

Bioassays on Twospotted Spider Mites using Organic Pesticides

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Abstract

This project reports laboratory studies conducted to evaluate the effects of organic pesticides on the survival and reproduction of a pest the twospotted red mite. The Control had the highest reproduction and highest survival rate followed by the pesticide Entrust® (*spinosad*). While Portal kills the red mites on contact and Molt-X kills the mites shortly after.

Introduction

The twospotted spider mites *Tetranychus urticae* (Acari: Tetranychidae) range from a orangeish to a deep red and have needle-like piercing-sucking mouthparts that penetrate the tissue of the leaves on which they are living and feeding on. The feeding of the mites causes graying or yellowing of the leaves also causing damage to the open flowers, such as browning and withering of the petals. Spider Mites spin webs on the hosting plant which tend infest woody plants, several crops such as tomatoes, eggplants, and cucumbers. Twospotted spider mites are a prominent pest found in green houses. These mites are the prey of phytoseiid mites. This mite lives on the same plant as red mites and eats them along with pollen. This red mite when it first hatches it has 3 sets of legs as a larva and is a transparent greenish color with two black dots on its thorax. As it changes into an adult it has 4 sets of legs.

Objectives

To test the oviposition and mortality of twospotted spider mites using different organic insecticides.

Materials and Methods

Two spotted spider mites used were from a established colony in Weslaco and the insecticides used in this study were :

- Agree® (*Bacillus thuringiensis*), a bacterium that effectively works to kill the larva of insects.
- Molt-X™ (azadirachtin) is a repellent, antifeedant ovipositional deterrent insecticide. Insects become sluggish, stop feeding and fail to mature and reproduce. The active ingredient component is obtained from neem trees.
- Portal (fenpyroximate) is a conventional miticide insecticide used as negative control
- Entrust® (*spinosad*), a fungus that attacks the nervous system causing the loss of muscle control . Causes insects to die of exhaustion within 1-2 days.

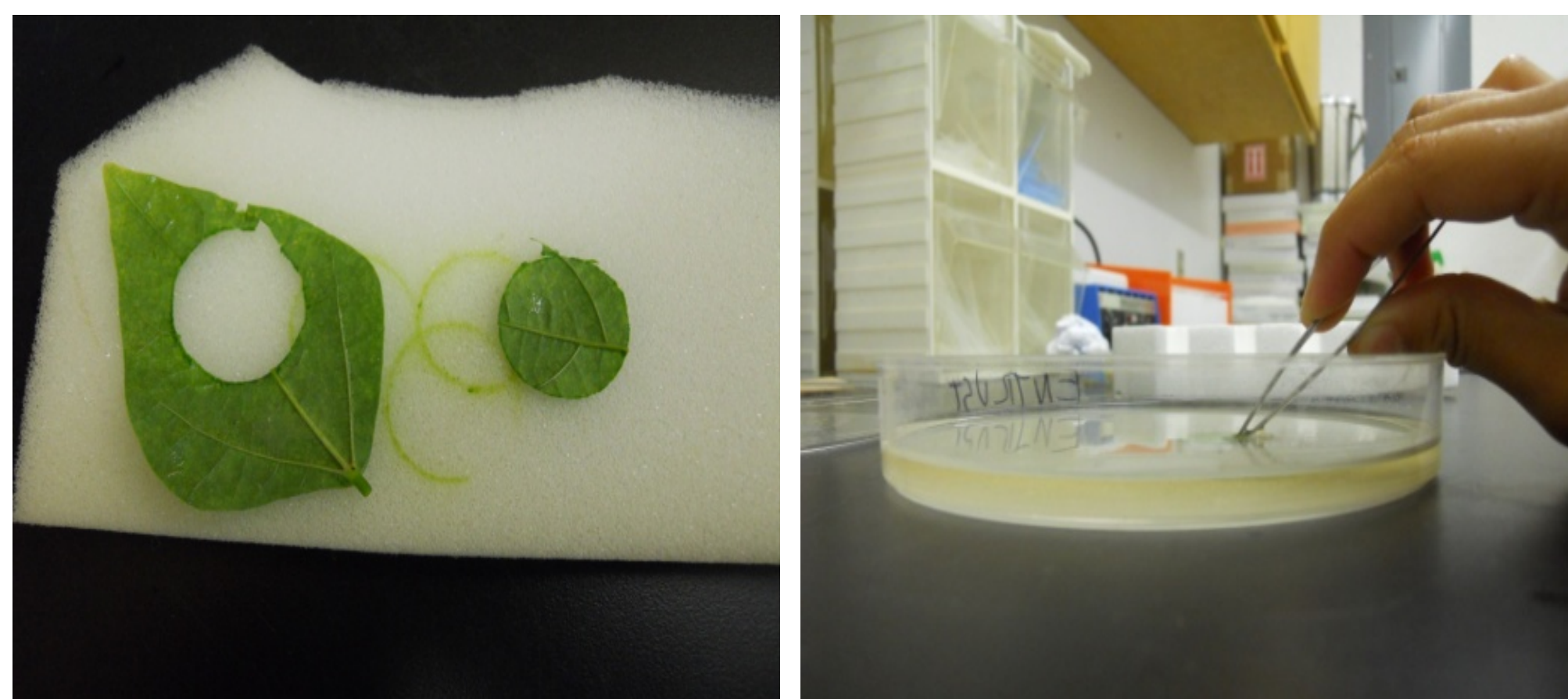
Table 1. Insecticides and rates used

Pesticides	Active ingredient	Doses (g/ 100ml)	
Molt-X™	azadirachtin	Low	0.1
		Medium	0.2
		High	0.4
Portal	fenpyroximate		0.1
Entrust®	spinosad	Low	0.1
		Medium	0.2
		High	0.6
Agree®	<i>Bacillus thuringiensis</i>	Low	0.1
		Medium	0.2
		High	0.4
Control			-

Steps followed to conduct these studies:

1. Prepare 5 Petri dishes (14-cm diam.) to contain a moist foam pad and a cotton strip. Label each Petri dish
2. Place a foam pad with cotton (on top) into a dish, and add water to keep cotton and foam pad moist
3. Cut out six leaf disks from lima bean leaves for each Petri dish (1-cm diameter).

Figure 1. (a) Leaf disk (1 cm diam), and (b) Petri dish (14 cm diam)



4. Dip six of the disks in a pesticide for five seconds. Then repeat this for each group of ten with a different pesticide and leave ten disks for the untreated control.
5. Place the ten leaf disks on the strip of cotton equidistant from each other with the bottom part of the leaves facing up. Leave disks to air dry
6. Then, place single red mite female
7. After all steps above were completed, place Petri dish in an incubator. At 23° C and 75% RH.
8. Record data every 12-hours for 72 hours recording the number of live, dead, or missing Red Mites and the number of eggs oviposited.
9. All experiments were replicated four times.

Figure 2. (a) Placement of leaf disks on top of moist cotton stripe, and (b) Red Mites spinning their webs and laying their eggs.



Figure 3 Female twospotted spider mite walking on a leaf, and damage caused on leaves by these mites .



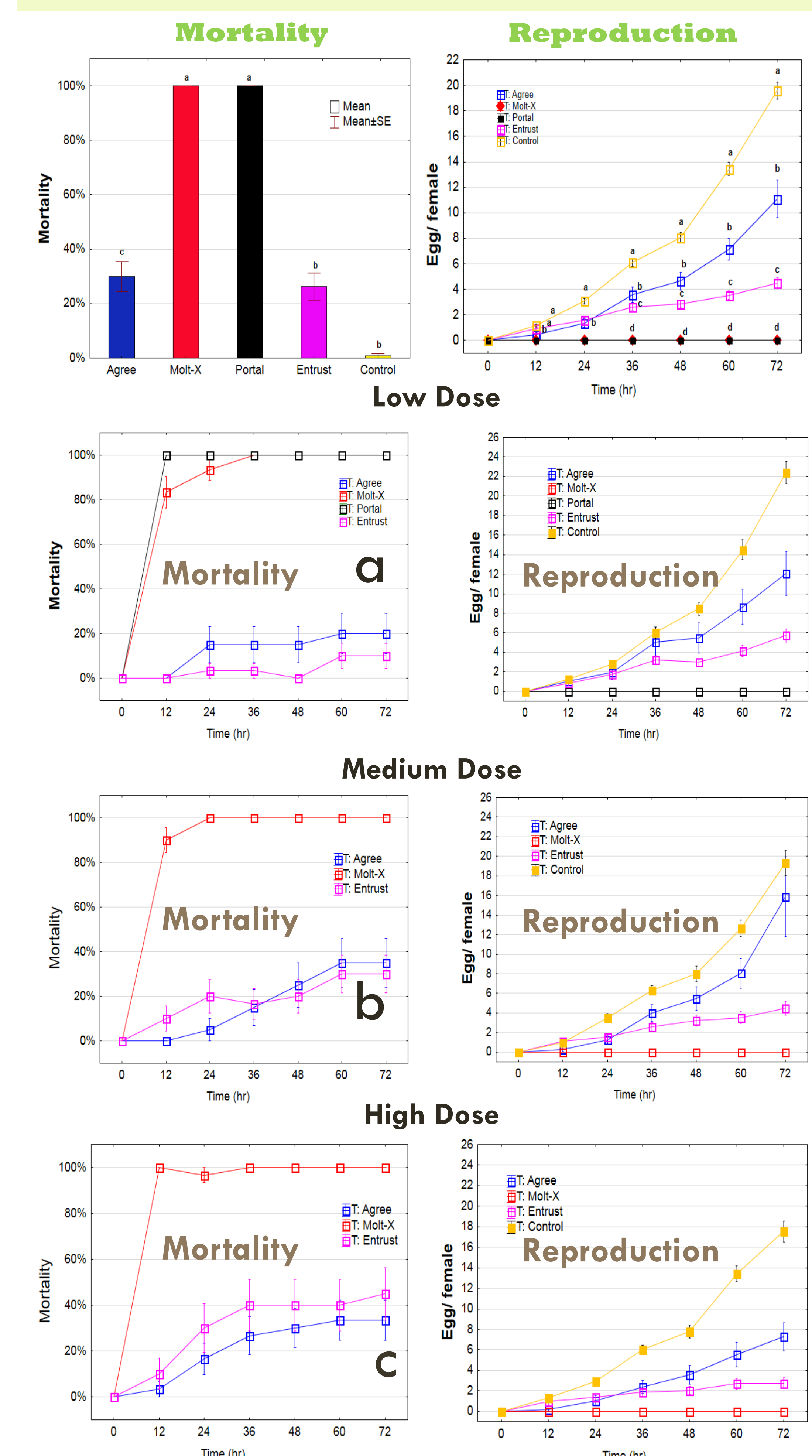
Acknowledgements

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Results and Discussions

The survival of Red Mite females was the first highest on leaf disks was the control the second highest leaf disk dipped in was Agree®. Despite being the second highest pesticide the reproduction rate was much lower than the control.

Portal and Molt-X™ had the highest mortality of female TSSM, and reduced oviposition. However, Agree and Entrust also caused mortalities that were significantly different than the control. In addition, Entrust reduced the oviposition significantly compared with the control. All these results shown the same trend across all the different doses used for each insecticide.



Conclusion

This study provides important information about the most commonly used organic insecticides. These results shown that some of these materials (Agree® and Entrust®) that are not used for mite control reduced mite oviposition in laboratory bioassays. Also, it is shown here that Molt-X® is as effective as the miticide Portal®. The effects on Agree®, Entrust® and Molt-X® under these controlled situations in the lab can be somewhat different than studies in the field when environmental conditions affect the duration and capacity of these organic pesticides.