

INCIDENCE AND SEASONAL FLUCTUATION OF CERTAIN LAND GASTROPOD SPECIES ASSOCIATED WITH SOME CROPS AND WEEDS AT SHARKIA GOVERNORATE.

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ABSTRACT

Occurrence and seasonal fluctuation of certain land gastropod species associated with some crops and weeds at Sharkia Governorate were conducted at two district belonging to Sharkia Governorate. Results revealed that *Monacha cartusiana* (Muller) and *Succinea putris* (Linnaeus) snails were found at Hehia and Meniet EL-Kamh while *M cartusiana* was found with higher density than *S putris* on agricultural crops and weeds .The majority of the examined crops were found with heavy infestation with *M cartusiana* while infestation with *S putris* was found light or moderate. Regarding weeds, it was noticed that chicory has heavy infestation with *M cartusiana* while scarlet pimpernel was found with no infestation in despite of the highly density of *M cartusiana* snails. It was necessary to mention that the field slug , *Deroceras reticulatum* was recorded for the first time at Meniet EL-Kamh associated with agricultural crops and chicory with high infestation .Regarding population dynamics, results revealed that *M cartusiana* snail was recorded with high density during spring months (March, April and May)as compared with winter or fall months .Data showed that cabbage harbored the highest population of *M cartusiana* while broad bean show the lowest numbers.

INTRODUCTION

Terrestrial Gastropod are considered one of the important group pests attacking agricultural crops in all over the world, These pests attack plants in all growth stages *i.e.* seeds, seedlings, roots and tuber crops. It caused yield reduction to field crops, vegetables, horticulture crops as well as ornamental plants by feeding on leaves, flowers and fruits crops or as vectors of fungal or viral disease to these crops.

Slugs and snails have an economic importance to man due to the injurious to agriculture, horticulture and forestry, furthermore, they are of economic importance in medical and veterinary practice, since they serve as intermediated hosts for certain parasitic worms of man and his domestic animals (Godan, 1983).

In Egypt many investigators reported that these pests have an economic importance for all crops (Kassab and Daoud, 1964; El-Okda, 1984; El-Deeb *et al.*, 1999 and El-Wakeil *et al.*, 2000).

Land molluscs have the important parts of studies by many investigators who reported that these pests distributed in all counties belonging to Sharkia Governorate (Ghamry *et al.*, 1993; Arafa, 1997 Ismail, 1997; El-Masry, 1997, Mahrous *et al.*, 2002, Ismail, 2004; Lokma, 2007, Shetaia *et al.*, 2009 and Abd-Allah and Ismail, 2011).

The present study aims to through light on the occurrence and seasonal fluctuation of certain land gastropod associated with some herbs, and field crops, vegetables and citrus trees at Sharkia Governorate.

MATERIALS AND METHODS

Survey of land molluscs on different agricultural crops and associated weeds at Sharkia Governorate:

A survey was conducted to study the incidence and seasonal fluctuation of land gastropod associated with some host plants in two districts of Sharkia Governorate during the period from Sept. 2009 to Aug. 2011. These districts and localities were: Hehia, (Hehia El-Balad and Al-Alakma) and Meniet Al-Kamh (Malames and Kardida). The survey included filed crops *i.e.* *Trifolium alexandrinum*; *Triticum vulgare*; *Vicia faba*; *Allium cepa* and *Allium sativum*); vegetable crops *i.e.* (*Pisum sativum*; *Lycopersicon esculentum*; *Cucurbita pepo*; *Brassica oleracea*; *Cucumis sativum*; *Lactuca sativa*; *Solanum melongena* and *Capsicum annum*); orchard crops *i.e.* (*Citrus sinensis* and *Citrus aurantium L.*) and weeds *i.e.* (*Cichorium pamilum*; *Polypogon monspeliensis* ; *Anagallis arvensis* ; *Amaranthus viridis* ; *Sonchus oleraceus*; *Avena fatua* ; *Convolvulus arvensis* ;and *Melilotus indica*) Samples of land gastropod were taken from each crops area by using the quadrat samples size 50x50 cm (Staikou and Lazaridou- Dimitriadou, 1990). Snails from each host plant in each survey areas were transferred in muslin cloth bags to the laboratory and identified according to the keys given by Godan (1983).

Seasonal fluctuation of *M. cartusiana* snails on certain field crops, vegetables and navel orange trees:

The seasonal fluctuation of the predominated glassy clover snail, *M. cartusiana*(MULLER) were determined on certain field and vegetables crops as well as navel orange trees at Abo-Kapeer district during two successive seasons (2009-2010 and 2010- 2011). Certain filed crops; Egyptian clover, wheat and broad bean; vegetable crops as pea, cabbage and lettuce and navel orange as fruit crop were chosen for this study. An area of about one feddan was selected for each crop. Five replicates of quadrat sample size (50x50 cm.) were randomly examined biweekly during the growing season of each crop except navel orange sample were counted monthly during 12 months. Examination was undertaken during early morning before sunrise. All snails found on plant or soil surface in the quadrat sample were counted and then left in their initial places (Baker, 1988). Data concerning temperature and relative humidity during the period of study were obtained from Metrological Station of Abo-Kapeer. The obtained data were subjected to statistical analysis using F test and correlation coefficient between snails population and each of temperature and relative humidity according to Costat Statically computer program (2005).

RESULTS AND DISCUSSION

Survey studies

A survey studies were carried out on gastropod fauna infesting different crops and associated weeds at two districts at Sharkia Governorate. Data presented in Table (1) revealed that the three species of herbivorous land molluscs were found on different host at Hehia and Meniet El-Kamh districts. These species were the glassy clover snail, *M. cartusiana*, (Muller) the amber snail, *Succinea putris* (Linnueus) and the field slug *Derocerus reticulatum*. (Muller). The identified species varied in their incidence and level of infestation according to the locality and the host plant types. It is obvious that *M. cartusiana* snail represented the highest incidence compared to the other species, since it was recorded in all host. Generally, the tested hosts can be classified into three categories according to the degree of infestation with *M. cartusiana*. These categories were: heavy, moderate, light and zero infestation. The majority of the examined crops were found with heavy infestation especially Egyptian clover, broad bean, wheat, lettuce, cabbage, egg plant, chicory, and sugar cane. On the other hand, onion, sweet clover, wild oat, water cress, were detected with moderate infestation. Garlic, hibiscus, cucumber, pepper, rabbit foot grass, slender amaranth, chicory, pepper, sour orange, navel orange, were found with light infestation at Hehia and Meniet El-Kamh districts.

Regarding *S. putrus*, it was detected only at Malames and Kardida belonging to Meniet El-Kamh district with light infestation on Egyptian clover, wheat, broad bean, navel orange and chicory.

It is necessary mentioned that the field slug, *Derocerus reticulatum* recorded only at Meniet El-Kamh district for the first time where recorded with light infestation on Egyptian clover, broad bean, wheat and navel orange.

Our obtained results are in harmony with results reported by many authors who surveyed land molluscs species in Egypt (Kassab and Daoud, 1964; El-Okda, 1980; 1984, El-Deep *et al.*, 1996; Mortada, 2002, and Arafa, 2006); in Sharkia Governorate (Ghamry *et al.*, 1993, El-masry 1997; Ismail, 1997, Mahrous *et al.*, 2002, and Lokma, 2007) who reported that the glassy clover snail, (*Monacha cartusiana*) was the predominant land snail in Sharkia Governorate.

On the other hand the field slug *Deroceras reticulatum* was found in different localities with light infestation. It is necessary to mentioned here that Sharkia Governorate have a great part of studies regarding land molluscs, therefore it is important to take these results in to consideration in I P M programmers for controlling gastropods.

Table (1): Incidence of land gastropod on different agricultural crops and associated weed at two districts in Sharkia Governorate

District	Village	Molluscs species	Host plant and infestation level	
			Agricultural crops	Associated weeds
Hehia	Hehia El- Balad Al- Alakma	<i>M. cartusiana</i>	Egyptian clover (+++), Broad bean (+++), Wheat (+++), Onion (+), Garlic (+), Lettuce (+++), Cabbage (+++), Cucumbers (+), Egg plant (+++), Pepper (+), and Sugar cane (+++)	Chicory (+++), Rabbit foot grass (+), Scarlet pimpernel (0), Annual yellow sweet clover (++), Wild oat (++) and Slender amaranth (+)
		<i>S. putrus</i>	Egyptian clover (+), Wheat (+), Sugar cane (+), Broad bean (++) and Mango (+)	Chicory (+),
Meniet El-Kamh	Malames - Kardidas	<i>M. cartusiana</i>	Egyptian clover (+++), Wheat (+++), Broad bean (+++), Onion (++) , Garlic (+), Sugar cane (+++), Lettuce (+++), Cabbage (+++), Squash (+), Cucumber (+), Pepper (+), Egg plant (+++), Water cress (+), Hibiscus (+), Navel orange (++) and Sour orange (+)	Chicory (+++), Annual sowthistle (+), Rabbit foot grass (+), scarlet pimpernel (0), Annual yellow sweet clover (+), Annual yellow sweet clover (+), Field bindweed (+), and Wild oat (++)
		<i>S. putrus</i>	Egyptian clover (+), Wheat (+), Navel orange (+) and Broad bean (+)	Chicory (+)
		<i>Deroceros reticulatum</i>	Egyptian clover (+), Wheat (+), Navel orange (+) and Broad bean (+)	Chicory (+)

0 = no infestation

+ = light infestation (less than 15 snails/0.25m²)

++ = moderate infestation (between 16-30 snails/0.25m²)

+++ = heavy infestation (more than 30 snails/0.25m²)

Seasonal fluctuation of *M. cartusiana* snails on different crops at Abo-Kapeer district, Sharkia Governorate:

Population dynamics of *M. cartusiana* snail was studied on Egyptian clover, wheat, broad bean, pea, cabbage, lettuce and navel orange in Al-Abazia, locality Abo-Kapeer district, Sharkia Governorate during two successive growing seasons 2009/2010 and 2010/2011. Data in Table (2) revealed that the initial infestation of *M. cartusiana* snails was recorded on cabbage and navel orange with a relatively moderate population density of (20, 22.2) and (18.4, 20.2) snails per sample size during the two growing seasons of 2009/2010 and 2010/2011, respectively. Regarding Egyptian clover, pea, and lettuce, the initial infestations were appeared in the beginning of October with low or moderate number of (15.8, 12.6), (8.2, 10.2) and (21.4, 23.2) snail sample size, respectively. The initial infestation of wheat and broad bean was appeared in November with low numbers of (3.4, 9.0) and (4.2 and 4.0) snails sample size, respectively.

As for the behavior of *M. cartusiana* population after the initial infestation, it is clear that the number of snails increased until April month where reach to its maximum population where recorded (33.8, 39.6); (23.0,

25.2); (19.0, 20.2); (34.6, 36.2), (34.6, 38.6); (28.6, 30.2), (26.4, 28.6) snail/sample size for Egyptian clover, wheat, broad bean, pea, cabbage, lettuce and navel orange during the two successive seasons, respectively.

It noticed that cabbage harbored the highest population of *M. cartusiana* followed by navel orange, Egyptian clover, lettuce, pea, wheat, while broad bean the lowest numbers. The total counted of the snails on these crops in the two successive seasons were (266.6, 299.4), (253.4, 267.6), (231.2, 244), (206.2, 220.2), (161.4, 161.6), (100.0, 116.4) and (72.4, 79.2), snail/sample size respectively. Moreover, values of population density of *M. cartusiana* snails on the tested crops were higher than in the later season 2010/2011 compared to those counted in the first season of 2009/2010. Generally, it could be concluded that the population density of *M. cartusiana* snails was obviously increased during spring months (March, April and May) as compared to population density during autumn or winter months.

Table (2): Seasonal fluctuation of *Monacha cartusiana* snail on different crops at Al- Abazia locality, Abo- Kapeer district, Sharkia Governorate

Date	Average number of <i>M. cartusiana</i>																Temp.	RH %
	Clover		Wheat		Broad bean		Pea		Cabbage		Lettuce		Navel Orange					
	1	2	1	2	1	2	1	2	1	2	1	2	1	2				
Sep.	0	0	0	0	0	0	0	0	20.0	22.2	0	0	18.4	20.2	30.2	31.8	65.4	63.3
Oct.	15.8	12.6	0	0	0	0	8.2	10.2	21.2	25.8	21.4	23.2	19.8	21.4	29.0	27.7	62.2	63.3
Nov.	18.0	18.2	3.4	9	4.2	4.0	13.6	15.2	23.0	26.4	23.2	24.0	22.0	23.4	24.2	25.0	62.6	60.0
Dec.	20.6	20.6	9.8	12.2	8.6	9.2	19.0	20.8	26.4	29.8	25.0	27.0	23.4	25.8	19.2	20.0	63.2	61.7
Jan.	25.6	28.8	12.6	15.4	10.2	11.6	24.2	26.2	28.6	30.6	26.2	27.4	26.2	25.6	15.6	17.7	65.2	60.3
Feb.	28.0	29.6	13.4	16.2	14.0	15.2	28.6	30.6	30.4	32.2	27.8	28.6	26.0	27.4	17.3	18.9	65.5	60.8
Mar.	29.2	32.4	17.2	18.6	16.4	19.0	33.2	32.4	31.2	35.4	28.2	30.0	27.2	28.2	19.7	22.9	60.7	62.2
Apr.	33.8	39.6	23.0	25.2	19.0	20.2	34.6	36.2	34.6	38.6	28.6	30.2	26.2	28.6	22.6	27.8	57.6	56.8
May	33.2	32.8	20.6	19.8	0	0	0	0	29.2	30.2	25.2	29.8	21.2	20.8	27.9	27.9	56.9	65.6
Jun.	27.0	29.4	0	0	0	0	0	0	32.0	28.4	0	0	17.2	19.8	30.6	32.0	58.9	58.9
Jul.	0	0	0	0	0	0	0	0	0	0	0	0	13.0	14.6	31.8	32.7	65.6	66.1
Aug.	0	0	0	0	0	0	0	0	0	0	0	0	12.6	11.8	31.9	33.5	67.1	67.7
Total	231.2	244.0	100	116.4	72.4	79.2	161.4	161.6	266.6	299.4	206.2	220.2	253.4	267.6				
Mean	25.6	27.1	14.2	16.6	12.6	13.2	23.0	24.5	26.6	29.9	25.7	27.5	21.1	22.3				

1= seasons 2009-2010

2 = seasons 2010-2011

The obtained data were completely agreement with results by many investigators in Egypt (Beshr 2000; El-Wakeil *et al.* 2000 and Arfa 2006), at Sharkia Governorate (Mahrous *et al* 2002, Ismail 2004, Lokma 2007, Shetaia *et al*, 2009 and Abd-Allah and Ismail 2011). Generally, these land gastropods were more increase during spring months (March, April and May) as compared to low numbers during the other seasons.

The correlation between some climatic factor (temperature and relative humidity) and population density of *M. cartusiana* snail during the two successive seasons was subjected to statical analysis. Data presented in Table (3) revealed that temperature showed significant or highly significant negative effect on numbers of *M. cartusiana* during the two successive seasons on all tested crops .Regarding the effect of relative humidity on population density of such snail, it noticed that the obtained results were

significant or insignificant effect on numbers of *M. cartusiana* during the two successive seasons of the tested crops.

Table (3): Effect of temperature and relative humidity on population density of the *M. cartusiana* snail on different crops at AL-Abazia locality Abo-Kapeer county, Sharkia Governorate.

Host plant	Temperature		Relative humidity %	
	2009/2010	2010/2011	2009/2010	2010/2011
E. Clover	-0.0346*	-0.0458*	-0.0062**	-0.0032**
Wheat	-0.0273*	-0.0325*	-0.0582 ^{ns}	-0.1357 ^{ns}
Brood bean	-0.0013**	-0.0204*	-0.5528 ^{ns}	-0.0396*
Pea	-0.0003**	-0.0040**	-0.6435 ^{ns}	-0.0232*
Cabbage	-0.0333*	-0.0309*	-0.0215*	-0.0038**
Lettuce	-0.0013**	0.0022**	-0.2300 ^{ns}	-0.1752 ^{ns}
Navel orange	-0.0001**	-0.0026**	-0.2831 ^{ns}	-0.0043**

Each value represents correlation coefficient

ns= no significant

* = Significant

** = highly significant

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التواجد والتذبذب الموسمي لبعض أنواع الرخويات الأرضية المصاحبة لبعض المحاصيل والحشائش في محافظة الشرقية
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تم دراسة التواجد والتذبذب الموسمي لبعض أنواع الرخويات الأرضية المصاحبة لبعض المحاصيل (حقلية - خضار- بساتين) بالإضافة إلي الحشائش الحولية المتواجدة في حقول كلا من ابوكبير وههيا ومنيا القمح محافظة الشرقية.

أوضحت النتائج وجود نوعين من القواقع الأرضية هما موناكا كارتوسيانا *Monacha cartusiana* & سكسنيا بوترس *Succinea putris* بمرکزي ههيا ومنيا القمح كما تلاحظ وجود قواقع موناكا كارتوسيانا بكثافة أعلا من قواقع سكسنيا بوترس كما لوحظ وجود بزاقة الحقل ديروسيراس رتيكيولاتم *Deroceras reticulatum* حيث سجلت لأول مرة في مركز منيا القمح ولم تسجل في مركز ههيا ومن الجدير بالذكر أن حشيشة السريس (الشيكوريا) سجلت أعلا تعداد لقواقع موناكا كارتوسيانا أما حشيشة صابون الغيط فلم يسجل عليها اي أعداد إطلاقا بالرغم من وجود أعداد من القواقع بجوارها.

أما بخصوص التذبذب الموسمي لقواقع موناكا كارتوسيانا *Monacha cartusiana* علي محاصيل حقلية ومحاصيل خضار وأشجار البرتقال بسرة لمدة عامين متتاليين. أظهرت النتائج أن أعداد القواقع أخذت في الزيادة تدريجيا إلي أن وصلت إلي ذروتها خلال اشهر الربيع (مارس- ابريل- مايو) بينما انخفضت في شهور الشتاء والخريف وقد لوحظ أن أعلا تعداد للقواقع سجل علي نبات الكرنب بينما علي الفول البلدي أقل تعداد.

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