



# Predation by Insidious Flower Bug, *Orius insidiosus*, Adults on Western Flower Thrips, *Frankliniella occidentalis*, Adults under Laboratory and Greenhouse Conditions

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## Abstract

Western flower thrips, *Frankliniella occidentalis* (Perg.), is a major insect pest of greenhouse production systems. A widely-used plant protection strategy is biological control, which entails releasing natural enemies; such as parasitoids and predators, that are commercially available from suppliers or distributors. Studies to assess predation of predatory mites and predatory bugs against specific prey are typically conducted under laboratory conditions. However, results obtained under laboratory conditions may not be equivalent to results observed under field conditions; including greenhouses when plants are present. Therefore, the goal of our study was to compare predation by insidious flower bug, *Orius insidiosus* Say, adults under laboratory and greenhouse conditions to determine if flower morphology of transvaal daisy, *Gerbera jamesonii*, cut flowers affects predation by adult insidious flower bugs on western flower thrips adults.

## Purpose

The purpose of this research was to compare predation by insidious flower bug, *Orius insidiosus*, adults on western flower thrips, *Frankliniella occidentalis*, adults under laboratory and greenhouse conditions to determine if flower morphology affects predation.

## Question, Hypothesis, and Prediction

**Question:** Will flower morphology influence predation of insidious flower bug, *Orius insidiosus*, adults compared to laboratory conditions after 24 and 48-hours?

**Hypothesis:** Insidious flower bug, *Orius insidiosus*, adults will prey on more adult western flower thrips, *Frankliniella occidentalis*, after 24 and 48-hours under laboratory conditions than under greenhouse conditions.

**Prediction:** Flower morphology, which can provide refuge from predation for western flower thrips, *Frankliniella occidentalis*, adults will reduce the number of western flower thrips adults preyed upon by insidious flower bug, *Orius insidiosus*, adults compared to petri dishes with no area of refuge under laboratory conditions.

## Study System

The predator we used for both experiments (laboratory and greenhouse) was adults of the insidious flower bug, *Orius insidiosus*. *Orius insidiosus* adults are black, 2 to 5 mm long (Mahr et al. 2001), and is a generalist predatory bug that feeds on a number of insect pests in horticultural cropping systems including: thrips, mites, aphids, whiteflies, scales, and caterpillars. The predator will also feed on insect eggs. (Barber 1936; Kiman and Yeargan 1985). However, in greenhouse production systems, *O. insidiosus* is primarily used against western flower thrips, *Frankliniella occidentalis*. Western flower thrips is a major insect pest of greenhouse-grown horticultural crops (Cloyd 2009) and can cause direct plant damage by feeding on leaves and flowers (Tommasini and Maini 1995), as well as indirect plant damage by vectoring viruses; such as, *Tomato spotted wilt virus* and *Impatiens necrotic spot virus* (Pappu et al. 2009). *Orius insidiosus* feeds on the larvae and adults of western flower thrips

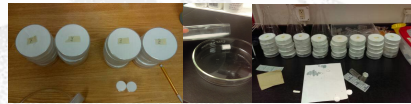
(Isenhour and Yeargan 1981) and Tommasini et al. 2004 estimated that they can consume more than 20 western flower thrips per day.



## Experimental Design and Methods

### Laboratory Experiment:

- > 2 X 2 factorial, completely randomized design.
- > Performed in Petri dishes with 9 replications per treatment.



> Treatments included no less than thirty western flower thrips adults and were as follows:

1. Western flower thrips only (24 hour assessment).
2. Western flower thrips only (48 hour assessment).
3. Western flower thrips + one insidious flower bug (24 hour assessment).
4. Western flower thrips + one insidious flower bug (48 hour assessment).

### Greenhouse Experiment:

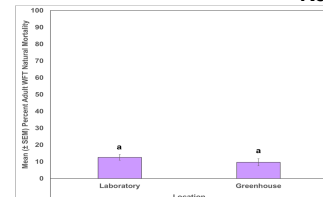
> Performed similar to the laboratory experiment except western flower thrips and insidious flower bug adults were released among thirty-six yellow transvaal daisy, *Gerbera jamesonii*, cut flowers.



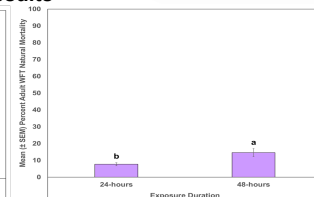
**Response Variable:** The number of live and dead western flower thrips adults for each treatment was determined after 24 and 48-hours. The percent of dead adult western flower thrips was determined by dividing the number of dead western flower thrips adults per treatment by the total number recovered and multiplying by 100.

**Data Analysis:** Analysis of variance, least significant difference test, and Schneider-Orelli's correction formula to account for natural mortality in the western flower thrips only treatments and over-estimating predation.

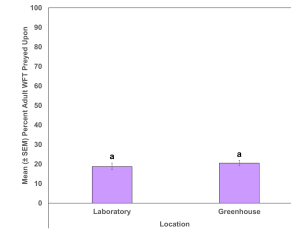
## Results



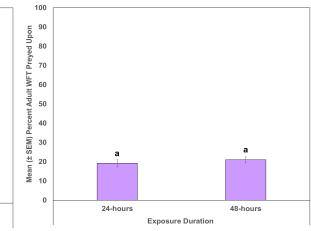
Mean (± SEM) percent adult western flower thrips (WFT) mortality without exposure to insidious flower bug adults in the laboratory (Petri dish) and greenhouse (cut flower). Means followed by the same letter are not statistically different ( $P \geq 0.05$ ).



Mean (± SEM) percent adult western flower thrips (WFT) mortality without exposure to insidious flower bug adults after 24 and 48-hours. Means followed by the same letter are not statistically different ( $P \geq 0.05$ ).



Mean (± SEM) percent adult western flower thrips (WFT) preyed upon when exposed to insidious flower bug adults in the laboratory (Petri dish) and greenhouse (cut flower). Means followed by the same letter are not statistically different ( $P \geq 0.05$ ).



Mean (± SEM) percent adult western flower thrips (WFT) preyed upon when exposed to insidious flower bug adults after 24 and 48-hours. Means followed by the same letter are not statistically different ( $P \geq 0.05$ ).

## Conclusions

- > Flower morphology did not significantly affect predation by insidious flower bug adults ( $F=0.09$ ;  $df=1, 18$ ;  $P=0.76$ ), indicating that they are efficient predators of WFT adults in transvaal daisy.
- > The number of WFT preyed upon was not significantly different between 24 and 48-hours ( $F=2.47$ ;  $df=1, 9$ ;  $P=0.12$ ), indicating that insidious flower bug adults become satiated within 48-hours when feeding on adult WFT.
- > Overall, an individual insidious flower bug adult can consume an average of 18 to 23 WFT adults in 48-hours.
- > This information will be useful to growers managing WFT in horticultural cropping systems and help them determine potential release rates of this predator for WFT management.

## Future Directions

- > Determining when satiation ends would be useful in understanding the biology and predatory behavior of adult insidious flower bugs.
- > Repeating the greenhouse experiment on transvaal daisy cut flowers in cages that prevent insect migration would help reduce potential experimental error.
- > Conducting and additional greenhouse experiment while varying WFT releases and insidious flower bug release rates would help to determine more precise release rates for WFT management.

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