# FOOD PLANT VARIETAL EFFECT ON THE REARING AND GRAINAGE OF MUGA SILKWORM, *ANTHERAEA ASSAMENSIS* HELFER, 1837

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**[Singh, N. I. & Goswami, D.** 2012. Food plant varietal effect on the rearing and grainage of Muga Silkworm, *Antheraea assamensis* Helfer, 1837. Munis Entomology & Zoology, 7 (2): 1023-1027**]**

ABSTRACT: The food plant varietal effect of muga silkworm, *Anthereae assamensis* Helfer was analysed on the six characters viz. effective rate of rearing (ERR), cocoon weight, cocoon shell weight, cocoon shell ratio (SR%), percentage of valid moth and fecundity by rearing on Som, *Persea bombycina* Kost. and Soalu, *Litsea polyantha* Juss during five different seasons. We observed higher cocoon weight in soalu than that of som while shell ratio was significantly higher in som than that of soalu in most of the seasons. In grainage parameters, soalu exhibited significant higher values than som in all the seasons indicating its superiority as seed crop. It can be deduced that commercial rearing of muga silkworm *Anthereae assamensis* Helfer can be taken up on both the food plants while for seed crop rearing should be conducted on soalu plants irrespective of seasons.

KEY WORDS: Muga, som, soalu , rearing, grainage.

The muga silkworm, *Anthereae assamensis* Helfer feeds on a wide range of host plants (Choudhury, 1982, 2005; Thangavelu et al., 1988; Barah et al., 1992; Singha & Das, 1999; Chakravorty, 2004; Saikia et al., 2004; Bindroo et al., 2009) among which Som, *Persea bombycina* Kost. and Soalu, *Litsea polyantha* Juss are the primary food plants of this silkworm and most of the traditional rearers prefer to rear on these two food plants for production of muga silk cocoons. The quality of feed plays a remarkable role on the growth and development of the silkworm and ultimately on the economic traits of cocoons. The nutritional status of the leaves of the different plants varies in the different seasons. The present study has been undertaken to make a comparative evaluation of the two popular varieties of muga food plants through bioassay with regard to the rearing performance and grainage performance particularly valid moth percentage and fecundity during five different rearing seasons.

## MATERIALS AND METHODS

The rearing was conducted in outdoor on the foliages of som, *Persea bombycina* Kost. and Soalu, *Litsea polyantha* Juss during five seasons viz. Aherua (June-July), Bhadia (August-September), Early kotia (September-October), Agherua (November-December) and late Jarua (January-February) under nylon net cover by providing sufficient space between food plants and nets for better aeration. Nylon nets were used as shade during day time and to protect from pests and predators during night. Chawki rearing was conducted on the tender leaves sprouted from the timely pruned plants while the late stage rearing was conducted on semi mature leaves. The rearing plots were well disinfected before rearing. The bioassay consists of four replications in each food plant variety with two hundred worms per replication.

For evaluation of rearing performance, four yield contributing parameters viz. effective rate of rearing (ERR %), single cocoon weight, cocoon shell weight, cocoon shell ratio (SR %) were considered. To examine the varietal effect of the food plants on grainage performance of the harvested cocoons, valid moth percentage of the emerged moths and fecundity were recorded. Data were statistically analysed. The rearing and grainage performances on both the food plants during each season were compared using the Student t-test and the probability $\propto$ = 0.05 was taken as the critical value for all tests. The ranking of the different species and breeds were worked out by following the multiple trait evaluation index method of Mano et al. (1992, 1993) which is outlined as follows-

Evaluation Index (EI) = $\frac{A-B}{C} x\ 10 + 50$

where,

A=individual value of the genotype

B = average value of the particular trait of the genotypes,

C = standard deviation of the particular trait,

10 = standard unit,

50 = fixed value.

Evaluation index values for individual characters for each genotype were calculated and average cumulative index value of the five characters under study was obtained. The genotype which recorded average index values of >50 was considered for selection and the genotypes which recorded average index value of <50 were considered as inferior.

## RESULT AND DISCUSSION

The rearing performances of the muga silkworm *Anthereae assamensis* Helfer on som and soalu during five different seasons are shown in table-I. The t-test indicated significant ($p < 0.05$) food plant differences among the parameters viz. valid moth percentage and fecundity in any given season. The rearing on soalu exhibited significant higher values in these parameters than that of som which indicates that soalu is suitable for seed crop rearing. In ERR%, significant difference was not observed in both the food plants during the four rearing seasons viz. "Aherua', "Bhodia', 'Early Kotia, and 'Aghanua', while significant variation was observed in this trait on both the food plants during 'Late Jarua. During this season, the ERR% on Soalu was significantly higher than that of Som. In cocoon weight and shell weight significant differences were not observed in both the food plants. During 'Aherua' and 'Aghanua' Cocoon Shell ratio on Som was significantly higher than that of Soalu while during early Kotia crop, this value was significantly higher on Soalu.

The evaluation index values of the four important yield contributing characters viz. effective rate of rearing (ERR %), single cocoon weight, cocoon shell weight and cocoon shell ratio (SR %) of muga silkworm *Anthereae assamensis* recorded from the rearing on the foliages of som and Soalu during five different seasons viz. Aherua, Bhodia, Early kotia, Aghanua and Late Jarua crops are shown in table II. Results revealed that none of the food plants was superior in all the characters during the five rearing seasons. Each plant exhibited superiority in certain characters during particular seasons only. Similar

observation has been reported in mulberry silkworm (Asma Maqbool et al., 2005).

During 'Aherua' crop rearing on 'soalu' showed superiority to 'som' by exhibiting individual EI values of >50 in five characters with cumulative EI value of 55.23, while the rearing on 'som' exhibited individual EI value of >50 in three characters with cumulative EI value of 50.28 thereby indicating that soalu is a better food plant during this season. However, the table-II revealed that 'som' is a better for commercial rearing while for seed crop rearing 'soalu' is suitable during this season.

In 'Bhodia' crop rearing on 'soalu' revealed higher individual EI values in cocoon weight, valid moth% and fecundity, while in shell weight higher EI value was shown by 'som'. During this season also it is found that rearing on 'soalu' is suitable for seed crop. During Early-kotia, both the food plants registered EI values of >50 in all the characters. Soalu exhibited highest cumulative EI value and highest individual EI values in cocoon weight, shell weight, valid moth % and fecundity. During 'Aghanua' crop, both the food plants exhibited individual EI values of >50 in four characters each. Highest EI values in SR% was shown by 'som', while highest EI values in ERR% and fecundity was shown by 'soalu'.

During late Jarua 'soalu' showed superiority to 'som' by registering individual EI values >50 in five characters viz. cocoon weight, shell weight, shell ratio, valid moth percentage and fecundity with cumulative EI value of 58.37 while, som exhibited individual EI values >50 in two characters only viz. cocoon weight and shell ratio.

In *Bombyx mori,* the nutritional elements of mulberry leave determine the growth and development of the larvae and cocoon production (Seidavi et al., 2005). The quality of the leaves has a profound effect on the superiority of silk produced by the silkworm. Leaves of superior quality enhance the chances of good cocoon crop (Ravikumar, 1988). The quality of feed plays a remarkable role for growth and development of the silkworm and ultimately on the economic traits of cocoons (Hazarika et al., 2003, 2005; Gangwar, 2010; Kumar & Vadamalai, 2010). In muga silkworm, *Anthereae assamensis* Helfer also nutrition plays an important role in improving the growth and development of the silkworm. The rearing on soalu plant showed shorter larval duration and higher cocoon weight than that of som while in silk quality cocoons from som exhibited superior quality (Saikia et al., 2004). Chakrovorty et al. (2004) reported higher weight of first and second instar larvae fed on soalu than that of the larvae fed on som and Digloti (*Litsaea salicifolia*) while higher moulting percentage was observed in first and second instar larvae fed on som. In the present study, we observed higher cocoon weight in soalu than that of som while shell ratio was significantly higher in som than that of soalu in most of the seasons. In grainage parameters, soalu exhibited significant higher values than som indicating its superiority as seed crop. It can be deduced that commercial rearing of muga silkworm *Anthereae assamensis* Helfer can be taken up on both the food plants even though rearing on soalu has shown better performance while for seed crop, rearing should be conducted on soalu plants irrespective of seasons.

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Table I. Rearing and Grainage parameters (Mean± standard Deviation) of *A. assamensis* Helfer during different rearing seasons on two different food plants.

| Season | Type of food plant | E.R.R. % | Cocoon Weight (g) | Shell Weight (g) | SR % | Valid Moth % | Fecundity |
|---|---|---|---|---|---|---|---|
| Aherua | Som | 47.70±2.2 | 5.25±0.24 | 0.4± 0.03 | 7.65±0.22 | 55.33±3.05 | 127±4 |
| | Soalu | 52±2 | 6.10± 0.2 | 0.46±0.02 | 6.64±0.2 | 67±3.25 | 140±3 |
| | "t" value | 2.47 | 2.50 | 1.25 | 6.24 * | 11.50* | 3.46* |
| Bhodia | Som | 37.90±3.3 | 8.00±0.5 | 0.52±0.03 | 6.25±0.27 | 60± 2 | 135±5 |
| | Soalu | 39.50±3.5 | 8.5±0.2 | 0.51±0.02 | 5.92± 0.3 | 80.00±4 | 142±3 |
| | "t" value | 1.41 | 1.32 | 1.25 | 1.55 | 9.5* | 6.75* |
| Early kotia | Som | 62.00±2 | 7.70±0.03 | 0.52±0.03 | 6.48±0.22 | 64.00±3 | 142 ±4 |
| | Soalu | 60.00± 3 | 8.60±0.2 | 0.57±0.02 | 6.90±0.3 | 83±4 | 150 ±6 |
| | "t" value | 1.16 | 1.90 | 0.69 | 3.2* | 11.42* | 3.17* |
| Agherua | Som | 60.00±2 | 5.20±0.24 | 0.42±0.03 | 8.08±0.22 | 72±5 | 142 ±5 |
| | Soalu | 63.30±3.5 | 5.50±0.32 | 0.43±0.04 | 7.8 ±0.20 | 75± 3 | 150±3 |
| | "t" value | 2.49 | 2.86 | 0.5 | 12.5* | 7.68* | 3.98* |
| Late Jarua | Som | 36.60±3.5 | 6.30±0.02 | 0.44±0.02 | 6.98±0.24 | 61.50±4.2 | 140± 3 |
| | Soalu | 41± 2 | 6.50±0.25 | 0.5±0.03 | 7.69±0.3 | 80.50±3 | 145±5 |
| | "t" value | 8.5* | 1.19 | 1.5 | 1.43 | 7.36* | 8.53* |

*significant at p=0.05

Table II. Evaluation indices for six traits of muga silkworm on two different food plants during five seasons.

| Crops | Food plant | ERR% | Cocoon wt. | Shell wt. | SR% | Valid moth | Fecundity | Cumulative E.I |
|---|---|---|---|---|---|---|---|---|
| Aherua | Som | 51.71 | 42.33 | 52.08 | 66.16 | 43.0 | 46.95 | 50.28 |
| | Soalu | 55.15 | 48.72 | 54.17 | 52.33 | 54.90 | 66.12 | 55.23 |
| Bhodia | Som | 42.08 | 63.0 | 66.67 | 46.98 | 47.77 | 58.75 | 54.2 |
| | Soalu | 43.56 | 66.76 | 64.58 | 42.46 | 68.15 | 69.07 | 59.09 |
| Early Kotia | Som | 64.4 | 60.75 | 66.67 | 50.14 | 51.84 | 69.07 | 60.48 |
| | Soalu | 62.57 | 67.52# | 77.08# | 55.89 | 71.21# | 80.87# | 69.19* |
| Aghanua | Som | 62.57 | 41.95 | 45.83 | 72.05# | 60.0 | 69.07 | 58.58 |
| | Soalu | 65.63# | 44.21 | 47.92 | 68.49 | 63.05 | 80.87# | 61.69 |
| Late Jarua | Som | 40.88 | 50.23 | 50.0 | 56.98 | 42.67 | 46.95 | 47.95 |
| | Soalu | 44.95 | 51.73 | 62.5 | 66.71 | 50.83 | 73.49 | 58.37 |

# Highest value of the trait, * highest evaluation index value