Effect of diet on the reproductive biology of the omnivorous biological control agent *Orius laevigatus* (Heteroptera: Anthocoridae)

Debora Diaz and Moshe Coll
Department of Entomology
University Hebrew of Jerusalem, Rehovot, ISRAEL

Introduction

Orius laevigatus is an effective biological control agent of agricultural pests such as mites and thrips. The ability of *Orius* to feed on both prey and plant materials may alter its behavior, reproduction and performance (1,2). These in turn would affect its ability to build up populations in the field and suppress pest infestations (2).

When fed on prey diet, females are monogamous, males deplete their sperm after three copulations, and copulation duration have a significant effect on female fecundity (3). It is unclear however, how adult diet affects *Orius* reproductive parameters.

The present research was aimed at determining the effect of prey (*Ephestia kuehniella* eggs) and non-prey foods (*Typha domingensis* pollen) on the reproductive biology of *Orius laevigatus.*

Materials and Methods

Orius laevigatus was obtained from Bio-Bee Biological Systems (Kibbutz Sde Eliyahu, Israel) and reared in the lab at 24 ± 1°C and 65 ± 5% R.H).

Mating experiments were performed in petri dishes using virgin individuals fed on a diet of either pollen or moth eggs (prey). Pollen diet was offered from the 3th instar (Figure 1).

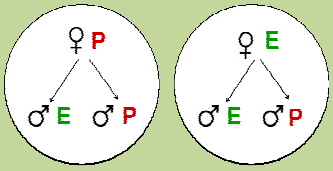

Fig. 1 Scheme of mating experiments with *Orius laevigatus* fed on pollen diet (P) and prey diet (E)

Mate choice and copulation duration were recorded and female fitness components such as fecundity, fertility and longevity were measured.

Results

EFFECT OF NYMPH DIET ON ADULT BODY SIZE

Body size of both females and males was affect by diet (Fig. 2).

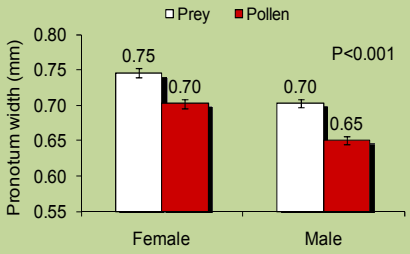

Fig. 2 Effect of prey (moth eggs) and *Typha* pollen diets on body size of adult *Orius laevigatus.*

EFFECT OF ADULT DIET ON FEMALE FECUNDITY

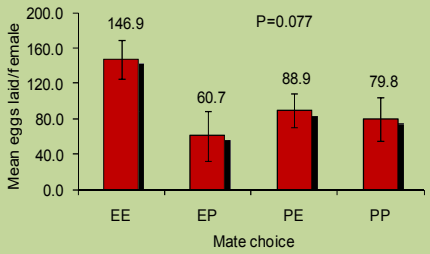

Fig. 3 Mean lifetime egg deposition ± SE by egg-fed females mated to egg-fed males (EE) or pollen-fed males (PE), and by pollen-fed females that were mated to egg- and pollen-fed males (EP & PP, respectively).

EFFECT OF ADULT DIET ON EGG HATCH

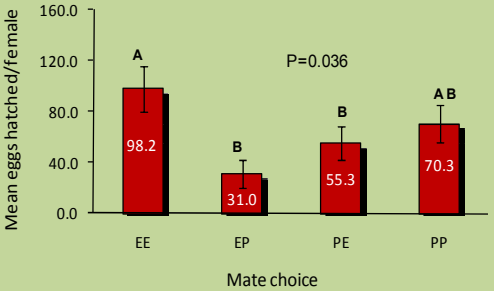

Fig. 4 Mean fertility (eggs hatched) ± SE from mating between male and female fed on eggs (EE) or pollen (PP), male fed on eggs and female fed on pollen (EP) and male fed on pollen and female fed on eggs (PE). Bars with the same letter are not significantly different (P>0.05; Student's t test).

EFFECT OF DIET ON COPULATION DURATION

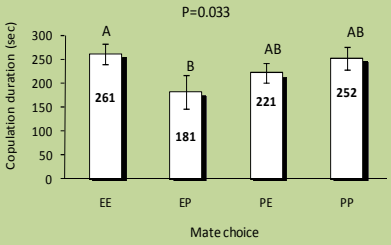

Fig. 5 Mean copulation duration ± SE of mating between males and females fed on eggs (EE) or pollen (PP), egg-fed males and pollen-fed females (EP), and pollen-fed males and egg-fed females (PE). Bars with the same letter are not significantly different (P>0.05; Student's t test)

Conclusions

Taken together, results suggest that when prey is scarce in the field and both sexes feed on pollen, reproduction may be sustained and *O. laevi*gatus populations persist until pests reappear in the field. This natural enemy may then be able to rapidly suppress the pest population preventing it from reaching economically damaging levels.

References

1. Cocuzza, G. E., De Clercq, P., Van de Veire, M., Cock, A., Degheele, D. and Vacante, V. 1997. Reproduction of *Orius laevigatus* and *Orius albidipennis* on pollen and *Ephestia kuehniella* eggs. Entomologia Experimentalis et Applicata 82:101-104.

2. Coll, M. and Guershon, M. 2002. Omnivory in terrestrial arthropods: mixing plant and prey diets. Annual Review of Entomology 47:267-297.

3. Leon-Beck M. and Coll M. 2009 The mating system of flower bug *Orius laevigatus*. Biological Control 50:199-203