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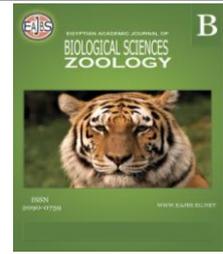


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## Field and Laboratory Studies on some Land Snails in the Southern Part of Port Saied Governorate

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### ABSTRACT

A survey study was carried out in two agricultural locations, El-Radwan Village and El-Asher Village, located at the Southern Part of Port Saied Governorate, during 2014/ 2015 and 2015 /2016. Major Field crops grown were Egyptian clover (*Trifolium alexandrinum*), Wheat (*Triticum vulgare*), and Sugar beet (*Beta vulgaris*). The obtained data revealed that land snails: *Monacha cantiana*, *Monacha cartusiana*, and *Succinea putris* species, were observed on these field crops. Results also indicated that Egyptian clover was the most preferred crop for the different stages of the mentioned land snails. The highest number of individual land snails was found on Egyptian clover followed by Sugar beet and wheat. In addition, the counted snails on the sugar beet field increased when planted nearby wheat. Therefore, suitable agriculture rotations, which avoid planting the investigated crops side-by-side, should be implemented, in order to lower the infestation of these land snail pests.

Land snails egg-laying study, during the four successive seasons of 2016/2017, under laboratory condition, the study revealed that the highest number of Eggs, for *M. cantiana* and *M. cartusiana*, occurred during autumn months, followed by spring then summer. While for *S. putris* the highest numbers of eggs were during spring and autumn, followed by winter and summer months, respectively.

### INTRODUCTION

In recent years, land snails and slugs exhibited serious danger as agricultural pests for the major field, vegetable and fruit crops in Egypt, they were found in high numbers causing great damage especially to Egyptian clover, Wheat, Maize, Potato and Cotton, many studies were conducted on the population fluctuation, activity and control of these pests, Godan (1983). Shalabby *et al.*, (2007), studied the biology, ecology and control of these agricultural pests on field crops such as clover, Wheat and ornamental plants. These pests increased in wet and damp soils especially in the northern part of the Delta, such as Dumyat, Port Saied and other Nile-Delta Governorates. Awad *et al.*, (2012). stated that low temperature and high relative humidity were effective factors to land snail and slug populations. These factors also affect their movement, activities, egg-laying, and egg-clutch size and egg numbers in each clutch, Ali, (2015).

Awad *et al.*, (2012) studied the population dynamics during which pest land snails

were attacking field crops, Vegetable crops and Fruit trees, causing serious economic damages. The damage was not only in quantity but also in the quality of Fruits such as Lemon, Orange, Apple, Peach, Guava and Pears. The damage occurs by scraping the cortex layer of these fruits, which encourages bacterial and fungal diseases resulting in rejection of export. Land snails and Slugs cause damage to plant seeds, seedlings, underground tubers, leaves and fruits. Damage to seedlings often results in the death of the plant, which causes major losses.

Prockow *et al.*, (2012) Stated that differences in population dynamics of Land snails in sub-montage, lowly and area of Poland. Also, the perception of climate and environmental changes on the performance and availability of the edible Land snails were researched by Giokas *et al.*, (2007) and Woogeng *et al.*, (2013).

The present study aims to concentrate on two points; the first one was the survey and population density of the land snails species on the planted field with each of Egyptian clover, wheat and sugar beet crop during four successive seasons of 2014/2015 and 2015/2016 in the Southern Part of Port Saied Governorate. The second one was an egg study (egg-laying and hatching) of some land snails species under laboratory conditions during the four successive seasons of 2016/2017.

## MATERIALS AND METHODS

The present work was carried out in two locations; El Radwan and El-Asher Villages, the Southern Part at Port Saied Governorate. Survey and population density of Land snails were recorded on Egyptian clover (*Trifolium alexandrinum*), Sugar beet (*Beta vulgaris*) and Wheat (*Triticum vulgare*), during four seasons of 2014/2015 and 2015/2016.

Three Fadden's from each crop were chosen for random samples and Five replicates of quadrat sample size (1m<sup>2</sup>) from each crop were randomly chosen, then left far from any pesticide contamination Asran (2001). All species of Land snails found within each quadrat (at the soil surface, stems and leaves) were recorded, counted in the field and sorted according to their species. The sampling was collected during the morning in the absence of rain and sunrise Baker *et al.*, (1991). Snails were collected monthly during the seasons from the two locations Eshra, (2013). The Snails were classified according to Godan's Key of Identification for Central European Pest Gastropods, (1983). Eggs laying under laboratory conditions were done by collecting adult snail individuals, of *M. cantiana*, *M. cartusiana* and *S. putris*, from the chosen field crops. Then transferred and kept, for six months, under laboratory conditions. The collected Land snails from two tested villages transferred to the laboratory and reared for six months on cabbage and lettuce leaves in wire cages and daily measure of temperature and relatives humidity. Ten individuals of each species were used in this experiment by using five replicates for each species (two individuals in each replicate) during four successive seasons 2016/2017. Egg clutches were counted and also egg numbers hatched from each clutches.

## RESULTS AND DISCUSSION

Land snails species were surveyed in two locations: El Radwan and El-Asher Villages, in the Southern Part at Port Saied Governorate. Continuous observation of Egyptian clover, Wheat, and Sugar beet crops was conducted precisely to determine the highest occurrence of Land snail species. Tables 1 & 2 showed that *Monacha cantiana* (Montagu, 1803), *Monacha cartusiana* (Müller, 1774) and *Succinea putris* (Linnaeus, 1758) species were recorded in all tested fields. The surveyed Land snails species could be classified according to the full description of Godan, (1983).

**1. Effect of Host Preference on The Population Density of Land Snail Species:**

The recorded data in table (1) showed mean numbers of counted individuals of Land snails *M. cantiana*, *M. cartusiana* and *S. putris* on Egyptian clover compared with wheat and sugar beet crops in two villages, during 2014/2015. Egyptian clover had the highest number of Land snails, 182.8 individuals, 149.0 individuals and 117.0 individuals at El-Radwan village, followed by sugar beet, 173.6 individuals, 147.8 individuals, 127.2 individuals and 111.0 individuals then wheat crop which recorded had 159.4 individuals, 153.4 individuals and 113.4 individuals during autumn, spring and winter, respectively. Whereas for El-Asher village, mean numbers were; of the Land, snails were 189.4 individuals, 155.0 individuals and 123.4 individuals on Egyptian clover. Followed by sugar beet, 193.4 individuals, 135.6 individuals, 125.0 individuals and 119.4 individuals. Then wheat, 152.0 individuals, 141.2 individuals and 137.0 individuals through spring, autumn and winter seasons, respectively.

**Table 1:** Survey and population density of Land snails, and Egg laying under field conditions at Port Saied Governorate during four successive seasons of 2014/2015.

Season	Snail species	El-Radwan Village									El-Asher Village									Climatic factors	
		E. clover			Wheat			Sugar beet			E. clover			wheat			Sugar beet			°C	RH
		No.	Egg Clut.	Egg No.	No.	Egg Clut.	Egg No.	No.	Egg Clut.	Egg No.	No.	Egg Clut.	Egg No.	No.	Egg Clut.	Egg No.	No.	Egg Clut.	Egg No.		
Spring	<i>M. cantiana</i>	48.2	2.8	60.2	44.4	2.6	60.4	48.8	2.8	62.4	52.4	3.2	72.4	40.6	2.8	68.8	56.4	3.4	80.4	30.4	74.2
	<i>M. cartusiana</i>	86.4	3.6	68.4	46.8	3.4	58.2	56.4	3.2	68.4	64.6	4.4	80.2	42.8	2.8	68.6	63.6	3.8	82.8	30.8	74.2
	<i>S. putris</i>	48.2	5.4	120.2	62.2	4.8	88.4	68.4	4.8	86.2	72.4	6.8	110.4	68.6	4.6	88.4	73.4	5.2	110.6	30.6	74.0
	Means	182.8	11.8	248.8	153.4	10.8	207.0	173.6	10.8	217.0	189.4	14.4	263.0	152.0	10.2	225.8	193.4	12.4	273.8		
	L.S.D.	6.6	4.2	4.2	6.2	3.8	3.8	6.8	4.4	4.4	6.6	4.2	4.2	4.8	2.8	2.8	6.8	4.2	4.2		
Summer	<i>M. cantiana</i>	-	-	-	-	-	-	42.6	2.6	48.4	-	-	-	-	-	44.8	2.6	52.2	32.4	68.2	
	<i>M. cartusiana</i>	-	-	-	-	-	-	36.4	2.4	46.2	-	-	-	-	-	38.2	2.6	54.2	32.4	68.2	
	<i>S. putris</i>	-	-	-	-	-	-	48.2	3.8	64.6	-	-	-	-	-	52.6	4.0	82.2	33.6	72.4	
	Means	-	-	-	-	-	-	127.2	8.8	159.2	-	-	-	-	-	135.6	9.2	188.6			
	L.S.D.	-	-	-	-	-	-	4.8	2.2	2.2	-	-	-	-	-	4.8	2.4	2.4			
Autumn	<i>M. cantiana</i>	46.4	2.6	58.8	42.2	2.6	52.4	42.4	2.8	58.2	48.4	2.8	62.4	40.2	2.6	60.2	36.2	2.2	48.2	22.6	66.4
	<i>M. cartusiana</i>	44.2	2.4	52.4	40.8	2.4	50.4	42.2	2.6	56.4	46.2	2.6	58.2	38.6	1.4	40.8	38.4	2.6	44.6	22.4	66.4
	<i>S. putris</i>	58.4	4.8	80.2	56.4	4.8	82.4	63.2	4.8	88.2	60.4	4.2	86.4	62.4	4.0	78.4	44.8	3.2	62.4	22.6	66.4
	Means	149.0	9.8	191.4	139.4	9.8	185.2	147.8	10.2	202.8	155.0	9.6	207.0	141.2	8.0	179.4	119.4	8.0	155.2		
	L.S.D.	4.8	2.8	2.8	4.8	2.4	2.4	4.2	2.6	2.6	4.6	2.4	4.6	2.2	2.2	3.8	2.0	2.0			
Winter	<i>M. cantiana</i>	36.4	1.8	28.4	40.4	2.0	40.2	32.4	2.2	48.4	38.2	2.0	48.6	36.2	2.0	40.4	32.2	2.0	46.2	18.4	68.2
	<i>M. cartusiana</i>	38.2	2.0	32.4	42.4	2.2	42.4	34.2	2.4	50.2	40.4	2.2	54.2	38.4	2.2	42.6	34.2	2.4	48.4	18.2	68.4
	<i>S. putris</i>	42.4	2.8	64.4	48.6	4.6	68.6	44.4	4.2	88.4	44.8	3.6	68.8	62.4	4.2	68.4	58.6	4.2	70.4	18.4	65.4
	Means	117.0	6.6	125.2	131.4	8.8	151.2	111.0	8.8	187.0	123.4	7.8	171.6	137.0	8.4	151.4	125.0	8.6	165.0		
	L.S.D.	4.0	2.0	2.0	4.2	2.2	2.2	3.6	2.2	2.2	3.8	2.0	2.0	4.4	2.2	2.2	4.2	2.4	2.4		

No. =number of individuals Egg Clut. =Number of Egg Clutches Egg No. =Number of Egg of all Clutches

The Survey data of Land snails in table (2) at El-Radwan village was similar to the previous crop. The recorded number of land snails on Egyptian clover were 209.2 individuals, 179.6 individuals and 145.0 individuals through spring, autumn and winter seasons of 2015/2016, respectively, followed by sugar beet 177.0 individuals, 157.8 individuals, 146.9 individuals and 145.4 individuals through spring, summer, winter and autumn, respectively, followed by wheat 175.0 individuals in autumn while the same number 155.4 individuals and 155.0 individuals through spring and winter seasons, respectively. At El-Asher village, Egyptian clover recorded 225.6 individuals, 157.8 individuals and 122.8 individuals through spring, autumn and winter, respectively, followed by sugar beet which recorded 205.2 individuals, 169.6 individuals, 165.6 individuals and 119.6 individuals through autumn, spring, winter and summer respectively while wheat crop recorded 173.0 individuals, 163.4 individuals and 103.4 individuals respectively.

**2. Egg Laying Under Field Conditions:**

Data obtained show that Tables 1 and 2 contain the means of egg clutches and egg numbers for studied Land snails. Egg clutches and egg numbers collected from Egyptian

clover which snail were 11.8 clutches and 248.8 eggs, 9.8 clutches and 191.4 eggs and 6.6 clutches and 125.2 eggs during spring, autumn and winter seasons of (2014/2015) years, respectively. This was followed by sugar beet 10.8 clutches and 217.0 eggs, 10.2 clutches and 202.8 eggs, 8.8 clutches and 187.2 eggs and 8.8 clutches and 159.2 eggs, during spring, autumn, summer and winter of (2015/2016), respectively. Followed by wheat crop with 10.2 clutches and 225.8 eggs and 9.8 clutches and 185.4 eggs and 8.4 clutches and 151.4 eggs and 8.0 clutches and 179.4 eggs respectively.

Followed Egyptian clover which recorded (14.4 clutches and 301.0 eggs),(13.2 clutches and 269.0 eggs) and (7.8 clutches and 169.0 eggs) during spring, autumn and winter respectively followed by wheat (10.2 clutches and 207.2 eggs), (13.4 clutches and 279.2 eggs) and (8.4 clutches and 151.8 eggs) then sugar beet which had high mean number only in summer (13.2 clutches and 249.0 eggs) and winter (12.2 clutches and 217.2 eggs), during spring, autumn, summer and winter of (2014/2015) respectively.

**Table 2:** Survey and population density of Land snails, and Egg laying under field conditions at Port Saied Governorate during four successive seasons of 2015/2016.

season	Snail species	El-Radwan Village									El-Asher Village									Climatic Factors	
		E. clover			wheat			Sugar beet			E. clover			wheat			Sugar beet			°C	RH
		No.	Egg Clut.	Egg No.	No.	Egg Clut.	Egg No.	No.	Egg Clut.	Egg No.	No.	Egg Clut.	Egg No.	No.	Egg Clut.	Egg No.	No.	Egg Clut.	Egg No.		
Spring	<i>M. cantiana</i>	60.4	4.2	80.4	44.8	2.6	42.4	52.4	2.8	44.8	68.6	4.8	88.6	42.4	3.2	62.4	64.2	4.0	82.2	28.4	64.4
	<i>M. cartusiana</i>	68.6	3.8	100.2	48.2	3.8	84.6	56.2	4.2	88.2	70.6	4.2	112.4	52.6	4.4	80.6	68.4	3.8	68.4	28.6	64.8
	<i>S. putris</i>	80.2	6.4	120.4	62.4	4.8	80.2	68.4	3.8	80.4	86.4	6.8	128.6	68.4	5.2	102.6	72.6	6.2	120.6	28.2	64.4
	Means	209.2	14.4	301.0	155.4	11.2	207.2	177.0	10.8	213.4	225.6	15.8	329.6	163.4	12.8	245.6	205.2	14.0	271.2		
	L.S.D.	6.6	4.2	4.2	6.2	3.8	3.8	6.8	4.4	4.4	6.4	4.2	4.2	4.8	2.8	6.8	4.2	4.2			
Summer	<i>M. cantiana</i>	-	-	-	-	-	46.8	3.8	78.4	-	-	-	-	-	-	48.4	3.2	68.8	32.6	68.6	
	<i>M. cartusiana</i>	-	-	-	-	-	48.4	4.6	84.2	-	-	-	-	-	-	52.4	4.0	82.2	32.4	68.2	
	<i>S. putris</i>	-	-	-	-	-	62.6	4.8	86.4	-	-	-	-	-	-	64.8	4.8	106.4	32.8	68.6	
	Means	-	-	-	-	-	157.8	13.2	249.0	-	-	-	-	-	-	165.6	12.0	257.4			
	L.S.D.	-	-	-	-	-	4.8	2.4	2.4	-	-	-	-	-	-	4.8	2.4	2.4			
Autumn	<i>M. cantiana</i>	54.6	4.8	82.4	56.4	4.2	88.6	44.6	3.8	70.4	46.8	3.8	72.6	54.2	3.8	64.6	42.4	3.0	82.4	28.1	74.2
	<i>M. cartusiana</i>	60.2	3.6	98.2	58.2	3.8	80.4	48.4	3.6	68.6	48.4	3.0	66.4	60.4	3.2	60.4	64.8	4.2	84.8	28.2	74.2
	<i>S. putris</i>	64.8	4.8	88.4	60.4	5.4	110.2	52.4	3.8	72.4	62.6	4.2	88.6	58.4	4.8	82.4	62.4	4.8	88.6	28.2	74.4
	Means	179.6	13.2	269.0	175.0	13.4	279.2	145.4	11.2	211.4	157.8	11.0	227.6	173.0	11.8	207.4	169.6	12.0	255.8		
	L.S.D.	4.8	2.8	2.8	4.8	2.4	2.4	4.2	2.6	2.6	4.6	2.4	2.4	4.6	2.2	2.2	3.8	2.0	2.0		
Winter	<i>M. cantiana</i>	38.4	2.0	38.4	40.4	2.4	40.6	38.4	2.8	60.2	40.2	2.6	44.8	32.4	2.8	48.4	40.2	3.4	66.4	18.6	68.8
	<i>M. cartusiana</i>	48.4	2.2	46.4	46.2	2.8	44.8	48.2	3.6	68.4	42.4	3.4	60.2	30.2	2.6	42.8	38.6	2.8	58.2	18.4	68.6
	<i>S. putris</i>	58.2	3.6	84.2	68.4	3.2	66.4	60.3	5.8	88.6	40.2	4.2	58.4	40.8	3.8	58.6	40.8	4.0	80.4	18.2	68.8
	Means	145.0	7.8	169.0	155.0	8.4	151.8	146.9	12.2	217.2	122.8	10.2	163.4	103.4	9.2	149.8	119.6	10.2	205.0		
	L.S.D.	4.0	2.0	2.0	4.2	2.2	2.2	3.6	2.2	2.2	3.8	2.0	2.0	4.4	2.2	2.2	4.2	2.4	2.4		

No. =number of individuals Egg Clut. =Number of Egg Clutches Egg No. =Number of Egg of all Clutches

According to obtained data of egg clutches and egg number through seasons of 2014/2015 and 2015/2016. Egyptian clover recorded the highest number of egg clutches and egg numbers (14.4 clutches and 263.0 eggs) in spring season followed by (9.6 clutches and 207.0 eggs) during autumn, while recorded (12.4 clutches and 273.8 eggs) on sugar beet through 2014/2015 less than seasons of 2015/2016 which recorded (15.8 clutches and 329.6 eggs) on Egyptian clover followed by (14.4 clutches and 271.2 eggs) on sugar beet through spring season followed by wheat which recorded (12.8 clutches and 245.6 eggs) in the spring season. From the mentioned data in tables (1 and 2), it could be concluded that the highest host preference was Egyptian clover followed by sugar beet and wheat crops as a result of population number of surveyed Land snails in addition to egg clutches and egg number.

### 3. Egg Laying Under Laboratory Conditions:

According to data in table (3), the mean of egg clutches of *S. putris* under laboratory Conditions recorded 1.8 clutches, 1.8 clutches in spring and autumn while recorded 0.8 clutches and 1.2 clutches in summer and winter respectively. Egg mean numbers for this Land snails recorded the same 32.4 eggs and 32.4 eggs in spring and autumn while in

summer season was 0.8 clutches and 18.2 eggs and in winter was 22.8, eggs. On the other hand, egg numbers differed from species to another *S. putris* recorded high number followed by *M. cantiana* which recorded 1.4 and 1.6 egg clutches in spring and autumn season, respectively. While 0.8 egg clutches and 0.6 egg clutches which recorded in the summer and winter season. Also mean egg number for *M. cantiana* was recorded 28.2 eggs, 30.2 eggs, 16.6 eggs and 12.4 eggs during spring, autumn, summer and winter seasons, respectively. *M. cartusiana* recorded 1.4 clutches, 1.2 clutches and 0.6 egg clutches in autumn, spring, summer and winter seasons respectively and 28.4 eggs, 22.4 eggs, 12.4 eggs and 12.2 egg numbers as a mean in autumn, spring, summer and winter respectively.

Table 3: Egg-laying of Land snails under Laboratory conditions during the four successive seasons of 2016/2017.

Land Snails species		Egg laying of Land snails during seasons											
		Spring			Summer			Autumn			Winter		
		No.	Egg clutches	Egg No.	No.	Egg clutches	Egg No.	No.	Egg clutches	Egg No.	No.	Egg clutches	Egg No.
<i>M. cantiana</i>		10	1.4	28.2	10	0.8	16.6	10	1.6	30.2	10	0.6	12.4
<i>M. cartusiana</i>		10	1.2	22.4	10	0.6	12.4	10	1.4	28.2	10	0.6	12.2
<i>S. putris</i>		10	1.8	32.4	10	0.8	18.2	10	1.8	32.4	10	1.2	22.8
Climatic Factors	°C	25			25			25			25		
	RH	68			68			68			68		

10 individuals=5 replicates×2 individuals on each replicate

The highest host preference was to Egyptian clover, followed by Sugar beet, then Wheat crop which during the successive seasons mentioned before. The farmer results proved that the number of clutches and Eggs varied according to the preferred host. The highest mean number of clutches and Eggs of the same tested Land snails were recorded on Egyptian clover, followed by Sugar beet, then by Wheat crop in the two Villages. Statistical analysis showed significant differences between the data reported during the four seasons for the three Land snails on Egyptian clover, Sugar beet and Wheat crops. The abovementioned results agree with the previous investigation:

Shalabby *et al.*, (2007), found that the population density of *Monacha cantiana* Snails on Sugar beet in three dates of the plantation was slight at the beginning of the season then the population increased gradually until reached maximum numbers in the end of seasons.

Mahmoud and Awad (2008), reported that the lowest population densities were recorded in October, November and December on clover, Wheat, Lettuce, Cabbage and Potato, while the population of the Snail and Slug species increased gradually in January, February and March. Also, the damage caused by both Snails and Slugs in Cabbage, Lettuce, Clover and Wheat was stronger after three months from the date of the plantation, than that in the second month. The damage was at its lowest in the first month.

Awad, *et al.*, (2012) showed that the highest population densities of Snails *Monacha cartusiana* and *Succinea putris* were recorded on the soil around plants, followed by the Branch and Leaves, while the two Slugs *Deroceras reticulatum* and *Limax maximus* were and Wheat. The population of both Snails and Slugs was larger in the case of Egyptian clover than in Sweet Potato and Wheat.

Abd El-Wahed, (2014) reported that the majority of the examined crops were found with heavy infestation especially Egyptian clover, Pea, Lettuce, Cabbage and Sugar beet. Samy, *et al.*, (2015) found that population densities of *Monacha cantiana* and *Monacha*

*cartusiana* differed according to the host plant and locality. Population densities of *Monacha* spp. were lower in Onion plantation than those of Lettuce and Cabbage plantation. The highest population densities were recorded in March and April at El- Riad and Sidi- Salem Part at Kafr El-Sheikh Governorate.

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### ARABIC SUMMARY

دراسات حقلية ومعملية على بعض القواقع الأرضية بجنوب محافظة بورسعيد

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أجريت هذه الدراسة فى قرى الرضوان والعاشر بجنوب محافظة بورسعيد، حيث تم حصر أنواع القواقع الأرضية بالقرينتين ومقارنة تعداد القواقع الأرضية واعداد البيض فى محاصيل البرسيم المصرى والقمح وبنجر السكر ، فى اربع مواسم (الربيع والصيف والخريف والشتاء) عامي 2014 و 2015 و عامي 2015 و 2016. تم حصر ثلاث أنواع من القواقع الأرضية فى قرى البحث وهم:

*Monaca cartusiana*, *Monaca cantina*, and *Succinic putris*

على محاصيل البرسيم المصرى و القمح و بنجر السكر من خلال تعداد القواقع الأرضية على المحاصيل السابقة فى القرينتين وتعداد الكثافة العددية للقواقع الثلاث باختلاف أعمارها التى وجدت فى محصول البرسيم المصرى مقارنة بمحصولي القمح وبنجر السكر ، فسجلت كثافة عدديه أقل فى التعداد للقواقع الثلاث فى محصول القمح مقارنة بمحصول البرسيم المصرى حيث كانت القواقع أقل تواجدا فى محصول البرسيم المصرى عن محصول بنجر السكر. ومع ذلك أوضحت النتائج أن أعداد القواقع الأرضية كانت كبيره فى محصول بنجر السكر مقارنة بمحصول القمح فى موسم الربيع ، مما يوضح إن القواقع كانت أكثر كثافة فى حقول بنجر السكر عن حقول البرسيم المصرى وحقول القمح فى الاراضي الزراعيه بالقرينتين.

نستخلص من ذلك أن محصول بنجر السكر يكون اكثر تعدادا للقواقع الأرضية مقارنة بمحصول البرسيم المصرى نظرا لتواجد بنجر السكر بكثافة عالية ولا تتعرض القواقع الأرضية للتناقص كما هو واضح فى البرسيم المصرى نتيجة الحشوات المتتالية للبرسيم، أما محصول القمح فنظرا لنقص الرطوبة الأرضية عن البرسيم المصرى وبنجر السكر لذلك نوصى باتباع برنامج مكافحة زراعيه عند زراعة محصول بنجر السكر لكي لا تكون إصابة فى محصول البرسيم المصرى ومحصول القمح وخصوصا اذا زرع مجاورا لبنجر السكر ، وأيضا عدم زراعة محصول بنجر السكر بجوار محصول البرسيم المصرى ومحصول القمح ولأن القواقع الأرضية تتجه مباشرة الى النبات المفضل لها فى موسم الربيع و أوضحت النتائج أن أعداد القواقع الأرضية كانت كبيره فى محصول بنجر السكر فقط فى موسم الصيف تسبب له خسارة فادحة نظرا لغياب البرسيم المصرى والقمح.

تحت الظروف المعملية، تمت التجربة خلال اربعة مواسم عامي 2016/2017 لفحص فقس البيض للقواقع الارضية بالقرينتين وسجلت اعداد البيض ارتفاعا فى الخريف والربيع للقواقع الثلاث يليها الشتاء ثم الصيف.