TOXICITY OF CERTAIN PESTICIDES TO EGG MASSES AND SECOND LARVAL STAGE OF *MELOIDOGYNE JAVANICA* UNDER LABORATORY CONDITIONS.

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Abstract

The ovicidal action of five insecticides against egg masses of. *M. Javanica* was carried out . Isoxation was the most toxic followed by fenamiphos, cyanofos, oxamyl and methomyl. The descending order of the ovicidal activity at the LC_{90} level was the same as at the LC_{50} level except of a switch in position between oxamyl and methomyl. This difference was discussed on the basis of the slope values of the toxicity lines .

The toxicity of pesticides to the second larval stage at the LC_{50} level revealed that the nematicides fenamiphos and oxamyl as well as the ovicide isoxathion were the most potent. However cyanofos and methomyl produced moderate toxicity to the larvae.

INTRODUCTION

In Egypt , as in many warm countries, root - knot nematodes *Meloidogyne* spp. are serious pests to many field and vegetable crops. For the foreseable future , nematicides may play a major role in controlling nematodes (Johanson , 1985). The efficacy of a number of different nematicides on hatching and second stage larvae of *Meloidogyne* spp. had been studied by several workers (McLeod and khair 1975;

Payan *et al.* 1987). Usually several pesticides are applied to a given crop during the growing season, some directly to the soil while others reach the soil as spray drift. There are limited information about the biological activity of insecticides to nematode populations especially the egg stage. The objective of this study is to evaluated the toxicity of three insecticides and two nematicides against egg masses and second stage larvae of *M. javanica* under laboratory conditions.

MATERIALS AND METHODS

Pesticides used were fenamiphos (Nemacur) EC 40% (O - ethyl - O - (3 methyl - 4 - methylthio) phenyl, N-isopropyl phosphoramidate); oxamyl (Vydate) L. 24 % (N, N - dimethyl - 2 - methylcarbamoyloxyimino - 2 (methylthio) acetamide; isoxathion (karphos) EC 5% (0,0- diethyl 0-5 phenylisoxazol 3 yl phosphorothioate); methomyl(Lannnate) sp 90% (S-methyl N-(methylcarbamoyloxy) thioacetimidate) and cyanofos (Cyanox) EC 50% (0-4 cyanophenyl) 0,0 dimethyl phosphorothioate). The first two compounds are nematicides while the other three are insecticides. Six concentrations from each pesticide were dissolved in water and replicated three times. Control treatment consisted of distilled water.

Egg masses of *M. javanica* were isolated from infected tomato roots obtained from pure culture and propagated in greenhouse. The second stage larvae was obtained by incubating egg masses in distilled water. Newly hatched larvae were collected using a micropipette.

To study the ovicidal action of the tested compounds, ten egg masses of almost equal size were placed in Petri dishes containing 10 ml of pesticide concentrations. Hatched larvae were counted 7 days after treatment and percentage unhatchability was recorded . To evaluate the toxicity of the tested peticides against the second stage larvae, about 1000 newly hatched larvae were used for every pesticide concentration. The final volume of diluted pesticide was 10 ml in 20 ml clean glass vials. Mortality counts were made 24 h after treatment. Data were corrected by Abbott's formula (1925), and the dosage-mortality regression lines were statistically analysed according to Finney (1952).

RESULTS AND DISCUSSION

As measured by the LC_{50} level, Isoxathion was the most effective ovicide followed by fenamiphos, cyanofos, oxamyl and methomyl (Tabe 1 and Fig. 1). At the LC_{90} level , the ovicidal activity was similar as that with the LC_{50} except for a switch in position between oxamyl and methomyl due to the interception of their toxicity lines. On the basis of the toxicity index, Isoxathion was the most potent (100) while the toxicity index for the other compounds ranged between 3.4 to 23.4 at the LC_{50} level , and 4.63 to 42.67 at the LC_{90} level.

The insecticides methomyl and cyanofos were generally efficient ovicides as were the nematicides fenamiphos and oxamyl. Similar results were indicated by McLeod and Khair (1975). Gerco and Thomason (1980) and Payan *et al.,* (1987)

Ioxathion was the most toxic compound to the second stage larvae as meas-

Table 1. Susceptibility of *M. javainca* egg - masses to some pesticides.

Pesticide	LC_{50} (ppm)	LC_{90} (ppm)	Slope	Toxicity Index* at	
				LC_{50}	LC_{90}
Fenamiphos	3.12	14.06	1.69	23.40	42.67
Oxamyl	14.75	129.67	1.36	4.95	4.63
Isoxathion	0.73	6.00	1.40	100.00	100.00
Methomyl	21.47	80.79	2.22	3.40	7.43
Cyanofos	5.7	46.90	1.40	12.81	12.79

$$\text{Toxicity Index} = \frac{LC_{50} \text{ or } LC_{90} \text{of the most potent compound}}{LC_{50} \text{ or } LC_{90} \text{ of the other tested cmpound}} \times 100$$

ured by the LC_{50} level. Fenamiphos came next , followed by oxamyl, cyanofos and methomyl (Table 2 and Fig. 2). The LC_{50} values were 2.5 , 4.07 , 7.7 , 46.7 and 53.5 ppm, respectively. At the LC_{90} level, the descending order of toxicity was fenamiphos , oxamyl , isoxathion, cyanofos and methomyl. The LC_{90} values ranged between 9.32 and 173.8 ppm. Cyanofos showed the steepest toxicity line (slope = 4.96) Whereas isoxathion had the flatest (slope 1.2) . The slope values for the rest of the toxicants ranged between 2.5 and 3.6 .

On the basis of the toxicity index, isoxathion was the most effective at the LC_{50} level. At the LC_{90} level, fenamiphos was the most toxic to the second stage larvae . Methomyl was least toxic at both levels.

These resutls indicate that fenamiphos , oxamyl and isoxathion are potent compounds against the second stage larvae of *M. javanica*. Cyanofos and methomyl

Table 2. Toxicity of certain pesticides to second stage larvae of M. javanica under laboratory conditions.

Pesticide	LC_{50} (ppm)	LC_{90} (ppm)	Slope	Toxicity Index* at	
				LC_{50}	LC_{90}
Fenamiphos	4.07	9.32	3.6	61.4	100.0
Oxamyl	7.70	22.02	3.8	32.5	42.3
Isoxathion	2.50	29.30	1.2	100.0	31.8
Cyanofos	53.50	173.80	2.5	4.7	5.4
Methomyl	46.70	84.60	4.96	5.4	11.0

$$\text{Toxicity Index} = \frac{LC_{50} \text{ or } LC_{90} \text{ of the most potent compound}}{LC_{50} \text{ or } LC_{90} \text{ of the other tested cmpound}} \times 100$$

Sun, 1950

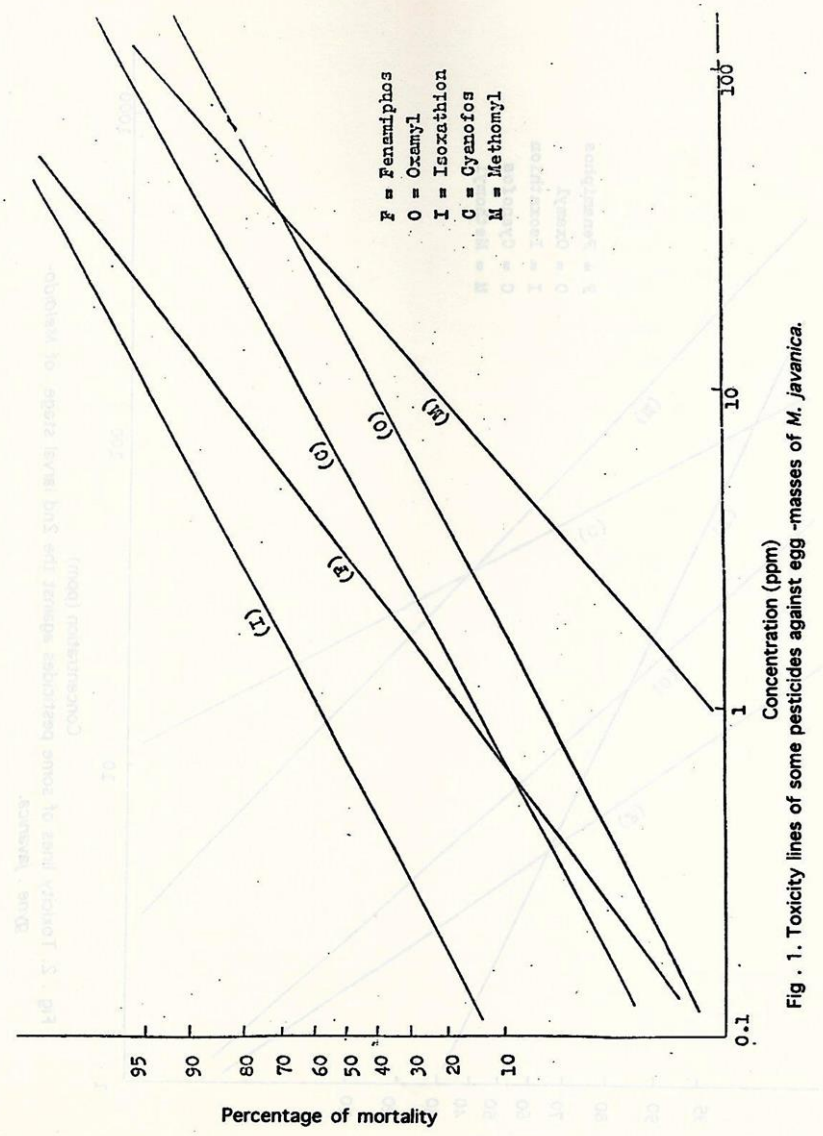

Fig . 1. Toxicity lines of some pesticides against egg -masses of *M. javanica*.

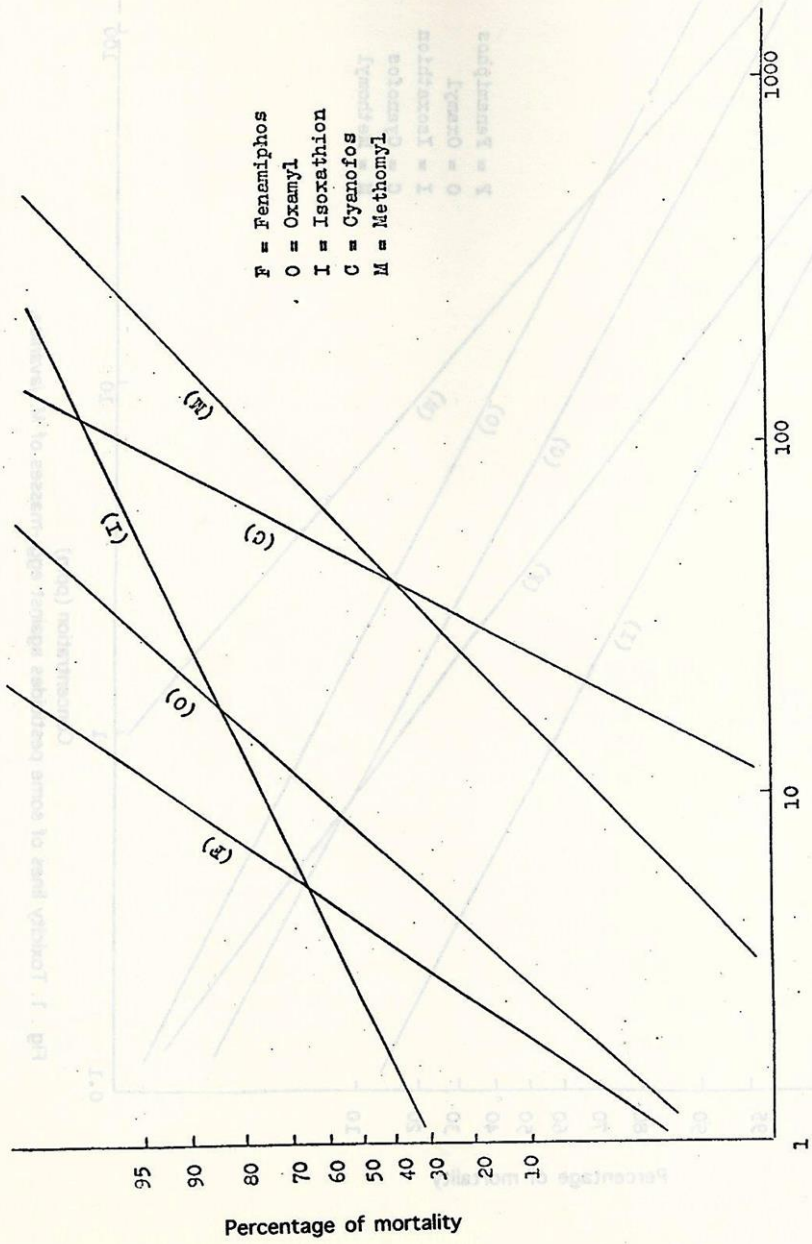

Fig . 2. Toxicity lines of some pesticides against the 2nd larval stage of *Meloidogyne . javanica.*

were however moderately toxic .

El-Morshedy (1980) showed that aldicarb, oxamyl and fenamiphos produced high contact toxicity against *Tylenchulus semipientrans* larvae under laboratory conditions. El -Shoura (1981) reported that fenamiphos was the most toxic nematicide against *M. incognita* followed by oxamyl, aldoxycarb, methomyl and carbofuran. On the other hand , McLeod and Khair (1975) reported that none of the tested oxime carbamate, organophosphate and benzimidazole nematicids killed larvae of *M. Javanica, M. incognita* and *M. hapla* immersed in 16 and 32 ppm solutions for 3 days .

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تأثير بعض المبيدات علي بيض ويرقات نيماتودا التعقد الجذري ميلودوجينا جافانيكا تحت ظروف المعمل

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تمت دراسة تأثير بعض المبيدات الحشرية والنيماتودية علي بيض ويرقات نيماتودا التعقد الجذري ، وكذلك التأثير علي تكوين العقد وأيضا علي عدد البيض في الكيس. وكانت المبيدات المستخدمة هي فيناميفوس، اوكساميل، ايزوكساثيون ، سيانوفوس، والميثومايل، ولقد تمت هذه الدراسه في المعمل .

ولقد اوضحت النتائج المتحصل عليها أن المبيد ايزوكساثيون كان أكثر فعاليه ضد بيض النيماتودا المختبرة يليه مركب الفيناميفوس ثم سيانوفوس واكساميل ، ثم مركب ميثوميل وذلك عندما اتخذ مقياس التركيز القاتل لنصف المجتمع ، وعند اتخاذ مقياس التركيز القاتل لـ ٩٠٪ من المجتمع أصبح الترتيب ايزوكساثيون – فيناميفوس – سيانوفوس – ميثوميل ثم اوكساميل .

كما اوضحت النتائج أن مبيدي الفيناميفوس والأكساميل وكذلك مبيد ايزوكساثيون له تأثير عال علي يرقات النيماتودا المختبرة في حين أن مبيدي سيانوفوس والميثوميل كانت سميتها متوسطة علي اليرقات.