

The efficiency of certain chemical and non-chemical insecticides against the mango soft scale insect, *kilifia acuminata* (Signoret) on mango trees in Ismailia Governorate.

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ABSTRACT

Two experiments were carried out to evaluate the efficiency of chemical and non-chemical insecticides on the mango soft scale insect, *kilifia acuminata* (Signoret) infesting mango trees in Ismailia Governorate. The first experiment was carried out at the first of January, 2007 in El-Kantra Gharb district and the second experiment was carried out at the first of January, 2008 in El-Kantra Gharb district, Ismailia Governorate, respectively. The obtained results of the first experiment indicated that Admiral gave the highest reduction percentage (91.44%), followed by Biroanza (85.53%), Biover (84.30%) and Malathion which gave (78.82%) percentage of reduction. The least effective compound was Conserve which showed (69.47%) percentage of reduction. The obtained results of the second experiment showed that Admiral the most superior compound which gave (86.14%) percentage of reduction. The rest of compounds could be descendgly arranged as follows: Gogopa oil (81.97%), Super Royal oil (81.97%), Biover (79, 29%), Royal oil (74.35%), and Diver and oil (72.17%) percentage of reduction. The least effective insecticide was Masrona oil which gave (72.03%) percentage of reduction of the different stages of the mango soft scale insect.

Keywords: Insecticides, mango soft scale insect, Ismailia Governorate

INTRODUCTION

Scale insects cause damage through immature and adult females. They attack tender shoot, twigs, leaves and fruits of mango trees, *Mangifera indica* L. These insects sucking the plant sap by their piercing sucking mouth parts. At high infestation leaves, and fruits were affected resulting yield reduction. Habib *et al.*, (1973) evaluated insecticidal sprays for the control of *K. acuminata* (Signoret) on mango trees. In general, a single application in May (after blooming) was more effective than one in either October or March. Mixture of 2% Triona oil with either 0.15% malathion or dimethoate gave the best control of this scale insect. Elwan, (1990), kwaiz, (1999), Badawy *et al.*, 2000 and El-Dash *et al.*, 2002 found that *Kilifa acuminata* (Signoret) attacks mango trees in Egypt and cause severe damage to leaves and fruits. Heavily infestation resulted leaves drop and branches dryness. Also this scale insect excretes large amount of honey dew. On which a group of fungi belonging to the genera capnodium, Alternaria known as sooty mould fungi were developed on the different plant parts. This sooty mould covers the leaves and fruits with a black that impedes photosynthesis of the plant, Ezzat and Hussien, (1969) , El-Dash, (1997), El-Dash *et al.*, (2002) and Soliman *et al.*, (2007),

stated that the mango soft scale insect, *kilifia acuminata* (Signoret) is considered one of the most important soft scale insect infesting Mango trees in Egypt.

Therefore, these works, two experiments were carried out to estimate the efficiency of some conventional insecticides and Bio-pesticides on the soft mango scale insect under the environmental condition of Ismailia Governorate.

MATERIALS AND METHODS

The effectiveness of certain compounds against the acuminate scale insect, *Kilifia acuminata* (Signoret), infesting mango trees was evaluated under the environmental conditions of Ismailia Governorate. Mango trees were twenty years old and 8-9 meter high. These trees were kept away from any insecticidal contamination through the last two years before these experiments. Tested treatments were distributed in randomized completely blocks design. Each treatment contains three replicates of three mango trees for each. The treated trees were completely sprayed by the tested materials using six horse power motor sprayers (John Bean motor), with a 600 liters tank at pressure of two pound per square inch. Each tree received 20-25 liters of the solution to ensure the complete covering of the tree parts. Random samples of 10 infested leaves with this scale insect were picked from each replicate immediately before spraying application and after one, two, three and four weeks from application. The samples were transferred to the laboratory in bags for examination by the aid of Stereo binocular microscope. Alive pre adults (nymphs), adult females and gravid females of this scale insect were counted and recorded per leaf. The reduction percentage of different stages of the acuminate scale insect, *k. acuminata* (Signoret) was estimated according to the equation of Henderson and Tilton, (1955) as follows:-

$$\text{Reduction Percentage} = 100 \left(1 - \left(\frac{T_a \times c_b}{T_b \times c_a} \right) \right)$$

where:

Ta = number of individuals in treated trees after treatment application

Tb = number of individuals in treated trees before treatment application

Ca = number of individuals in control trees after treatment application

Cb = number of individuals in control trees before treatment application

The tested treatments against the acuminate scale insect, *k. acuminata* (Signoret) were:

Two experiments were carried out in two private mango orchards, the first experiment was carried out at the first of January, 2007 and the second one was carried out at the first of January, 2008 at El-Kantra Gharb, Ismailia Governorate.

The first experiment:

Malathion 57% EC (phosphorus) (100cm³/100 liter of water), (Conserve 0.24 CB (0.02w/w spinosad) (50cm³/100 liter water), Bioranza 10% WP (*Metarhizium anisopliae*) (200g/100 liter water), Biover 10% WP (*Beauveria bassiana*) (200g/100 liter water), and Admiral 10% EC (pyriproxyfen) (IGR) (50cm³/100 liter water).

The second experiment:

Royal oil (mineral oil) (2.5 liter/100 liter water), Massrona oil (mineral oil) (2.5 liter/100 liter water), Super Royal oil (mineral oil) (1.5 liter/100 liter water), Gogopa oil (mineral oil) (50cm³/100 liter water), Diver oil (mineral oil) (1.5 liter/100 liter water), Biover 10% WP (*Beauveria bassiana*) (200g/100 liter water), and Admiral 10% EC (pyriproxyfen) (IGR) (50cm³/100 liter water).

The obtained data was analyzed by using M state computer program software. When F values were significant means were separated by Fisher least significant differences (LSD) at 0.05 level of significance.

RESULTS AND DISCUSSIONS

In the first experiment, three Bio-pesticides, (Bioranza, Biover and Conserve), Insect growth regulator, (Admiral) and conventional insecticides (Malathion) were evaluated. The obtained data was illustrated in Fig. (1) based on the comparison among the tested treatments on the general average of percentage of reduction during the whole period of experiment, (4 weeks). It could be stated that Admiral which gave (91.44%) percentage of reduction was the most effective treatment, followed by Boioranza and Biover (85.53% and 84.30%, reduction percentage, respectively).

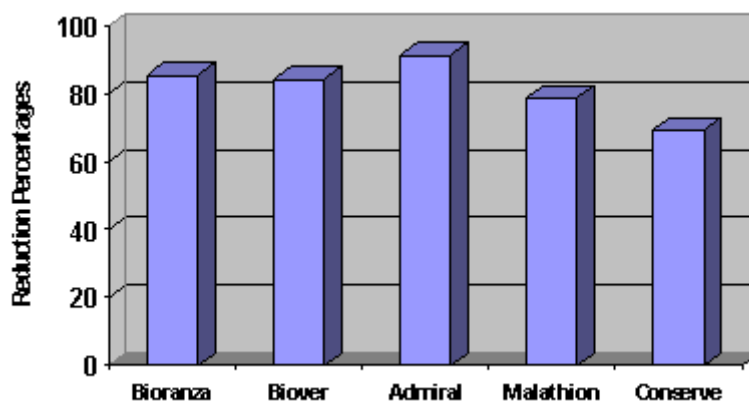


Fig. 1: The efficiency of certain chemical and non-chemical insecticides against the mango soft scale insect, *kilifia acuminata* (Signoret) on mango trees in the whole period of experiment, (4 weeks) at El-Kantra Gharb district, Ismailia Governorate.

On the other hand, Malathion and Conserve were the least effective treatments which gave (78.82%) and (69.47%) reduction percentage, respectively.

In the first post-treatment count, one week after spraying application, the obtained results were illustrated in (Fig. 2), Preadults of the acuminate scale insect, *k. acuminata* (Signoret) were the most susceptible stage to all the tested treatments after one week from spraying application. Mean percentages of reductions were (83.92%), (80.86%) and (80.15%) percentages of reduction, respectively for Preadults, Adult females and Gravid females of this scale insect, respectively.

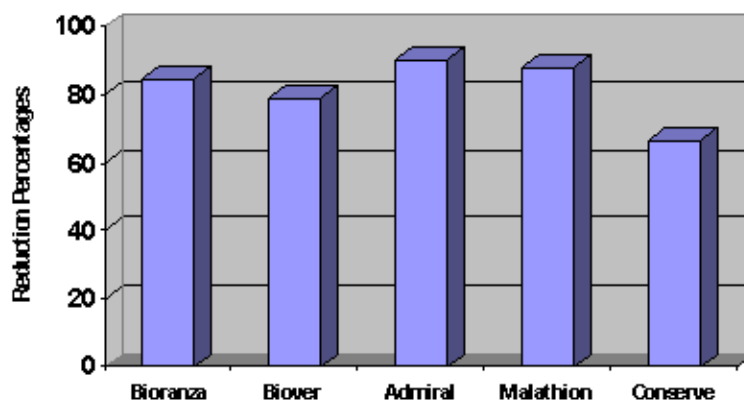


Fig. 2: The efficiency of certain chemical and non-chemical insecticides against the mango soft scale insect, *kilifia acuminata* (Signoret) on mango trees after one week from spraying application at El-Kantra Gharb district, Ismailia Governorate.

The tested treatments could be arranged as follows: Admiral (89.96%), Malathion (88.07%), Bioranza (84.69%), Biover (78.83%) and Conserve (66.65%), percentage of reduction, respectively.

In the second post-treatment count, two weeks after spraying application, the results clearly revealed that preadults and gravid females were slightly more susceptible to all the tested treatments than adult females of this scale insect. Percentages of reduction were (85.16%), (78.66%) and (81.25%), respectively for Preadults, Adult females and Gravid female of the acuminate scale insect. The obtained data was illustrated in (Fig.3), Admiral was the superior treatment which gave (89.81%) reduction percentage, followed by Bioranza (84.92%), Biover (83.70%), and Malathion (81.94%). While Conserve was the least affective treatment (68.07%) percentage of reduction.

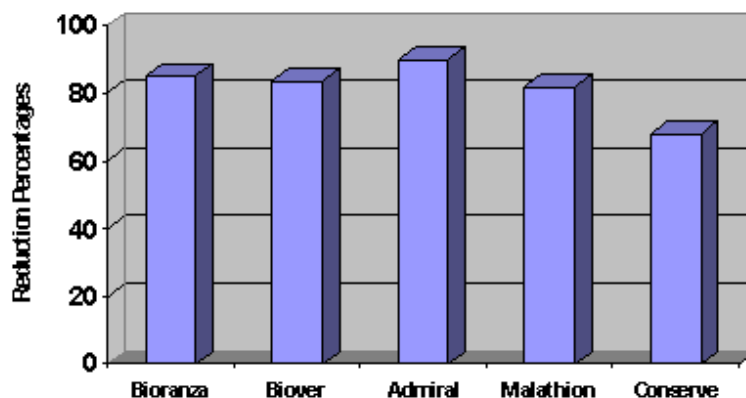


Fig. 3: The efficiency of certain chemical and non-chemical insecticides against the mango soft scale insect, *kilifia acuminata* (Signoret) on mango trees after two weeks at El-Kantra Gharb district, Ismailia Governorate.

Three weeks after spraying application, the obtained data revealed that Pre adults and Gravid females were slightly susceptible to the tested compounds than Adult females of the mango soft scale. Percentage of reduction were (84.99%), (80.58%) and (84.42%), respectively for Preadults, Adult females and Gravid females of this scale insect.

The results were illustrated in (Fig. 4), The tested treatments could be arranged as follows:- Admiral (93.18%), followed by Bioranza and Biover which gave (90.22%) and (87.36%) reduction percentage, respectively and finally Malathion and Conserve were the least effective treatments against the different stages of mango soft scale insect which gave (75.65%) and (70.20%) reduction percentage, respectively.

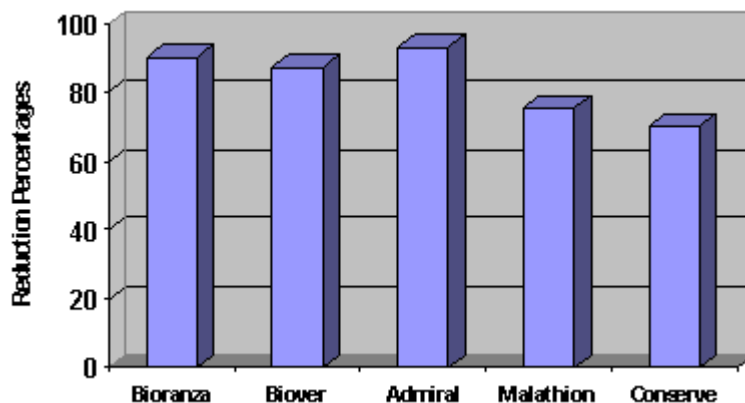


Fig. 4: The efficiency of certain chemical and non-chemical insecticides against the mango soft scale insect, *kilifia acuminata* (Signoret) on mango trees after three weeks at El-Kantra Gharb district, Ismailia Governorate.

The reductions percentages in the different stages of the acuminate scale insects in the fourth post-treatment count, four weeks after spraying application, were (84.23%), (79.51%) and (80.93%) percentage of reduction for Pre adults, Adults females and Gravid females of the mango soft scale insect, respectively.

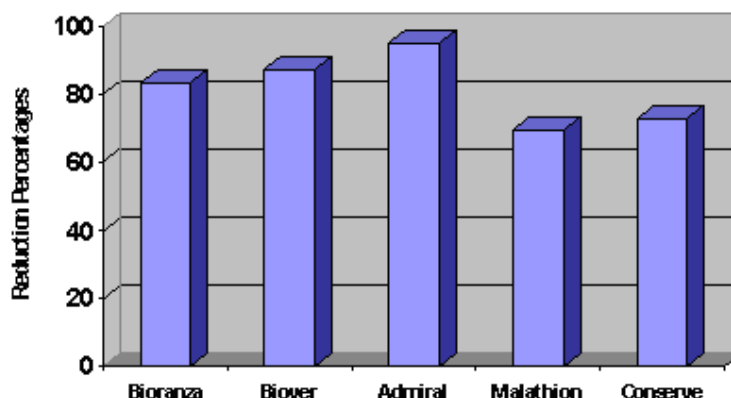


Fig. 5: The efficiency of certain chemical and non-chemical insecticides against the mango soft scale insect, *kilifia acuminata* (Signoret) on mango trees after four weeks at El-Kantra Gharb district, Ismailia Governorate.

The obtained results of the tested treatments were illustrated in (Fig. 5), Admiral gave the highest effectiveness on this scale insect with (94.80%) reduction percentage, followed by Biover (87.29%), Bioranza (83.17%), Conserve (72.94%) and Malathion (69.60%) reduction percentage, respectively.

It could be concluded that Admiral was the most effective treatment which gave (91.44%) percentage of reduction of the different stages of the acuminate scale insect, *k. acuminata* (Signoret), followed by Bioranza (85.53%), Biover (84.30%) and Malathion (78.82%) percentage of reduction. The least effective compound was Conserve which gave (69.47%) percentage of reduction of this scale insect.

Concerning the second experiment, the obtained data was graphically illustrated in Fig. (6). The tested treatments for the whole period of experiment were Biover, Admiral, Royal oil, Masrona oil, Gogopa oil, Diver oil and Super Royal oil. These compounds were evaluated against the different stages of the acuminate scale insect, *k. acuminata* (Signoret). The obtained data showed that Preadults of this scale insect were slightly more susceptible to the tested treatments than Adult females and Gravid females of this scale insects.

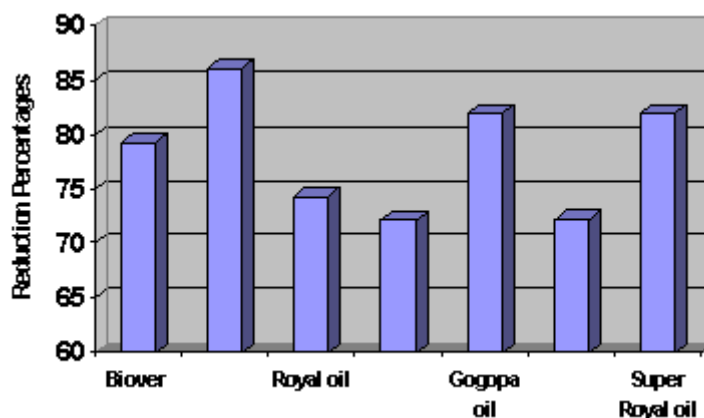


Fig. 6: The efficiency of certain chemical and non-chemical insecticides against the mango soft scale insect, *kilifia acuminata* (Signoret) on mango trees at El-Kantra Gharb district, Ismailia Governorate.

The reduction percentages were (80.54%), (76.69%) and (77.56%) reduction percentage, respectively for Preadults, Adult females and Gravid females of this scale insect.

The obtained results showed that Admiral was the most effective treatment which gave (86.14%) percentage of reduction, followed by Gogopa oil and Super Royal oil which showed (81.97%) percentage of reduction, respectively. Bivor, and Royal oil gave (79.29%) and (74.35%) percentage of reduction. Diver oil showed (72.17%) percentage of reduction. While the least effective treatment was Masrona oil which gave (72.03%) percentage of reduction of this scale insect.

In the first post-treatment count, one week after spraying application, Pre adults (76.53%) were the most susceptible for all the tested treatments than Adult females (72.65%) and Gravid females (73.96%) percentage of reduction.

The obtained results of the tested treatments were illustrated in (Fig. 7). The tested treatments could be arranged in the following descending order: Admiral (85.23%), Super Royal oil (80.14%), Gogopa oil (79.05%), Biover (73.82%), Royal oil (68.72%), Diver oil (66.98%) and the least effective treatment, was Masrona oil (66.68%) percentage of reduction of the different stage of this scale insect.

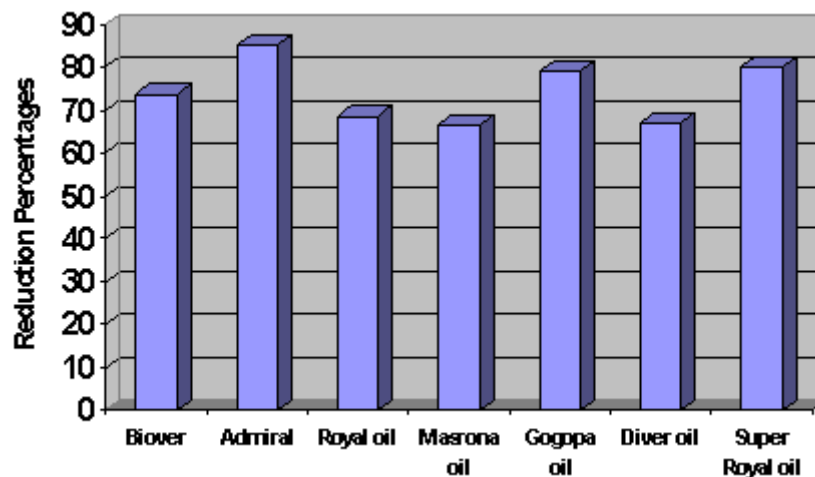


Fig. 7: The efficiency of certain chemical and non-chemical insecticides against the mango soft scale insect, *kilifia acuminata* (Signoret) on mango trees after one week at El-Kantra Gharb district, Ismailia Governorate.

Two weeks after spraying application, the second post-treatment count, the data clearly showed that Pre adults and Gravid females were slightly more susceptible than Adult females of this scale insect. Percentages of reduction were (79.53%), (75.35%) and (77.80%) percentage of reduction for Pre adults, Adult females and Gravid females of this scale insect, respectively.

The obtained data of the tested insecticides was illustrated in (Fig.8) Admiral gave the highest effective compound against the acuminate scale insect which gave (82.77%) percentage of reduction of this scale insect, followed by Super Royal oil (81.87%), Biover (80.40%), Gogopa oil (80.20%), Royal oil (74.40%), and Diver oil (71.99%). The least effective compound was Masrona oil (71.31%) percentage of reduction of this scale insect.

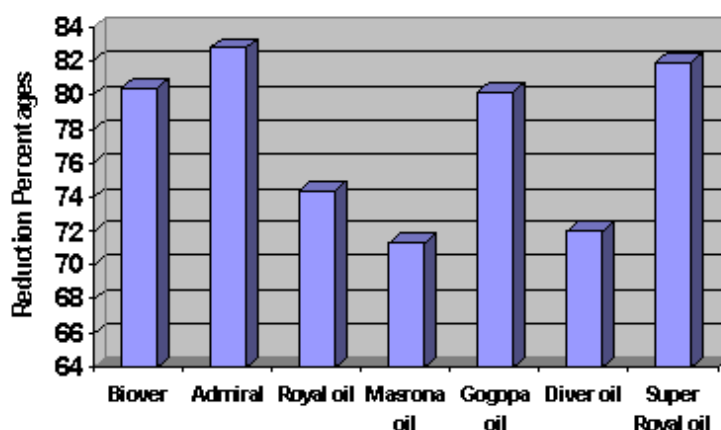


Fig. 8: The efficiency of certain chemical and non-chemical insecticides against the mango soft scale insect, *kilifia acuminata* (Signoret) on mango trees after two weeks at El-Kantra Gharb district, Ismailia Governorate.

The obtained data in the third post-treatment count, three weeks after spraying application, revealed that Pre adults (83.11%) were more susceptible to the tested treatments than Adult females (78.65%) and Gravid females of this scale insect (79.83%) percentage of reduction. The obtained results of the tested materials were illustrated in (Fig. 9), Admiral (87.35%) percentage of reduction was the most effective treatment, followed by Gogopa oil (83.20%), Super Royal oil (82.62%), Biover (81.69%), Masrona oil (77.13%), Royal oil (76.63%) and Diver oil (75.08%) percentage of reduction of this scale insect.

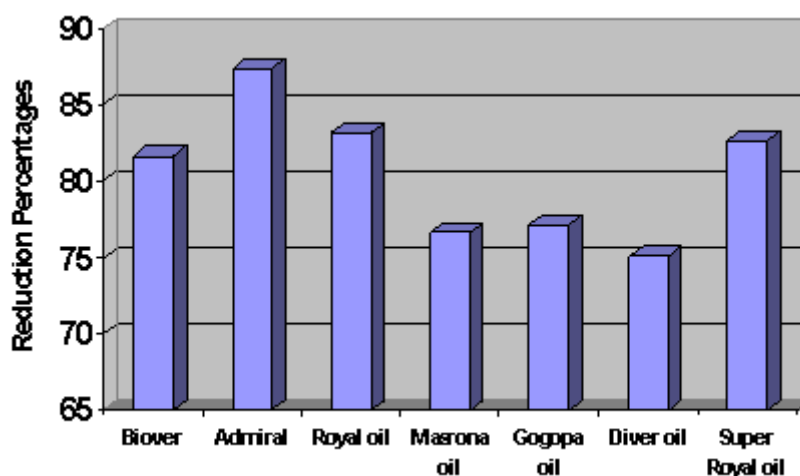


Fig. 9: The efficiency of certain chemical and non-chemical insecticides against the mango soft scale insect, *kilifia acuminata* (Signoret) on mango trees after three weeks at El-Kantra Gharb district, Ismailia Governorate.

The data in the fourth post-treatment count, four weeks after spraying application, showed that Pre adults were slightly more susceptible to the tested treatments than Adult females and Gravid females of the mango soft scale insect. Percentages of reduction were (83.04%), (80.11%) and (78.69%) percentage of reduction, respectively. The obtained data in the fourth post-treatment count of the tested compounds was illustrated in (Fig.10). The tested insecticides could be arranged as follows: Admiral (89.20%) percentage of reduction, followed by Gogopa oil (85.44%), Super Royal oil (83.23%), Biover (81.24%), Royal oil (77.63%), Diver oil (74.52%) reduction percentages and the

least effective compound was Masrona oil (73.10%) percentage of reduction of the different stage of this scale insect.

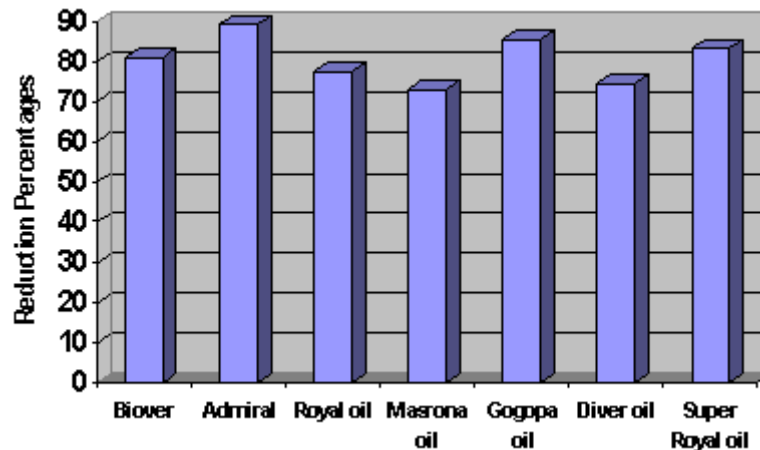


Fig. 10: The efficiency of certain chemical and non-chemical insecticides against the mango soft scale insect, *kilifia acuminata* (Signoret) on mango trees after four weeks at El-Kantra Gharb district, Ismailia Governorate.

It could be concluded that Admiral was the most effective treatment against the acuminate scale insect, *k. acuminata* (Signoret). The percentage of reduction was (86.14%) while the least effective compound was Masrona oil where the percentage of reduction was (72.03%). The rest of the tested treatments could be arranged in the descending order as follows: Gogopa oil, Super Royal oil, Biover, Royal oil and Diver oil. The percentages of reduction were (81.97%), (81.97%), (79, 29%), (74.35%) and (72.17%) percentage of reduction of the different stages of this soft scale insect, respectively.

These results are in agreement with Habib *et al.*, (1973), Helmy *et al.*, (1984), Nada *et al.*, (1990), Kawiz, (1999), Badawy *et al.*, (2000) who evaluated organophosphorous insecticides, mineral oils against the different stages of the acuminate scale insect, *k. acuminata*, (Signoret).

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ARABIC SUMMARY

كفاءة بعض المبيدات الكيميائية والغير كيميائية على حشرة المانجو القشرية الرخوة (كيلفيا أكيوموناتا) على أشجار المانجو في محافظة الإسماعيلية

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أجريت تجربتان الأولى في الأول من يناير 2007 في منطقة القنطرة غرب والثانية في الأول من يناير 2008 في منطقة القنطرة غرب بمحافظة الإسماعيلية لدراسة كفاءة بعض المبيدات الكيميائية والغير كيميائية على حشرة المانجو القشرية التي تصيب أشجار المانجو في محافظة الإسماعيلية. أظهرت النتائج في التجربة الأولى أن الأدميرال أعطى أعلى نسبة إبادة (91.44%) يليه بيورانزا (85.53%)، بيوفار (84.30%)، والملاثيون (78.82%) نسبة إبادة. وكان الكونسيرف أقل المبيدات تأثيراً حيث أعطى (69.47%) نسبة إبادة. أشارت النتائج في التجربة الثانية أن مبيد الأدميرال أعطى أعلى نسبة إبادة على الأعمار المختلفة لحشرة المانجو القشرية الرخوة حيث أعطى (86.14%) وتم ترتيب بقية المبيدات حسب كفاءتها على النحو التالي:-

جوجوبا أويل (81.97%)، سوبر رويال أويل (81.97%)، بيوفار (79.29%)، رويال أويل (74.35%) وديفر أويل (72.17%). وكان أقل مبيد كفاءة هو المصرونا أويل حيث أعطى (72.03%) نسبة إبادة على الأعمار المختلفة لحشرة المانجو القشرية الرخوة في محافظة الإسماعيلية.