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CONTROL OF PLEURODONTE ORBICULATA SNAILS BY DIFFERENT CHEMICALS USED IN THE FIELD

(with 3 Tables and 1 Fig.)

By

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مقاومة قواقع البليرودونيت أوربيكولاتا بإستخدام
كيماويات مختلفة تطبق في الحقـــــل

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في محاولة لمقاومة قواقع البليرودونيت أوربيكولاتا التي لها أهمية إقتصاديـــــة حيث أنها تدمر المحاصيل الزراعية وتنقل للأغنام بعض الديدان الرئوية ، أجريت بعـض التجارب بإستخدام أنواع مختلفة من الكيماويات التي تستخدم طبيعيا في الحقل · وقـــد شملت هذه الكيماويات على مبيدات القواقع (مثل البيلايـيد والترتيا الزرقـــــاء) ومبيدات حشرية (مثل الديازينون) ومبيدات حشرية ضد حشرات النبات (مثـــل الديمثوت ٤٠٪ والديوبنت لاناتا ٢٠٪) بتركيزات مختلفة وأوضحت الدراســـة أن المبيدات الحشرية الخاصة بحشرات النبات كان لها أحسن تأثير في مقاومة هـــذه القواقع · وقد نوقشت في هذه الدراسة الطريقة المثلى لكيفية تعرض القواقع للكيماويات والمبيدات الحشرية وذلك لدراسة كفاءتها وتأثيرها على القواقع ·

SUMMARY

The present investigation was a trial to control the terrestial snail "Pleurodonte orbiculata" which have a high economic and medical importance in the Egyptian semi-arid area (away from the Nile Valley). The experiment was done by using various types of chemicals used normally in the field including molluscicides (as Baylauscide & Copper sulphate), animals insecticides (as Diazenon) and plant insecticides (as Dimethoate 40% & Dupont Lanate 20%). The results showed that the plant insecticides were the most safe and efficient in controlling these snails even when used in its natural dose used in the field. The ideal methods for exposure of strong land snails to the chemicals and its efficacy were discussed.

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INTRODUCTION

Pleurodont orbiculata is considered as one of terrestrial snails (Order: Stylommatophora, Family: Helicellidae) which are widely distributed allover the world (MALEK, 1980). Fretter and GRAHAM (1962) stated that the members of family Hellicellidae play an important role as intermediate hosts for lung worms.

In the present work Pleurodonte orbiculata (Fig. 1-B & 1-C) snails were present in Moderiat El-Tahrier, Egypt, causing severe losses in all types of green leaves. During the dry conditions the snails stand dormant contracting their soft part inside the shell and secrete a sticky matter, firmly adhere their apreture on the corresponding surface as bark of trees, stone, wood or anything. The snails having high ability to resist the dry conditions for a long period, where they remain dormant not needing any food.

With increasing of the humidity around the snails as a result of rainfall or during plant irrigation, the snails become highly active and creep over the surrounding surface (Fig. 1-B) attacking all types of plant eating the green leaves producing severe losses. Sheep which eat the snail with grasses may be infected by lung worms.

The produced high economic losses to the plants by the previous mentioned snail and transmission of diseases specially the parasitic one to the animals, stimulate the authors to try to control these dangerous strong snails by studying the efficacy of some various types of chemicals used in the field.

MATERIAL AND METHODS

Pleurodonte orbiculata snails were brought from Moderiat El- Tahrier, Egypt and maintained in the laboratory for 2 weeks in clean plastic dishes (40x60x10cm); covered with finstrated plastic sheet. They were identified according to Malek (1980).

Representative samples from the snails were dissected in clean petri-dishes according to El-Bahy (1988) and examined under the research microscope to detect the presence of any Nematode larvae in their tissues. The extracted lavae were identified according to Lapage (1956).

The snails were washed by tap water directly before exposure to the chemical where the active living snails (Fig. 1-B) were selected.

The Tested Chemicals Included:

1 - Molluscicides as
- Balluscide (5, 2-dichloro-4 nitro salicylic anilide ethanolamine) (Bayer, Germany)
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- Copper sulphate ($Cuso_4 . 5H_2O$)
  (from Laboratory)

2 - Animal insecticide:

- Diazinon. [Neocidol C6OE O.O-diethyl O-(2-Isopropyl-6-methyl-phrimidine pyrimidine phosphorthioate. A product of Ciba Geigy Limited. Basel, Switzerland].

3 - Plant insecticides;

- Du pont Lannate 20 L (20% Methyl S- Methyl - N- Thioacetimidate).[K.Z. Company].
- Dimethoate 40% (Dimethoate 40% O.O Dimethyls S, Phosphorodithioate). [K.Z. Company].

The Molluscicides were tested in concentrations below, equal & more than the commercial lethal dose which applied in the field as 0.8 ppm & 1.2 ppm for Bayluscide and 25 ppm, 30 ppm & 35 ppm for Copper sulphate. Each concentration was tested for 1, 2 & 3 hours.

Diazinon was tested in low concentration as 1 ml, 2 ml. & 4 ml per litre for 1, 2, 3, 6 and 8 hours exposure, and in high concentrations as 8 ml, 20ml & 40 ml per litre for 1, 3 & 6 hours.

The plant insecticides were used in their commercial lethal dose, then double and trible of its concentration as 0.75 ml, 2 ml and 3 ml per one litre for Dimethoate 40% and 3.30 ml, 6.60 ml, 9.90 ml per one litre for Dupont Lannate 20 L. Each concentration was tested for 1, 2 & 3 hours exposure period.

Exposure of the snails in every case was applied according to the immersion technigue of W.H.O. (1961) & EL-BAHY (1984).

The snails remained under supervision for one week after sxposure to the chemicals, examined two times daily where the vitality of the snails was detected by using fine needle for testing the contraction of snail's food (ABDEL-GHANI, 1955). The dead snail (Fig. 1-D) was easily detected by its fleshy part being swelled, relaxed completely, extending to needle test and was surrounded by heavy muocus material. A snail was kept in dechloronated tap water as a control for every experiment.

RESULTS

Ten percent of the dissected snails showed Nemotode Larvae (Fig. 1-A) that measured 250-500 um in length and have tapering wavy tail devoid of dorsal spine. They were identified as one of Protostrongylus species larvae.

1 - EFFECT OF MOLLUSCICIDES:

Copper sulphate and Bayluscide have low effect at the commercial lethal dose (30 pmm & 1 ppm respectively), where only 40% 30% from the exposed snails died after 3 hours exposure to the above 2 molluscicides respectively.

The mortality rate increased reaching 80% in both molluscicides after 3 hours exposure under concentration of 35 ppm $CUSO_4$ + 1.2 ppm Baylluscide, the control snails immersed in dechloronated tap water at the same time have no mortalities, (table 1).

2 - EFECT OF DIAZINONH:

The considerable effect of Diazinon as molluscicides on the exposed Pleurodonte orbiculate snails appeared at concentration of 4 ml/litre for 2 hours where the mortality reached 45%. The mortality rate increatsed with the increase of Diazinon concentration reaching 85% at 8 ml/litre for one hour and to 100% mortality after 3 hours under the same concentration (table 2).

It is worth mentioning that the snails were unable to resist immersion-even in untreated water- for 6 hours or more where the mortality reached 80% and increased to 100% after 8 hours in control snails (Table 2).

3 - EFFECT OF PLANT INSECTICIDE:

Exposure of snails to Dimethoate 40% which is used in spraying of the fruit trees was found to be the more efficient method of control. The mortality percentage began as 50% after one hour and reached 100% after 3 hours exposure to concentration of 0.57 ml/litre. This is the normal concentration used for spraying of friut trees. The mortality rate increased to 100% after one hour at concentration 2 ml/litre and above without any mortality in the control snails immersed in water;(Table 3).

Du pont lannate 20 L has lower effect than the previous one where the commercial lethal dose (3.30 ml/Litre) gave 100 percent mortality at that concentration with exposure period longer than Dimethoate (Table 3).

DISCUSSION

Pleurodonte orbiculata considered as one of land snails playing a role in transmission of the lung worms. One hundred five of the dissected snails in this study were harbouring Protostrongylus larvae. This illustrates the importance of this snails species as a vactor for lung worms infecting sheep. In the present study the authors aimed to select the more effective molluscicide and the ideal method for its application that can distruct this dangerous terrestrial snail; from chemicals usually used in the field.

The most effective method of application was by leaving the snail at first exposed to water, then after 15 minutes (where all snails become active and moved) they were exposed to the chemical substances.

The present study proved that the field applied molluscicides produced their effect when applied on the snails for a period not less than 3 hours. Therefore they were considered as unsuitable for field application where the snails were not exposed well during spraying (due to their creeping away from the treated area).

Diazinon appeared more effective when applied in high concentration (8 ml/Litre) but this concentration may be harmful to the plants and animals. However the present study proved the efficacy of the plant insecticide Dimethoate 40% even when used in the normal concentration aplied in the field against fruit flies (0.75 ml/Litre). It is worthmentioning that this chemical at this concentration have no dangerous effect on the plants or animals and the snails did not need long exposure time to induce mortality. The present authors, therefore concluded that the plant insecticide Dimethoate 40% is the most effecient chemical when used by the suggested method of application in control of this wandering snail.

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Table (1): Mortality % in Pleurodonte orbiculata snails immersed in lolluscucides

Exposure period	Copper Sulphate			Bayluscide			Control in water
	The tested Concentrations p.p.m			The tested Concentrations p.p.m			
	25 ppm	30 ppm	35 ppm	0.8 ppm	1.0 ppm	1.2 ppm	
1 h	0 %	0 %	10 %	0 %	0 %	10 %	0 %
2 h	0 %	0 %	20 %	0 %	0 %	10 %	0 %
3 h	0 %	40 %	80 %	0 %	30 %	80 %	0 %

Table (2): Mortality % in Pleurodonte orbiculata snails immersed in Diazenon

Exposure period	Testing of low Concentration			Control
	1 ml/Li.	2 ml/Li.	4 ml/Li.	
1 h	0 %	15 %	30 %	0 %
2 h	0 %	30 %	45 %	0 %
3 h	10 %	40 %	65 %	0 %
6 h	90 %	95 %	100 %	80 %*
8 h	100 %	100 %	100 %	100 %*

Exposure period	Testing of high Concentration			Control
	8 ml/Li.	20 ml/Li.	40 ml/Li.	
1 h	85 %	90 %	100 %	0 %
3 h	100 %	100 %	100 %	0 %
6 h	100 %	100 %	100 %	80 %*

* Control snail may be Kolled by long immersion in water.

Table (3): Mortality % in Pleurodonte orbiculata snails immersed in plant insecticides

Exposure period	Du Pont Lannate 20 L			Dimethoate 40 %			Control in water
	The tested Concentrations p.p.m			The tested Concentrations p.p.m			
	3.30 ml/Li	6.60 ml/Li	9.90 ml/Li	0.75 ml/Li	2 ml/Li	3 ml/Li	
1 h	30 %	40 %	70 %	50 %	100 %	100 %	0 %
2 h	60 %	80 %	90 %	50 %	100 %	100 %	0 %
3 h	60 %	100 %	100 %	100 %	100 %	100 %	0 %

PLEURODONTE ORBICULATA SNAILS

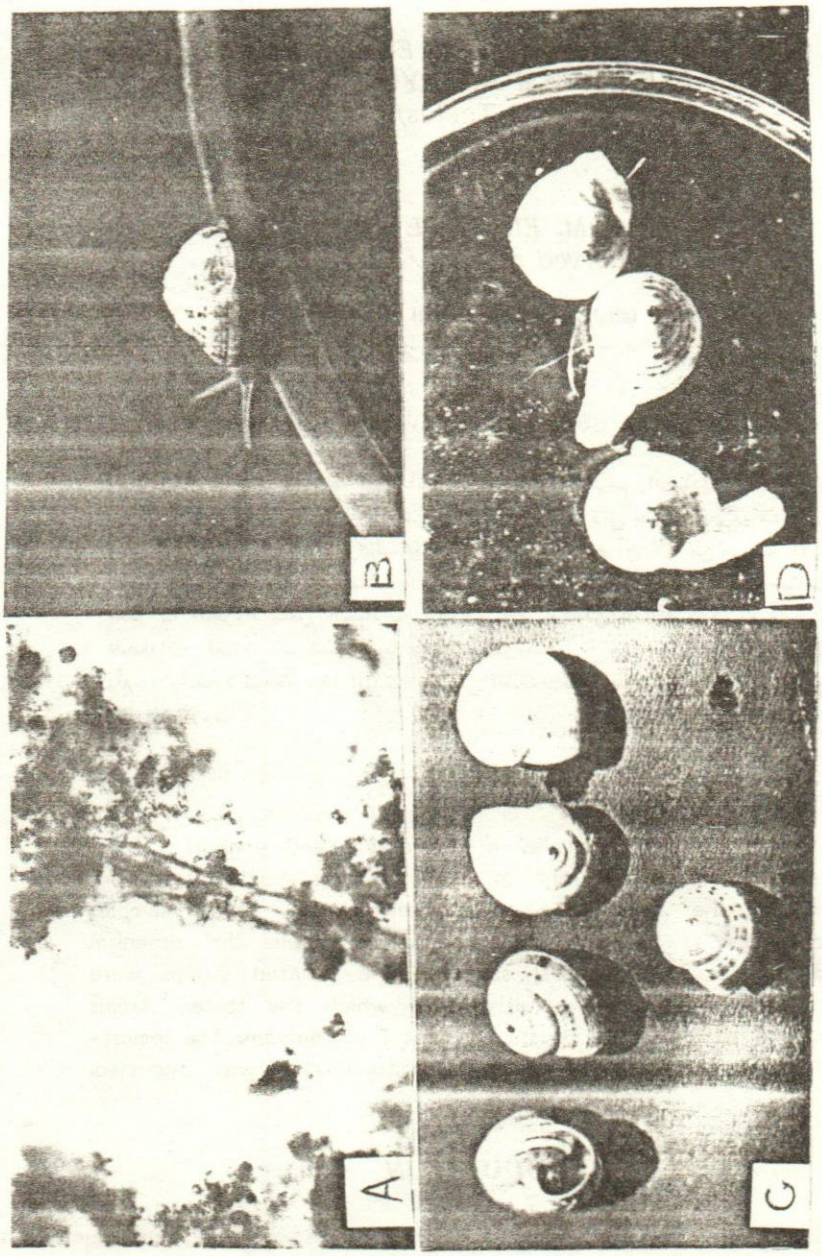

Fig. (1): A) Nematode larva detected in tissue of infected snails.
B) Free active snail creep over a plastic surface.
C) Dormant snail contracted in its shell.
D) The extended snails after exposure to Dimethoate 40%.