

RATE OF FOOD CONSUMPTION IN THE PRAYING MANTIDS
(DICIYOPTERA : MANTIDAE) : WITH REFERENCE TO
BODY AND MANDIBULAR SIZE AND OVIPOSITION CYCLE

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The feeding behaviour of adult mantids *Euantissa pulchra* (Fabricius), *Elmantis trincomaliae* (Saussure), *Humbertiella ceylonica* Saussure and *Hierodula* sp has been observed. The relationships between the feeding rate and the size of the body, mandibles, and the interoviposition periods has been reported.

The praying mantids are the sit and wait type of predatory insects. Many authors have reported that the size of the mantids is the main feature for increased rate of food consumption (Rau and Rau, 1913; Matsura *et al.* 1975; Holling *et al.* 1976). The feeding rate is also related to the interoviposition periods in mantids. (Kramer, 1960; Holling, 1966; Matsura *et al.* 1975. With this present background knowledge of feeding behaviour an attempt has been made to study the feeding behaviour of four species of mantids in relation to the size of the body and mandibles as well as to the interoviposition periods.

MATERIALS AND METHODS

Adult mantids of both the sexes of *Euantissa pulchra* (Fabricius), *Elmantis trincomaliae* (Saussure), *Humbertiella ceylonica* Saussure and *Hierodula* sp were used for the study providing house flies as food.

RESULTS AND DISCUSSION

Relationship between mantid size and feeding rate :

In the present study it is found that all the female mantids studied are com-

paratively larger in size than their respective males. The feeding rate in the females is proportionately fixed according to their sizes and the feeding rate in the males related to the body size, is comparatively much lower than their respective females (Tables 1a and b. The above observations are in accordance with the findings reported for *Stagmomantis carolina* (Rau and, Rau 1913) and *Paratenodera angustipennis* (Matsura *et al.* 1975).

Though the body size of adult mantids is a major factor for feeding rate, the length of the body may be an additional factor to increase the rate of food consumption. All the female mantids studied are remarkably longer and their feeding rates are significantly higher than their respective males. The present observation compares with the findings reported in case of *P. angustipennis* by Matsura *et al.* (1975).

The length and width of the crop and abdomen are significantly related to each other. The abdomen with a larger sized crop stores higher amount of food. It is therefore inferred that the rate of food consumption in the mantids studied is significantly related to

Table 1: Showing the measurement (in average) of the length of body abdomen, mandibles and maximum number of house flies eaten. (Mean of five observations)

	Body length (mm)	Abdomen		Mandible (Left)		No. house flies eaten (per day)
		L (mm)	W (mm)	L (mm)	W (mm)	
A. FEMALES:						
<i>E. pulchra</i>	22.5	10.6	5.0	1.5	0.5	7.8
<i>E. trincomallae</i>	25.9	13.8	6.9	1.9	1.0	10.3
<i>H. ceylonica</i>	36.8	17.5	9.1	3.1	1.7	17.8
<i>Hierodula sp.</i>	68.4	37.2	12.8	4.5	3.0	75.0
B. MALES:						
<i>E. pulchra</i>	15.0	5.6	2.9	0.9	0.5	1.8
<i>E. trincomallae</i>	20.0	8.0	3.2	1.2	0.8	3.4
<i>H. ceylonica</i>	32.2	14.4	4.1	2.0	1.3	10.0
<i>Hierodula sp.</i>	55.6	22.4	8.0	3.2	2.5	22.6

L—Length; W—Width; mm—millimeter

the size and length of the body, abdomen as well as crop.

Relationship between the mandible size and feeding rate :

The left mandible is generally larger than the right one and is about 2 times larger in the females than in their respective males. The size of the mandibles in the males and the females studied is given in (Tables 1a & b). The mandibles project ventrally and the tip of the left mandible crosses over the proximity of the right mandible. There are 3 fully developed and chitinized teeth in the left mandible of mantids which move over the 2 in the right mandible. The molar ridge is significantly larger in the female mantids whereas it is smaller and weaker in their respective males. The molar ridges and the size of the

mandibles in the female of *E. pulchra*, among the female mantids, are comparatively smaller and hence the feeding rate is very less. The female of *Hierodula sp.* has the highly developed molar ridges and larger sized mandibles and it is able to consume higher number of prey with minimum duration (Tables 1a and b).

The observations of the size of the mandibles, chitinized teeth, molar areas and muscles substantiate that the rate of food consumption markedly depends upon the level of development of the molar ridge formation.

Relationship between the oviposition cycle and feeding rate :

The feeding rate of adult female mantids is also related to the reproduc-

tive stage and inter-oviposition periods. The larger sized female mantids have prolonged interoviposition periods whereas the period is significantly shorter in the smaller sized females. The period is markedly prolonged, in all the females, towards their senescence periods than in their nascent adult periods.

The rate of food consumption is gradually increased from the day of ootheca deposition. At the beginning of the interoviposition periods, the female mantids consume the minimum number of prey and correspondingly the development of the oocytes is at the initial growth stage. The progressive rate of food consumption is highly pronounced in the larger sized mantids whereas it is rather lower in the smaller sized ones in *E pulchra* and *E trincomaliae*.

At the middle of the interoviposition period the female mantid consumes considerably the higher number of prey. Both the feeding rate and the oocyte growth rate are gradually and parallelly increased upto the middle of the interoviposition period and thereafter the rate of food consumption alone is gradually regressed whereas the growth rate of oocytes is progressively increased. The feeding is completely ceased on or one day prior to the ootheca deposition. During the latter period, the oocytes are fully matured and are ready to deposit. The present observation coincides with the works reported in the mantids (*M. religiosa* Kramer, 1960), *H. crassa*

(Holling, 1966) and *P. angustipennis* (Matsura *et al*, 1975) and in Diptera *Diogmites missouriensis* (Scarborough, 1979). In the earlier half of the interoviposition period, due to the growth of the oocytes the feeding rate is progressively increased whereas in the later half, due to the presence of matured oocytes and lack of space in the body cavity, the feeding rate is decreased. There is therefore an inverse relationship in between these two factors.

REFERENCES

- HOLLING, C.S. 1966. The functional response of invertebrate predators to prey density *Ent. Soc. Canada*, 48 : 1-86.
- HOLLING, C.S. DUNRRACK, R.L., and DILL, L.M. 1976. Predator size and prey size: Presumed relationship in the mantid *Hierodula coarctata* Saussure. *Can. J. Zool.*, 54 : 1760-1764.
- KRAMER, S. 1960. Observations of prey capture in Mantids. *J. N. Y. Ent. Soc.*, 68 (1) : 3-12.
- MATSURA, T., INOUE, T. and HOSOMI, Y. 1975. Ecological studies of a Mantid, *Paratenodera angustipennis* DE SAUSSURE L. Evaluation of the feeding condition in Natural habitats *Res. Popul. Ecol.*, 17 : 64-76.
- RAU, P. and RAU, N. 1913. The Biology of *Stagmomantis carolina*. *Trans Acad. Sci. St. Louis*, 22 : 1-58.
- SCARBROUGH, A.G. 1979. Predatory behaviour, and prey of *Diogmites missouriensis* Bromely in Arkansas (Diptera: Asilidae). *Proc. Ent. Soc. Wash.*, 81 (3) : 391-400.