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Incidence of terrestrial snails and slugs associated with certain cultivated plants from different localities at Ismailia Governorate

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ABSTRACT

Incidence of terrestrial snails and slug was survey in five localities at Ismailia Governorate during 2021-2022. These localities were Ismailia city, Abo- Swear, El- Kassasen, Fayed and El-Tall El- Kabeer. Survey of land snails and slugs was conducted to study the definition and distribution of snails and slugs attacking different host plant trees, field crops and ornamental plants nurseries. Survey revealed that twelve species belonging to five families of Order Stylommatophora and Class Gastropoda. These families and species were *Massylaea (Eoboina) vermiculata, Theba pisana* (Helicidae); *Monacha obstructa, M. cartusiana, M. cantiana* (Hygromiidae); *Cochlicella barbara, C acuta, C. conoidea, Xeropicta krynickii* (Geomitridae); *Succinea Cleopatra, S. putris* (Succineidae); *Deroceras leave, D. reticulatum* (Limicidae). Results revealed that cultivated trees infested with nine species of snails. On the other hand; field crops infested with eleven species of snails. The Slug *D. leave* was found on strawberry and cabbage plants. Surveyed of terrestrial snails and slug on ornamental plant showed that eleven species were recorded from different plants. Both slugs *D. leave* and *D. reticulatum* were highly population on cultivated plants. *Massylaea vermiculata* was highly population on Gazania, Rozmary and Roses at El-Tall El Kabeer city.

Introduction

The Phylum Mollusca is probably the third most important animal group after the arthropods and vertebrates (South, 1992). The terrestrial mollusca including snails and slugs are destructive agricultural pest causing economic damage to wide variety of plants including horticulture, field crops and forestry. Damage caused by snails depends not only on their activity and population density, but also on their feeding habits, which differ from one species to another. Land snail feed on leaves, roots, tubers and ornamental plants (El-Okda, 1981). In addition, during movement snails causing undesirable small which prevents men and even animals from feeding on these contaminated plants (El-Okada,1984; Sallam et al., 2009). Land snail cause also a heavy damage to seed of oil plants and leaves of ornamental plants, as well as, citrus, peach, palm and vegetable *i.e*. cabbage, carrot and bean (El-Deeb et al., 1999; El-Okda,1979,1981; Ismail et al., 2003; Lokma, 2007; Shahawy et al., 2008). The great damage of land snails to many agricultural horticultural crops in Egypt has become increasing apparent and become one of the most important pests at different Governorate (Mohammed, 2015; Ismail, 1997; Rady et al., 2014). Economic damage is caused not only by terrestrial snails, but also by terrestrial slug, which are recorded as serious pest of agricultural crops and ornamental plants in multiple spots in Deltal River Region Governorate. They mainly inhabit more humid and shady places such as green houses and nurseries (Lokma 2007; Ali 2011; Rady et al., 2014; Abou Senna, 2016).

The present work was to throw light survey of terrestrial snails and slug infested some and command plants species attacking with snails in different host plant from different localities at Ismailia Governorate.

Materials and Methods

Ismailia is one of Suez Canal Governorates, situated in North-East of Egypt (30° 35`N and 32° 16` E). Total area is 5066 m2. An enquire lent of 0.48% of the total area of Egypt. Ismailia Governorate is divided to seven localities. Survey of snails and slug were carried out in five of them during year 2021-2022.These localities were Ismailia city(old and new university, El-Taqadme village); El-Tall El-Kabeer; Fayed (Sarabum); El-Kassaseen and Abo-Sweer). Survey of snails and slug were conduct to study the definition and distribution of terrestrial snail species and slug attacking different host plant from different localities. Terrestrial snail and slug were collected from various habitats, agricultural field crops (egyptian clover, beans, cabbage, lettuce, wheat and strawberry) ; cultivated tree (Mango and orange) and ornamental plant nurseries(gazania, rozmary, roses devils tongue and pothos). Also, snails were collected from irrigation canal around cultivated area.

Density terrestrial snail and slug survey accumulation as per tree for cultivated tree; by square 1mx1m for field crops and ornamental plant nurseries.

Samples of collected terrestrial snails and slug were transferred in muslin cloth bag to the laboratory for identification. Terrestrial snails were identified by their shell characteristics. Snails and slug have been identified based on conchological criteria with reference to: Godan,(1983); Reham F. and Ramdane, (2020); Reham F. and Robinson, (2020); Mohammed,(2015).

Results and Discussion

Results of incidence of terrestrial snails and slug infesting or assaulted fruit tree; field crop and ornamental plant nurseries at five localities in Ismailia Governorate during 2021-2022. This locality was Ismailia city, Abo- Swear, El- Kassasean, Fayed city and El-Tall El- Kabeer. The main observation that mango tree cultivated in most land at Ismailia Governorate. During autumn and spring season (September to May), farmers cultivated land with Egyptian clover, beans, wheat and strawberry plants under mango tree. During summer menthes (Joann to October) land snails found around soil tree and between calve of mango tree. Survey revealed that twelve species belonging to five family of order Stylommatophora class Gastropoda. These family and species were: *Massylaea (Eoboina) vermiculata, Theba pisana* (Helicidae); -*Monacha obstructa, M.cartusiana, M.cantiana* (Hygromiidae); *Cochlicella barbara, C.acuta, C.conoidea, Xeropicta krynickii* (Geomitridae); *Succinea Cleopatra, S. putris* (Succineidae); *Deroceras leave, D. reticulatum* (Limicidae).

Results in table (1) shown that, high infested with *M. vermiculata* was recorded at El Kasssean city. Also results shown that, *C. barbara* found in high infested mango trees and *S. cleopatra* in irrigation canal at Sarabum, Fayed city. Results shown also; *Monacha obstructa* (F.Hygromiiidae) found in high infestation around soil and in the calve of the tree after reaping field crops in most localities at Ismailia governorate. Results of incidence of terrestrial snails on cultivated tree was nine different species.

Results in table (2) shown that, incidence of terrestrial snails infested field crop lick e.g Egyptian clover, beans, wheat, strawberry plants and arrogation cana. Survey reveal that eleven species of terrestrial snails and slugs found in field crop in different localities at Ismailia Governorate, *Monach obstructa* (F. Hygromiidae) was collected in high infestation in all localities (more than 100 snails / 1m2) during the high season (Fabre to May).. On the other hand; Slug recorded by two species *Deroceras leave* and *D. reteculatum* found in cabbage and strawberry plant in Ismailia city; El-Kassasean and El-Tall El-Kabeer in moderate number. Also, *Cochilcella barbara and C. acuta* found in moderate number around arrogation canal. On the other hand; *Xeropicta krynickii*

(*Helicella vestalis*) was recorded in a little number in Egyptian clover at Abo- Swear locality. Other species of terrestrial snails was recorded in moderate or low infestation in most localities of study.

Results in table (3) shown that, survey of terrestrial snails and slug in ornamental plant showed that; eleven species were recorded from different plants at different localities at Ismailia governorate. Two species of slug were collected in moderate number under potted of pots in most of the nurseries in different regions under study. On the other hand; *Xeropicta krnickii* was found in high infestation around Devils tongue at Ismailia city. Other species of terrestrial snails found and collected in little number at different locates. Also, Gazania plant and Rozmary infested with *Massylaea vermiculata* in high number at El Tall El Kabeer city.

Results in table (4) shown that comparative study between different localities under study at Ismailia governorate. These comparative studies shown that; ornamental plant at Ismailia city recorded ten species of land snails with relative abundance 53% compeer with cultivated tree and field crop. On the other hand; field crop recorded high absolute species in Abo-Swear, Fayed and El-Tall El-Kabeer localities (Absolut species were 7, 5, and 6 with R.A. 64%, % 50% and 46% respectively). Results also in Table (4), shown that Ismailia city recorded high numbers of species (10 species) compeer with other localities; Relative species was 26% flowed by El Kassasean city (N.S. 9; R.S. 23%).

These results are in harmony with those reported by many investigators who surveyed land snails in different Governorates of Egypt. Mohammed (2015) in his survey of terrestrial species on different vegetation, vegetable, fruit and ornamental plant. Survey was done in some governorate e.g. Qalubis, Sharkia, Gharbia, Munyfia, Dakahlia, Dumyat and Ismailia. Survey of snails during two successive years 2013-2014 revealed that; ten land snails species belonging to five families. Helicidae (*Eobania vermiculata, Theba pisana*); Hygrommiidae, (*Helicella vestalis, Cochicella acuta, Monacha cartusiana, M. obstructa*); Succineidae, (*Succinea putris, S. oblonga*); Acchatinidae, (*Rumina decollate*) and Zonitidae, (*Oxychilus alliarius*).

Abou-Senna, et al. (2016); at Sharkia Governorate, found that most crops highly infested with *Monacha cartusiana* snails, while *Succinea putris* and *Deroceras leave* had moderately to low infestation. Rady, et al. (2014); when survey terrestrial five species were infesting some vegetable and field crops from February to May 2008and 2009 at Sharkia and Ismailia Governorate. These species were; *Monacha cartusiana; Cochlicelia acuta; Succinea putris; Deroceras leave* and *D. reticulatum.*

Gad, et al. (2019); found that, four species of land snails at Qalubia and Sharkia Governorate. These species were *Monavha cartusiana, Eobaina vermiculata, Succinea putris* and *Cochlicella acuta.* Reham Fathey and Ramdane (2020); Survey and taxonomic of terrestrial snail recorded in Egyptian

field, gardens and nurseries. Six species were recorded; *Succinea cleoptra* (Succineidae); *Cochlicella acuta, Xeropicta krynickii* (Geomitridae); *Massylaea vermiculata, Theba pisana* (Helicidae) and *Monacha obstructa* (Hygromiidae). *Deroceras reticulatum* and *D. leave* were first recorded on Egypt clover in Meniet El-Kamh and Zagazig districts, Sharkia Governorate Lokma, 2007).

As reported by Rady et al. (2014), *D.laeve* and *D. reticulatum* infest different crops in the governorates of Ismailia and Sharkia Governorate. Shetaia et al. (2009), Survey of certain land snails species infesting some vegetable and field crops as well as fruit trees were determined at some localities in Sharkia Governorate. Results revealed that the glassy clover snail *Moncha cartusiana* and *Succinea putris* were recorded. The majority of the examined crops were found with heavy infestation with *M. cartusiana* snail while *S. putris* were recorded with moderate or light infestation

Table (1) Incidence of terrestrial snails associated with certain cultivated tree plants from different localities at Ismailia Governorate.

Family Species	Localities/ host plant- site /density				
	Ismailia city	Abo- Swear	El- Kassasean	Fayed city	El-Tall El- Kabeer
Helicidae					
Massylaea(Eoboina) vermiculata	+ (mango)	+ (mango)	+++(mango & orange)	++(mango)	+(mango)
Theba pisana	+ (mango)				
Hygromiidae					
Monacha obstructa	<+++(mango)		++(mango)		+(mango)
M.cartusiana	++(mango)				>+(mango)
Geomitridae					
Cochlicella barbara		+(mango)	+(mango)	+++(mango)	
C.acuta		++ (in canal)			
C.conoidea			++ (in canal)		
Xeropicta krynickii		> +(mango)		> +(mango)	
Succineidae					
Succinea cleopatra			+++ (in canal)		

(> +) low infestation rate >5 (+) 1-5 (++) 6-10 (+++) 11-15 (< +++) < 15 Snails / per tree or 1x1m. for crop field or ornamental plant nurseries (9 species)

Table (2): Incidence of terrestrial snails associated with certain field crop plants from different localities at Ismailia Governorate.

Family / Species	Localities/ host plant- site /density				
	Ismailia city	Abo- Swear	El- Kassasean	Fayed city	El-Tall El- Kabeer
Helicidae					
Massylaea(Eoboina) vermiculata	+ (cabbage &Lettuce)	+ (cabbage)	+ (cabbage)	+(cabbage)	+(cabbage & Lettuce)
Theba pisana	>+(cabbage)	>+(cabbage)			>+(cabbage)
Hygromiidae					
Monacha obstructa	+++(Egyptian clover	+++(Egyptian clover)	+++(Egyptian clover& bean)	++(Egyptian &clover)	++(Egyptian & clover)
M.cartusiana		>+(Egyptian clover)	>+(Egyptian clover)		
-*M.cantiana*	>+(Egyptian clover)			>+(Egyptian clover)	
Geomitridae					
Cochlicella Barbara		+ in canal			
C.acuta			+++(Egyptian clover, bean& canal)	>+(Egyptian clover)	>+(Egyptian clover)
Xeropicta krynickii		>+(Egyptian clover)			
Succineidae					
-*Succinea cleopatra*			++(in canal)	++(in canal)	
Limicidae					
Deroceras leave	++strawberry		+ cabbage		+ cabbage >+strawberry
D. reticulatum	>+strawberry	>+strawberry			

(> +) low infestation rate > 5 (+) 1-5 (++) 6-10 (+++) 11-15 (< +++) < 15 Snails / per tree or 1x1m. for field crop or oroantral plant nurseries (11species)

Table (3) Incidence of terrestrial snails associated with certain ornamental plant nurseries from different localities at Ismailia Governorate.

Family / Species	Localities/ host plant- site /density				
	Ismailia city	Abo- Swear	El- Kassasean	Fayed city	El-Tall El- Kabeer
Helicidae					
Massylaea(Eoboina) vermiculata	++ gazania	+ gazania			+++ (gazania & Rozmary & Roses)
Theba pisana	> + Roses		> + gazania	> + gazania	
Hygromiidae					
Monacha obstructa	+ Gazania				+ Gazania & ++ Rozmary
M.cartusiana	> + Gazania		> + Gazania		
M.cantiana	> + Gazania				
Geomitridae					
Cochlicella barbara	> + (Devil's tongue)		> + (Devil's tongue)		>+ (Devil's tongue)
C.acuta	> + (Devil's tongue)		> + (Devil's tongue)		
Xeropicta krynickii	+++ (Devil's tongue)				
Succineidae					
Succinea cleopatra					

		+ in canal	++ in canal
Limicidae			
Deroceras leave	++ Pothos	++ Pothos	++ Pothos
D. reticulatum	++ Pothos	++ Pothos	

(> +) low infestation rate >5 (+) 1-5 (++) 6-10 (+++) 11-15 (< +++) < 15 Snails / per tree or 1x1m. for crop field or oroantral plant nurseries (11 species)

Table (4): Comparative study of absolute and Relative abundance of terrestrial snails and slug species collected from different localities at Ismailia Governorate during 2021-2022

Number of species and Relative abundance of snails species in different localities										
	Ismailia city		Abo- Swear		El- Kassasean		Fayed city		El-Tall El- Kabeer	
	A.S	R.A.	A.S	R.A.	A.S	R.A.	A.S	R.A.	A.S	R.A.
Cultivated trees	4	21%	3	27%	5	28%	3	30%	3	23%
Field crops	5	26%	7	64%	6	33%	5	50%	6	46%
Ornamental plants	10	53%	1	9%	7	39%	2	20%	4	31%
Total collected species	19		11		18		10		13	
Number species (N.S)	10		7		9		7		6	
Relative species (R.S)	26%		17%		23%		17%		15%	

(A.S): Absolut species; total number species in different plant
(R.A): Relative abundance; Number species / Total collected species in localities
(N.S): Number species; Total species in different plant.
(R.S.): Relative species; Total species in different plant/ Total species from all localities under studies

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