

SUMMARY

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1. Three lepidopteran tea pests, *Buzura suppressaria*, *Eterusia magnifica* and *Euproctis latisfascia* commonly occurred in tea plantations of Darjeeling Terai (foothills and plains). While *B. suppressaria* mostly attacked the younger leaves of full grown tea bushes, *Et. magnifica* was largely confined to the mature leaves of middle tier and *E. latisfascia* frequented the lower tier on old and senescent leaves.
2. Host preference tests conducted with the above three folivores on three common clonal varieties (Tv₁, Tv₁₈ and Tv₂₆) revealed that all the three varieties were consumed by the three folivores. However, early and late instars of *B. suppressaria* and *Et. magnifica* showed a clear preference for Tv₂₆ and *E. latisfascia* (early and late instars) had a preference for Tv₁₈.
3. Allometric growth study indicated the different patterns of growth among the three lepidopteran tea pests. Such a study can help in distinguishing the developing instars of the above three folivorous species based on the measurement of different parts of the body. Further, the difference in the slope (k) and intercept (b) values also reflected the differential growth patterns of the three species. The morphometric study also indicated a gradual increase of the different parts of the body along with the age.

4. In the present study, artificial diets for the rearing of *B. suppressaria*, *Et. magnifica* and *E. latisfascia* under the laboratory condition was established for the first time.
5. Comparative study on performance of the three lepidopteran tea pests on natural (tea leaf) and artificial diets were done. Artificial diets were found to be almost equally capable of supporting growth and development of the three folivores like that of their natural diets.
6. Regression values based on daily food consumption and larval body weight change showed that these two variables were closely related on both the diets irrespective of the stages in *B. suppressaria* and *E. latisfascia*. However, *Et. magnifica* showed a less relationship between the two variables.
7. Survivorship study of each species on natural (tea leaf) and artificial diets indicated similar pattern of curves on both the diets. Percentage of mortality shows parallel trends on both the diets. The number of survivors (emerging adults) were almost equal (20%) for *B. suppressaria* and *E. magnifica* but number was somewhat less (10%) in *E. latisfascia*, possibly for its complete rearing from egg to egg on artificial diet.
8. The nutritional quality of the artificial diet could be judged by stable growth and development of all the three species. In general the duration of different developmental stages (stadium) and life cycles were found to be shortened on artificial diet than on natural diet. In *B. suppressaria* third,

fifth and pupal durations were shorter on artificial than on natural diet. *Et. magnifica* showed almost similar result where the third and fourth larval durations were shorter on artificial diet than on natural diet. In *E. latisfascia*, second, fourth, fifth instar and pupal stadia durations were shorter on artificial diet.

9. Under reproductive performance the study on changes in body mass for the pupa and adults on both the diets indicated that the natural diet influenced formation of heavier females in *B. suppressaria* and *Et. magnifica* than on artificial diet, while the situation was reverse in case of *E. latisfascia*. No differential influence of the diets could be noted on adult emergence and longevity.
10. In general higher relative consumption rate (RCR) and relative growth rate (RGR) were recorded in all the three species on natural diet despite higher maintenance cost as compared to that on artificial diets. Such higher maintenance cost on natural diet indicated a greater utilization of energy for keeping up the metabolic functions of the body.
11. The RCR and RGR values of *B. suppressaria* were found to be higher than that of *Et. magnifica* both in fourth and fifth instars on natural diet which can be related with higher nutritional quality of its food (tea leaf). An enhanced RGR value for *B. suppressaria* was matched with a higher AD (Approximate digestibility).

12. The RCR value of *E. latisfascia* was recorded to be higher than the other two folivorous species (*B. suppressaria* and *Et. magnifica*) on natural diet. Higher RCR was matched with lower RGR value indicating compensatory feeding to mitigate the less amount of nutrients from food.
13. In general, the RCR was lower in all the three folivores on artificial diet but a higher RGR indicated nutritional adequacy of the artificial diet. RCR of *B. suppressaria* and *Et. magnifica* were higher on artificial diet at the penultimate stage showing a better adaptation of these folivores at the advanced stages on artificial diet. In spite of lower RCR on artificial diet in *E. latisfascia*, RGR was higher on both the stages on artificial diet showing a better performance on artificial diet.
14. Approximate digestibility (AD) on natural diet showed to be higher for *B. suppressaria* followed by *Et. magnifica* and then *E. latisfascia*. On artificial diet AD value of *Et. magnifica* was found to be lowest compared to the other two species. The higher AD indicated better quality of the food consumed by three lepidopteran tea pests.
15. In all the three species, efficiencies of conversion of ingested (ECI) and digested (ECD) food, in general were higher on artificial diet than on the natural diet. The only exception was the fourth instar of *B. suppressaria*.
16. Higher the maintenance cost, lower is the accumulation of energy indicated by a lower production index. This was found to be true for *E. latisfascia* on natural diet. However, high production index on artificial diet

in all the three species in advanced stages indicated that the utilization of the nutrients (present in the diet) took place.

17. Biochemical analysis of the plant nutrients and the corresponding body mass of the larvae reflected an efficient system of conversion of the nutritional components present in the natural and artificial diets by all the advanced larvae of the three lepidopteran tea pests.

18. The proportion of conversion of nitrogen from artificial diet to body mass was found to be much higher on artificial diet than on natural diet. This may be due to the absence of polyphenolic compounds in artificial diet interfering with the available nitrogen in the diet.

19. The accumulation of lipid in the artificial diet-reared larvae showed concentration of lipid (despite a lipid poor diet) supporting their normal growth and development.

20. The significant role of moisture was evident by the better performance of the folivores on the natural diet having higher amount of moisture.

21. Judging by the overall performance of the three lepidopteran species, artificial diet could be evaluated as a viable alternative resource for rearing of these tea pests. Such a maiden attempt, hopefully, would serve several purposes connected with basic and applied researches on tea pests. Nevertheless, there is still room for improvement of the diets for developing rearing facilities of these lepidopteran pests.