing. A parallel batch is also maintained at natural plantation at Jhingatpur forest patch.

#### LOCATIONAL DETAILS OF KARGI ROAD , “ KOTA ”

<a href="#">Coordinates</a>	 22.3°N 82.03°E
<a href="#">Altitude</a>	336.34 MSL
<a href="#">Country</a>	 <a href="#">India</a>
<a href="#">State</a>	<a href="#">Chhattisgarh</a>
<a href="#">District(s)</a>	<a href="#">Bilaspur</a>
<a href="#">Place</a>	<a href="#">Kargi Road, Kota</a>

Based on the voltinism two sets of experiments is undertaken as follows:

A) i) under inter eco-racial hybridization Raily as a superior parent was crossed with Data trivoltine and F1 is being produced. The occurrence of peduncle with variable size and number is being recorded and experiment was continued up to F3 generation in 2010. In 2011 the F4 was raised and data was recorded as above on parameters for characterization of hybrid progeny;

ii) In another combination the above F1 was back crossed with Daba trivoltine male and continued up to BC2 in 2010 and BC 3 was raised during first crop 2011. The data was recorded as above;

B) under inter eco-racial hybridization Raily as a superior parent was crossed with Daba bivoltine and its reciprocal . The F1 is being produced. The occurrence of peduncle with variable size and number is being recorded during 2010 and experiment was continued up to F2 generation in 2011. In 2011 the F4 was raised and data was recorded as above;

#### Results & discussions:

The nature grown Raily is being collected in five distinct zone of Bastar district and based on its marketing place which is known as R-nongur, r-darbha, r-keshkal, r-narayanpur etc., as raily cocoons are collected by local inhabitants as peduncle removed cocoons. It seems that they do not understand the importance of peduncle as a marketable commodity due to lack of awareness. Also, the nature of availability of cocoon in tall trees makes compulsive grounds to harvest peduncle- less cocoons ( leaving peduncle in plants ) for marketing.

This resulted lack of information on occurrence of different sized peduncles, no. of rings etc., information in the literature documented and published. The limited material available with the authors during present studies indicates that short and long peduncle comes to 66.5 % and 33.5 % in the F1 population; 86% and 14 % in the F2/BC2 population; 94 % and 6 % in F3/BC3 population and

96 % & 4% in F4 population. The decreasing trend in peduncle length is distinctly evidenced with progressing the progenies. Similarly in the available populace 2 ring and 3 ring peduncle population comes to 4.22 % and 2.63 % in F1 population; 8.9% and 2.34 % in F2/BC2 population; 2.3 % and 0.45 % in F3/BC3 population. An irregular trend of inheritance of variable ring number requires more systematic studies for confirmation. Further 4 rings in a peduncle was also observed in 5 numbers of cocoons in F2 generation. The longest peduncle was observed and recorded was 27.5 cm in the progeny of Raily X Raily combination (ex-situ) generation. Comparing the BV and TV breeder stock maintained with this nucleus seed station indicates the dominance of small size peduncle with one ring as a dominating population and big size peduncle with 2 and more no. of rings is meager and may be considered as exception. (Table, histogram and photographs)

The interesting features of the present studies reveals that Daba cultivar is being subjected to close, randomized sib-mating over the years and generations resulted occurrence of short pedunculate with one ring and may be considered as dominant characters. Interestingly in all the combinations studied above in 3-4 generations indicates that the occurrence of long and small pedunculated cocoons with 2-3 rings in remarkable proportions and warrants necessity to incorporate this features as one of the selection criteria in ongoing breeding programs. It is also interesting to reveal that there seems to be direct correlation with high vigour of the populace viz., higher cocoon weight, shell weight and pupa weight with length of peduncle and presence of more no. of rings. It also appears to be logical that long peduncle with 2-3 rings can sustain more cocoon weight and presence of more no. of rings to support and check the over oscillation which may be harmful for pupal survival. The review of literature on the importance of presence of peduncle on insect behavior is silent. But in author's opinion it is associated with better aeration, better receptiveness of diurnal lights, luminary lights, better exchange of air moisture and enabling better site for adult emergence. It also seems that it is an insect adaptation to deceive the enemies as during leaf fall the cocoons on trees appears to be fruit of the food plant.

The observation also warrants necessity to undertake advance studies to identify the gene responsible for producing long peduncle, studies of fibroin structure, specific gene coding for differential nature of fibroin and sericin deposition in peduncle with its molecular dimensions if any. It also requires studies to identify the genetical basis of inheritance in quantitative terms and enviro-host interaction if any. There has been occurrence of few double stalked peduncle adjoined in ring end of cocoon were also recorded which may be considered as new record and may be treated as exceptional cases may be due to anomalies in spinning behavior

### **Conclusion:**

The preliminary studies on occurrence of peduncle structure reveals that peduncle length and rings is required to be incorporated in the breeding program as while racial characterization of eco-races due care has not been taken. The tendency of occurring long and medium size peduncle in different progenies of bivoltine and trivoltine vis-vis to superiority of cocoon characters indicates that long peduncle cocoons may be racial character for wild eco -races. This character seems to be directly proportional to total silk available against cultivated race Daba BV and TV. There is need to evolve race with long peduncle and more no. of rings as it will be beneficial to the industry as silk obtained from peduncle is utilized for coarse yarn production (noil) syn. bufta and the fabric made of it is having specific brand of export demand as a furnishing material

1. Table showing the length of peduncle and number of rings in a peduncle:

Combination	Long peduncle range 6 cm-18cm ( % of population)	Short peduncle range Below 6 cm (% of population)	No. of rings in peduncle	
			2 ( % )	3 ( % )
Raily X Raily- F1	65	34.9	8.2	7.7
Daba BV X Raily-F1	20	80	8.1	4.2
Raily X Daba BV-F1	29	71	1.3	0.44
F1 ( Raily X DTV)	27	73	1.4	0.51
BC1 ( Raily X Daba TV)=F1 X Daba TV=BC1	26	74	2.1	0.31
<b>Average</b>	<b>33.5 %</b>	<b>66.5%</b>	<b>4.22</b>	<b>2.63</b>

F2( Raily X DTV)	16	84	16	4.4
BC1 X DTV = BC2	12	88	1.8	0.28
<b>Average</b>	<b>14%</b>	<b>86%</b>	<b>8.9</b>	<b>2.34</b>

F3 ( Raily X Daba TV)	9	91	4.2	0.7
BC2 X DTV = BC3	3	97	0.8	0.2
<b>Average</b>	<b>6%</b>	<b>94%</b>	<b>2.5</b>	<b>0.45</b>

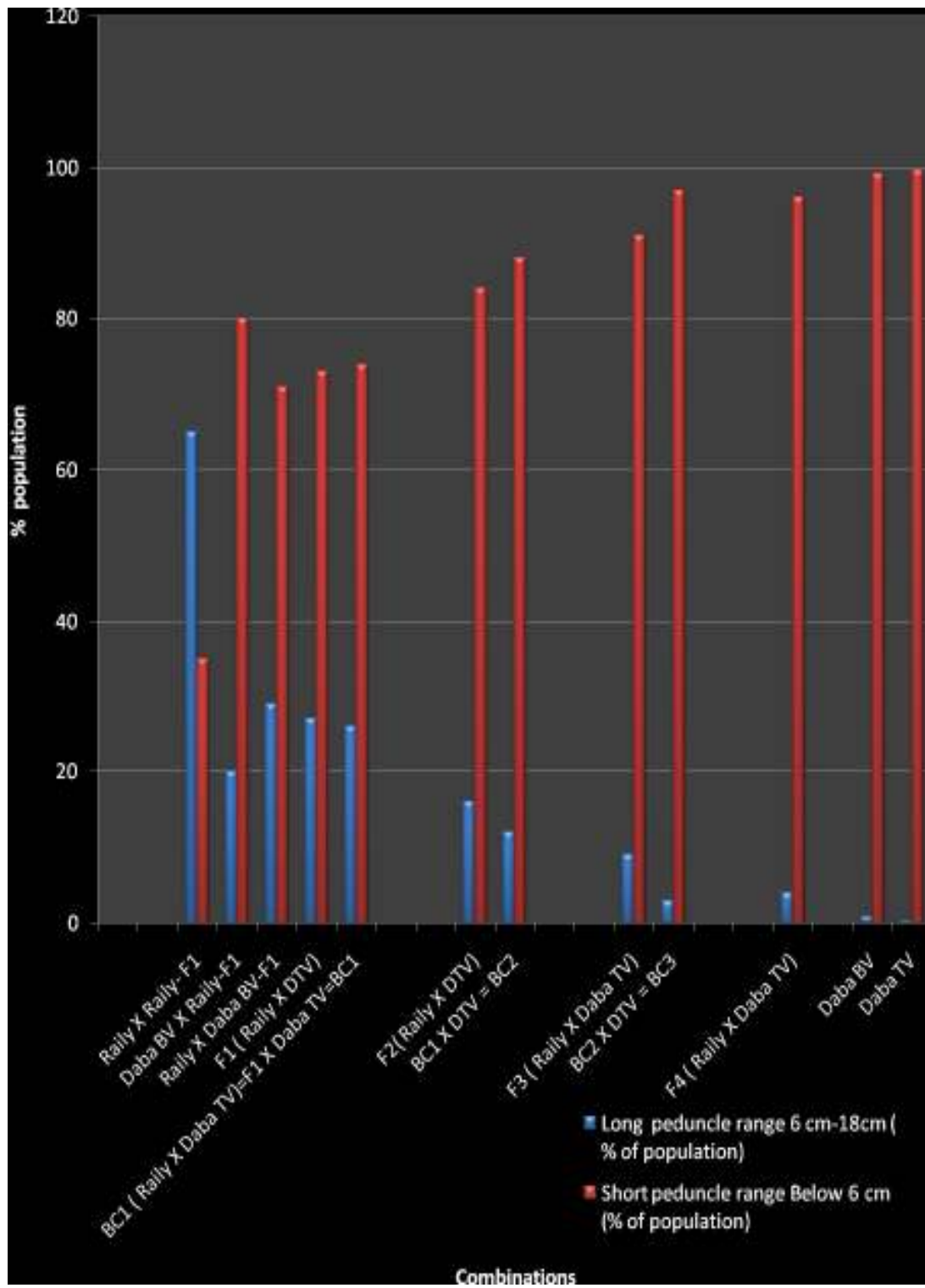
F4 ( Raily X Daba TV)	4	96	2.7	0.2
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Daba BV	0.8	99.2	-	-
Daba TV	0.3	99.7	-	-

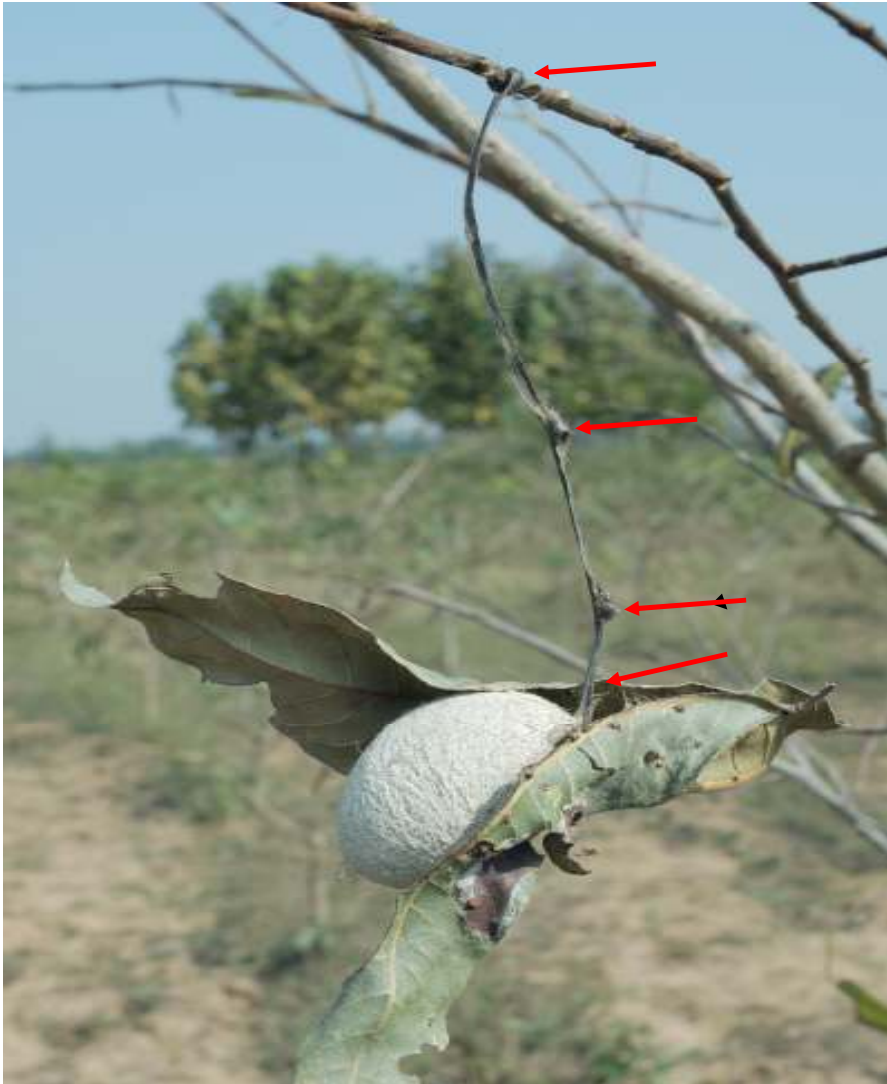
\* In F2 four rings were observed in 5 cocoons;

\* Longest peduncle length was observed by the authors in the progeny and recorded is 27.5 cm.

2. Histogram showing the percentage of population with long and short peduncle:



**3. Photographs:**



**F1 GENERATION COCOON**



**COCOON WITH LONG PEDUNCLE WITH 3 RINGS**



**COCOONS WITH LONG PEDUNCLES**





**LONGEST PEDUNCLE OBSERVED AND RECORDED IN F1 GENERATION (COCOON WEIGHT 15.69 gm)**



Cocoon with double stalked peduncle



Peduncle with 4 and more no. of rings



Cocoons with short peduncle

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