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Relative variations in the rearing performances of mutant strains of *Antheraea mylitta* D. (Saturniidae: Lepidoptera) during seed crop season and commercial crop season

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Abstract
The present communication accounts for the relative variations in respect of rearing performances of three mutant strains viz; Daba–blue, Daba–yellow and Daba–almond evolved from the Daba ecotype of *A. mylitta* D during the Seed Crop Season (July- August) and Commercial Crop Season (September-October). Results obtained are indicative of the fact that the three mutant strains of *A. mylitta* D. differ among themselves in respect of their rearing performances. The rearing performances of Daba–blue have been found evidently better than the Daba–yellow and Daba–almond. Commercial crop Season has registered its supremacy over Seed crop season in respect of rearing performances among the 3 mutant strains of *A. mylitta* D. 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 *A. mylitta* D.

Keywords: ecotype, cocoon weight, shell weight, shell ratio, filament length

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) [2] 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) [2] presented details of species variations in the genus *Antheraea* producing vanaya silks. Fristrom (1965) [8] found variation in morphological characters of mutant strains of Drosophila melanogaster. Krishnaswamy *et al.* (1973) [4] developed desired methods of silkworm culture under different conditions. Sharma *et al.* (1990) [5] reported significant variations in quantitative and qualitative characters among different ecotypes of *Antheraea mylitta* D. 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) [13]. Genetic variability among the ecoraces of tropical tasar silkworm have been reported by Renuka *et al.* (2016) [12].

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. along with its normal Daba–green (control) were collected from the Seed Supply Centre, Chaibasa (Jharkhand) and also from the Field Laboratory, Nagari, Ranchi. The collected cocoons were put under Normal laboratory conditions in the Post Graduate Department of Zoology, Magadh University, Bodhgaya for proper acclimatization for a week and thereafter, assorted and analysed as per the method suggested by Krishnaswamy (1973) [4]. The entire grainage operations were carried out during seed crop (July- August) and Commercial Crop Season (September-October), as per the methods suggested by Jolly *et al* (1983) [10]. The method involves proper examination of coupled female moths for disease free egg laying and thereafter, the eggs were washed in 2% formalin solution and soaked with filter papers. The eggs were then incubated at 30^0C till hatching of the first instar larvae.

The newly hatched larvae of mutant strains were brushed on *Terminalia arjuna* plants and were reared on the foliages of Arjuna Plant till cocoon formation. The rearing of different mutant strains with their control was carried out for both the seasons. The data in respect of E.R.R. (Effective Rate of Rearing), Cocoon weight, Shell Weight, Shell Ratio and Filament length were recorded carefully for each set of mutant strain and control. The data were further statistically analysed, correlated and finally presented in the tables.

Results and Discussion
The rearing performances of three mutant strains of *Antheraea mylitta* D. namely Am-blue, Am-yellow and Am-almond with different body colours along with its control in respect of Effective Rate of Rearing (E.R.R%), Cocoon weight, Shell weight, Shell ratio, Peduncle length and total

period of cocoon formation during the seed crop (July-August) and commercial crop (September- October) seasons have been evaluated and results so obtained in respect of relative rearing performances of three different mutant strains of *Antheraea mylitta* are recorded in tables 1 and 2..

Table 1 reveals the relative rearing performances of three mutant strains during the seed crop season. Table indicate that the E.R.R% (40.0, 37.0, 33.0%), cocoon weight (11.83, 11.21 and 11.15 gms.), shell weight (1.53, 1.32 and 1.25 gms.), shell ratio (11.90, 11.21 and 10.95%), peduncle length (2.0,1.6 and 1.2 cm) and total period of cocoon formation (28,32 and 34 days) of Am- blue, Am-yellow and Am-almond respectively present evident variations in their rearing performances among themselves but evidently superior than its control having E.R.R (29%), cocoon weight (10.93 gm.), shell weight (1.20 gm), shell ratio (10.48%), peduncle length (1.0 cm) and total days of cocoon formation (40 days).

Likewise table 2 accounts for the relative rearing performances of three mutant strains of *Antheraea mylitta* during the commercial crop season. Table clearly shows that E.R.R. (42.0, 39.0 and 35.0%), cocoon weight (11.89, 11.28 and 11.25 gms.), shell weight (1.60, 1.38 and 1.35 gms.), shell ratio (12.10,11.61and 11.10%), peduncle length (2.4, 1.8 and 1.4cm.) and total period of cocoon formation (26, 30 and 32 days) of Am-blue, Am-yellow and Am-almond mutant strains of *Antheraea mylitta* present evident variations among themselves in their relative rearing performances. However, the relative rearing performances of all the three mutant strains have been found superior to its control having the E.R.R. (31.0%), cocoon weight (11.10 gm.), shell weight (1.29 gm), shell ratio (10.98%), peduncle length (1.1 cm.) and total period of cocoon formation (38 days).

Table 1: Table showing relative rearing performances of 3 mutant strains of *Antheraea mylitta* during seed crop season

Sl. No.	Parameters of rearing	Am-Blue	Am-yellow	Am-almond	Control	C.D. at 0.5% level for Characters
1	E.R.R (%)	40.0	37.0	33.0	29.0	**
2	Cocoon weight (gm)	11.83	11.21	11.15	10.93	*
3	Shell weight (gm)	1.53	1.32	1.25	1.20	*
4	Shell ratio (%)	11.90	11.21	10.95	10.48	*
5	Peduncle length of Cocoon (cm)	2.0	1.6	1.2	1.0	N.S.
6	Total period of Cocoon formation (days)	28	32	34	40	*

E.R.R. = Effective Rate of Rearing Am = *Anthearea mylitta* N.S. = Not significant * = Significant ** = Highly Significant

Table 2: Table showing relative rearing performances of 3 mutant strains of *Antheraea mylitta* during Commercial crop season

Sl. No.	Parameters of rearing	Am-Blue	Am-yellow	Am-almond	Control	C.D. at 0.5% level for Characters
1	E.R.R (%)	42.0	39.0	35.0	31.0	**
2	Cocoon weight (gm)	11.89	11.28	11.25	11.10	*
3	Shell weight (gm)	1.60	1.38	1.35	1.29	*
4	Shell ratio (%)	12.10	11.61	11.10	10.98	*
5	Peduncle length of Cocoon (cm)	2.4	1.8	1.4	1.1	N.S.
6	Total period of Cocoon formation (days)	26	30	32	38	**

E.R.R. = Effective Rate of Rearing Am = *Anthearea mylitta* N.S. = Not significant * = Significant ** = Highly Significant

A comparative analysis in relation to rearing performances of three mutant strains of *Antheraea mylitta* along with its control during the seed crop and commercial crop seasons reveals the under given facts:

- Results obtained are indicative of the fact that all the three mutant strains of *antheraea mylitta* differ among themselves in their relative rearing performances during the seed crop and commercial crop season.
- Among the three mutant strains of *Antheraea mylitta* the rearing performances of Am-blue mutant strain is relatively better than Am-yellow and Am-almond mutant strain. It follows the given preferential order:

Am-blue > Am-yellow > Am-almond

- The rearing performances of all the three mutant strains in spite of their differences have been evidently found superior than the control during both the seasons of rearing.
- The relative productivity and quality of tasar cocoons are significantly superior to control.
- The relative rearing performances of all the three mutant strains of *Antheraea mylitta* along with its control are by and large better during the commercial crop season than the seed crop season which reveals the significant impacts of seasonal differences on the rearing performances of mutant strains along with its control.

The results obtained appear to be the outcome of genetic variabilities 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 performances in various rearing parameters. 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 rearing performances. 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) [2], Ahsan *et al.* (1975).

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