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Effect of Food-Plants on Weight and Fecundity of the Adult Grasshopper, *Trilophidia annulata* Thunberg (Orthoptera: Acrididae) at Constant Temperature and Humidity

M J MOONIS and S A AZIZ
Entomology Section, Department of Zoology, Aligarh Muslim University, Aligarh

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The effect of food-plants on the weight and fecundity of *Trilophidia annulata* Thunberg was studied at 32±2°C and R.H. 65±5%.

The food-plants *Cichorium intybus* Linn., *Trifolium alexandrinum* Linn. and *Poa annua* Linn. were found to be the best food-plants for the development of this grasshopper. The fecundity is also high on these plants. On grasses like *Cynodon dactylon* L. (Pers.) and *Cyperus rotundus* Linn., the development and fecundity are adversely affected. The percentage of the drop in weight after oviposition on different food-plants ranges from 9.08 to 12.8%.

Key Words: Trilophidia annulata, Thunberg, Fecundity, Maturation

Introduction

The quality of food largely influences the growth, speed of development and fecundity in insects. This has been observed by Sanderson (1939) on *Melanoplus differentialis* Thomas., Pfadt (1949) on *Melanoplus mexicanus* Sauss., Kozhanchikov (1950) on *Locusta*, Barnes (1955) and Pickford (1958) on *Melanoplus sanguinipes* F., Phipps (1950) on *Locusta*, Norris (1954, 1959) on *Schistocerca gregaria* Forsk. and *Nomadacris septemfasciata* Serv. and Karelina (1960) on *Chorthippus albomarginatus* Deg. etc.

Materials and Methods

Ten pairs of the newly emerged adults of *Trilophidia annulata* obtained from the stock maintained in the laboratory were reared in large glass jars, measuring 20 cm×15 cm. The jars were placed in the incubator at 32±2°C and 65±5% RH. Each pair was reared in a separate glass jar and fed on a particular food daily. The weight after emergence was recorded on alternate days to study the relation between the weight and maturation. Percentages of increase in weight from emergence to maturity and fall

in weight after oviposition were determined. The number of egg-pods were counted throughout the life of each pair. Egg counts were recorded from each pod.

Results

There was a marked difference in the increase in weight of females and males from the time of emergence to maturation when fed on different food-plants (table 1, and figure 1). The increase in weight in females was maximum on *Cichorium intybus*, (73.62%) and minimum (32.57%) on *Cynodon dactylon*, while in males it was maximum on *Poa annua* and *Triticum aestivum* and was almost the same on other plants. It may be observed from table 1 and figure 2 that the mean percentage drop in weight after the first oviposition on different food plants was almost the same. The highest drop in weight after oviposition was on *Trifolium alexandrinum* (12.8%) and the least on *Cynodon dactylon* (9.08%).

The highest number of eggs per female (138.7) were laid on *Trifolium alexandrinum* and the lowest (15.3) on *Cynodon dactylon.*

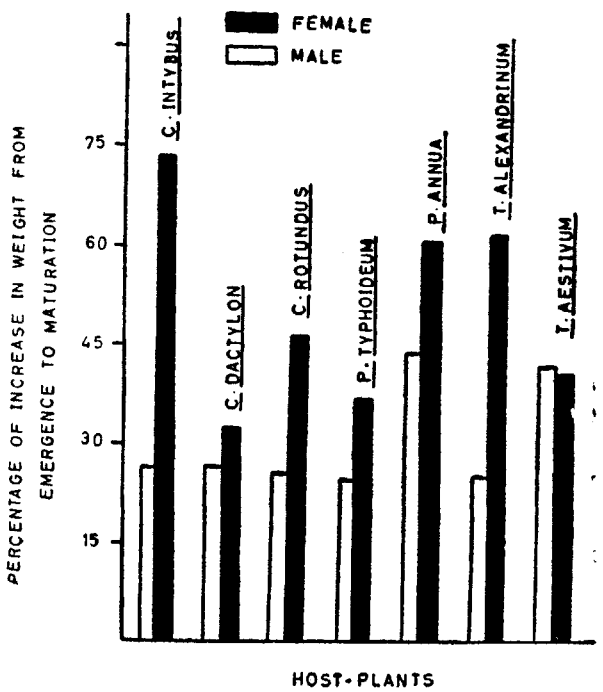

Figure 1 Percentage of increase in weight of the adult male and female from emergence to maturation of *Trilophidia annulata* Thunb. when fed on different host-plants

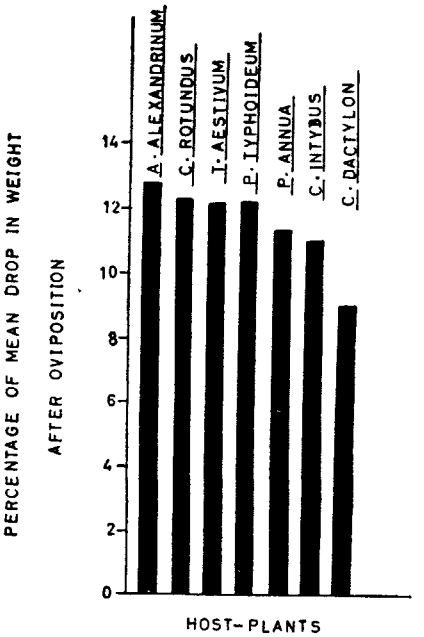

Figure 2 Mean drop in weight after first oviposition in the females of *Trilophidia annulata* Thunb. when fed on different host-plants

Discussion

Studies reveal that the food-plants have a direct effect upon the weight and maturity of insects. Similar observations were made by Norris (1954, 1959 a) in *Schistocerca gregaria* and *Nomadacris septemfasciata* and Phipps (1950) in *Locusta*. Richards and Waloff (1954) suggested that the correlation between the weight and maturation may

Table 1 *Changes in weight from emergence to maturation and the mean drop in weight after first oviposition of Trilophidia annulata Thunberg fed on different host plants at 32±2°C and 65±5% RH*

Name of the plants	Sex	Avg. wt. of adult just after emergence (mg)	Average weight of mature adult (mg)	Percentage of increase from emergence to maturation	Mean drop in weight after oviposition	
					mg	%
Cichorium intybus Linn.	Female	162.8	282.66	73.62	31.22	11.04
	Male	100.0	126.57	26.57	—	—
Cynodon dactylon L (Pers)	Female	134.63	178.40	32.57	17.40	9.08
	Male	77.00	97.50	26.79	—	—
Cyperus rotundus Linn.	Female	142.12	206.01	46.69	25.25	12.25
	Male	69.40	87.60	26.22	—	—
Pennisetum typhoideum L (Rich)	Female	136.67	186.88	36.74	22.78	12.13
	Male	81.50	101.50	24.54	—	—
Poa annua Linn.	Female	162.30	261.20	61.12	29.7	11.37
	Male	86.66	125.00	44.24	—	—
Trifolium alexandrinum Linn.	Female	162.20	263.60	61.90	33.8	12.8
	Male	81.50	111.88	25.00	—	—
Triticum aestivum Linn.	Female	174.88	246.00	40.67	29.88	12.15
	Male	79.12	113.50	42.06	—	—

Table 2 *Fecundity of Trilophidia annulata Thunberg fed on different host plants at 32±2°C and 65±5% RH (Observations based on 10 replicates)*

Name of the plant	Total no. of egg-pods	Total eggs laid	Average no. of egg-pods per female (a)	Average no. of eggs per pod (b)	Average fecundity = b × a eggs per female
Trifolium alexandrinum Linn.	108	1387	10.8	12.84	138.7
Poa annua Linn.	62	907	6.2	14.63	90.7
Cichorium intybus Linn.	70	817	7.0	11.67	81.7
Pennisetum typhoideum L (Rich)	41	591	4.1	14.41	59.1
Triticum aestivum Linn.	53	457	5.3	8.62	45.6
Cyperus rotundus Linn.	32	312	3.2	9.75	31.2
Cynodon dactylon Linn. (Pers)	14	153	1.4	10.93	15.3

determine the readiness of females in a wild population to oviposit. Iqbal (1972) observed that the weight of adult grasshopper of *Spathosternum prasiniferum* Walker. increases till maturation and fluctuates thereafter.

The food plants also had a marked effect on the reproductive potentiality of the grasshopper studied by us. Sanderson (1939) observed faster development, high survival and more egg laying in *Melanoplus differentialis* reared on soyabean plants than those reared on cotton. Pfadt (1949) observed the following plants favourable to *Melanoplus mexicanus* from the point of view of egg production (in descending order of suitability): Dandelion, Thistle, Kentucky blue grass and Western couch grass, their being a high positive correlation of 0.9 between plants which are preferred and those which afford high survival, and similarly a high correlation of 0.76 between survival and production of egg-pods. Kozhanchikov (1950) observed high fecundity in *Locusta* fed on grasses, while its reproduction was completely supressed on compositae, cruciferae and leguminosae. According to Barnes (1955), the food-plants have a stricking effect on egg-laying of *Melanoplus sanguinipes*. It laid 196 eggs per female when fed on *Sisymbrium irio* (cruciferae) and only 89 eggs on *Sorghum halepense*. Tauber et al. (1945) also observed similar effects of different food plants on the egg production of *Melanoplus bivittatus* say.

The fecundity of this grasshopper is thus adversely affected when fed on grasses like *Cynodon dactylon* and *Cyperus rotundus*, while it is accelerated on *Pennisetum typhoideum* and *Triticum aestivum*. The fecundity of this grasshopper is maximum on *Trifolium alexandrinum*, *Poa annua* and *Cichorium intybus*. It may be concluded that the above diets constitute a suitable diet for this grasshopper while *Triticum aestivum* and *Pennisetum typhoideum* may serve as the medium diet and the rest are not favourable. But in the absence of all the above diets, this grasshopper may survive on grasses like *Cynodon dactylon* and *Cyperus rotundus*.

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