# EVALUATION OF ALTERNATIVE SCALICIDES AGAINST THE HEMISPHERICAL SOFT SCALE INSECT *SAISSETIA COFFEAE* (WALKER) INFESTING *CYCAS REVOLUTA* THUNB. UNDER SEMI FIELD CONDITIONS

**IBTISAM A. HEMEIDA, [1], H. A. EL-SHABRAWY[1] , EKRAM I.M. HELMY[2] AND OMNIA M. N.I. EL-SAHN[2]**

*1- Faculty of Agriculture, Cairo University, Giza*
*2- Plant Protection Research Institute, ARC, Egypt*

(Manuscript received 12 December 2005)

***Abstract***

Five compounds, two summer miscible oils, namely Super Misrona and Super Mox , winter mayonnaise oil, Alboleum , liquid soap (Misrol 410) and Ashok (a neem kernel extract) were tested against *Saissetia coffeae* different stages infesting Cycas palm like in El-Zoherya botanical garden at Cairo Governorate in two successive seasons (April 2003 and 2004 ) .

Results revealed that Alboleum ( mayonnaise oil ) gave the highest reduction % in the 2 seasons with 94.63 and 91.44 %, 25 days after treatment, followed by Super Mox oil (91.68 & 91.77% ), super Misrona oil ( 82.99 & 85.73 % ) and Misrol soap gave ( 73.84 & 73.93 % ), respectively. While, the neem kernel extract (Ashok) recorded the lowest reduction % with 27.24 & 23.77 % in both seasons, respectively. Analysis of data showed a significant differences between oils, liquid soap and Ashok.

Also , data recorded that the nymphal stage was the most affected stage after 25 days from treatment with 75.55 and 77.23 % in the two experimental seasons. While adult and gravid females came next with (73.73 & 73.84 % ) and ( 72.95 & 68.91 %), respectively, with insignificant differences between stages in the 1st season.

From the previous mentioned data, it was clear that mayonnaise oil and the 2 miscible oils gave an excellent results as a control agents against different stages of *S. coffeae* at tested rate of 1.5% and 1%. Also, no phytotoxic effect observed on the tested plant leaves.

## INTRODUCTION

*Cycas revoluta* Thunb. is consider one of the wide spread plant in tropical and sub-tropical regions and a precious palm like. It grows slowly and ever green all over the year ( Bader 1995). However, it is infested with many kind of insects especially the sap sucking insects.

*Saissetia coffeae* (Walker) (Homoptera: Coccidae) is a soft scale insect infesting many kinds of ornamental plants especially cycads (Hammon and Williams 1984), causing a serious damage to the leaves such as, yellowish and dryness, beside the honey dew secretion which helps the growth of the black sooty mould covering the upper surface of the leaves preventing the photosynthesis and respiration causing

malformation to the green leaves (Hanafi 1976) which consider the fortune of any ornamental plant. The present investigation was planned to evaluate the efficiency of certain alternative insecticides against different stages of *S. coffeae* on cycas palm like including mineral oils , liquid soap and plant extract . In addition to study their phytotoxicity on the testing plants.

## MATERIALS AND METHODS

Spraying experiments were conducted in El-Zoherya botanical garden , Cairo Governorate in April during two successive years 2003 and 2004.

Two years old of cycas palm like cultivated in pots, heavily infested with *S. coffeae* were selected to evaluate the efficiency of the tested compounds under semi field conditions ( wooden green house) .

**Treatments used were as follows**

1- Super Misrona oil ( 95 % EC) : miscible oil, the tested rate was 1%.

2- Super Mox oil ( 95 % EC) : miscible oil, the tested rate was 1%.

3- Alboleum oil ( 85 % EC) : mayonnaise oil, the tested rate was 1.5%.

4- Misrol 410 : liquid soap, the tested rate was 1.25%.

5- Ashok : neem kernel extract, the tested rate was 0.2%.

**Samples**: Sample of 3 pots replicated four times ( 12 pots / treatment) , 2 leaflets were taken from each pot ( 24 infested leaflets / treatment)

One liter plastic sprayer was used to spray the infested plants , infested leaflets were sampled before spraying and 5,10,15,20 and 25 days after spraying. Samples were transferred immediately in a paper bags for carefully examinations by the aid of binocular microscope. Alive nymphs , adults and gravid females were counted. The reduction percentages were calculated in all treatments according to Stafford and Summers Equation (1963).

$$\textbf{Reduction \%} = \frac{\text{Pre Treat. Count} - \text{Post Treat. Count}}{\text{Pre Treat. Count}} \times 100$$

The least significant differences (L.S.D.) among treatments efficiency and among their different stages affect were considered when "F" value was significant.

**Phytotoxicity** : Dryness, yellowish and malformation were not observed on the tested plants after two weeks after spraying , to consider the side effect of the tested treatments.

## RESULTS AND DISCUSSION

Field observation showed a negligible phytotoxic effects on cycas leaves two weeks after spraying with different treatments which applied in April 2003 and 2004 under the semi field conditions of (26-33) °C and (63-78)R.H.% at El-Zoherya botanical garden , Cairo Governorate. However, the plants were healthy with bluish green leaves color in case of oils spraying . This fact is in agreement with El-Sebae *et al.* (1976) and Helmy *et al.* (1992, 1999 and 2001).

Reduction % in *S. coffeae* different stages during 1st and 2nd seasons of the study are presented in Tables 1,2.

Data presented in Table (1) revealed that, Alboleum gave the highest mean reduction % 10 days after treatment with 82.07 % followed by Super Mox oil , Super Misrona oil , Misrol soap with mean reduction of 72.08, 67.37, 55.93 %, respectively, then Ashok came at last with 17.21%. Analysis of data showed significant differences among treatments.

High reduction % were recorded after 25 days from spraying with significant differences among treatments , Alboleum recorded the superior mean reduction followed by the same previous sequence of treatments with 94.63, 91.68, 82.99 and 73.84 %. However, poor mean reduction was obtained by Ashok which gave 27.24 %.

Concerning the effectiveness of the tested compounds on the different stages of *S. coffeae* in the same table, data revealed that the nymphal stage showed a highly significant affect 10 days after spraying followed by adult females then the gravid females with average 69.91, 58.48 and 48.08 %, respectively with significant differences among them. Analysis of data showed insignificant differences among the nymphs, adult females and gravid females 25 days after treatment with mean reduction 75.55, 73.73 and 72.95%, respectively.

Almost the same results were obtained in the second year as shown in Table (2) where Alboleum and Super Mox were the most effective compounds on different stages of *S. coffeae* with (73.90 & 91.44 %) and (70.50 & 91.77%), respectively, after 10 and 25 days from spraying, followed by Super Misrona then Misrol soap with (59.87 & 85.73%) and (34.75 & 73.93 %) . However, Ashok gave the least reduction with 18.22 and 23.77% in both post treatment counts, respectively. Statistical analysis showed significant difference in mean reduction % between both Alboleum & Super Mox and the other treatments in the two post treatment counts.

In case of mean reduction % between stages, there were significant differences among nymphs, adult females and gravid females after 10 days from treatment with 65.14, 49.03 and 40.17%, respectively. Also, after 25 days from spraying, there were significant differences between the affect of the nymphs, adult females and gravid females with mean reduction % of 77.23, 73.84 and 68.91%, respectively.

Table 1. Reduction percentage in different stages of *Saissetia coffeae* infesting cycas palm like after spraying with five compounds at El-Zohreya botanical garden in spring season 2003.

| Treatments | Reduction % in the alive *S. coffeae* different stages after treatment / leaflet | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | After 5 days | | | Mean | After 10 days | | | Mean | After 15 days | | | Mean | Aftert 20 days | | | Mean | After 25 days | | | Mean |
| | Nym. | Adult | Gravid female | % | Nym. | Adult | Gravid female | % | Nym. | Adult | Gravid female | % | Nym. | Adult | Gravid female | % | Nym. | Adult | Gravid female | % |
| 1- Super misrona oil 1% | 63.36 | 48.67 | 48.35 | 53.46 b | 70.87 | 72.57 | 58.68 | 67.37 c | 73.1 | 76.11 | 61.98 | 70.4 c | 80.61 | 77.88 | 73.96 | 77.48 c | 83 | 84.96 | 81 | 82.99 c |
| 2- Super mox oil 1% | 80.05 | 50 | 26.95 | 52.33 b | 92.12 | 66 | 58.12 | 72.08 b | 91.56 | 74 | 73.05 | 79.54 b | 95.35 | 84 | 76.95 | 85.43 b | 92.46 | 92 | 90.58 | 91.68 b |
| 3- Misrol soap 1.25% | 65.42 | 36.96 | 40.69 | 47.69 c | 73.1 | 54.35 | 38.73 | 55.39 d | 84.55 | 54.35 | 56.86 | 65.25 d | 83.63 | 71.74 | 59.31 | 71.56 d | 78.21 | 71.74 | 71.57 | 73.84 d |
| 4- Ashok 0.2% | 18.31 | 9.6 | 3.6 | 10.50 d | 16.6 | 20 | 15.02 | 17.21 e | 14.76 | 23.2 | 17.42 | 18.46 e | 26.12 | 26.49 | 28.53 | 27.05 e | 26 | 29.6 | 26.13 | 27.24 e |
| 5- Alboleum oil 1.5% | 87.71 | 84.34 | 67.69 | 79.91 a | 96.84 | 79.52 | 69.86 | 82.07 a | 96.13 | 95.18 | 90.25 | 93.85 a | 98.4 | 90.36 | 92.42 | 93.73 a | 98.06 | 90.36 | 95.49 | 94.63 a |
| Mean % of stages | 62.97 a | 45.91 b | 37.46 c | | 69.91 a | 58.48 b | 48.08 c | | 72.02 a | 64.57 b | 59.91 c | | 76.82 a | 70.09 b | 66.23 c | | 75.55 a | 73.73 a | 72.95 a | |
| L.S.D. for treatments = | | | | 1.19 | | | | 2.11 | | | | 1.33 | | | | 1.57 | | | | 1.68 |
| L.S.D. for stages = | | | | 2.62 | | | | 2.76 | | | | 2.56 | | | | 2.17 | | | | 3.46 |

Table 2. Reduction percentage in different stages of *Saissetia coffeae* infesting cycas palm like after spraying with five compounds at El-Zohreya botanical garden in spring season 2004.

| Treatments | Reduction % in the alive *S. coffeae* different stages after treatment / leaflet | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | After 5 days | | | Mean % | After 10 days | | | Mean % | After 15 days | | | Mean % | Aftert 20 days | | | Mean % | After 25 days | | | Mean % |
| | Nym. | Adult | Gravid female | | Nym. | Adult | Gravid female | | Nym. | Adult | Gravid female | | Nym. | Adult | Gravid female | | Nym. | Adult | Gravid female | |
| 1- Super misrona oil 1% | 76.69 | 39.58 | 30.04 | 48.77 c | 80.06 | 65.63 | 33.91 | 59.87 c | 77.58 | 52.08 | 55.36 | 61.67 c | 86.64 | 69.79 | 60.52 | 72.32 c | 92.19 | 86.46 | 78.54 | 85.73 b |
| 2- Super mox oil 1% | 78.75 | 44 | 54 | 58.92 b | 89 | 56 | 66.5 | 70.5 b | 83.57 | 94.67 | 75 | 84.41 a | 92.52 | 94.67 | 83.5 | 90.23 a | 93.48 | 94.67 | 87.15 | 91.77 a |
| 3- Misrol soap 1.25% | 35.28 | 31.65 | 20.69 | 29.21 d | 36.73 | 46.84 | 20.69 | 34.75 d | 52.25 | 58.23 | 56.9 | 55.79 d | 67.51 | 68.35 | 63.79 | 66.55 d | 77.69 | 73.42 | 70.69 | 73.93 c |
| 4- Ashok 0.2% | 35.4 | 16 | 14.05 | 21.82 e | 26.62 | 10.67 | 17.36 | 18.22 e | 21.47 | 18.67 | 38.02 | 26.05 e | 13.31 | 13.33 | 34.71 | 20.45 e | 24.67 | 22.67 | 23.97 | 23.77 d |
| 5- Alboleum oil 1.5% | 84.48 | 58 | 59.4 | 67.29 a | 93.3 | 66 | 62.41 | 73.90 a | 91.92 | 74 | 71.43 | 79.12 b | 95.34 | 84 | 81.2 | 86.85 b | 98.12 | 92 | 84.21 | 91.44 a |
| Mean % of stages | 62.12 a | 37.85 b | 35.64 b | | 65.14 a | 49.03 b | 40.17 c | | 65.36 a | 59.53 b | 59.34 b | | 71.06 a | 66.03 b | 64.74 b | | 77.23 a | 73.84 b | 68.91 c | |
| L.S.D. for treatments = | | | | 0.53 | | | | 0.75 | | | | 1.78 | | | | 2.06 | | | | 1.78 |
| L.S.D. for stages = | | | | 2.61 | | | | 2.17 | | | | 2.57 | | | | 1.31 | | | | 2.16 |

In general, the results of the present investigation are in agreement with those obtained by Rawhy and Rofail (1965), who stated that summer oils proved a successful effect against red and black scales. The same results were achieved by volk oil ( mayonnaise oil) 2.5 % without phytotoxic effects of any kind ( El-Sebae *et al.* 1976, Aly *et al.* 1984, Helmy *et al.* 1992, Hassan *et al.* 1994, El-Imery *et al.* 1995, Helmy *et al.* (1999 , 2001and 2002), Atteya (2004) and Kwaiz *et al.* (2004).

From the previously mentioned results, it can be concluded that, the mayonnaise oil (Alboleum) at rate of 1.5 % and the miscible oils ( Super Mox and Super Misrona oil) at rate of 1% were more efficient on various developmental stages of the soft scale , *Saissetia coffeae* ( Walker) in spring application with no phytotoxicity on the plant green leaves. While Misrol soap gave a convenient results but not like oils . Ashok recorded a poor effect on the different stages of *S. coffeae.*Also, data clearly showed that the nymphal stage was the most affected stage followed by the adult females then the gravid females.

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# تقييم فاعلية بعض بدائل المبيدات ضد الحشرة الرخوة نصف الكروية *Saissetia coffeae* (Walker) التى تصيب نباتات السيكس *Cycas revoluta* Thunb. تحت ظروف الصوب

**إبتسام عبد المنعم حميده[1]، حمدى عبد الصمد الشبراوي[1]، إكرام إسماعيل محرم حلمي[2]، أمنية محمد نبيل إسماعيل الصحن[2]**

١- *كلية الزراعة جامعة القاهرة، جيزة.*

٢- *معهد بحوث وقاية النباتات، مركز البحوث الزراعية، دقي، جيزة.*

تم تقييم ٥ مركبات كبدائل للمبيدات و التى تتمثل فى إثنين من الزيوت الصيفية (زيت سوبر مصرونا و زيت سوبر موكس)، زيت شتوى (ألبوليوم) ، صابون مصرول السائل و مستخلص بذور النيم لمكافحة الحشرة القشرية الرخوة نصف الكروية *Saissetia coffeae* و التى تصيب نبات السيكس بحديقة الزهرية النباتية بمحافظة القاهرة فى موسميين متتاليين هما أبريل ٢٠٠٣ و ٢٠٠٤.

بعد ٢٥ يوماً من إجراء تجربة الرش بهذه البدائل أوضحت النتائج فاعلية الزيوت المعدنية و خاصة الزيت الشتوى ألبوليوم فى موسمى الدراسة و الذى سجل متوسط نسبة خفض ٩٤,٦٣ و ٩١,٤٤ % في الموسمين على التوالى و ذلك عند إستخدامه بمعدل 1.5 %. يليه زيت سوبر موكس و سوبر مصرونا عند الإستخدام بنسبه ١% أظهر نسبه خفض (٩١,٦٨ و ٩١,٧٧ %) و (٨٢,٩٩ و ٨٥,٧٣ %) على التوالى ثم صابون مصرول (٤١٠) السائل عند إستخدامه بتركيز ١,٢٥% أعطى متوسط نسبة خفض (٧٣,٨٤ و ٧٣,٩٣ %) و يأتى المستخلص النباتى لبذور النيم في المؤخرة مسجلاً أقل نسبة خفض (٢٧,٢٤ و ٢٣,٧٧ %) فى الموسمين على التوالى عند استخدامه بتركيز ٠,٢%. و الجدير بالذكر أن هناك فروقاً معنوية بين المعاملات.

و من الواضح أيضاً أن الطور الحورى للحشرة كان أكثر الأطوار تأثراً بالمركبات المستخدمه حيث سجل أعلى نسبة خفض فى موسمى الدراسة و التى كانت ٧٥,٥٥ و ٧٧,٢٣ % على التوالى بعد ٢٥ يوم من الرش يليه طور الإناث البالغة ثم الإناث الواضعة للبيض بنسبة خفض (٧٣,٧٣ و ٧٣,٨٤ % ) و (٧٢,٩٥ و ٦٨,٩١ %) على التوالى، بدون فروق معنوية بين الأطوار فى الموسم الأول.

و من النتائج السابقة يمكن ملاحظة أن الزيوت المعدنية (الشتوية و الصيفية) لها تأثير فعال على الأطوار المختلفة للحشرة نصف الكروية بمعدل إستخدام ١,٥ للزيت الشتوى و ١ % للزيوت الصيفية بدون وجود أى أضرار على أوراق النباتات المعاملة.