**FORMAL REPORT 2017**

EFFECTS OF KLEENGROW™ AND STRIP-IT PRO™ ON WESTERN FLOWER THRIPS, *FRANKLINIELLA OCCIDENTALIS*, PUPAE UNDER LABORATORY CONDITIONS

Yinping Li and Raymond A. Cloyd

Department of Entomology

Kansas State University, Manhattan, KS 66506 USA

**Objective**

The objective of the following laboratory study was to determine the direct effects of KleenGrow™, and STRIP-IT PRO™ on the pupae of western flower thrips, *Frankliniella occidentalis* (Pergande) (Thysanoptera: Thripidae).

**Materials and Methods**

**A. Insect colony**

A laboratory colony of western flower thrips (*Frankliniella occidentalis*) was maintained on green beans (*Phaseolus vulgaris* L.), purchased from a local supermarket (Dillons; Manhattan, KS), in Glad® (The Glad Products Company; Oakland, CA) plastic containers [20.4 x 14.4 x 9.4 cm (length x width x height)] with No-Thrips insect mesh (150 x 150 microns: Greentek; Edgerton, WI) under the following conditions: 24 ± 3ºC, 50% to 60% relative humidity, and constant light. In order to provide food for the larvae, and food and oviposition sites for adults, green beans were changed every 2 to 3 days.

**B. Experiment**

The study involved an experiment that was set-up as a completely randomized design. Two chemicals were evaluated: 1) dodecyl dimethyl ammonium chloride (KleenGrow™: Pace 49, Inc.; Burnbury, BC, Canada) and 2) acid-based phosphate-free cleaner (STRIP-IT PRO™: Pace 49, Inc.; Burnbury, BC, Canada). Four concentrations of KleenGrow™ were tested: 1.0 fl oz/1 gallon, 0.5 fl oz/1 gallon, 0.13 fl oz/1 gallon, and 0.06 fl oz/1 gallon; and two concentrations of STRIP-IT PRO™ were tested: 8.0 fl oz/1 gallon and 5.0 fl oz/1 gallon. There was also a water control and blank (untreated) check. There were a total of 8 treatments with 5 replications per treatment. The treatments were all prepared in 400 mL of water based on the rates provided by Judy McWhorter (Pace 49, Inc., National Sales Manager). The treatments and rates used are presented below:

1. Blank (untreated) check.

2. Water control.

3. Didecyl dimethyl ammonium chloride (KleenGrow™) at 1.0 fl oz/1 gallon (3.0 mL/400 mL).

4. Didecyl dimethyl ammonium chloride (KleenGrow™) at 0.5 fl oz/1 gallon (1.5 mL/400 mL).

5. Didecyl dimethyl ammonium chloride (KleenGrow™) at 0.13 fl oz/1 gallon (0.40 mL/400 mL).

6. Didecyl dimethyl ammonium chloride (KleenGrow™) at 0.06 fl oz/1 gallon (0.18 mL/400 mL).

7. Acid-based phosphate-free cleaner (STRIP-IT PRO™) at 8.0 fl oz/1 gallon (25 mL/400 mL).

8. Acid-based phosphate-free cleaner (STRIP-IT PRO™) at 5.0 fl oz/1 gallon (15.6 mL/400 mL).

Growing medium preparation for the experiment was as follows: a 6.0-L plastic container (Rubbermaid Home Products; Wooster, OH) was filled with Sunshine LC1 RSi Professional Growing Mix growing medium (SunGro Horticulture Canada Ltd.; Seba Beach, Alberta, Canada) consisting of 70 to 80% Canadian sphagnum peat moss, perlite, and dolomitic limestone. The growing medium was moistened with approximately 200 mL of water. The plastic container with growing medium was then heated for 25 minutes in a microwave set at full-power (1,200W output). After the growing medium was allowed to cool, 1,800 mL of water was applied to the growing medium. About 400 mL of growing medium was placed into a 473 mL deli container. The deli container was tapped five times in order to reduce the amount of air-space within the growing medium.

Twenty western flower thrips pupae, obtained from the laboratory colony, were randomly positioned on the growing medium surface of each 473 mL deli container with 400 mL of growing medium. Pupae are generally located at a depth of 1 to 5 mm in the growing medium (Helyer et al., 1995). The pupae can be distributed through the growing medium via cracks and crevices present on the growing medium surface (Yinping Li; personal observation), so no additional growing medium was needed to cover the pupae. Then 75 mL of each treatment solution was uniformuly applied as a drench to the growing medium surface. A lid was modified with No-Thrips insect mesh for ventilation, which prevented emerging western flower thrips adults from escaping. A half-section of a yellow sticky card [7.7 x 10.4 cm (length x width): Pestrap Phytotronics, Inc.; Earth City, MO] was affixed to the center of the lid in order to capture emerging western flower thrips adults. Each 473 mL deli container was placed into a larger petri dish (14.0 cm diameter) in order to collect any leachate from the bottom of the deli containers. The deli containers were exposed to laboratory conditions [22 ± 3ºC and 18:6 (L:D) hour photoperiod]. The number of western flower thrips adults captured on the yellow sticky cards was counted 15 days after the experiment was initiated.

**Results**

The KleenGrow™ concentrations of 1.0 fl oz/1 gallon and 0.5 fl oz/1 gallon, and the STRIP-IT PRO™ concentrations (8.0 fl oz/1 gallon and 5.0 fl oz/1 gallon) had the lowest number of adult western flower thrips captured on the yellow sticky cards compared to the other treatments (Figure 1 and Table 1). However, it should be noted that even the water control had <10 western flower thrips adults captured on the yellow sticky cards. The reason for this is that applications of solutions to the growing medium can move the pupae deeper into the growing medium profile, thus making it difficult for adults that were previously pupae to emerge from the growing medium (Yinping Li; personal observation). Therefore, caution must be exercised when interpreting the results of the experiment. However, some of the treatments may have actually directly affected western flower thrips pupae.

**References**

Helyer, N. L., P. J. Brobyn, P. N. Richardson, and R. N. Edmoondson. 1995. Control of western flower thrips (*Frankliniella occidentalis* Pergande) pupae in compost. Ann. Appl. Biol. 127: 405-412.

**Figure 1.** Number (No.) of western flower thrips (WFT), *Frankliniella occidentalis*, adults captured on the yellow sticky cards (YSCs) for each treatment (n=8). Treatment designations: 1) Blank=blank (untreated) check, 2) Water=water control, K-1=KleenGrow™ at 1.0 fl oz/1 gallon (3.0 mL/400 mL), K-0.5=KleenGrow™ at 0.5 fl oz/1 gallon (1.5 mL/400 mL), K-0.13=KleenGrow™ at 0.13 fl oz/1 gallon (0.40 mL/400 mL), K-0.06=KleenGrow™ at 0.06 fl oz/1 gallon (0.18 mL/400 mL), S-8=STRIP-IT PRO™ at 8.0 fl oz/1 gallon (25 mL/400 mL), and S-5=STRIP-IT PRO™ at 5.0 fl oz/1 gallon (15.6 mL/400 mL).

**Table 1.** Mean and standard error of the mean (SEM) associated with

the treatments (n=8).

|  |  |  |
| --- | --- | --- |
|  | **Mean** | **SEM** |
| Blank | 16.6 | 2.33 |
| Water | 8.4 | 1.93 |
| K-1 | 2.8 | 0.58 |
| K-0.5 | 4.4 | 1.50 |
| K-0.13 | 9.8 | 2.03 |
| K-0.06 | 7 | 0.83 |
| S-8 | 1.8 | 0.58 |
| S-5 | 2.8 | 0.86 |

**Completed:** July 3, 2017