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# AN ATTEMPT TO DESIGN A CHEMICAL CONTROL PROGRAM TO SUPPRESSION PIERCING SUCKING PESTS INFESTING CUCUMBER PLANTS AT SOHAG REGION

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## ABSTRACT

Four pesticide programs were designed in an attempt to evaluate their efficacy for control of piercing sucking pests and two spotted spider mites that infest cucumber plants at Sohag region. The experiment was conducted during autumn plantation 2015 and spring plantation 2016. Each program contains three pesticides which were sprayed three times successively at 15 days interval. The mean number and percent reduction of pest population density was considered. Program 2 (Planch, Applaud and Oberon) showed the greatest mean percentage reduction for both seasons for aphids and whitefly (78% and 79.7%, respectively). While program (1) (Bio-sect, Berna Star and Sortem) had the lowest mean percentage reduction for both seasons and for both pests (65.2% and 63.6%, respectively). Otherwise, no significant differences were found between program (2) and program (4) (Planch, Sortem and Oberon) which had the most effective and caused the highest mean percentage reduction for both season for thrips (78% and 77.3%, respectively). Similar results were obtained for program (1) and program (3) (Planch, Berna star and Sortem) where no significant differences were found (58.6% and 63.6%, respectively). So it could be concluded that Program (2) which includes three chemical pesticides was the most effective one. On the other hand, Program (B) (Applaud,

Oberon and Challenger) which is completely chemical was the most effective program in reducing the population of the two spotted spider mite (80.1 %), while Program (A) (Sortem, Bio-sect and Berna Star) which is completely non-chemical Program was the least effective one with total mean % reduction (63.8 %). Also, among programs designed to control piercing sucking pests, Program (2) has increased significantly the yield of cucumber by 60.9 % followed by program 4 (45.3 %), Program 3 (34.7 %) and Program (1) (20.5 %). Otherwise, for spider mite designed programs, Program (B) has increased significantly the yield of cucumber by 48.0 % followed by Program (D) (34.0 %), Program (C) (33.1 %) and Program A (28.1%).

**Keywords**: Piercing- sucking pest, cucumber plants, spring and autumn plantation, chemical control programs

## INTRODUCTION

Cucumber (*Cucumis sativus* L.) is one of the most essential cucurbitaceous vegetable crops in Egypt. Cucumber plants are infested by many piercing sucking pests such as the cotton aphid, *Aphis gossypii* (Glover); tomato whitefly, *Bemisia tabaci* (Genn.); onion thrips, *Thrips tabaci* (Lind.); potato leafhopper, *Empoasca decipiens* (Paoli) and the two-spotted spider mite, *Tetranychus urticae* (Koch). (Coudriet *et al*. 1985, Nozato 1988, Higgins 1992, Abdel-Hafiz 2002, Jan *et al*. 2003, Hanafy 2004, Oltean *et al*. 2012 and Hussein *et al*. 2015).

These pests can cause severe problems in the production of cucumber either through direct damage to the crop or through transmission of disease agents, such as the aphid-borne mosaic viruses (Webb 2001). Insecticides are highly effective in controlling most insect pests. However, a limited number of generally effective pesticides may be used that are safe to apply, handle, and store (Sharma *et al*., 2016). Pesticides produced from bio or natural origin have been recently attracted the attention of many scientists to avoid the problems caused by synthetic compounds. They are deeply interested in their chemical constituents and biological properties (Abou-Yousef *et al*. 2010). Therefore, attempts have been made for replace synthetic pesticides by natural pesticides of plant, mineral and biotic origins which are recognized as safe, less persistent and more specific (Oudejans, 1991, Bambawale *et al*. 1995, El-Bassomy, 1998, Lee *et al*. 2012 and El-Sayed, 2013).

The present work aims to evaluate efficacy of different designed programs in controlling piercing sucking pests and spider mite infesting cucumber planted during autumn and spring cultivation at Sohag region.

## MATERIALS AND METHODS

**Cucumber plants and programs area:-**

1. **For piercing sucking pests**
   An area of 840 $m^2$ was cultivated with cucumber variety Hail (PS 410832) on 13th September and 16th February during 2015 and 2016, respectively. This area was divided into twenty replicates. Four replicates were used for each program.

2. **For two-spotted spider mite**
   An area of 840 $m^2$ was cultivated with cucumber variety Hail (PS 410832) on 16th February during 2016. This area was divided into twenty replicates. Four replicates were used for each program
   .

1. **Design of experiment**
   Randomized complete blocks design (RCBD) was applied.

2. **Programs design**
   Four suggested programs were designed for control piercing sucking pests (**Table 1**) and two-spotted spider mites (**Table 2**). Each program contains three pesticides which were sprayed successively at 15 days interval.
3. **Sampling technique:**
   Samples of 10 leaves were randomly collected from each replicate, representing different stages of the canopy. They were inspected early morning in the field and number of piercing sucking pests adults were recorded. Samples were kept in a paper bags and transferred to the laboratory for the immature stages inspection with the aid of digital microscope. Counts of programs and control were recorded 1 day before the first spray, 7 and 14 days after each spray.

4. **Assessment of population:**
   The mean population numbers of the four replicates of each program at each inspection time was determined. The % reduction averages for each spray and the overall average of reduction for each program were calculated according to (Henderson and Tilton, 1955).

5. **Determination of yield:**
   Yield quantity for each program was determined by calculating the mean weight of the replicates till the end of harvest time.

6. **Statistical analysis:**
   Statistical analysis was conducted using ANOVA-two way, followed by Duncan's Test by using Co-stat 6.4 computer program according to (Steel and Torrie 1981).

Table (1): The designed programs, treatments application time and dose for the control of the piercing sucking insects during Autumn plantation 2015 and Spring plantation 2016

| Designed programs | Autumn plantation of 2015 and sequence of treatments | | |
|---|---|---|---|
| | 1st spray (3 Oct.) | 2nd spray (17 Oct.) | 3rd spray (1 Nov.) |
| Program (1) | Bio-sect 200gm/100L. | Berna star 400ml/100L. | Sortem 250ml/100 L. |
| Program (2) | Planch 30ml/100L. | Applaud 100ml/100L. | Oberon 60ml/100L. |
| Program (3) | Planch 30ml/100L. | Berna star 400ml/100L. | Sortem 250ml/100 L. |
| Program (4) | Planch 30ml/100L. | Sortem 250ml/100 L. | Oberon 60ml/100L. |
| Designed Programs | Spring plantation of 2016 and sequence of treatments | | |
| | 1st spray (4 Mar.) | 2nd spray (18Mar.) | 3rd spray (1 Apr.) |
| Program (1) | Bio-sect 200gm/100L. | Berna star 400ml/100L. | Sortem 250ml/100 L. |
| Program (2) | Planch 30ml/100L. | Applaud 100ml/100L. | Oberon 60ml/100L. |
| Program (3) | Planch 30ml/100L. | Berna star 400ml/100L. | Sortem 250ml/100 L. |
| Program (4) | Planch 30ml/100L. | Sortem 250ml/100 L. | Oberon 60ml/100L. |

Table (2): The designed programs, treatments application time and dose for the control of the two-spotted spider mite during Spring plantation 2016

| Designed Programs | Spring plantation of 2016 and sequence of treatments | | |
|---|---|---|---|
| | 1st spray (8 Mar.) | 2nd spray (22 Mar.) | 3rd spray (5 Apr.) |
| Program (A) | Sortem 250ml/100 L. | Bio-sect 200gm/100L. | Berna star 400ml/100L. |
| Program (B) | Applaud 100ml/100L. | Oberon 60ml/100L. | Challenger 60ml/100L. |
| Program (C) | Oberon 60ml/100L. | Sortem 250ml/100 L. | Bio-sect 200gm/100L. |
| Program (D) | Oberon 60ml/100L. | Challenger 60ml/100L. | Sortem 250ml/100 L. |

## RESULTS AND DISCUSSION

### 1. Evaluation of suggested programs for the control of piercing sucking pests

**a. Aphid**

Data in (Table 3) showed that Program (2) had the highest % reduction mean (78.8 %) followed by Program (4) and Program (3) (74.8 % and 73.8 %, respectively), while Program (1) (66.5 %) was the lowest effective one during Autumn plantation 2015.

In Spring plantation 2016 (Table 4) also Program (2) proved to be significantly the most effective program among all tested programs, followed by Program (3) (73.3 %) and Program (4) (70.1 %) without significant difference between the last two programs. Program (1) maintained its lower activity (63.8 %)

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**b. Whitefly**

The percentage reduction means of the four programs against whitefly attacking cucumber in Autumn plantation 2015 were determined (Table 3). Results showed that, Program (2) had the highest % reduction mean (80.5 %) followed by Program 3 (75.8 %) and Program (4) (73.7 %). While Program (1) had the lowest % reduction mean (70 %). Generally, the results showed that, the % reduction means of all Programs on whitefly were higher than those obtained on aphid during this season.

In Spring plantation (Table 4) the % reduction means on whitefly showed significant differences between all programs and superiority of Program (2) (78.9 %) compared to Program (4) (73.4 %) and Program (3) (63.3 %). Program (1) again, gave the lowest % reduction mean (57.2 %).

**c. Thrips**

Data on thrips during Autumn plantation 2105 (Table 3) and in Spring plantation 2016 (Table 4) showed that, Program (4) and Program (2) were significantly the most effectives programs (81.7 % and 79.5 %, respectively) followed by Program (3) (62.3 %) and Program (1) (58.7 %). In Spring plantation 2016, Program (2) gave the highest % reduction mean (76.4 %) followed by Program (4) (72.8 %), Program (3) (64.9 %) and Program (1) (58.4 %).

Data recorded in (Table 5) included the mean % reductions of the piercing sucking insects for both seasons and overall mean % reductions by the tested programs. Results indicated that, Program (2) (which is completely chemical) was the most effective one among all programs with overall mean % reduction78.5 % followed by Program (4) (74.4 %) which consists of two chemical and one non-chemical pesticides, Program (3) (68.9 %) which contains two non-chemical pesticides and one chemical one and the completely non-chemical Program (1) (62.4 %).

Kafoury *et al*. (1997) stated that, the best results for control *B. tabaci* on cucumber occurred with

the application of Imidacloprid at 21 days intervals. Shawir (2000) stated that, applied of Actellic, Drusban, Cypermethrin and Sumicidin for three times at 15 days interval gave reduction of *B. tabaci* population by 83.2, 83.0, 73.9 and 56.6 % respectively. Omar *et al*. (2001) found that imidacloprid was the most potent insecticide in reducing *A. gossypii* on squash followed by Malathion then Super royal either after two sprays at three week intervals or three sprays at one week intervals. Anwar *et al*. (2007) revealed that all used programs were significantly reduced the population density of the sucking insects infesting cotton plants with general mean reduction (69.4 %- 85.3 %). Magdy (2012) Revealed that, the tested sequences showed high protection for the green bolls of cotton with protection percentages ranged from 69.9 % (sequence 6) to 93.5 % (sequence 7). Also, the sequence programs induced high effect representing 80.0 up to 94.6 %. Pitan and Filani (2013) revealed the ability of protect cucumber plants from thrips infestation by spraying of lambda-cyhalothrin at 25 g a.i / ha at weekly intervals.

**2. Evaluation of suggested programs for the control of the two spotted spider mite**

Data presented in Table (5) showed that, there were significant differences between all programs. Program (B) which is completely chemical (Applaud, Oberon and Challenger) was the most effective program in reducing the population of the two spotted spider mite (80.1 %) followed by the Program (D) (75.0 %) which is consisted of two chemical pesticides (Oberon and Challenger) and one botanical oil (Sortem) and Program (C) which includes one chemical pesticides (Oberon), one botanical oil (Sortem) and one biocide (Bio-sect) (71.5 %).The Program (A) which is completely non-chemical program was the least effective one with total mean % reduction (63.8 %). As seen from these results, here again the partially inlaying Program with one non- traditional pesticide Program (D) had reasonable results not far from that of the completely chemicalone

Table (3): Mean counts and % reductions of piercing sucking insects by the tested programs on cucumber during Autumn plantation 2015

| Treatments | Pre sprav | Mean numbers of aphid / 10 cucumber leaves and % reductions | | | | | | | | | | | | | | | | | | Ove O * |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1st spray | | | | | | 2nd spray | | | | | | 3rd spray | | | | | | |
| | | 7th Day | | 14th Day | | Mean | | 7th Day | | 14th Day | | Mean | | 7th Day | | 14th Day | | Mean | | |
| Program 1 | 39.5 | 51.3 | 44.9 | 24.3 | 84.0 | 37.8 | 64.4 | 51.5 | 75.9 | 69.0 | 61.5 | 60.3 | 68.7 | 42.0 | 69.9 | 48.8 | 64.9 | 45.4 | 67.4 | 66.5 c |
| Program2 | 42.0 | 12.8 | 87.4 | 21.3 | 86.8 | 17.0 | 87.1 | 58.3 | 74.6 | 61.3 | 68.2 | 59.8 | 71.4 | 43.3 | 71.2 | 21.3 | 81.2 | 32.3 | 76.2 | 78.8 a |
| Program 3 | 63,0 | 16.8 | 82.7 | 21.3 | 86.4 | 19.0 | 84.5 | 68.5 | 69.3 | 63.0 | 66.2 | 65.8 | 67.8 | 44.0 | 70.0 | 40.3 | 63.2 | 42.1 | 66.6 | 73.8 b |
| Program 4 | 36.3 | 16.0 | 81.3 | 24.3 | 82.6 | 20.1 | 81.9 | 55.5 | 71.4 | 58.5 | 64.1 | 57.0 | 67.7 | 34.0 | 73.5 | 25.5 | 73.8 | 29.8 | 73.7 | 74.8 b |
| Untreated | 35.8 | 85.3 | | 138.0 | | 111.6 | | 195.8 | | 164.5 | | 180.1 | | 128.8 | | 128.8 | | 128.8 | | |
| Mean numbers of whitefly/ 10 cucumber leaves and % reductions | | | | | | | | | | | | | | | | | | | | |
| Program 1 | 17.8 | 33.3 | 55.1 | 19.5 | 87.4 | 26.4 | 71.3 | 59.8 | 75.3 | 71.0 | 60.0 | 65.4 | 67.7 | 37.5 | 76.9 | 44.3 | 67.4 | 40.9 | 72.1 | 70.0 c |
| Program2 | 20.0 | 11.5 | 86.4 | 26.3 | 84.9 | 18.9 | 85.6 | 61.3 | 77.4 | 52.8 | 73.4 | 57.0 | 75.4 | 43.3 | 76.1 | 23.5 | 84.6 | 33.4 | 80.4 | 80.5 a |
| Program 3 | 63.0 | 16.0 | 79.1 | 20.3 | 88.2 | 18.1 | 83.6 | 68.5 | 73.6 | 70.8 | 63.3 | 69.6 | 68.4 | 26.0 | 85.2 | 55.5 | 62.6 | 40.8 | 73.9 | 75.8 b |
| Program 4 | 20.8 | 15.3 | 82.5 | 41.3 | 77.7 | 28.3 | 80.1 | 48.5 | 82.8 | 71.5 | 65.8 | 60.0 | 74.3 | 69.0 | 63.7 | 56.8 | 64.4 | 62.9 | 64.1 | 73.7 bc |
| Untreated | 14.3 | 60.0 | | 125.5 | | 92.8 | | | 195.0 | | 139.7 | | 167.3 | | 129.8 | | 109.5 | | 119.6 | |
| Mean numbers of thrips / 10 cucumber leaves and % reductions | | | | | | | | | | | | | | | | | | | | |
| Program 1 | 41.0 | 30.3 | 27.9 | 19.8 | 76.3 | 25.0 | 52.1 | 24.0 | 56.2 | 18.5 | 56.4 | 21.3 | 56.3 | 12.5 | 71.2 | 6.5 | 80.3 | 9.5 | 75.7 | 58.7 b |
| Program2 | 35.3 | 8.0 | 77.8 | 16.8 | 76.6 | 12.4 | 77.2 | 14.8 | 69.0 | 7.0 | 81.0 | 10.9 | 75.0 | 5.3 | 86.1 | 1.0 | 96.2 | 3.1 | 91.1 | 79.5 a |
| Program 3 | 63.0 | 12.5 | 73.2 | 20.3 | 77.7 | 16.4 | 75.4 | 24.0 | 60.2 | 23.3 | 49.8 | 23.6 | 55.0 | 26.0 | 44.5 | 14.8 | 58.8 | 20.4 | 51.7 | 62.3 b |
| Program 4 | 36.5 | 6.0 | 83.9 | 16.0 | 78.7 | 11.0 | 81.3 | 11.3 | 77.2 | 9.3 | 75.7 | 10.3 | 76.4 | 5.8 | 84.6 | 1.0 | 96.6 | 3.4 | 90.6 | 81.7 a |
| Untreated | 41.0 | 42.3 | | 84.0 | | 63.1 | | 55.5 | | 41.0 | | 48.3 | | 43.3 | | 33.3 | | 38.3 | | |

Means followed by the same letters are non-significantly different from each other at 0.05 Probability.

Table (4): Mean counts and % reductions of piercing sucking insects by the tested programs on cucumber during Spring plantation 2016

| Treatments | Pre spray count | Mean numbers of aphid / 10 cucumber leaves and % reductions | | | | | | | | | | | | | | | | | | Overall mean % Red. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1st spray | | | | | | 2nd spray | | | | | | 3rd spray | | | | | | |
| | | 7th Day | | 14th Day | | Mean | | 7th Day | | 14th Day | | Mean | | 7th Day | | 14th Day | | Mean | | |
| | | Count | %Red. | Count | %Red. | Count | %Red. | Count | %Red. | Count | %Red. | Count | %Red. | Count | %Red. | Count | %Red. | Count | %Red. | |
| Program 1 | 42.5 | 42.8 | 37.2 | 25.0 | 80.3 | 33.9 | 58.8 | 46.0 | 73.8 | 73.5 | 55.6 | 59.8 | 64.7 | 39.5 | 68.2 | 19.0 | 76.5 | 29.3 | 72.4 | 63.8 c |
| Program2 | 48.3 | 16.0 | 78.9 | 27.5 | 80.6 | 21.8 | 79.8 | 51.0 | 74.3 | 49.5 | 73.2 | 50.3 | 73.7 | 20.8 | 85.3 | 26.8 | 71.1 | 23.8 | 78.2 | 77.1 a |
| Program 3 | 44.3 | 16.3 | 77.2 | 22.7 | 82.7 | 19.5 | 79.9 | 40.8 | 77.7 | 68.0 | 60.2 | 54.4 | 68.9 | 44.5 | 65.6 | 21.3 | 74.6 | 32.9 | 70.1 | 73.3 b |
| Program 4 | 35.5 | 15.0 | 72.8 | 20.5 | 80.0 | 17.8 | 76.4 | 41.3 | 71.3 | 50.8 | 61.6 | 46.0 | 66.5 | 27.3 | 72.0 | 23.3 | 63.4 | 25.3 | 67.7 | 70.1 b |
| Untreated | 39.8 | 63.5 | | 117.8 | | 90.7 | | 164.3 | | 154.3 | | 159.3 | | 117.3 | | 75.8 | | 96.6 | | |
| Mean numbers of whitefly/ 10 cucumber leaves and % reductions | | | | | | | | | | | | | | | | | | | | |
| Program 1 | 59.5 | 60.7 | 33.1 | 45.0 | 68.8 | 52.9 | 51.0 | 66.5 | 64.1 | 75.5 | 55.5 | 71.0 | 59.8 | 41.3 | 71.7 | 80.0 | 53.4 | 60.6 | 62.5 | 57.2 d |
| Program2 | 58.0 | 16.2 | 81.1 | 25.5 | 82.0 | 20.9 | 81.5 | 39.0 | 78.4 | 32.0 | 80.4 | 35.5 | 79.4 | 35.0 | 75.2 | 45.5 | 72.7 | 40.3 | 74.0 | 78.9 a |
| Program 3 | 63.0 | 26.0 | 69.5 | 26.3 | 80.8 | 26.1 | 75.2 | 64.8 | 62.9 | 90.3 | 43.6 | 77.5 | 53.2 | 50.3 | 63.4 | 70.0 | 56.8 | 60.1 | 60.1 | 63.3 c |
| Program 4 | 59.5 | 25.3 | 72.2 | 32.8 | 77.2 | 29.0 | 74.7 | 26.5 | 85.7 | 62.3 | 63.2 | 44.4 | 74.5 | 35.3 | 75.8 | 58.5 | 65.8 | 46.8 | 70.8 | 73.4 b |
| Untreated | 60.0 | 91.5 | | 146.0 | | 118.8 | | 187.0 | | 171.7 | | 179.4 | | 147.3 | | 173.3 | | 160.3 | | |
| Mean numbers of thrips/ 10 cucumber leaves and % reductions | | | | | | | | | | | | | | | | | | | | |
| Program 1 | 52.8 | 60.0 | 32.8 | 60.5 | 64.3 | 60.6 | 48.5 | 66.5 | 69.1 | 83.3 | 65.1 | 74.9 | 67.1 | 41.3 | 76.6 | 80.5 | 44.0 | 60.9 | 60.3 | 58.4d |
| Program2 | 60.8 | 23.0 | 77.8 | 41.5 | 78.7 | 32.4 | 78.2 | 68.0 | 72.6 | 62.3 | 77.4 | 65.1 | 75.0 | 38.8 | 80.9 | 48.8 | 70.5 | 43.8 | 75.7 | 76.4a |
| Program 3 | 63.0 | 26.0 | 73.0 | 30.3 | 83.2 | 28.1 | 78.1 | 93.3 | 59.2 | 99.0 | 61.0 | 96.1 | 60.1 | 101.5 | 45.6 | 61.8 | 59.8 | 81.6 | 52.7 | 64.9c |
| Program 4 | 61.3 | 28.0 | 73.3 | 26.3 | 86.7 | 27.1 | 80.0 | 65.3 | 73.9 | 108.5 | 60.9 | 86.9 | 67.4 | 58.8 | 71.2 | 50.5 | 69.9 | 54.6 | 70.5 | 72.8b |
| Untreated | 56.8 | 97.5 | | 182.8 | | 140.2 | | 232.0 | | 256.0 | | 244.0 | | 189.5 | | 155.5 | | 172.5 | | |

Means followed by the same letters are non-significantly different from each other at 0.05 Probability.

Table (5): Mean and overall % reductions of the aphid, whitefly and thrips populations by the tested programs on cucumber during both seasons of 2015 and 2016.

| Treatments | % Reduction of aphid | | % Reduction of whitefly | | % Reduction of thrips | | * Mean % reduction of Aphid for both seasons | * Mean % reduction of whitefly for both seasons | * mean % reduction of thrips for both seasons | *Overall mean% reduction in both seasons |
|---|---|---|---|---|---|---|---|---|---|---|
| | Autumn 2015 | Spring 2016 | Autumn 2015 | Spring 2016 | Autumn 2015 | Spring 2016 | | | | |
| Program 1 | 66.5 | 63.8 | 70.0 | 57.2 | 58.7 | 58.4 | 65.2 c | 63.6 d | 58.6 b | 62.4 d |
| Program 2 | 78.8 | 77.1 | 80.5 | 78.9 | 79.5 | 76.4 | 78.0 a | 79.7 a | 78.0 a | 78.5 a |
| Program 3 | 73.8 | 73.3 | 75.8 | 63.3 | 62.3 | 64.9 | 75.5 b | 69.6 c | 63.6 b | 68.9 c |
| Program 4 | 74.8 | 70.1 | 73.7 | 73.4 | 81.7 | 72.8 | 72.5 b | 73.6 b | 77.3 a | 74.4 b |

Table (6): Mean counts and % reductions of two-spotted spider mite population by the tested programs on cucumber during spring plantation 2016

| Treatments | Pre spray count | Mean numbers of spider mite/ 10 cucumber leaves and % reduction | | | | | | | | | | | | | | | | | | *Overall % Red. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1st spray | | | | | | 2nd spray | | | | | | 3rd spray | | | | | | |
| | | 7th Day | | 14th Day | | Mean | | 7th Day | | 14th Day | | Mean | | 7th Day | | 14th Day | | Mean | | |
| | | Count. | %Red | Count. | %Red | Count. | %Red | Count. | %Red | Count. | %Red | Count. | %Red | Count. | %Red | Count. | %Red | Count. | %Red | |
| Program A | 60.5 | 36.0 | 66.9 | 40.7 | 77.1 | 38.4 | 72.0 | 75.5 | 70.3 | 105.5 | 60.2 | 90.5 | 65.3 | 99.7 | 52.6 | 95.25 | 48.2 | 97.5 | 50.4 | 63.8 d |
| Program B | 65.0 | 42.75 | 63.3 | 40.0 | 79.0 | 41.4 | 71.1 | 32.0 | 88.2 | 33.0 | 88.3 | 32.5 | 88.3 | 34.7 | 84.5 | 45.5 | 76.9 | 40.1 | 80.7 | 80.1 a |
| Program C | 63.0 | 26.0 | 78.6 | 28.75 | 85.6 | 27.4 | 82.1 | 61.75 | 78.4 | 106.25 | 64.3 | 84.0 | 71.4 | 106.75 | 54.8 | 91.75 | 55.5 | 99.3 | 55.1 | 71.5 c |
| Program D | 68.8 | 34.25 | 72.3 | 43.0 | 78.8 | 38.6 | 75.5 | 34.5 | 88.1 | 62.25 | 79.4 | 48.4 | 83.7 | 87.75 | 63.4 | 90.75 | 56.7 | 89.3 | 60.0 | 75.0 b |
| Untreated | 62.5 | 112.0 | | 184.2 | | 148.1 | | 263.3 | | 276.7 | | 270.0 | | 217.8 | | 190.5 | | 204.1 | | |

Means followed by the same letters are non-significantly different from each other at 0.05 Probability.

**1. Impact of planned pest control programs on cucumber yield**

**2.**

The different efficiency of pests control programs was reflected on cucumber yield as follows:

**a. Programs planned for the control of piercing sucking insects**

The percentage increases of cucumber during Autumn 2015, Spring 2016 and both seasons due to the practicing of insects control programs were determined as shown in (Figure 1) . Program 2 has increased significantly the yield of cucumber by 60.9 % followed by program 4 (45.3 %), Program 3 (34.7 %) and Program 1 (20.5%).

**b. Programs planned for the control of the two spotted spider mite**

The percentage increases of cucumber during spring 2016 due to the practicing of pests control programs. Program B has significantly increased the yield of cucumber by 48.0 % followed by Program D (34.0 %), Program C (33.1 %) and Program A (28.1%).

Magdy (2012) revealed that, using of sequences pesticides reduced the cotton yield loss in comparing with the control and the recorded yield loss percentages were 10.17, 13.7, 7.91, 14.38, 20.5, 13.82 and 6.72 % for sequences 1 to 7, while it was 46.76 % for the control. Kanika *et al.* (2014 a) recorded that, Omite caused highest increase (23.65 % over control) followed by Nimbecidine, *B. bassiana* ($10^{10}$ spores / ml) and *B. bassiana* ($10^{8}$ spores / ml) 13.97, 11.82, 8.67 % increase over control, respectively on cucumber. Sood *et al*. (2015) indicated that, the application of spiromesifen 240 SC at (144 g a.i. / ha) at 21 days intervals resulted in highest yield per plant.

**CONCULSION**

It could be concluded that population fluctuation of piercing sucking pests were obvious in spring plantation more than autumn plantation. So we can recommend growers for earlier planting date (autumn plantation) to avoid high pest densities and their fluctuations

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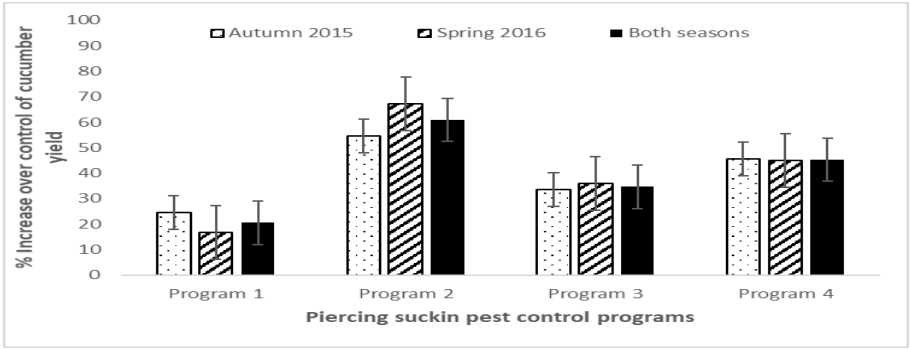


Figure (1): % Increase in cucumber fruits weight after application of the piercing sucking insects control programs.

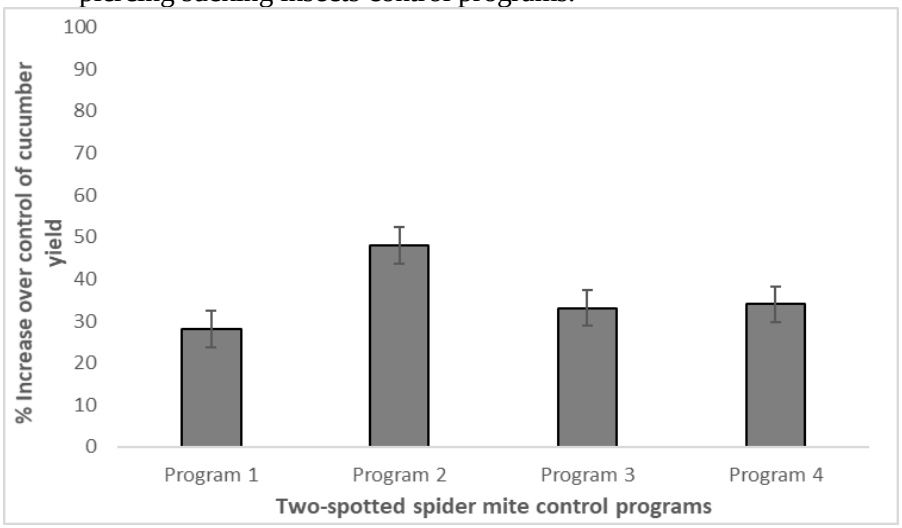


Figure (2): % Increase in cucumber fruits weight after application of two spotted spider mite control programs.

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# محاولة لتصميم برنامج مكافحة كيميائية للحد من الآفات الثاقبة الماصة التي تصيب نباتات الخيار في منطقة سوهاج

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تم تصميم 4 برامج للمبيدات في محاولة لتقييم كفاءتها في مكافحة الافات الثاقبة الماصة والعنكبوت الاحمرالتي تصيب نباتات الخيار في منطقة سوهاج. قد اجريت التجربة خلال العروتين الخريفي والربيعي لعام 2015 و 2016. اشتمل كل برنامج استخدام 3 مبيدات تم رشها 3 مرات متتابعة بفارق 15 يوم. تم الاخذ في الاعتبارالمتوسط والنسبة المئوية للخفض في الكثافة العددية لهذه الافات. اعطى البرنامج الثانى (بلانش–ابللود–اوبيرون) على متوسط نسبة خفض للموسمين لحشرتي المن والذبابة البيضاء ( 78.8% و 79.7% علي التوالي) بينما كان البرنامج الاول كان الاقل تاثيرا بنسبة خفض للموسمين لكلا الحشرتين بنسبة (65.2% و 63.6% علي التوالي). من ناحية اخري، لا توجد فروق معنوية بين البرنامج الثاني (بلانش–ابللود–اوبيرون) والبرنامج الرابع (بلانش–سورتيم–اوبيرون) حيث كانا اكثر فاعلية وتسببا في اعلي نسبة خفض للتربس خلال الموسمين (78% و 77.3% علي التوالي). نفس النتائج للبرنامج الاول (سورتيم– بيرنا ستار– بيوسكت) والثالث (بلانش– بيرنا ستار– سورتيم) ، حيث لا يوجد فروق معنوية (58.6% و 63.6% علي التوالي). والخلاصة فأن البرنامج الثاني هو الاكثر فاعلية ومن ناحية اخري، وجد ان البرنامج B (ابللود،اوبيرون،شالينجر) الذي هو كيمائي كليا كان الاكثر فاعلية في نسبة خفض تعداد العنكبوت الاحمر (80.1%)، بينما البرنامج A (سورتيم، بيوسكت، بيرنا ستار) وهو غير كميائي كليا له اقل فاعلية بمتوسط نسبة خفض (63.8%). ايضا ما بين البرامج المصصمة لمكافحة الافات الثاقبة الماصة، فأن البرنامج الثاني ادي الي زيادة معنوية في محصول الخيار بنسبة 60.9% يليها البرنامج الرابع بنسبة 45.3%، البرنامج الثالث (34.7%) والبرنامج الاول (20.5%). بينما للعنكبوت الاحمر، البرنامج (B) ادي الى حدوث ارتفاع فى كمية المحصول بنسبه بلغت 48 % ثم البرنامج (D) بنسبة ارتفاع ( 34 %) ثم البرنامج (C) بنسبة ارتفاع (33.1%) مقارنة بالمتحصل عليه من المساحة الغير معاملة.