

Safe control of terrestrial snails in Sugar beet (*Beta vulgaris*)

At Kafr El - Sheikh Governorate

By

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*A Thesis Submitted in Partial Fulfillment
Of
The Requirement for the Doctor of Philosophy Degree
in
Environmental Science*

Department of Agricultural Science
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2014

APPROVAL SHEET

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

((وَقُلْ رَبِّيَ زِدْنِي عِلْمًا))

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ACKNOWLEDGEMENT

The author would like to express her deep thanks and gratitude to late Prof. Dr. Mahmoud Tharwat and Late prof. Dr. Sherief Hafez, plant protection Department, Faculty of Agricultural , Ain Shams University for their supervision and help during this study .

Gratefulness are also due to Late prof Dr. Hassan I. El-Deeb, and Late Prof Dr. Helmy Ali Zedan, Harmful Animal Research Department, Plant Protection Research Institute, for their supervision and help in writing this thesis.

My thanks to Dr. Ahmed Eid Abd El-Maged Mahgoub , plant protection Department, Faculty of Agricultural , Ain Shams University for his supervision and help in this thesis.

My deep gratitude and thanks to Dr. Magdy Welson , Professor of Research Department animals harmful to agriculture Vice president for extension and training of plant Protection- Dokki -Giza for his supervision and help in this thesis

Finally, my great thanks are also due to all staff members of the Harmful Animal Research Department, Plant Protection Research Institute, Agricultural Research Center, Ministry of Agriculture, Cairo, Egypt.

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ABSTRACT

Several experiments under laboratory and field conditions had been conducted to study safety methods for population management of common land snails in sugar beet plantations at El-Hamool, Quallein and Sakha districts, Kafr El-Sheikh Governorate. The obtained results could be summarized as follows:

1. *Monacha cantiana* and *Cochlicella acuta* were the dominant species on sugar beet plants at the three locations, while *Succinea putris* was found in few numbers and slight infestation in the same localities on sugar beet plants especially which was near vegetables fields.
2. Sugar beet leaves were the most preferable for *M. cantiana* snails followed by lettuce and cabbage leaves. On the other hand, onion and garlic leaves were the most repellent food for *M. cantiana* snails due to repellent effect of taste and odor. Bran as a dry bait was the most preferable to *M. cantiana* snails followed by crushed wheat, crushed bread, crushed maize and crushed rice. When we use attractive materials as black sugar-cane molasses and vanilla, *M.cantiana* snails preferred bran with molasses more than bran with vanilla, while bran with onion juice was the lowest preferable followed by garlic juice due to its repellent taste.
3. The highest damage of different levels of *M.cantiana* infestation was recorded. General means of reduction in shoot weight were 68, 75, 86, 120 and 135 gm and reduction of root weights were 80, 86, 90, 120 and 156 gm when plants were

infested with 10, 20, 30, 40 and 50 snails, respectively and reductions was increased when numbers of snails were increased.

4. The agricultural practices included soil cultivation and ploughing the soil, treated the seeds by systemic insecticide (Gauscho) , uses onion and garlic intercropped with sugar beet greatly reduced the attack of the snails *M.cantiana* and *C. acuta* to more than 50%.
5. The microbial compounds as Protecto, Bioranza and Spinosad were used as dipping and baits, then were estimated against *M.cantiana* and *C.acuta* under laboratory conditions.
6. The results showed that spinosad was the most effective to *C. acuta* than *M.cantiana* , while Protecto was the most effective to *M .cantiana* followed by Bioranza than *C. acuta* as a dipping method. On the other hand, protecto was the most effective for *C. acuta* than *M.cantiana* and Bioranza was most effective for *M.cantiana* followed by Spinosad than *C.acuta* snails under field conditions, the obtained results revealed that Protecto was most effective at high concentration followed by Bioranza, while Spinosad was the least effective.

Key words : *Monacha* sp. , *Cochlicella* sp . ,*Succinea* sp .,Sugar beet ,
Agricultural practices and biocid .

INTRODUCTION

Slugs and snails are of importance to agricultural habitat because of the damage they do in agriculture, horticulture and forestry. In Egypt, the destructiveness of land snails is far greater today than in former time (**Kassab and Daoud, 1964; El-Okda, 1983 and Abd Allah *et al.*, 1992**). Their spread is greatly differed from place to another depending on food supply and weather conditions (**Mahrous, 2002**). Many plants re subjected to snail attack, particularly at the peak of their activity, which occur during spring (**El-Deeb *et al.*, 1996**). They attack leaves, buds, flowers and even the trunk of trees and cause a great damage to vegetables, ornamentals, shrubs and a wide variety of crops, fruits and other plants in most of the areas of their distribution (**Malec, 1985 and El-Deeb *et al.*, 1999**).

Until now, land snails are mostly controlled chemically using pesticides and chemical fertilizers (**El-Okda, 1980 and Fouad *et al.*, 2004**). Most investigators recommended use of molluscicides that are selectivity active, biodegradable, inexpensive and readily available in affected area especially under economic and ecological consideration (**Radwan and El-Wakil, 1991 and El-Khodary *et al.*, 2001**).

The terrestrial snails *Monacha cantiana* (Montagu) became an important agricultural pest causing a great damage to crops in different localities in Egypt . It was recorded with a relatively high population density on major economic crops at Kafr El-Sheikh governorate (**Sharsher *et al.*, 1996**), since the percentage of

infestations were 39.6, 73.1 and 74.2% on Egyptian clover, sugar beet and broad bean, respectively. These pests are controlled chemically by synthetic molluscicides insecticides (**Crowell, 1967 and El-Okda, 1981**). These chemical compounds cause environmental contamination giving rise to residues in food, fruits and water. Therefore, the present work was conducted on the land snail species which found in sugar beet fields at Kafr El-Sheikh governorate. To achieve this goal, the following studies were carried out:

- Ecological studies: Those studies include survey of common land snail species on sugar beet crop in three districts, El-Hamool, Kallin and Sakha at Kafr El-Sheikh Governorate.
- Population dynamics and distribution of common species at the same district.
- Food preference and feeding behavior of snails under laboratory conditions.
- Estimate of damage which caused by snails in leaves and roots of sugar beet plants.
- Evaluation of the efficacy of some agricultural methods to control land snail species.
- Evaluation of the efficacy of some microbial compounds against land snail species under laboratory and field conditions.

REVIEW OF LITERATURE

1. Terrestrial snails associated with agricultural crops:

1.1. Survey and distribution :

Kassab and Daoud (1964) found that *Theba pisana* (Muller), *Helicella vestalis* (Xeropicta) and *Eobania vermiculata* (Muller), were distributed through the Delta region, and they recorded with excessive abundance only in certain restricted Northern area . Also, they mentioned that *H. vestalis* and *T. pisana* were recorded in fruit trees while the snail *Monacha obstructa* was shown in the cultivated fields in the Delta region in clover and rice fields.

Bishara et al. (1968) surveyed the land snails infesting the cultivated fields and orchards in Northern region of Delta in Egypt. They found six species namely; *Euparypha pisana* (Muller), *Helicella sp.*, *Theba sp.*, *Cochlicella acuta*, *Eobania vermiculata* and *Rumina decollate* (Linne).

El-Okda (1984) indentified the land mollusks in Ismailia Governorate. He found that the land snails, *Monacha sp.* and *Oxychillus sp.* which infested cultivated fields, orchards and ornamental trees in Fayed region, they were increased especially in the areas cultivated with clover . Wheat fields in infested areas were vigorously attacked while beans, watermelon, maize and tomato were slightly attacked.

Baker and Vogelzang (1988) mentioned that, *Theba pisana* was found at different habitats. Also, they found a large snails on

short grass, soil surface shrubs and tall herbs. Also, the small snails were rarely found on these hosts.

Baker (1989) surveyed various species of land snails. He found that the snail *Theba pisana*, *Cochlicella acuta* and *C. barbara* were introduced as a pests of cereal crops in southern Australia.

El-Okaa et al. (1990) mentioned reported that the land snail *Helicella sp.*, *Theba pisana* (Muller), *Cochlicella acuta* and *Eobania vermiculata* were dominant on guava and pear trees in El-Maamoura region, Alexandria.

Ali (1991) said that the land snail *Monacha obstructa* recorded for the first time in Pakistan. The adult snails were easily recognized in the field.

Newmann et al. (1994) recorded the land snail *Helix aspersa* as a pest of many vegetable and field crops in England.

Azzam (1995) recorded 15 Molluscs species belonging to four families; the Zonited, *Oxychilus sp.*, the Succinids *sp.*, *Oxyloma Cleopatra* and *Succinea sp.*, the subulimid, *Rumina decollate*, the Helicids, *Theba pisana*, *Cochlicella acuta*, *Helicella vstalis*, *Eobania vermiculata*, *Helix aspersa*, *Helix ceperata* and *Monacha sp.* in ten Governorates name Alexandria, Beheira, Cairo, Fayoum, Giza, Ismailia, Sharkia, Kafr El-Sheikh, Kaliobiya and Menufiya.