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Relative variations in the breeding performances of mutant strains of *Antheraea mylitta* D (Saturniidae: Lepidoptera)

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Abstract
The present communication accounts for the relative variations in respect of coupling, egg laying and hatching performances of three mutant strains *viz*; Daba–blue, Daba–yellow and Daba–almond evolved from the Daba ecotype of tasar silk producing famous indigenous non–mulberry sericigenous insect of great commercial importance. Results obtained are indicative of the fact that the three mutant strains of *A. mylitta* D. differ among themselves in respect of their breeding performances. The breeding performances of Daba–blue in respect of coupling, egg laying and hatching have been found evidently better than the Daba–yellow and Daba–almond. The results obtained appear to be the outcome of relative variations in the genetic architecture and physio-genetic makeup among the three mutant strains of Indigenous tropical tasar silk producing insects.

Keywords: Ecotype, coupling, breeding, hatching

Introduction
Antheraea mylitta D. belonging to family Saturniidae of order Lepidoptera is the principal indigenous tasar silk producing insect existing in the tropical tasar silk producing states namely Jharkhand, Orissa, Madhya Pradesh, Maharashtra and Bihar in India. The tasar larvae are usually reared in the forest areas mainly on the foliages of *Terminalia arjuna*, *Terminalia tomentosa* and *Shorea robusta*, the primary tasar host plant. The tasar producing insects are wild, polyphagous and bivoltine/multivoltine in nature. *Antheraea mylitta* D. exists in the forms of several ecotypes and three distinct mutant strains with three different larvae body colours such as blue, yellow and almond as compared to normal green. It is important to mention that the evolution of three different strains of Daba ecotype of *A. mylitta* D.viz; Daba–blue, Daba–yellow and Daba–almond is spectacular development in the field of tasar culture. Jolly *et al.* (1969) [4] observed that the mutant strains of tropical silkworm in spite of having the same chromosomal number differ among themselves in their behavioural manifestations. Further Jolly *et al.* (1985) [5] presented details of species variations in the genus *Antheraea* producing vanaya silks. Ahsan *et al.* (1975) [1] carried out investigation in relation to relative variations in the breeding performances of *A. mylitta* D. Fristrom (1965) [2] found variation in morphological characters of mutant strains of Drosophila melanogaster. Henneberry *et al.* (1975) observed significant impacts of environmental conditions on the breeding performances of Pinkball worm, *Pectinophora*. Krishnaswamy *et al.* (1973) [6] developed desired methods of silkworm culture under different conditions.
Sharma *et al.* (1990) [10] reported significant variations in quantitative and qualitative characters among different ecotypes of *Antheraea mylitta* D. Kumar *et al.* (2017) [7] mentioned evident variation in the coupling behaviour of different tasar silkworms in relation to different conditions. The significant impact of environmental conditions on the biological manifestations of tropical tasar silkworm, *A. mylitta* D. has been worked by Sharma *et al.* (2013) [9]. Genetic variabilities among the ecoraces of tropical tasar silkworm have been reported by Renuka *et al.* (2016) [8].

Materials and methods
Healthy and disease free tasar cocoons of three mutant strains such as Daba–blue, Daba–yellow and Daba–almond of *Antheraea mylitta* D. With its normal Daba–green (control) were collected from the rearing sites of Chaibasa (Jharkhand) and brought to laboratory conditions

at P.G. Department of Zoology, Magadh University, Bodh Gaya in view of evaluating their relative breeding performances in respect of coupling, egg laying and hatching. Uniform tasar cocoons of three mutant strains and its control was considered for the present experiment and entire grainage operations were carried out as per the methods suggested by Krishnaswamy *et al.* (1973) [6] and Jolly (1983).

Coupling: Equal number of male and female moths of three different mutant strains of *Antheraea mylitta D.* and its control were kept separately in coupling cages just after the emergence of moths under normal laboratory condition. During the period of coupling dark condition was maintained at uniform temperature and relative humidity of laboratory. The data obtained in relation to percentage of coupling of mutant strains and also its control were carefully analysed and presented in the table alongwith histogram.

Egg laying: Decoupled female moths of mutant strains and its control in equal number were selected and thereafter kept in egg laying paper boxes on filter paper under the normal laboratory conditions for three days during the breeding seasons. Total numbers of egg laid for three days by three mutant strains as well as the control were carefully recorded, analysed and presented in the table.

Hatching: Eggs laid by three mutant strains of *Antheraea mylitta* D. alongwith its control were collected separately and thoroughly washed with dilute solution of Dettol and thereafter soaked with filter paper and after removing the surface moisture of eggs were carefully packed in hatching boxes in equal numbers (200 no.).The hatching boxes made up of plastic with transparent top and perforated bottom were used during the experiment. The equal number of eggs for mutant strains and its control were kept in incubation room at temperature 30̊ C ± 1 till hatching. The percentage of hatching for three mutant strains and control were recorded separately, analysed and presented in the table and histogram. Uniform laboratory conditions were maintained at all the stages of experiments related to examine the relative breeding manifestations of all 3 mutant strains of *Antheraea mylitta.*

Results and discussion

The results obtained in relation to breeding manifestations of three different mutant strains of Daba ecotype of *Antheraea mylitta* D. have been presented in table 1 and graphical representation showing relative variation in coupling and hatching percentage of mutant strains of *Antheraea mylitta* D. has been depicted in Fig. 1. The table indicates the coupling percentage (70%, 60% and 50%), number of eggs laid (227, 206 and 170) and hatching percentage (60%, 52% and 43%) of Am–blue, Am–yellow and Am–almond. The mutant strains respectively present evident variation among themselves in respect of their relative breeding manifestations. The table further indicates that the breeding performance of Am–blue as compared to Am–yellow and Am–almond is relatively better as far as the coupling fecundity and fertility of mutant strains are concerned. However, percentage of coupling, the number of eggs laid and percentage of hatching of all three mutant strains of *A. mylitta* D. have registered their supremacy over the control (coupling 40%, number of eggs laid 170 and percentage of hatching 35%) in spite of their relative variations.

Table 1: Table showing relative variations in the breeding performances of mutant strains of *Antheraea mylitta* D.

S. No.	Mutant Strains of *A. mylitta* D.	Av. Coupling (%)	Av. Number of eggs laid	Av. Hatching (%)
1	Am –blue	70.0	227	60.0
2	Am –yellow	60.0	206	52.0
3	Am –almond	50.0	193	43.0
4	Control Am –green	40.0	170	35.0

Am – *Antheraea mylitta* ** - Highly Significant * - Significant
C.D. at 0.5% level for characters**,*, *

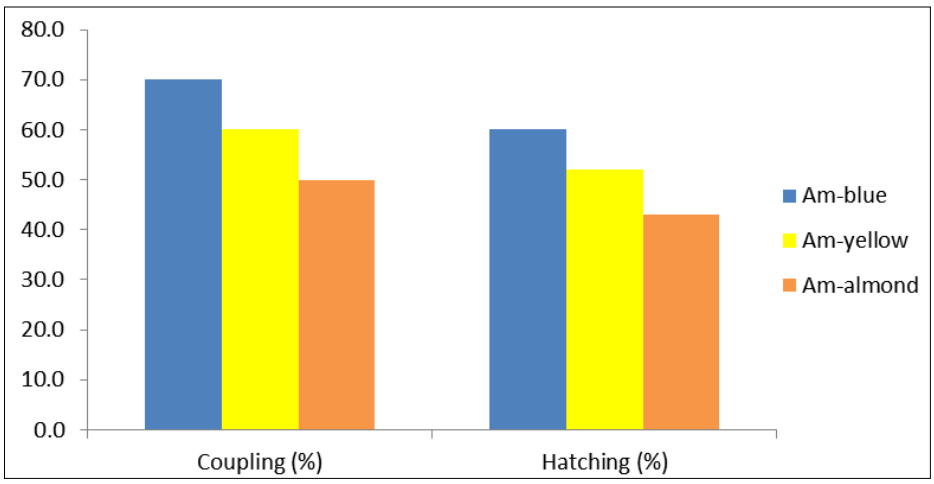

Fig 1: Histogram showing relative variation in coupling and hatching percentage of mutant strains of *Antheraea mylitta* D.

Conclusion

The results obtained appear to be the outcome of genetic variability among the three mutant strains of *A. mylitta* D. on account of relative differences in their physio–genetic makeup. It further appears that the Am–blue mutant strain as compared to Am–yellow and thereafter Am–almond is more robust in its genetic architecture as such it has shown relatively better breeding manifestation. Results obtained are indicative of the fact all the three mutant strains of *A. mylitta* D. in spite of relative differences have registered their

supremacy over the control (Daba–green) on account of desired beneficial mutation in relation to their breeding activities. Thus the evolution of three distinct mutant strains of tropical tasar silkworm is in the larger interest of tasar culture. The said results are very much unconformities of earlier investigations carried out by Jolly *et al.* (1969) [4], Ahsan *et al.* (1975) [1].

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