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COMPARISON AMONG THREE COMMERCIAL MALATHION INSECTICIDE AND THEIR MIXTURES WITH MINERAL OIL (KZ) AGAINST 0*PULVINARIA PSIDII* (MASK) AND *PLANOCOCCUS CITRI* (RISSO.) INFESTED GUAVA AND CITRUS TREES IN ALEXANDRIA GOVERNORATE.

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ABSTRACT

Three organophosphorus insecticides (malason, malatox and malatol have the same active ingredient) and a summer mineral oil (Kz) were tested in a field experiment to evaluate their efficiency as a single insecticide or in mixtures of Op's and mineral oil (Kz). *Pulvinaria psidii* (Mask) (Homoptera: Coccidae) and *Planococcus citri* (Risso.) (Homoptera: Pseudococcidae) are scale insects attacking guava and citrus trees so that they were treated with the above treatments (four materials and three binary mixtures). Mixtures and Kz single treatment were more effective than the single treatment of the OP's significantly when treated on guava trees for *P. psidii* but they differ significantly when studied for *P. citri*. On the other hand there were no significant differences among all of insecticides when treated on citrus for *P. psidii* or *P. citri* so it could be concluded to use mineral oil (Kz) which is less pollute to the environment to be used for controlling those scale insects when infest citrus.

INTRODUCTION

Citrus and guava trees were highly infested by *Pulvinaria psidii* and *Planococcus citri* which attacking leaves, branches and fruits. These insects are the most injurious insect pests because they suck the trees sap causing drying up of the leaves, and dwarf branches. Also, they secrete honeydews on which the black mould grows up, prevents photosynthesis, respiration of leaves and cause defoliation (Shaaban & Sheikh, 1988; Clark *et al.*, 1992; and Abdel-Rhaman *at al.*, 2002).

The intensive use of conventional insecticides for controlling insects leads to :

1- development of insect resistance such as resistance of the San Jose scale insect on citrus in California to hydrogen cyanide in 1930 (Metcalf *et al.*, 1962).
2- many arthropods especially spider mites whose population had been generally small or moderate suddenly became major pests.
3- the destruction of natural enemies that had previously been held as potentially controlling the injurious species under restraint.
4- the environmental contamination and killing wildlife (Flint and Bocsh 1981).

Petroleum oils were recommended as insecticides as early as 1763 but probably very little were used until the nineteenth century (Metcalf *et al.*, 1962). Local sprays oils are used for years against scale insects, mealy bugs, thrips, aphids and mites on different crops and fruit trees. Oil sprays are used

most commonly in horticulture to control scale insects and mites (Chapman *et al.*, 1952), Micks and Berlin (1970) and El–Sebae *et al.*, (1976) stated that resistance was not recorded for mineral oils which still have the advantage of being effective to resistant strains.

The present work was conducted to investigate the effectiveness of three OP's insecticides (malason, malatox and malatol have the same active ingredient) and a summer mineral oil (Kz) as a single treatment or in mixtures of OP's and mineral oil (Kz) against *Pulvinaria psidii* (Mask) (Homoptera: Coccidae) and *Planococcus citri* (Risso.) (Homoptera: Pseudococcidae) on guava and citrus trees.

MATERIALS AND METHODS

Experiment was conducted in the beginning of July, 2003 in a private orchard of mixed guava and citrus trees at Maamora, district, Alexandria Governorate, Chosen trees were similar in size, shape, height, vigour and homogeneous in infestation rate. Treatments with the four pesticides and their mixtures were applied with knapsack motor sprayer (600 liter). Table (1). Each treatment was replicated four times; one plot was left without spraying and considered as a control. Treatments were randomly distributed over 50 trees of each fruit. Treatments were randomly sampled before spray and after 2, 4, 6 and 8 weeks to determine the compounds activity on *Pulvinaria psidii* and after 1, 2, 3 and 4 weeks for *Planococcus citri*. Forty leaves were selected from each treatment and picked randomly from each direction, pre and post treatment for each sampling interval. The living number of insect pests (*P.psidii* and *P.citri*) were examined and recorded.

Reduction percentage was estimated using Henderson and Telton equation (1955) to evaluate the efficiency of the tested materials. Analysis of variance and LSD value for comparing the mean reduction of each treatment was adapted according to Sendecor (1961).

Table (1) Type of treatment and rate of application

Treatment	Compound	applied rate	Company
1	Malason 50% W.P	300g/100 L	Kafer El-Ziat Pesticides and Chemicals Co.
2	Malatox 50% W.P	300g/100 L	El-Helb Pesticides and Chemicals Co.
3	Malatol 57% E.C	300g/100 L	Bamby Trade-Seeds and Chemicals Co.
4	Kz oil 95% E.C	1.5L/100 L	Kafer El-Ziat Pesticides and Chemicals Co.
5	Malason + Kz	1 : 1	Tank Mixture
6	Malatox + Kz	1 : 1	Tank Mixture
7	Malatol + Kz	1 : 1	Tank Mixture
8	Control	-	-

RESULTS AND DISCUSSION

Data presented in Table (2) and Fig. (1) show the effect of tested seven treatments against *Pulvinaria psidii* infested guava trees, and indicated that mixture of malatol with Kz oil was the most effective treatment followed by mixture of malatox with Kz oil then Kz oil single treatment without

significant differences in between, on the other hand there were no significant differences among single treatment of the three commercials formulations of the OP's insecticides (Malason, Malatox and Malatol) and mixture of malason with Kz oil where malatox single treatment was the least effective treatment. The effects of tested treatments could be arranged as reduction percentages in the following order : (malatol + kz); (malatox + kz); kz oil; (malason + kz); malatox; malason and malatol where they caused reduction percentage 96.6, 95.4, 94.0, 92.0, 90.6, 89.5 and 89.1%, respectively.

Table (2) : Efficiency of some treatments on *Pulvinaria psidii* attacking guava leaves at Maamora, Alexandria.

Time	Malason	Malatox	Malatol	Kz	Malason + Kz	Malatox + Kz	Malatol + Kz
	Reduction percentages						
After 2 weeks	98.6	99.1	91.7	97.3	90.8	99.3	98.9
After 4 weeks	99.7	93.4	94.0	91.9	93.8	98.0	96.8
After 6 weeks	97.1	74.7	86.0	92.9	91.3	89.0	100.0
Mean	89.5^{c}	89.1^{c}	90.6^{c}	94.0^{abc}	92.0^{bc}	95.4^{ab}	96.6^{a}
After 2 months	98.1	76.5	84.1	94.4	98.2	86.1	83.2

$L.S.D._{0.05} = 4.43$

To find out the persistence of the treatments it could be concluded that malatol and malason when mixed with Kz oil showed increase of reduction effect up to 6 weeks and the others treatments showed decrease of reduction effect where malason and Kz oil single treatments slightly decreased, malatol single treatment moderately decreased but malatox in a single or mixture treatment highly decreased.

Results in Table (3) and Fig. (2) show the effect of tested seven treatments against *Pulvinaria psidii* infested citrus trees and indicated that there were no significant differences among all of treatments. Mixtures of malatox, malason and malatol with Kz oil were more effective than the single treatments with reduction percentage 99.0; 97.2 and 96.0% respectively. Malatol single treatment was the most effective one among the single treatments (OP's insecticides and mineral oil) followed by malatox, malason and Kz oil which was the least effective treatment. They caused reduction percentages 95.0; 94.4; 93.9 and 90.7% respectively.

Table (3) : Efficiency of some treatments on *Pulvinaria psidii* attacking citrus leaves at Maamora, Alexandria.

Time	Malason	Malatox	Malatol	Kz	Malason + Kz	Malatox + Kz	Malatol + Kz
	Reduction percentages						
After 2 weeks	94.1	93.6	99.5	93.9	97.6	99.3	90.7
After 4 weeks	98.9	99.0	96.8	91.0	98.3	99.0	99.3
After 6 weeks	88.7	90.7	88.7	87.3	95.7	98.7	98.0
Mean	93.9	94.4	95.0	90.7	97.2	99.0	96.0
After 2 months	67.1	71.1	96.0	86.6	93.6	98.2	91.9

There were no significant differences between treatments effect.

Fig. (1) : Efficiency of some treatments on *Pulvinaria psidii* attacking guava trees at Maamora, Alexandria.

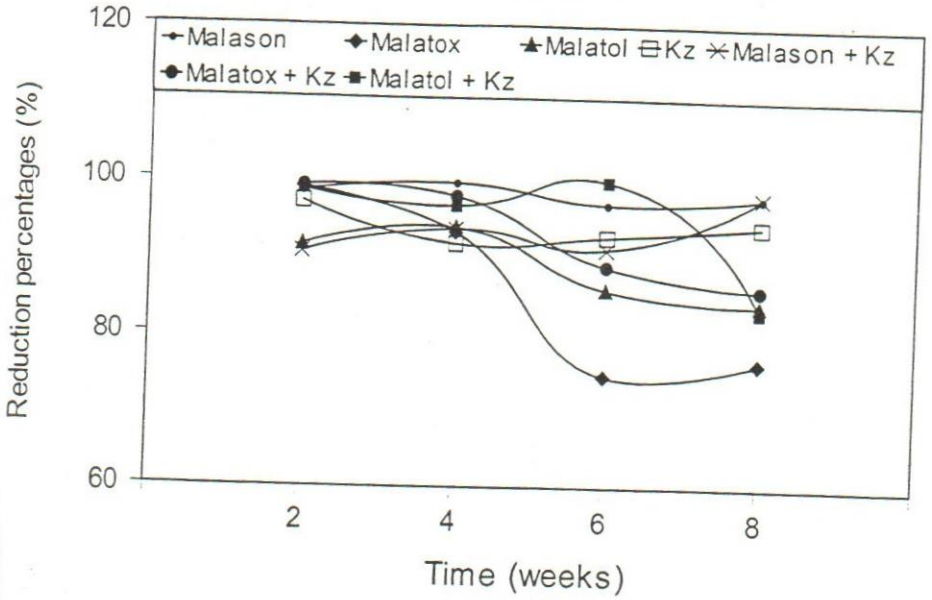
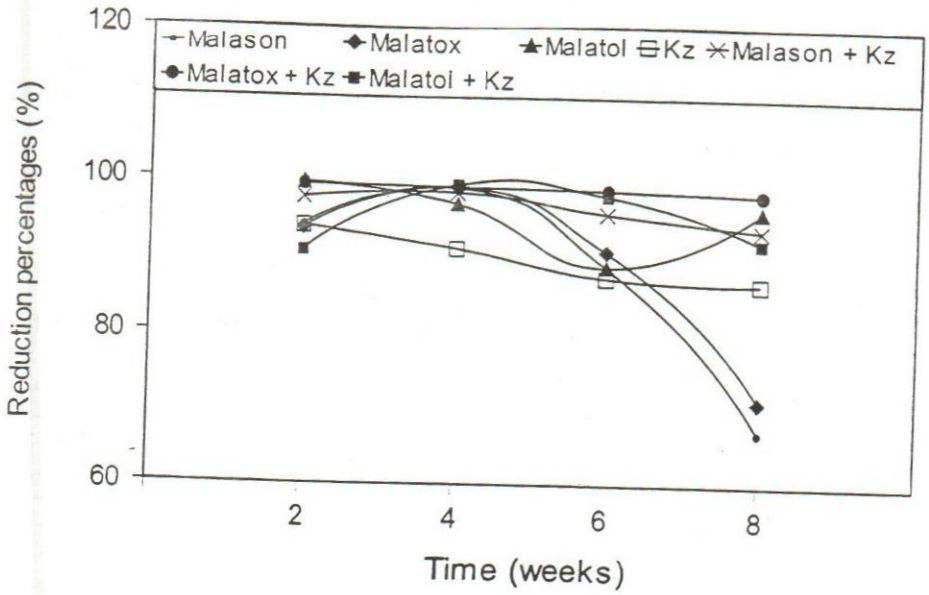


Fig. (2) : Efficiency of some treatments on *Pulvinaria psidii* attacking citrus trees at Maamora, Alexandria.



Generally, data presented in Table (3) show that mixture of malatol with Kz oil not only persist up to 6 weeks but also increased reduction percentage while all of the other treatments decreased their reduction percentage with the same time.

The results presented in Table (4) and Fig. (3) indicated the effect of treatments on *Planococcus citri* on guava trees. The data indicated that there were no significant differences between treatments of single or mixture for every OP's insecticide. There were no significant differences between malatol + Kz; malason + Kz; malatol and malason where they caused reduction percentages 96.2; 95.9; 94.6 and 92.6% respectively, also there was no significant differences between malatox as a single or mixture treatments where they caused reduction percentages 88.7 and 87.3% respectively. Kz oil treatment was the least effective one against *Planococcus citri* on guava trees where it caused reduction percentage 86.8% without significant differences with malatox and their mixture together.

Table (4) : Efficiency of some treatments on *Planococcus citri* attacking guava leaves at Maamora, Alexandria.

Time	Malason	Malatox	Malatol	Kz	Malason + Kz	Malatox + Kz	Malatol + Kz
	Reduction percentages						
After 1 week	94.9	83.7	93.6	84.6	93.7	85.2	92.1
After 2 weeks	89.4	96.7	97.1	88.0	97.8	87.5	100.0
After 3 weeks	93.5	85.8	93.0	87.8	97.2	89.2	95.5
Mean	92.6^{ab}	88.7^{bc}	94.6^{a}	86.8^{c}	96.2^{a}	87.3^{c}	95.9^{a}
After 4 weeks	75.8	87.2	97.2	85.4	95.7	97.5	98.4

$L.S.D._{0.05} = 4.2$

Table (5) and Fig. (4) show the effect of tested insecticides against *Planococcus citri* on citrus trees and indicated that there were no significant differences among all of treatments. They could be arranged in the following order : malason; Kz oil; (malason + Kz); (malatox + Kz); malatol; malatox and (malatox + Kz) where they caused reduction percentages 96.2; 94.0; 92.8; 92.7; 92.6; 91.3 and 88.8% respectively.

These results were in agreement with that reported by Moursi *et al.*, (1991) who mentioned that under dry farm system, masrona oil has more effective against *Leucaspis ricca* than the organophosphorus and pyrethroid compounds. Also, the results are in agreement with that reported by Gomaa *et al.*, (1997) who reported that super royal or folk oils mixed with malathion gave low reduction when used separately.

Finally, from the listed data and reviewed literature it could be concluded that mineral oil (Kz) is effective for controlling scale insects and have least harmful effects on beneficial species and environment. No serious injury was noticed on Guava or citrus trees. It could be concluded that mineral oils could be used as scalicide safely without phytotoxic effect. These results agree with those obtained by El-Sebae *et al* (1976), Helmy *et al.*, (1992), Moursi *et al.*, (1991), Yigit *et al.*, (1992), Gomaa *et al.*, (1995) and El-Deeb (1999).

Fig. (3): Efficiency of some treatments on *Planococcus citri* attacking guava trees at Maamora, Alexandria.

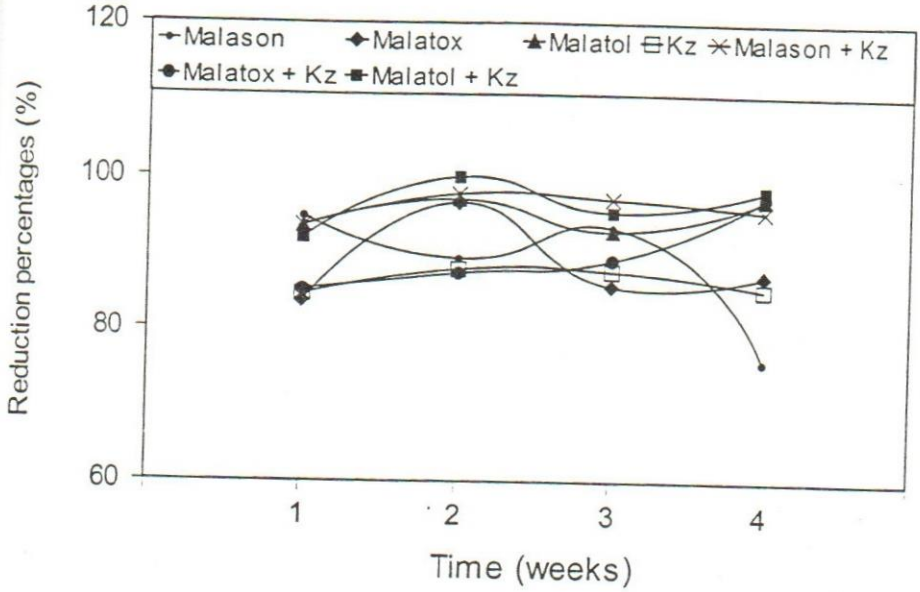


Fig. (4) Efficiency of some treatments on *Planococcus citri* attacking citrus at Maamora, Alexandria.

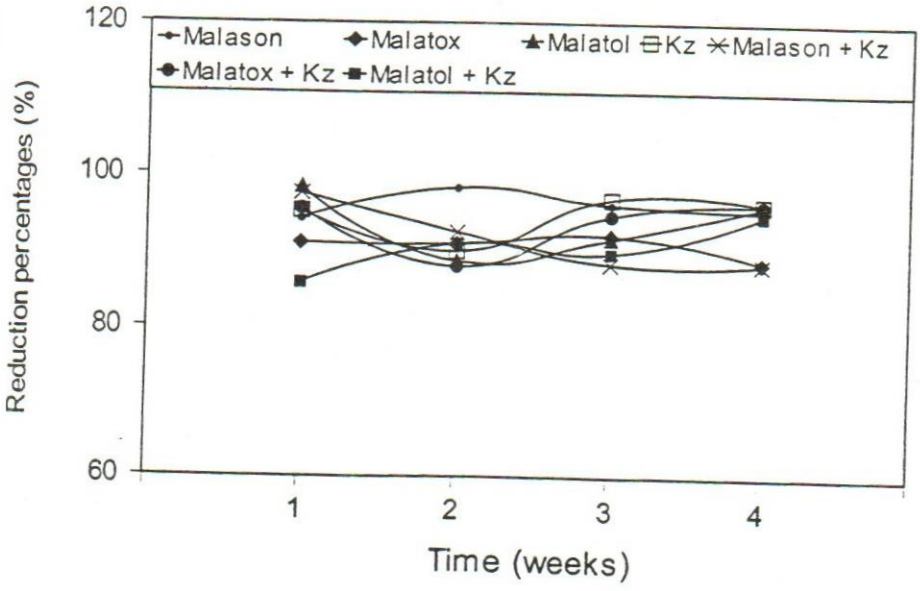


Table (5) : Efficiency of some treatments on *Planococcus citri* attacking citrus leaves at Maamora, Alexandria.

Time	Malason	Malatox	Malatol	Kz	Malason + Kz	Malatox + Kz	Malatol + Kz
	Reduction percentages						
After 1 week	94.2	91.0	98.3	95.2	97.5	95.5	85.8
After 2 weeks	98.3	91.0	88.7	90.0	92.5	88.0	91.0
After 3 weeks	96.1	92.0	91.6	96.8	88.3	94.6	89.7
Mean	96.2	91.3	92.6	94.0	92.8	92.7	88.8
After 4 weeks	95.3	88.5	95.9	96.2	88.3	96.1	94.7

There were no significant differences between treatments effect.

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المقارنة بين ثلاث تجهيزات تجارية لمبيد الملاثيون والزيت المعدنى كزد ضد حشرتى البلفيناريا وبق الموالح الدقيقى على اشجار الجوافة والموالح بالاسكندرية

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اجريت تجربتين حقليتين لمقارنة كفاءة ثلاث تجهيزات تجارية لمبيد الملاثيون الفوسفورى وهم الملاسون، الملاتوكس، الملاتول بتركيز 1.5 فى الالف والزيت المعدنى الصيفى كزد فى صورة مستحلب بتركيز 1.5% فرديا او مخلوطا ضد حشرتى البلفيناريا والبق الموالح الدقيقى التى تصيب اشجار الموالح والجوافة.

اوضحت النتائج ان مخاليط المبيدات الفوسوفرية الثلاثة والزيت المعدنى كانت اكثر تأثيرا من المعاملات الفردية حيث احدثت اعلى نسبة خفض فى تعداد الحشرات موضع الدراسة وكان التأثير ضد حشرة البلفيناريا اكثر معنويا من بق الموالح الدقيقى على اشجار الجوافة. ومن ناحية اخرى لا توجد فروق معنوية بين تأثير نفس المعاملات وبعضها ضد الحشرتين موضوع البحث على اشجار الموالح. وعليه يمكن التوصية باستعمال الزيت المعدنى كزد منفردا لمكافحة هاتين الحشرتين على اشجار الموالح والجوافة بدل من المبيدات الفوسفورية حيث انه اقل تلوثا للبيئة.