EVALUATE THE PREFERENCE OF PUPAL PARASITOID, DIRHINUS GIFFARDII AGAINST HOST PUPAE OF BACTROCERA CUCURBITAE

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Major ENTOMOLOGY

INTRODUCTION

B. cucurbitae is a serious pest of many cucurbits and is considered the foremost fruit fly pest of India. It is the only species that is uniformly widespread, attacking a large array of cucurbit fruits in India. It has been observed to withstand all kinds of adverse climatic conditions from the plains to the hilly tracts. It is easily recognized while at rest by its predominant orange brown color, postsutural yellow stripes, facial spots, and a characteristic wing pattern. The species is extremely variable morphologically especially in body coloration, chaetotaxy and wing markings. Under scanning electron microscope the teeth of denticles of the eversible membrane of ovipositor are 7-9 in number, similar and quite short. *B. cucurbitae* is commonly known as the “melon fly” due to its preference for melons (Kapoor and Agarwal, 1983).

Biological control provided effective procurement, environmentally and sustainable approach to pest control. The artificial rearing of parasitoids insects began long ago, with the main goal, to try to obtain an average, to multiply and produce parasitoids in biological control strategies to be published. But it is also a powerful tool to perform studies on biology, physiology and behavior of the entomophagous, especially endo-parasitoid species (Grenier, 2000).

The fruit fly *Dirhinus giffardii* (Hymenoptera: Chalcididae), (Silvestri, 1914) originated in West Africa. The fruit fly well distributed in more than twenty countries specially Central American and Pacific regions. *D. giffardii* deposited their eggs by pierce the pupae wall on the host pupa, the host developed into larva emerged parasitoids (Wang and Messing, 2004). Female fruit fly laying eggs in host flesh which developed into maggots inside the fruit in large quantity and damaged the fruit which are unfit for selling and feeding purpose. Fruit causes seven billion rupees annually losses by damaging the fruit in the orchard as well market. 100% losses in fruit market of India and 76.5% in Bannu caused by guava fruit fly and 76.5%. *B. zonata* causes 190 million euros annually in fruit industry in Egypt (El-Husseini et al., 2008). *D. giffardii* female preferred hosts which are bigger in size. Newly hatched wasp larvae of *D. giffardii* are white in colour, transparent, smaller in size and feed on host tissue. The pupae complete their life cycle within 2-3 days and male partner born earlier then their counterpart female. The fruit fly survived upto 18-30 days at 270C and 70-75 relative humidity. The life cycle includes egg stage (2 days), larva stage (9-10 days) pupa stage (7-8 days) and adult stage (10-15 days) (Wang and Messing, 2004).

OBJECTIVES

1. To evaluate host age (pupa) preference of the parasitoid on choice and non choice bases.
2. To determine age specific pupal parasitism % of *D. giffardii on B. cucurbitae.*

MATERIALS AND METHODS

The study was conducted at Dipterian Research Laboratory Department of Entomology, Faculty of Crop Protection, Sindh Agriculture University Tandojam. To evaluate the preference of pupal parasitoid, *D. giffardii* against host pupae of *B.*

cucurbitae. The temperature ranged from 27^0C. The parasitoid and pupae of fruit fly species were obtained from Dipterian Research Laboratory.

Adult diet

D. giffardii were reared on artificial diet making solution of 30% honey and 70% water.

Larval diet

The larvae were reared on different fresh fruits by eggs laying of adult females fruit fly. The infested fruits were transfer in the saw dust for pupation.

Saw dust

It were purchased from saw machine and placed inside the confined cages. The infested fruits were shifted in the saw dust cage, after few days larvae pop out and drop into the saw dust to pupate. The saw dust will sieve to separate the pupae of fruit flies.

Experimental design

48 hours old pupae of fruit flies were kept in jar. Each jar will contain 50 unparasitized pupae of *B. dorsalis* and *B. cucurbitae* along with a pair of *D. giffardii*. The jars were placed in incubators for 48 hours, then the jars were transfered to Dipterian Research Laboratory, and kept there until the emergence of *D. giffardii.*

Statistical analysis

The data thus collected were subjected to statistical analysis using analysis of

variance to know the significance of differences, and LSD (Least Significance Difference) test was applied to compare different treatments.

RESULTS

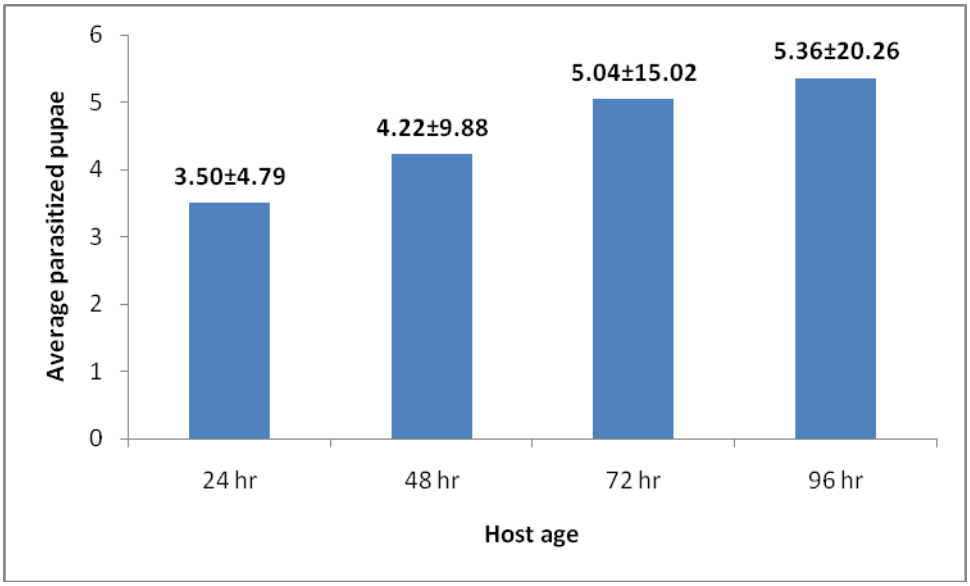
In order to study evaluate the preference of pupal parasitoid, *D. giffardii* against host pupae of *B. cucurbitae* the experiment was carried out at the Bio Control Research Laboratory, Department of Entomology, Sindh Agriculture University Tandojam during the year 2016. The two day old (48hrs) pupae of *B. cucurbitae* were exposed to a pair of parasitoid *D. giffardii* different ages of parasitoids viz., 24, 48, 72, and 96 hrs for parasitism. The host pupae of *D. giffardii* were counted for parasitized pupae and parasitism percentage. The results are presented in Figures 1 to 3, their analysis of variance as shown as Appendix-I & II.

Parasitized pupae of *Dirhinus giffardii* on different ages (choice)

The results on the effect of different ages of *D. giffardii* on host pupae of *B. cucurbitae* revealed that the age of *D. giffardii* participate a non-significant (P>0.05) role for parasitized count.

The data (Figure-1) indicated that average parasitized pupae of *D. giffardii* after 24, 48, 72 and 96 hours of age was 3.50±4.79, 4.22±9.88, 5.04±15.02 and 5.36±20.26, respectively. The pupae of *D. giffardii* parasitized minimum level after 24 and 48 hours of age and reaching at peak level after 72 and 96 hours of age. This

indicates that *D. giffardii* causing maximum mortality after 96 hours of age.



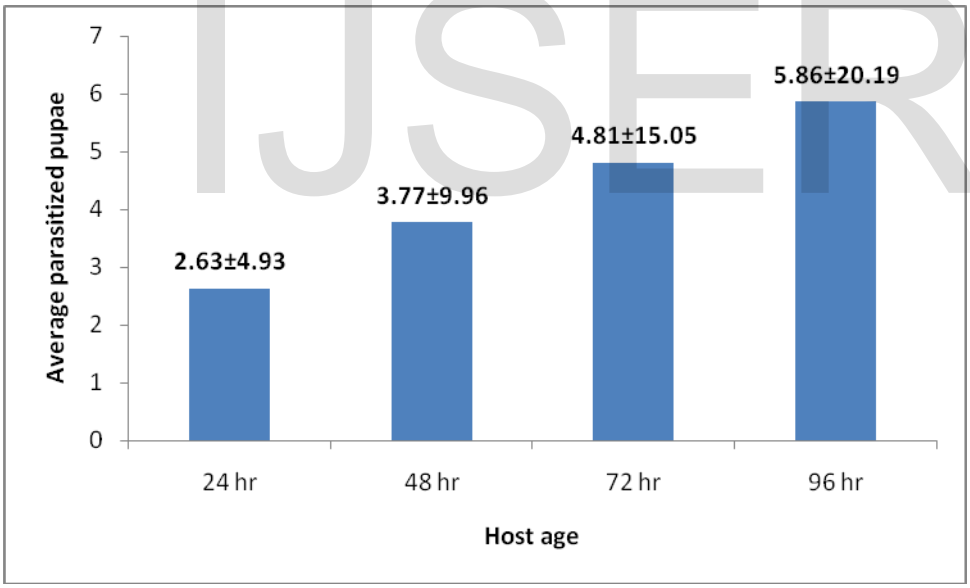
SE	**4.1484**
LSD	**8.2496**
P-value	**0.9697NS**

Figure-1 Effect of host age preference on parasitized pupae of *Bactrocera cucurbitae* on choice

Parasitized pupae of *Dirhinus giffardii* on different ages (no choice)

The results on the effect of different ages of *D. giffardii* on host pupae of *B. cucurbitae* revealed that the age of *D. giffardii* participate a non-significant (P>0.05) role for parasitized count.

The data (Figure-2) indicated that average parasitized pupae of *D. giffardii* after 24, 48, 72 and 96 hours of age was 2.63±4.93, 3.77±9.96, 4.81±15.05 and 5.86±20.19, respectively. The pupae of *D. giffardii* parasitized minimum level after 24 and 48 hours of age and reaching at peak level after 72 and 96 hours of age. This indicates that *D. giffardii* causing maximum mortality after 96 hours of age.



SE	**4.1502**
LSD	**8.2530**
P-value	**0.8803**

Figure-2 Effect of host age preference on parasitized pupae of *Bactrocera cucurbitae* on no choice

Parasitism percentage of *Dirhinus giffardii* on different ages

The data (Figure-3) indicated that on choice basis the average parasitism percentage of *D. giffardii* after 24, 48, 72 and 96 hours of age was 58.33, 70.33, 84.00 and 89.33 respectively. The pupae of *D. giffardii* causing maximum parasitism after 96 hours of age; while minimum parasitism was noted after 24 hours of age.

On no choice basis the average parasitism percentage of *D. giffardii* after 24, 48, 72 and 96 hours of age was 48.83, 62.83, 80.16 and 97.66 respectively. The pupae of *D. giffardii* causing maximum parasitism after 96 hours of age; while minimum parasitism was noted after 24 hours of age.

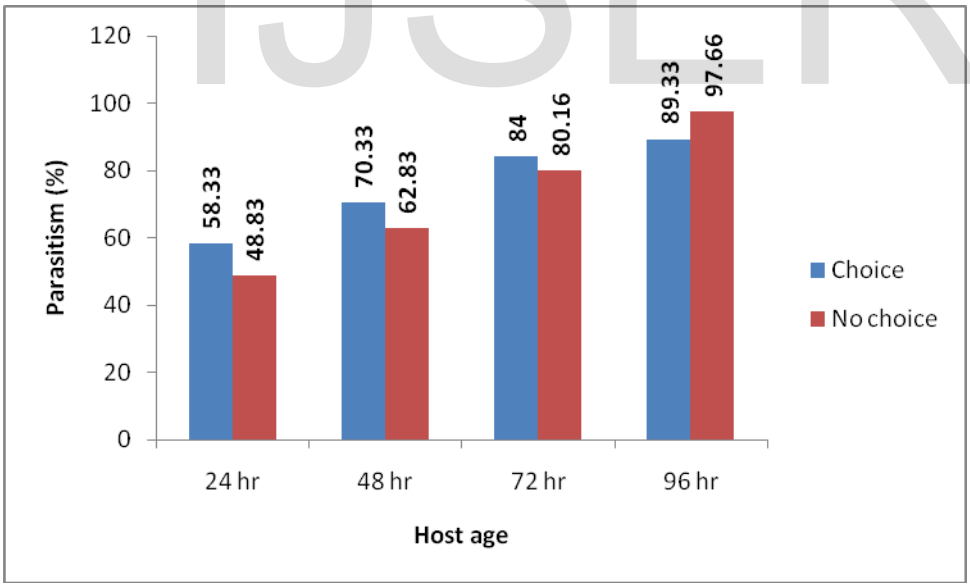


Figure-3 Parasitism percentage of *Dirhinus giffardii* after 24, 48, 72 and 96 hours on choice and no choice basis

Conclusions

The pupae of *D. giffardii* considerable causing parasitism on minimum level after 24 and 48 hours of age and reaching at peak level after 72 and 96 hours of age.

Suggestions

The release of pupal parasitoid *D. giffardii* is suggested to be included in the IPM programs for effective control of fruit fly species. For effective fruit fly control biological means may preferably be used and IPM strategies may be introduced among farmers at their door step.