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EFFECT OF WEIGHT LOSS DURING PUPAL STAGE ON THE HATCHING OF EGGS IN *LEUCINODES ORBONALIS* (GUEN) (PYRALIDAE:LEPIDOPTERA)

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RESUMO: A perda de peso durante o estádio pupal desenvolvido em diferentes plantas hospedeiras foi quase a mesma; mas a taxa de perda de peso diferiu de hospedeiro para hospedeiro. O número de ovos depositados pela mariposa foi diferente em hospedeiros diferentes. O número de ovos eclodidos também variou de hospedeiro para hospedeiro. Isto mostra que a fertilidade deste inseto foi afetada pela planta hospedeira. A taxa de peso corporal por dia durante o estágio pupal foi inversamente proporcional aos ovos subsequentemente eclodidos.

ABSTRACT: Weight loss during the pupal stage in rearing on different host plants was almost the same; but the rate of weight loss differed from host to host. The number of eggs oviposited by the moth was different on different hosts. The number of eggs hatched also varied from host to host. This shows that the fertility of this insect was affected by the host plants. Rate of weight loss per day during the pupal stage was inversely proportional to the subsequent hatching of the eggs.

INTRODUCTION

It was observed earlier that phytophagous insects viz , *Diaphania indica* (PANDEY, 1974) exhibits the tendency of weight loss/day in pupal stage, which is inversely proportional to the hatching of eggs. Sufficient data on applicability of this relationship in other phytophagous insects is still lacking. The present investigation deals with the relationship between weight loss during pupal stage and the hatchability of eggs in *Leucinodes orbonalis* reared on different host plants.

MATERIAL AND METHODS

The experiment was conducted under the laboratory conditions from November 1987 to January 1988 during which the temperature ranged from 11 to 25°C and R. H. varied from 41 to 86%. The five food plants brinjal long violet, brinjal white long, brinjal round purple, tomato and potato were grown in separate plots. Tender and fresh food was used to rear the insects obtained from laboratory maintained on separate diets of the above food plants for one generation The study was conducted as follows:

Weight gained by Larvae and weight loss during pupal stage. The experiment for each food plant consisted of three replicates, each with 20 larvae. The larvae were reared in small beakers covered by fine muslin cloth. They were provided with fresh food material twice a day, once in the morning and once in the evening, until pupation. Larvae were weighed everyday from third instar to the last day of the larval stage. Similarly, the weight of the pupae was also recorded until the date of emergence and the pupal duration was noted. Weight loss during pupal stage was calculated by deducting the weight of the prepupa. The rate of weight loss/day during the pupal stage was calculated by dividing the total weight loss during pupal stage by dividing the total weight loss during pupal stage by respective pupal duration.

Egg production and hatching of eggs. After emergence of the moths, the five pairs of moths of each food plants were selected and maintained with respective host tissue and accordian folded paper in a glass chimney whose top was covered by muslin cloth. The moths were provided with 20% sugar solution in cotton bolls. Total number of eggs laid by the female during her life time was recorded. Eggs obtained from the female were kept on moistened filter paper for eclosion When the eggs hatched, the percentage of hatching was recorded. The above records were obtained for females reared as larvae separately on five food plants.

RESULTS

Weight gained by larvae and weight lost during pupal stage. The results are summarised in Table 1 There is difference in the weight of the prepupa with respect to different food plants. It is minimum (88.0 mg) on potato but

the maximum (91 5 mg) on brinjal long violet Analysis of variance test detected the significant difference in the weight of the prepupa, in response to rearing on different food (P 0.05) On the basis of the weight of the prepupa, the food plants may be arranged as brinjal long violet, brinjal white long, brinjal round purple, tomato and potato. Weight loss during pupal stage is almost equal irrespective of difference in food plants but the rate of weight loss varied among different food plants.

Egg production and hatching. The number of eggs laid by *L. orbonalis* differed mostly from food to food (Table 2) Hatching of the eggs also differed significantly from plant to plant. It was the highest (96%) on brinjal white long and the lowest on potato (88%) None of the tested food plants induced cent per cent hatching of eggs. It varied from 88-96% in response to rearing on different food plants (P 0.05) On the basis of percentage of hatchability, the host plants may be arranged as brinjal-white long, brinjal long violet, brinjal round purple, tomato and potato.

The data of the Table 1 show that the total weight loss during pupal stage is almost the same irrespective of the kind of food plants. This suggests that the weight loss during the pupal stage does not depend on the kind of which larvae were reared. The data of the Table 2 show that the hatching of eggs is independent of the weight loss during preceeding pupal stage. Coefficient of correlation between hatching and weight loss comes to -0.40; observed value of t(t=0.94) for the sample in hand is much less than the Table value 2.20 at 11 degree of freedom. As such, the hypothesis that hatchability of eggs is independent of weight loss during pupal stage is very well tennable. Fig. 1 also points the same.

Table 1 also shows that the rate of weight loss (R) differed from host to host. Fig. 2 representing the hatching of the eggs (H) against reciprocal of the rate of weight loss (1/R) shows a line fit with non-zero slope and zero intercepts. This indicates the relation HR = k (H = hatchability of eggs, R = rate of weight loss during pupal stage and k = constant) The differential response of pupa to the weight loss per day may be either due to variation in the temperature and R. H. But, since all the experimental materials were subjected to similar variation in temperature and R.H., so the variation in temperature and R.H. can not be accounted to differentiate rate of weight loss in relation to host plants tested

DISCUSSION

Our findings confirm the relation (HR = k) proposed by PANDEY (1974) in *Diaphania indica*. In *L orbonalis* also, the hatchability of eggs is inversely proportional to the rate of weight loss during the pupal stage. Evidently, the hatchability of eggs differs from plant to plant, because different plants induce different rates of weight loss during the pupal stage. PEPER AND HASTING (1943) have reported that the unsaturated fatty acid, Linoleic acid, is essential for normal growth and development In this insect also, this acid or other fatty acids may be essential for normal growth and development. The defficiency of this fatty acid, perhaps disturbs the normal rate of metabolism and therefore, depending on the extent of defficiency, the rate of weight loss during pupal stage in *L. orbonalis* differs from plant to plant. ROBERTSON AND SANG (1944) have reported that the variation in vitamin content of food induces the hatching of eggs. Therefore, in this insect it appears that the variation in the vitamin content is responsable for variation in weight loss when the insect is reared on different food plants. Further investigation which is in progress in our laboratory is likely to confirm this.

Our results show that the fecundity and fertility is affected differently by different host plants. However, BRANSON AND ORMAN (1967) and DANIEL (1969) have reported that the fertility is not affected by alternate host plants.

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Table 1 **Weight loss in *Leucinodes orbonalis* during pupal stage**

Host plant	Wt. of prepupa	Wt. of pupa on last day of pupal stage	Av.Wt. loss during pupal stage	Av Pupal stage in days	Av. rate of Wt. loss per day in mg
Brinjal long violet	91 5±0.89	66.0±0.71	25.5	14.10±0.64	1.60
Brinjal white long	90.0±0.81	64.0±0.81	26.0	16.20±0.90	1.60
Brinjal round purple	89.8±0.87	62.10±0.81	27 7	16.60±0.68	1.66
Tomato	89 5±0.83	62.0±0.84	27.5	19.30±0.65	1.42
Potato	88.0±0.81	62.5±0.83	25.5	21.4±1.06	1 19

Table 2. **Fertility of *Leucinodes orbonalis* on different foods**

Host plants	Nº of eggs/ female	Nº of eggs that hatched	% of hatchability of eggs
Brinjal long violet	201.0 ± 13.32	195.0 ± 13.44	95
Brinjal white long	180.0 ± 15.08	173.1 ± 15.96	96
Brinjal round purple	169.0 ± 15.85	158.0 ± 14.38	92
Tomato	110.0 ± 17.15	98.0 ± 11.90	90
Potato	85.4 ± 10.54	76.0 ± 7.19	88

Effect of weight loss during pupal stage

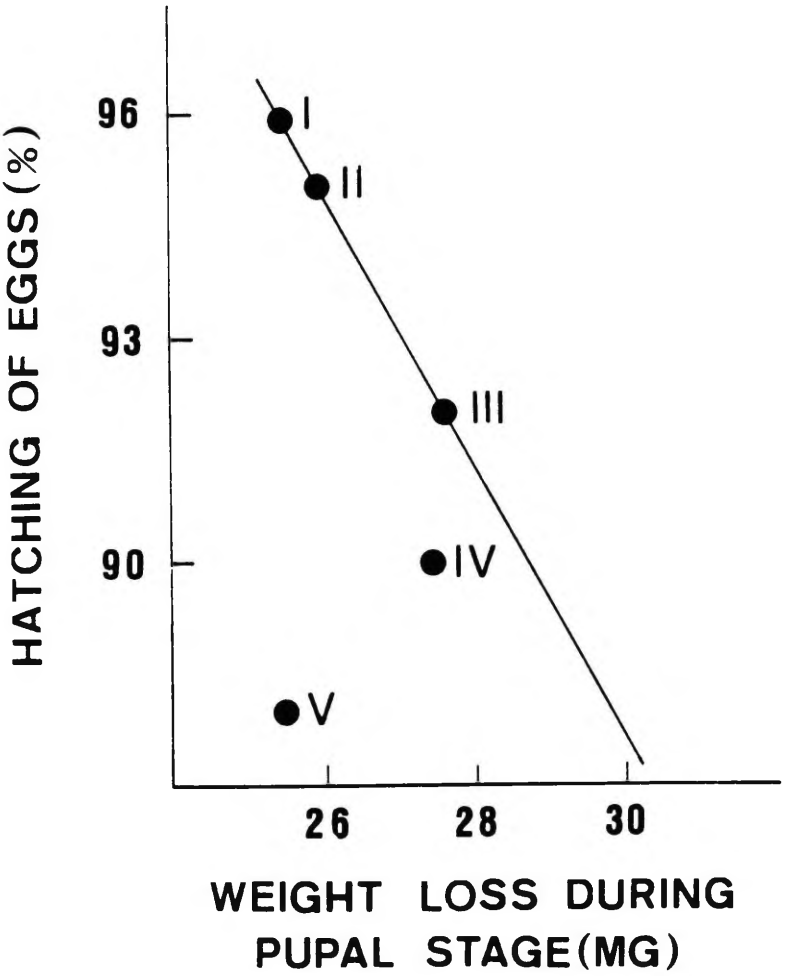

Fig. 1: Relationship between hatching of eggs and total weight loss during pupal stage; numbers indicate the serials of the food mentioned in the text

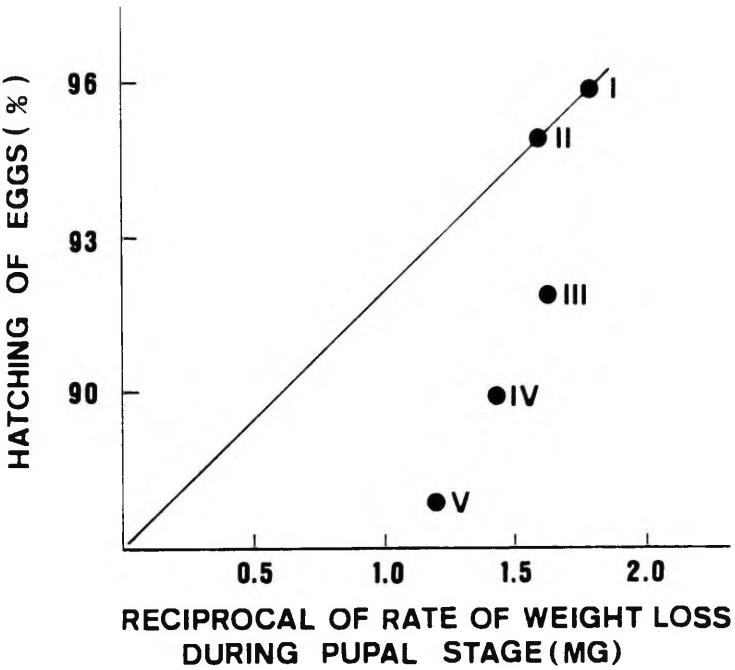

Fig. 2. Relationship between hatching of eggs and rate of weight loss during pupal stage; numbers indicate serials of the food plants mentioned in the text