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PRELIMINARY STUDIES ON *MONACHA CARTUSIANA* SNAIL INFESTING COTTON SEEDLINGS AT SHARKIA GOVERNORATE

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ABSTRACT: Ecological and control studies were conducted o *Monacha cartusiana* **Muller infesting cotton seedlings at Sharki Governorate. Results assured that the land snail,** *Monach cartusiana* **attack cotton seedlings during the first stages pos emergence until the end of May. Regarding dispersal of** *M cartusiana* **snails to cotton fields, results revealed that the populatio density of snails and percent of infested seedling were concentrate in the adjacent areas to clover fields and decreased gradually fa from to the site of infestation. The same trend was observed at 1 and 20 m far from the adjacent Egyptian clover field. Percent o infested seedlings reached the highest value in April, while the lowes value was found in May. It's necessary to mention, that snai infestation did not appear in cotton cultivation after May. Methomy and metaldehyde were evaluated against** *M. cartusiana* **snail unde field conditions. Metaldehyde was more effective than methomyl i controlling the land snail,** *M. cartusiana* **infesting cotton seedlings.**
Key words: Cotton, land snails, dispersal, control, metaldehyde

INTRODUCTION

Recently, land molluscs have become one of the serious pests in most world countries causing economic damage to a wide variety of field crops, vegetables and fruit trees (Godan, 1983; Ali & Sulemon, 1992 and Barker, 2002). Many plants are subjected to snail attack with severe damage, particularly at the peak of the activity period which occur during spring (Ismail, 1997; Mahrous, *et al.*, 2002 and Ismail, 2004). They eat leaves, buds, flowers and even the trunk of trees and caused great

damage to vegetables and ornamental shrubs (Kassab and Daoud, 1964; El-Okda, 1984; El-Deeb *et al.*, 1996; Shetaia 2005 and Lokma 2007). Hassan and Dalliny (1967) reported that fresh water snail *Lanistas carianatus* made a great injury to rice in Egypt. Individuals attack the growing rice in the early stage causing the death of whole seellings. Many snail species were recorded infesting Egyptian clover and cotton fields at different governorates. Moreover, individuals of *M. cartusiana* move from infested clover fields to neighbouring cotton onces (Shetaia, 2005; Abdel-Haleim, 2007 and Lokma, 2007). The present study aims to throw light on population behaviour, dispersal and control of *Monacha cartusiana* snails infesting cotton crop at Sharkia Governorate.

MATERIALS AND METHODS

Population Behaviour of *M. cartusiana* in Cotton Fields

Population changes of *M. cartusiana* were carried out in two separate fields at Hehia county, Sharkia Governorate during 2006 and 2007. The first field was located in Tweeba locality, while the second one was in Al-Amber locality, Al-Alakma village. Numbers of snails were counted in quadrate sample of 50 × 50 cm in early morning before sunset. Snails were counted weekly during the growing season of cotton crop. All snails found on plants or soil in the quadrate were counted and left in their initial places (Baker, 1988a).

Dispersal of *M. cartusiana* from Infested Clover Field to Adjacent Cotton Onces

Dispersal of *M. cartusiana* snails from the site of infestation (Egyptian clover field) to inside the cotton field was investigated during the period from March to May in two separate fields during 2006 and 2007. The first field was located at Tweeba village while the other field was located in Al-Amber locality,Al-Alakma village. Five samples each of about 50× 50 cm were taken from three strips, which were chosen parallel, to the border. The diameter of the first strip adjacent to the border was one meter while the diameter of the other strips were 10 m. Samples were taken from the cotton field at distances of 1, 10 and 20 m far from the border of each field. Weekly sample were undertaken in early morning. Mean numbers of snails/plant, and

percent of infested seedlings were calculated as follows:

$$\% \text{ Infested seedlings} = \left(\frac{\text{Number of damaged seedlings}}{\text{Total number of examined seedlings}}\right) \times 100$$

$$\text{Mean number of snails/plant} = \left(\frac{\text{Total number of counted snails on seedlings}}{\text{Total number of examined seedlings}}\right)$$

Efficacy of Certain Pesticides Against *Monacha cartusiana*

The molluscicidal activity of methomyl (Newmeal 20% SL) and metaldehyde (Gastrotox 5% G.) were tested in a cotton field infested with *M. cartusiana* snail at Al-Alakma locality, Hehia county, Sharkia Governorate during the growing season in April 2006. The study area was divided into 3 plots each of about 50 m and the same area was lefted between each other. The field was irrigated one day before treatment. The tested methomyl was applied as poisonous baits at concentration of 5 % (5 part of toxicant + 5 parts of sugar cane syrup + 90 parts of wheat bran) and metaldehyde was applied as ready bait (Gastrotox 5 % G. metaldehyde). Control treatment was designed without pesticides. Treatments were replicates three times. Baits were offered on plastic pieces each one contained about 100 gm. Number of dead and alive snails were counted one day before application and then at 1, 3, 7, 14 days post treatment. Reduction percentages were calculated according to the formula given by Henderson and Tilton (1955) as follows:

$$\% \text{ Reduction} = \left(1 - \frac{t_2 \times r_1}{t_1 \times r_2}\right) \times 100$$

Where:

r_1 = number of alive snails before treatment in untreated plots

r_2 = number of alive snails after treatment in untreated plots

t_1 = number of alive snails before treatment in treated plots

t_2 = number of alive snails after treatment in treated plots

Data were statistically analyzed using F test and L.S.D. values were calculated at 0.05 %.

RESULTS AND DISCUSSION

Incidence and Seasonal Population Behaviour

Field observation assured that cotton seedlings were infested with the land snail *M. cartusiana* during the first two months post emergence and caused serious damage to infested plants. So some farmers obligated to beat up.

Data in Fig. 1 show the population behaviour of *M. cartusiana* snail on cotton seedlings in two localities during two successive growing seasons of

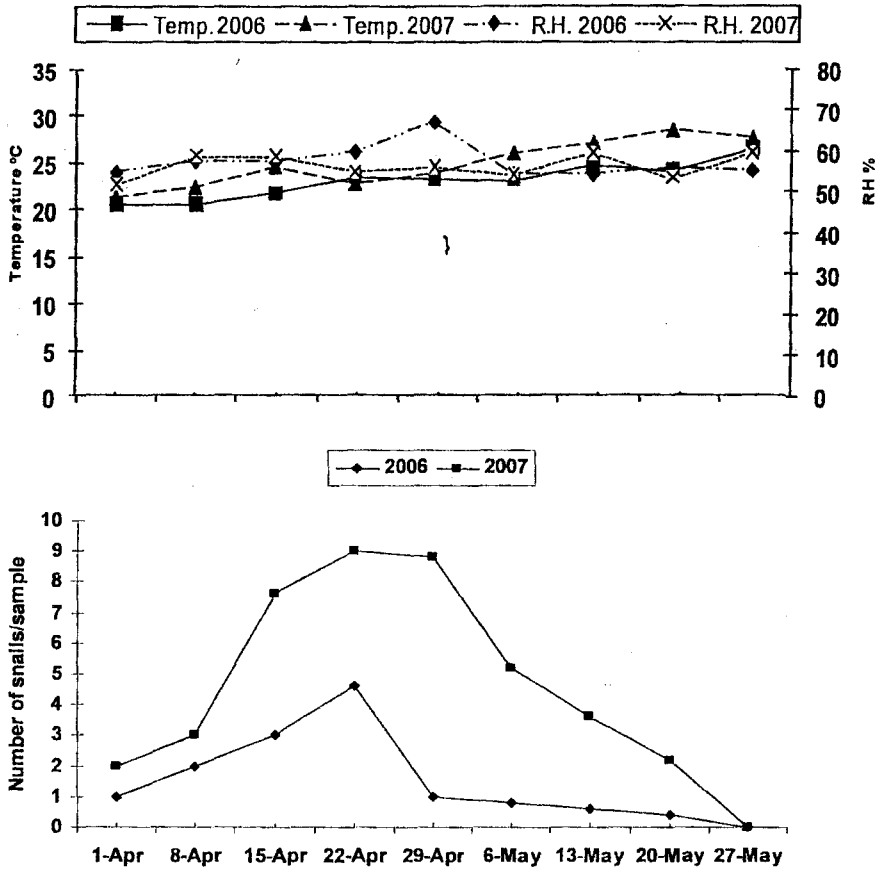

Fig. 1: Population behaviour of *Monacha cartusiana* snails infesting cotton seedlings during the two growing seasons of 2006 and 2007 as influenced by weather conditions.

2006 and 2007. Population density of *M. cartusiana* snails began with a relatively low numbers and then increased gradually to reach the peak at the end of April and then decreased until the end of May where no snails were observed climbing plants.

Dispersal of *M. cartusiana* Snails in Cotton Fields

Dispersal of *M. cartusiana* snails in cotton fields was determined in two localities (Tweeba and Al-Amber), Al-Alakma village, Hehia county during two successive growing seasons of 2006 and 2007. Data in Table 1 revealed that the highest values of percent infestation were detected at 1 m far from clover fields with value of 100 %, while the respective values at 10 m and 20 m were 27.27 % and 9.03 % respectively, at the end of April. On the other hand, mean number of snails per plant was decreased also as the distance far from the adjacent clover field was increased.

Generally, it could be concluded that the glassy clover snail attack cotton seedlings. Since individuals of such snail moved from the infested Egyptian clover fields to neighbouring cotton ones. Moreover, as the distance from source of infestation increased, number of counted snails were obviously decreased. On the other hand, inspection for snails carried out during June month revealed no infestation with *M. cartusiana*. This may be attributed to increase of temperature that did not suitable for snails.

Data in Table 2 illustrate dispersal and infestation level of *M. cartusiana* snail attacked cotton seedlings in Al-Amber locality, Hehia county, Sharkia Governorate during the growing season of 200. Results revealed that percent of infested seedlings and number of snails per seedling at the second growing season were more abundance that those of the previous growing season of 200 at Tweebn locality. This could be attributed to certain optimum climatic factors where the average values of temperature and R.H. % at whole tested periods were 2 and 25 °C and 70 and 75 % during the two successive seasons, respectively.

Results revealed that the highest percent of infested seedlings was detected at 1 m distance with value of 100 % while the respective values at 10 and 2 m were 69.69 and 11.42 % in mid-April, respectively. Regarding number of snails per seedling, the same trend was observed where

Table 1. Dispersal and infestation level of *Monacha cartusiana* snails infesting cotton seedlings in Tweeba locality, Hehia county, Sharkia Governorate during the growing season of 2006.

Distances	1m far from Egyptian clover		10 m from Egyptian clover		20m from Egyptian clover	
Exam Date	% Infested seedlings	No. snails/ plant	% Infested seedlings	No. snailsplant	% infested seedlings	No. snails/plant
8-Apr	93.75	0.46	65.51	0.24	8.57	0.05
15-Apr	81.25	0.31	50.00	0.23	14.4	0.05
22-Apr	62.96	0.85	62.50	0.66	0.04	0.22
29-Apr	100.0	0.08	27.27	0.18	9.09	0.02
6-May	41.66	0.08	63.63	0.45	30.00	0.30
13-May	30.00	0.30	20.00	0.30	10.00	0.10
20-May	0	0	0	0	0	0
27-May*	0	0	0	0	0	0

* = No snails were noticed climbing cotton seedlings

the highest values were detected at 1 m distance with values of 1.75 snails per plant, while the respective values at 10 and 20 m were 0.95 and 0.15 snails/plant at 15 April, respectively.

Thepa pisana and *Cernuella virgata* may invade in the edges of crops from adjacent habitats in which numbers were high. Snails moved out of a well-grazed permanent pasture to adjacent weedy roadside vegetation in early summer. They returned to the pasture in autumn (Baker, 1988 a, b). The infestation with *Arion lusitanicus* and *Deroceras reticulatum* slugs were concentrated in sown wild flower strips and adjacent rape field. The slug damage in rape plants 1m from the wild flower strips was significantly higher that at greater distances from the strips, within a distance up to 2 m from the wild flower strips (Frank, 1998).

Attack of cotton seedlings by land snails have been reported by many authors (Shetaia, 2005; Lokma, 2007 and Abedel Aal 2007). They reported that *M. cartusiana* snails attacked cotton seedlings in certain localities at Sherkia Governorate, where they move from infested Egyptian clover to adjacent cotton.

Finally, Abdel Haleim (2007) surveyed terrestrial snails infesting Egyptian clover and cotton in Gharbia and Fayoum Governorates. She found four snail species attacked these crops i.e. *M. obstructa*, *E. vermiculata*, *Theba pisana* and *Helicella vestalis*. On the other hand, our findings disagree with her results concerning population density on cotton crop, since she reported that the peak of land snails was recorded during September in Gharbia and Fayoum Governorates, while the lowest density was recorded during July. Moreover, she mentioned that these snails were not recorded during March in Gharbia and Fayoum Governorates.

Efficacy of Certain Pesticides Against *M. cartusiana* Snail Under Field Conditions

The molluscicidal efficiency of methomyl and metaldehyde were evaluated against *M. cartusiana* snails under field conditions. Data in Table 3 revealed that metaldehyde was more toxic than methomyl in both initial or residual effects against *M. cartusiana* snails with % reduction of 68.98 (42.79) and 91.92 (60.89), respectively. Regarding general means, metaldehyde was more effective than methomyl which

Table 2. Dispersal and infestation level of *Monacha cartusiana* snails infesting cotton seedlings in Al-Amber locality, Hehia county, Sharkia Governorate during the growing season 2007.

Distances	1m far from Egyptian clover		10 m from Egyptian clover		20m from Egyptian clover	
Exam Date	% infested seedlings	No. snails/plant	% infested seedlings	No. snails/plant	% infested seedlings	No. snails/plant
15-Apr	90	1.75	43.4	0.95	10.00	0.15
22-Apr	88.46	1.73	63.41	0.25	12.90	0.06
29-Apr	100.0	1.18	69.69	0.36	11.42	0.08
6-May	69.44	0.72	57.57	0.21	59.37	0.43
13-May	88.23	1.05	90	0.60	84.61	0.76
20-May	75	0.91	70	0.60	30.00	0.20
27-May*	2.0	0	0	0	0	0

* = No snails were noticed climbing cotton seedlings

Table 3. Efficacy of certain pesticides in controlling the land snail *Monacha cartusiana* in cotton fields at Sharkia Governorate.

Pesticide	% reduction after treatment (in days)						General mean
	1 day	3 days	Initial effect	7 days	14 days	Residual effect	
Methomyl	63.95	21.64	42.79	39.65	82.14	60.89	**51.84**
Metaldehyde	65.24	72.73	68.98	90.23	93.61	91.92	**80.45**
L.S.D. $_{0.05}$			2.266***			2.267***	

gave 80.45% reduction while methomyl gave 51.89% reduction of *M. cartusiana* snail under field conditions. Generally, it could be reported that metaldehyde was more effective than methomyl in controlling *M. cartusiana* snails under field conditions.

When discussing these results, it`s necessary to mention that metaldehyde products predominate in the molluscicide bait market in most regions of the world. In Britain, for example, bait products containing metaldehyde were used on 55 % of the crop area treated with chemicals for gastropod control, compared to 40 % for methiocarb and 5 % for thiodicarb containing baits (Garthwaite and Thomas, 1996).

Mulluscicidal baits containing metaldehyde or some carbamates, such as methiocarb or thiodicarb, can give good control of gastropods (Barker, 2002). Metaldehyde and carbamate compounds were tested by many investigators, who assured that these compounds were more effective against land snails under laboratory or field conditions (Radwan *et al.* 1992; Ghamry *et al.* 1993; Aioub *et al.* 2000; Ismail, *et al.*, 2005; Shetaia, 2005; Ismail & Hegab, 2006 and Lokma, 2007). Abdel Haleim, 2007 reported that methomyl compound exhibited the highest molluscicidal effect against land snails infesting Egyptian clover and cotton fields at Gharb a and Fayoum Governorate. Finally, Ismail and Mohamed, (2009) reported that metaldhyde was the most effective compound followed by methomyl, while abamectine was the lowest one against *M. cartusiana* under laboratory condition.

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دراسات تمهيدية على القوقع موناكا كارتوسيانا الذي يصيب بادرات القطن في محافظة الشرقية

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أجريت دراسات ايكولوجية ومكافحة على قوقع البرسيم الزجاجي (موناكا كارتوسيانا) الذي يصيب بادرات القطن في محافظة الشرقية، أكدت الدراسات أن قوقع البرسيم الزجاجي يصيب بادرات القطن في المراحل الأولى من عمرها حتى نهاية شهر مايو تقريبا، وبخصوص توزيع الإصابة في الحقول المصابة بالقواقع الأرضية اتضح أن الإصابة تزداد في المناطق المجاورة لمصدر الإصابة وتقل بالابتعاد عن مصدر الإصابة – ومما هو جدير بالذكر أن الإصابة في حقول القطن تأتى أما من الحقول أو من إصابة سابقة في الزراعات السابقة كما لوحظ أن النسبة المئوية للبادرات المصابة تصل ذروتها خلال شهر مايو وتقل خلال شهر ابريل، هذا ولم تلاحظ اى إصابات بالقوقع لزراعات القطن بعد شهر مايو كما أجريت تجربة حقلية لمكافحة القوقع الارضى الذي يصيب بادرات القطن واستخدم فيه مبيد الميثوميل كطعم سام والميتالدهيد كطعوم جاهزة أوضحت النتائج أن الميتالدهيد كان أكثر فعالية من الميثوميل ضد قوقع البرسيم الزجاجي الذي يصيب بادرات القطن.