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**SURVEY AND POPULATION DYNAMICS OF SOME  
LAND SNAILS INFESTING DIFFERENT PLANT HOSTS  
AT SHARKIA GOVERNORATE.**

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**ABSTRACT**

The present investigation concerned to study some ecological, aspects of terrestrial snails infesting different plant hosts viz, some field, vegetable, horticultural, ornamental and aromatic plant crops at Sharkia Governorate. A randomly survey carried out to detriment the incidence of land snail species at different area i.e., Hehia, Belbies, Meniat Elkamh, Abou Hammad and Zagazig districts at . Results revealed that three species of land snails belonging to three families of order: Stylommatophora were found. The snails and their families were Family: Hygromiidae (*Monach cartusiana*), Succineidae (*Succinea putris*) and Helicidae (*Eobania vermiculate*). The recorded snails' species were varied in their incidence and it's level of infestation according to the location and host plants. *M. cartusiana* was dominant comparing with the other species; it was recorded in all surveyed area. *M. cartusiana* recorded the highest level and infestation on Egyptian clover (+++), Brood peen (+++) and cabbage (+++), especially at Hehia districts. The recorded land snail's species could be ranked according to their incidence in studied areas as following: *M. cartusiana* > *S. putris* > *E. Vermiculate*. However there were many studies conducted on the Population dynamic of snails *M. cartusiana* and *E. Vermiculate* at Sharkia Governorate, so snail of *S. putris* was subjected to study this phenomena in this investigation Results indicated that, *S. putris* was recorded on Egyptian clover with high density during spring months (March, April and May) throughout two successive seasons 2015/2016 and 2016/2017 at Hehia and Belbies distracts. Population density of *S. putris* slightly increased to reach its peck (27.8 and

35 individual) & (37.4 and 42.4 individual) during April of growing season 2015/2016 and 2016/2017 at Hehia and Belbies districts respectively.

**Keywords:** Survey, Population dynamic, *Succinea putris*, *Monach cartusiana*, *Eobania vermiculate* land snail, Sharkia.

## INTRODUCTION

Earlier, land snails in Egypt were not have a significant importance in agriculture environment. However in the last decats, importance of land snails as agriculture pests increased gradually till becomes one of major pests in some cases, land snails concerned a serious pests cause damage to wide variety of field crops, vegetables and fruit trees in many countries all over the world Godan(1983). In Egypt, Arafa (1997) found that, *Monach cartusiana* and *Cochlicella acuta*, infested caesarians and mandarin trees in Abou-Hammad district while *Eobania verimculata* was recorded on ornamental plants in Zagazig district. Ismail, (1997) mentioned that four species of land snails, i.e *M. cartusiana*, *Helicella vestalis*, *E. vermiculata*, and *C. acuta* were recorded on different crops at 17 localities representing 7 counties of Sharkia Governorate. Lokma, (2007) surveyed five districts of Sharkia Governorate such as Belbies, Fakous, Kafr-Saker, Meniet El-Kamh and Zagazig during the period from February to May in 2003 and 2004, He found that the glassy clover snail, *M. cartusiana* infested all crops in all localities of Sharquia Governorate, while the conical snail *C. acuta* was found in El-Katiba village (Belbies district). Abed (2017) land snails were recorded on several field crops i.e. Wheat, Egyptian clover, Broad bean, Barley, Maize and Sugar beet while vegetable crops i.e. Lettuce, Cabbage, Cucumber, Kidney bean, Eggplant, Onion, Okra, Tomato, Garlic, Dill and Parsley in 12 villages follow

three districts in Sharkia Governorate.

The aim of this study was to through the light on the occurrence and seasonal population dynamics of some land snails on some associated with field crops at Sharkia Governorate.

## MATERIALS AND METHODS

**A: study area:** Five main districts at Sharkia Governorate were chosen, some of these districts included more than one site (village). The study areas and their site were: Hahira district: (Al-Awasga – Hussien Timour and Kafr Abou Hatab), Belbies district: (Kafr Aioub), Meniat Elkamh district :( El-karakra and Banadf), Abou Hammad district (El-Sheikh Gebil), Zagazig district :( El-Nakkaria, Bani Shebl, and Manshiet Abou Al-Akhdar).

**B. host plants:** The host plant species in this study were: field crops as Egyptian clover, (*Trifolium alexandrinum*); wheat (*Triticum aestivum*); broad bean (*Vicia faba*) and onion (*Allium cepa*); vegetable crops i.e. cabbage, (*Brassica oleracea*); lettuce (*Lactuca sativa*), horticultural crops such as navel orange (*Citrus sinensis*) and ornamental plants i.e. Palm trees (*Cycas revoluta*) and aromatic plants Mint (*Mentha spicata*) and Basil (*Ocimum basilicum*)

### c- Survey and population dynamic.

**C.1: Randomly survey of land snails infesting different host plants.:** In all districts land snails species were counted early morning in each host plant area in addition to the snails on the host plant of each field crops using the quadrature sample size 50x50cm (Staikou et al., 1990). Samples of the land snails were collected in plastic box then transferred to the laboratory of

plant protection instate identification of land snails done according to Godan (1983).

**C.2. Population dynamics of Succinea putris on the Egypt clover:** This study was conducted in two districts i.e. Hehia district (HussienTimour) village and Belbies district (Kafr Aioub) village during two growing seasonal 2015/2016 and 2016/ 2017, About one fadden cultivated with Egyptian clover in each village was selected Five replicates of quadrate sample size (50 x 50 cm) per each Fadden were examined monthly intervals using the methods as mentioned previously.

## RESULTS AND DISCUSSION

Several ecological studies studied comprise the identity of the land snails infesting different crops at Sharkia Governorate and population dynamics on several crops. Therefore, survey and population dynamics of some land snail's species were especially on major crops at Sharkia Governorate.

**Survey studies of some land snails during 2015/2016 and 2016/2017 in five districts at Sharkia Governorate:** Widely survey was carried out on some land snails infesting different crops at ten villages representing five districts at Sharkia Governorate. The results present in Table (1) revealed that three species of land snails were found on different crops, belonging to different families of order: Stylommatophore the families were: Hygromiidae (*M. cartusiana*), Succineidae (*S. putris*) and Family: Helicidae (*E. vermiculata*). The identified species varied in their incidence and level of infestation according to locality and host type. It was observed that *M. cartusiana* was dominant compared with the other species since it was

recorded in all surveyed areas. Moreover, the majority of the examined plants were liable to be infested with this snail followed by *M. cartusiana* and *S. putris* while, *E. vermiculate* was the lowest one in this respect. Generally, the listed hosts can be classified into three categories according to the degree of infestation. The categories were heavy, moderate and light infestation. The majority of examined crops with heavy infestation by *M. cartusiana* were Egyptian clover, Wheat, lettuce and Cabbage cultivated in Hehia district Kafer Abou-Hatab, and Hussien Timour, Abou Hamed district El-Shekh Gebil Belbies district Kafer Aioub village and Zagazig district Bani-Shebl, El-Nakkaria and Manshiet Abou Al-Akdar village, On the other hand, *S. putris* snail was recorded on Egyptian clover at Banadf, (Meniet El-Kaamh district), Al-Awasga, (Hehia district), Hussien timour, (Hehia district), El-Shekh Gebil, (Abou Hamed district), and Kafer Aioub village (Belbies district). Regarding to *E. vermiculata* it was recorded on navel orange tree and ornamental plant recorded in Banadf (Meniet El-Kaamh district) and Bani- Shebl village (Zagazig district). Five species of land snails in different localities at Sharkia Governorate. There were 12 districts containing 44 localities infested with land snails, *M. cartusiana*, *H. vestalis*, *C. acuta*, *E. vermiculata* and *Succinea* sp. (Mahrous *et al.*, 2002 and Shetaia 2005). Also *M. cartusiana* and *S. putris* snails were found at Sharkia Governorate. *M. cartusiana* snail was found with higher density than *S. putris*. The majority of examined crops were found with heavy infestation with *M. cartusiana* snail, while, *S. putris* was recorded with moderate or light infestation in the examined localities Shetaia *et al.*, (2009). Four tybes of gastropods i.e. *Monacha cartusiana*, *Monacha cantiana*, *Succinea putris* and *Deroceras laeve*.

Infesting several field crops i.e. wheat, Egyptian clover, broad bean, barley, maize and sugar beet as well as vegetable crops i.e. lettuce, cabbage, cucumber, kidney bean, eggplant, onion, okra, tomato, garlic, dill and parsley in 12 villages follow three districts in Sharkia Governorate Abed (2017)

**Table (1):** Survey of land snails and level of infestation on different Crops in certain districts at Sharkia Governorate during the Period from 2016-2017.

Districts	Villages	Species	Host plant
Meniet El-Kaamh	El-Karakra	M. cartusiana	Egyptian clover (+), Lettuce (+), Onion (+), Brood bean (+), Guava (0), Garlic (+).
	Banadf	M. cartusiana	Egyptian clover (+ +), Brood bean (+), Wheat (+), Cabbage (+ +).
		S. putris	Egyptian clover (+).
		E. vermiculata	Orange tree (+ + +).
Hehia	Al-Awasga	M. cartusiana	Egyptian clover (+++), Onion (+), Wheat (+), Brood bean (+++), Cabbage (+ +).
		S. putris	Egyptian clover (+++).
	Kafr Abou Hatab	M. cartusiana	Egyptian clover (++), Wheat (+), Cabbage (+ + +), Brood bean (+), Lettuce (+).
	Hussien Timour	M. cartusiana	Egyptian clover (+++), Wheat (+), Onion (0), Brood bean (+), Cabbage (+ + +).
		S. putris	Egyptian clover (+).
Abou Hammad	El-Sheikh Gebil	M. cartusiana	Egyptian clover (+++), Lettuce (+), Wheat (+), Onion (+), Guava (0), Brood bean (++).
		S. putris	Egyptian clover (++).
Belbies	Kafr Aioub	M. cartusiana	Egyptian clover (+++), Brood bean (++), Wheat (+), Cabbage (+++), Onion (+).
		S. putris	Egyptian clover (++).
Zagazig	Bani Shebl	M. cartusiana	Egyptian clover (++), Lettuce (++), Brood bean (+).
		E. vermiculata	Palm tree (++), Mint (+), basil (+)
	El-Nakkaria	M. cartusiana	Egyptian clover (+), Wheat (+), Cabbage (++), Brood bean (+).
	Manshiet Abou Al-Akhdar	M. cartusiana	Egyptian clover (++), Brood bean (+), Wheat (+), Cabbage (+).

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

(++) = Moderate infestation (between 15-30 snails/0.25m2).

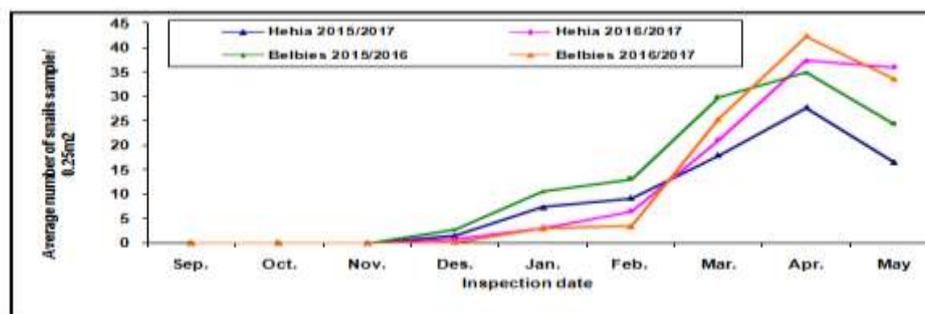
(+++)= Heavy infestation (more than 30 snail/0.25m2).

**Seasonal population dynamics of *S. putris* snail at two districts on Sharkia Governorate.:** Data given in Table (2) and Fig., (2) showed that, initial infestation of *S. putris* appeared in the beginning at December on Egyptian clover with a relatively low population densities of (1.6, 2.8) & (0.8, 0.2) snails per quadrat size 50 x 50 cm in the growing seasonal 2015/2016 and 2016/2017 at Hehia and Belbies districts respectively, regarding the population behavior of *S. putris* after the initial infestation, it was clear that the number of snails were slightly increased to reach its peak (27.8, 35) & (37.4, 42.4) snails per quadrat sample size (50 x 50 cm) at April for growing seasonal 2015/2016 and 2016/2017 at Hehia and Belbies districts respectively in Sharkia Governorate.

Generally, general mean reached (10.07, 14.4) & (13.13, 13.48) snails per quadrat sample size (50 x 50 cm) for one seasonal 2015/2016 and 2016/2017 at Hehia and Belbies districts respectively in Sharkia Governorate.

**Table (2):** Population dynamic of *S. putris* land snails during 2015/2016 And 2016/2017 on Egyptian clover at two districts in Sharkia Governorate.

Inspection date	Average number of snail's sample/ 0.25m <sup>2</sup>							
	Hehia		Belbies		Temperature °C		R.H. %	
	2015/2016	2016/2017	2015/2016	2016/2017	2015/2016	2016/2017	2015/2016	2016/2017
Sep.	-	-	-	-	29.8	26.95	54.75	54.5
Oct.	0	0	0	0	26.47	26	53.33	62.2
Nov.	0	0	0	0	20.97	21.05	64.7	55.9
Des.	1.6	0.8	2.8	0.2	15.97	15.55	58.77	57.1
Jan.	7.4	3.2	10.6	3	15.2	14.35	49.3	56.1
Feb.	9.2	6.6	13.2	3.5	16.2	15.45	52.73	58.8
Mar.	18	21.2	29.8	25.5	21.57	19.5	45.3	50.9
Apr.	27.8	37.4	35	42.4	25.3	22.45	42.73	47
May	16.6	36	24.4	33.6	27.87	27	43.1	41.9
Total	80.6	105	115.2	107.9	-	-	-	-
Mean	10.07	13.13	14.4	13.48	-	-	-	-



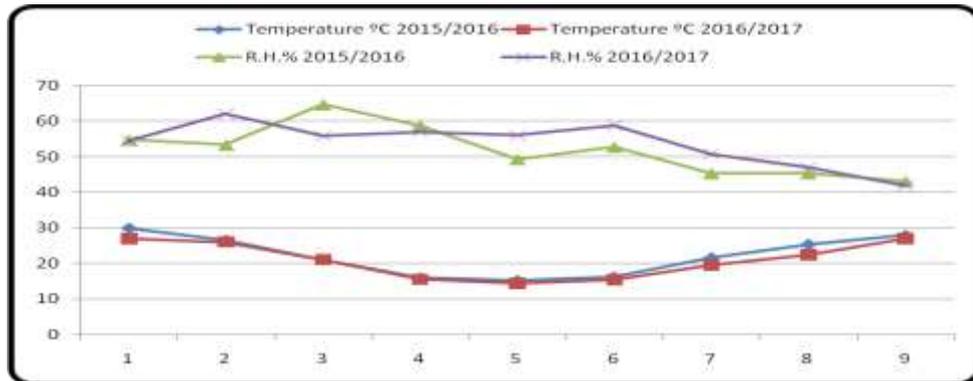
**Fig. (2):** Population dynamic of *S. putris* land snails during 2015/2016 and 2016/2017 on Egyptian clover at two districts in Sharkia Governorate.

The correlations between some climatic factors i.e. temperature and relative humidity and population density of *S. putris* during the two successive growing seasons were subjected to statistical analysis. Data presented in Table (3) and Fig., (3) revealed that temperature and relative humidity showed variable effect on population density of *S. putris*. On Egyptian clover .Temperature showed non-significant effect on number of *S. putris* during growing the two seasons also between the locations on the obesity, relative humidity showed highly significant on the population dynamic of *S. putris* during these growing seasons of between the locations.

**Table (3):** Correlation between temperatures and relative humidity on the population density of *S. putris* on Egyptian clover at Hehia Belbies districts in Sharkia Governorate.

districts	Temperature °C		Relative humidity %	
	2015/2016	2016/2017	2015/2016	2016/2017
Hehia	0.3575 ns	0.2216 ns	0.0142*	0.0011**
Belbis	0.3841 ns	0.2482 ns	0.0087**	0.0027**

n.s = not significant. \* = significant at 0.05 level. \*\* = Highly significant at 0.05.



**Fig. (3):** Temperature and relative humidity during two successive seasons 2015/2016 and 2016/2017.

land snails of *E. vermiculata* were found through all over the whole year with minimum population in January and gradually increased to reach its maximum value in May Ismail, (2004). Also the land snail *M. cartusiana* beginning with low densities and gradually increased to reached its maximum population density in April on broad bean, pea and lettuce. Whereas *Succinea putris*, recorded the maximum values in April on wheat, broad bean, pea, cabbage and lettuce, while on clover and navel orange it recorded the maximum peaks in May Shetaia (2005). Investigated the population density of land snail *M. cartusiana*, *M. cantiana*, *S. putris* and *Succinea elegans* at south district of Port Saied region, Port Saied Governorate on Egyptian clover, wheat and sugar beet. Result revealed that, the maximum population density of these land snails was noticed on the soil, stems and leaves of tested crops. The maximum population density of these land snails was noticed on Egyptian clover followed by wheat and sugar beet, also the maximum population density was reports through spring season followed by autumn and winter Awad, (2013)

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## حصر وديناميكية التعداد لبعض أنواع القواقع الارضية التي تصيب بعض العوامل النباتية في محافظة الشرقية.

[٦]

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### المستخلص

أجريت هذه الدراسة بهدف حصر بعض أنواع القواقع الارضية التي تصيب بعض المحاصيل الحقلية والخضر والبستانية والزينة في محافظه الشرقيه وكذلك دراسة حركة التعداد لقوقع السكسينيا بوتروس علي محصول البرسيم المصري.

١- دراسات حصر القواقع الأرضية في محافظة الشرقية: تمت هذه الدراسة علي عدة محاصيل حقلية هي القمح، البرسيم، الفول والبصل، وكذلك محاصيل خضر وهي الخس، الكرنب، الثوم، محاصيل بستانية اشجار البرتقال أبو سره ونباتات عطريه النعناع والريحان ونباتات الزينه مثل نخيل الزينه وتمت هذه الدراسة في ١٠ قرى تتبع ٥ مراكز في محافظة الشرقية وهي مركز الزقازيق و مركز منيا القمح و مركز بلبيس ومركز ابو حماد ومركز هيهيا خلال الفترة من يناير ٢٠١٦ إلي مارس ٢٠١٧.

حيث تم تعريف ٣ أنواع من القواقع تابعة لثلاث عائلات من رتبة طرفية العيون (order: Stylommatophora) هذه العائلات هي (Hygromiidae) ويتبعها قوقعي الموناكا كارتوسيانا (Monachacartusiana) وعائلة (Succinidae) ويتبعها قوقع السكسينيا بوتروس (Succineaputris) وعائلة قوقع الاوبانيا (Eobania vermiculate) (Helicidae)

فقد تم تسجيل وجود قوقع الموناكا كارتوسيانا في خمس مراكز وهي مركز منيا القمح و مركز هيهيا ومركز بلبيس ومركز ابو حماد ومركز الزقازيق علي محاصيل البرسيم والكرنب والخس والفولوالقمح والبصل والثوم اما قوقع السكسينيا تم تسجيله في اربع مراكز وهي مركز بلبيس ومركز هيهيا ومركز ابو حماد ومركز منيا القمح علي محصول البرسيم المصري اما بالنسبة لقوقع الاوبانيا تم

تسجيله في مركزين فقط وهما مركز الزقازيق ومركز منيا القمح علي أشجار البرتقال أبو سره والريحان والنعناع ونخيل الزينه

٢- **ديناميكة التعداد لقوق السكسينيا بوتروس علي محصول البرسيم المصري في منطقتين في محافظة الشرقية:** تمت دراسة الديناميكيه الموسمي لقوق السكسينيا بوتروس علي محصول البرسيم في قرية حسين تيمور التابعه لمركز ههيا وقرية كفر ايوب التابعه لمركز بلبيس في محافظة الشرقية في موسمين متتاليتين ٢٠١٥-٢٠١٦ و ٢٠١٦-٢٠١٧ وأوضحت الدراسة أن أقل تعداد للقوق علي محصول البرسيم المصري في شهر ديسمبر (١,٦ & ٢,٨) & (٠,٨ & ٠,٢) قوق في ربع متر مربع أثناء موسمي النمو ٢٠١٥/٢٠١٦ و ٢٠١٦/٢٠١٧ في مركزي ههيا وبلبيس علي التوالي محافظه الشرقيه وأنه يوجد زيادة واضحة في كثافة التعداد خلال أشهر مارس إبريل مايو (٣٥&٢٧,٨) & (٤٢,٤&٣٧,٤) قوق في ربع متر مربع أثناء موسمي النمو ٢٠١٥/٢٠١٦ و ٢٠١٦/٢٠١٧ في مركزي ههيا وبلبيس علي التوالي في محافظه الشرقيه.