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## V. SUMMARY

The present study was carried out during 2005 and 2006 seasons to investigate the pesticidal and biological activity of various compounds and biological agents against the two spotted spider mite, *Tetranychus urticae* which considered one of the main pests infesting cotton plant in Egypt.

### **1. Relative toxicity of the tested compounds on adult stage of the two-spotted spider mite, *Tetranychus urticae* Koch under laboratory conditions:**

#### **1.1. Agrin 32000 IU/mg (*Bacillus thurengiensis* var *kurstaki*):**

The mortality percentages of mite adults ranged from 37.500-58.75, 45.00-67.50, 53.95-72.50 and 68.06-96.11% after 1, 3, 6 and 9 days, respectively. When comparing between the effects of Agrin at different intervals, (LC<sub>50</sub> 183540, 108640, 62308.005 and 48883.892 ppm) after 1, 3, 6 and 9 days, respectively. On base of the LC<sub>90</sub> values, the effects of Agrin at different intervals, (LC<sub>90</sub> 4946800, 2341900, 2224400 and 199670 ppm) after 1, 3, 6 and 9 days, respectively. The slope of adult stages of *T. urticae* population in Agrin at different intervals, it was found

0.896, 0.961, 0.825 and 2.097 after 1, 3, 6 and 9 days, respectively.

### **1.2. Vertemic 1.8% EC (abamectin):**

The mortality percentages among mite adult stages ranged between 66.25-78.75, 73.61-81.94, 77.94-88.24 and 81.25-93.75% after 1, 3, 6 and 9 days, respectively. When compare between the effects of abamectin at different intervals, ( $LC_{50}$  0.392, 0.078, 0.144 and 0.267 ppm) after 1, 3, 6 and 9 days, respectively. On base of the  $LC_{90}$  values, the effects of abamectin at different intervals, ( $LC_{90}$  43.122, 40.783, 11.556 and 4.423 ppm) after 1, 3, 6 and 9 days, respectively. The slope of adult stages of *T. urticae* population in abamectin at different intervals, it was found 0.628, 0.471, 0.673 and 1.051 after 1, 3, 6 and 9 days, respectively.

### **1.3. Cascade 10% WDC (flufenoxuron):**

The mortality percentages among mite adult stages ranged between 63.75-83.75, 76.39-95.83, 83.82-98.53 and 86.76-98.53% after 1, 3, 6 and 9 days, respectively. When compare between the effects of flufenoxuron at different intervals it was found that  $LC_{50}$  were 23.991, 17.051, 12.045 and 5.297 ppm after 1, 3, 6 and 9 days, respectively. On base of the  $LC_{90}$  values, the effects of flufenoxuron at

different intervals, ( $LC_{90}$  413.429, 141.807, 94.096 and 64.442 ppm) after 1, 3, 6 and 9 days, respectively. The slope of adult stages of *T. urticae* population in flufenoxuron at different intervals, it was found 1.037, 1.393, 1.436 and 1.181 after 1, 3, 6 and 9 days, respectively.

#### **1.4. Consult 10% EC (hexaflumuron):**

The mortality percentages among mite adult stages ranged between from 28.75-43.75, 29.17-50.00, 35.00-56.67 and 32.69-71.15% after 1, 3, 6 and 9 days, respectively. When compare between the effects of hexaflumuron at different intervals, ( $LC_{50}$  391.756, 219.692, 142.941 and 88.76 ppm) after 1, 3, 6 and 9 days, respectively. On base of the  $LC_{90}$  values, the effects of hexaflumuron at different intervals, ( $LC_{90}$  30493.084, 5464.833, 3521.629 and 517.927 ppm) after 1, 3, 6 and 9 days, respectively. The slope of adult stages of *T. urticae* population in hexaflumuron at different intervals, it was found 0.678, 0.918, 0.921 and 1.673 after 1, 3, 6 and 9 days, respectively.

#### **1.5. Super Misrona Oil 94% EC (light mineral oil):**

The mortality percentages among mite adults ranged from 22.5-30.00, 16.67-37.50, 38.89-50.00 and 52.78-80.56% after 1, 3, 6 and 9 days, respectively. When compare between the effects of Super Misrona oil at

different intervals, ( $LC_{50}$  20735E+1, 14693.194, 9379.477 and 2035.296 ppm) after 1, 3, 6 and 9 days, respectively. On the other hand, the  $LC_{90}$  values, the effects of Super Misrona oil at different intervals, ( $LC_{90}$  48827E+4, 27167E+1, 51145E+2 and 18999.736 ppm) after 1, 3, 6 and 9 days, respectively. The slope of adult stages of *T. urticae* population in Super Misrona oil at different intervals, it was found 0.38, 1.012, 0.468 and 1.321 after 1, 3, 6 and 9 days, respectively.

#### **1.6. Micronized sulfur 80% WP:**

The mortality percentages among mite adult stages ranged from 35.00-57.50, 38.89-69.44, 55.88-85.29 and 71.88-98.44% after 1, 3, 6 and 9 days, respectively. When compare between the effects of Micronized Sulfur at different intervals, ( $LC_{50}$  1054.934, 711.611, 367.128 and 299.112 ppm) after 1, 3, 6 and 9 days, respectively. On base of the  $LC_{90}$  values, the effects of Micronized Sulfur at different intervals, ( $LC_{90}$  23610.789, 6613.509, 2473.836 and 947.243 ppm) after 1, 3, 6 and 9 days, respectively. The slope of adult stages of *T. urticae* population with Micronized Sulfur at different intervals, it was found 0.949, 1.324, 1.547 and 2.56 after 1, 3, 6 and 9 days, respectively.

### **1.7. Liquid Sulfur 30%:**

The mortality percentages among mite adult stages ranged from 40.00-62.50, 57.50-85.00, 68.42-89.47 and 84.72-94.44% after 1, 3, 6 and 9 days, respectively. When compare between the effects of Liquid Sulfur at different intervals, (LC<sub>50</sub> 321.002, 152.712, 82.869 and 14.767 ppm) after 1, 3, 6 and 9 days, respectively. On base of the LC<sub>90</sub> values, the effects of Liquid Sulfur at different intervals, (LC<sub>90</sub> 7175.787, 1345.734, 890.221 and 381.955 ppm) after 1, 3, 6 and 9 days, respectively. The slope of adult stages of *T. urticae* population with Liquid Sulfur at different intervals, it was found 0.95, 1.356, 1.243 and 0.907 after 1, 3, 6 and 9 days, respectively.

## **2. Efficacy of the tested compounds against the two-spotted spider mite, *Tetranychus urticae* under field conditions:**

### **2.1. First season (2005):**

The cotton plants were sprayed by using the recommended concentration of seven compounds; namely (agrin, abamectin, flufenoxuron, hexaflumuron, Super Misrona Oil, Micronized Sulfur, and Liquid Sulfur) to study the effectiveness on the adult stages of the two-spotted spider mite, *Tetranychus urticae*.

Concerning the toxicity of the previous tested compounds against the adult stages of *T. urticae*, obtained data show that all tested compounds were effective against adult stages, but in different trends.

Abamectin gave highly reduction percent (85.11%) in infestation against the adult stages of *T. urticae*; while Agrin, flufenoxuron, hexaflumuron, Super Misrona Oil, Micronized Sulfur, and Liquid Sulfur gave approximately the same order 66.20, 77.10, 72.16, 70.96, 71.73 and 70.29, respectively.

## **2.2. Second season (2006):**

As the same trend, Abamectin gave highly percent reduction (88.32%) in infestation against the adult stages of *T. urticae*; while, agrin, flufenoxuron, hexaflumuron, Super Misrona Oil, Micronized Sulfur, and Liquid Sulfur gave approximately similar results 69.17, 83.67, 75.71, 75.10, 69.15 and 72.02, respectively.

It can be concluded that the three compounds (abamectin, flufenoxuron and hexaflumuron) gave more of equal effective under laboratory and field conditions than the other three compounds (Super Misrona oil, liquid sulfur and Micronized sulfur) but the price of the first three compounds highly costs, therefore could be used successfully



in an integrated pest programs (IPM) for controlling the two spotted- red spider mite, *Tetranychus urticae* Koch (Acarina : Tetranychidae) on cotton plants.