

MONITORING THE CHANGES IN THE POPULATION ACTIVITY OF *MONACHA OBSTRUCTA* IN APPLE ORCHARDS AND EGYPTIAN CLOVER FIELDS IN GIZA GOVERNORATE

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Abstract

The clover land snail, *Monacha obstructa* (Ferussae), is a destructive pest to field vegetable and ornamental crops as well as some fruit orchards. Monitoring studies were carried out in an apple orchard interplanted with Egyptian clover at El-Saff, Giza Governorate, during two successive years from October, 1997 to September, 1999. *M. obstructa* was found on apple trees all the year round with peaks during June/July to September, 1998 and 1999. The maximum abundance took place during summer (54%) followed by spring (26%), while they were 15 % and 5 % during autumn and winter, respectively. *M. obstructa* attacked the Egyptian clover fields from October and increased during the following months to reach maximum at the end of the season in May of the next year. The two highest seasonal activities were achieved during winter (46%) and spring (43%) seasons.

Accordingly, it is preferred not to interplant apple orchards with Egyptian clover since the later is a preferable host to *M. obstructa*.

INTRODUCTION

The Egyptian clover, *Trifolium alexandrinum* L. is the main foliage crop for farm animals in Egypt during autumn, winter and early spring. The plant covers a widespread areas alone or interplanted with fruit orchards as apple.

The clover snail, *Monacha obstructa* (Ferussae), severely attacks clover plants. Numerous mucus trails produced by the snails appeared on the plant foliage causing an unacceptable odour to cattle (kassab and Daoud, 1964). *M. obstructa* attacks also vegetables, field crops, ornamental nurseries as well as mango and citrus orchards. El-Okda.(1980) stated that it has one generation per year and El- okda et al.(1989) also recorded *M. obstructa* severe infestation from May to November on fences, while inhabits the inner plantations from December to April. He added that the highest population was found all the year round especially in neglected fields, orchards and inside plants.

On the other hands, kady et al. (1983) stated that *M. obstructa* began the increase in the Egyptian clover fields from late March to mid-April.

The aim of the present study is to monitor changes in the seasonal activity of the Egyptian clover snail, *M. obstructa*, in apple orchards interplanted with Egyptian clover. This study helps in planning a successful control program.

MATERIAL AND METHODS

For the field trials, an apple orchard (10 feddans and 12 years old) interplanted with Egyptian clover located at El- Wedi district, El Saff, Giza Governorate was selected for monitoring the changes in the population density of the land snail, *M. obstructa* during two successive seasons; October, 1997 to September, 1999. Monitoring was carried out twice a month. Ten random samples were picked up from apple trees (each represents one replicate) and one m² area of Egyptian clover was randomly replicated 10 times . The snails were picked up in the early morning then released again under the trees after counting.

Numbers of snails per each apple tree (from October to September) and per 1m² Egyptian clover (from October to May) were recorded for each month and then each season . The separate effects of the mean temperature and relative humidity on the land snails of apple trees and Egyptian clover plants were taken into consideration (Snedecor and Cochran, 1990). Data per feddan were accumulated such that the feddan of apple orchard harbour 260 trees (4x4 between trees) and assumed that a feddan of clover equal 4000 m² (200 m² were subtracted as irrigation canals and roads).

RESULTS AND DISCUSSION

Table 1 and Figure 1 indicated that *M. obstructa* existed all the year round on apple trees (from October to September), but from October to May in the Egyptian clover fields

A. In Apple Orchards: As seen in Table 1 minimum snail activities of *M. obstructa* on apple trees were noticed during December, January and February 1997 / 1998 (6.2, 1.5 and 7.3 individuals, respectively, in the first season, and 8.5, 0.0 and 11.6 individuals, respectively, in the second season, 1998/1999). The maximum activities

were noticed during September, August and July of the first season (151.5, 139.2 and 136.8 individuals, on apple trees, respectively) and during July, September, August and June of the second season (182.6, 173.5, 159.2 and 147.1 individuals, respectively).

The mean seasonal data on apple trees resulted in 171.7-142.5, 84.9-57.3, 44.9-43.5 and 16.8-11.5 individuals during summer, spring, autumn and winter months, respectively. The mean percentages of individual activities during the respective periods were as follows: - the summer season showed the highest number of snails on apple trees (53.8 individuals and 53.9%), followed by spring (25.4 individuals and 26.7%) and autumn (16.4 individuals and 14.1%) then the least number was noticed during the winter season (5.3 individuals and 4.3%) in the first (1997/1998) and second (1998/1999) season, respectively.

The direct effect of the mean temperature on the mean number of snails was significantly positive during summer and spring seasons ($r = +0.9343$ and $+0.9496$, respectively). However it was insignificantly positive during autumn and winter ($r = +0.4532$ and $+0.4321$, respectively).

The effect of relative humidity was insignificantly negative ($r = -0.4669$ and -0.4046) during summer and spring, respectively, but insignificantly positive during autumn and winter ($r = +0.4731$ and $+0.4501$, respectively).

B. In Egyptian Clover Fields: Data in Table 1 showed that the population density of the snail, *M. Obstructa*, increased ascendingly from the early date of plantation in October, until the last date of harvesting in May. The ascending numbers were 5.2 & 6.3, 33.1 & 45.1, 97.3 & 125.3, 178.5 & 180.1, 225.3 & 239.0, 265.2 & 287.0, 293.6 & 301.4 and 335.2 & 347.0 individuals during October, November, December, January, February, March, April and May of the two seasons (1997/1998 and 1998/1999), respectively. Data in Table 1 indicated that the highest seasonal activity was during winter (223.0 & 235.5 individuals/m²), then spring (209.6-216.2 individuals/m²) and lastly autumn (49.2-54.9 individuals/m²). The percentages of individual activities during autumn, winter and spring were 11.46% and 43%, respectively.

The direct effect of the mean temperature on the mean number of snails was negative and significant during the winter of the first period ($r = -0.6791$) and insignifi-

cant during spring and autumn ($r=-0.0728$ and $+0.4713$, respectively). The effect of the mean relative humidity was negative and insignificant during winter and spring ($r = -0.4334$ & 0.3540 , respectively), but insignificant during autumn ($r=+0.431$)

The aforementioned data disagree with Kady *et al.* (1983) who recorded *M. obstructa* infestation from mid-March to late April. Also, EL-Okda *et al.* (1989) reported the snail infestation from December to April.

Table 2 calculated the monthly and seasonal mean number of *M. obstructa* population on apple trees and Egyptian clover plants per feddan. Data indicated that 4-9 and 5-6 % of the snail population/feddan was on apple trees during autumn months (October, November and December). Snail number decreased to only 0.3 and 0.5 % of the population / feddan during winter season (January, February and March), but slightly increased throughout spring to 2.1 and 2.5 % in 1997 /98 and 1998/99, respectively. However, during summer months (July, August and September) the snail population / feddan was almost double the mean number of spring. That was because of the absence of Egyptian clover and the hiding of the snail between grass near irrigation canals and under the leaves on the ground.

On the other hand, Table 2 indicated that snail infestation concentrated on Egyptian clover plants where the mean number per feddan reached 95.1 and 94.4 %, 99.7 and 99.5 % and 97.9 and 97.5 % during autumn, winter and spring in 1997/98 and 1998/99, seasons, respectively.

Accordingly, it is preferred not to interplanting apple orchards with Egyptian clover or other crops since the later is a preferable host to *M. Obstructa*. Also, the snail infestation can easily be eliminated in apple orchards through the snail management practices such as ploughing, supervised fertilizers, mechanical methods and soil management (Nakhla , *et al.* , 1993; Nakhla, 1995; Nakhla and El - Sisi, 1995).

Table 1. The monthly mean number of *M. obstructa* on apple trees and Egyptian clover during two successive seasons (1997/ 98 and 1998/ 99) at El- wedi, Giza Governorate.

Month/Season	Mean no. of Snails per unit tree or area			
	First Season (1997/ 98)		Second Season (1998/ 99)	
	Apple	<i>E. clover</i>	Apple	<i>E. clover</i>
October	109.1 ± 3.6 (60- 254)	6.3 ± 1.2 (0-11)	93.0 ± 7.2 (51- 203)	5.2 ± 1.1 (0-10)
November	15.1 ± 3.1 (0- 27)	33.1 ± 6.2 (15- 78)	33.2 ± 6.3 (0- 65)	45.1 ± 5.1 (12- 115)
December	6.2 ± 2.5 (0- 12)	125.3 ± 8.1 (29- 200)	8.5 ± 1.5 (0- 21)	97.3 ± 3.2 (53- 201)
Average Autumn Percentage	43.5 (16.4%)	54.9 (11.3%)	44.9 (14.1%)	49.2 (9.86%)
January	1.5 ± 1.2 (0-6)	178.5 ± 5.6 (95- 209)	0.0 ± 0.0 (-)	180.1 ± 7.6 (99- 335)
February	7.3 ± 1.4 (0- 15)	225.3 ± 8.3 (103- 319)	11.6 ± 2.5 (0- 23)	239 ± 6.5 (97- 412)
March	25.8 ± 2.6 (8- 43)	265.2 ± 7.2 (115- 412)	38.9 ± 4.3 (12- 65)	287 ± 9.3 (101- 411)
Average Winter Percentage	11.5 (4.4%)	223 (45.7%)	16.8 (5.3%)	235.3 (47.0%)
April	38.7 ± 3.4 (20- 75)	296.6 ± 7.8 (117- 447)	41.2 ± 3.1 (30- 87)	301.4 ± 6.7 (211- 443)
May	53.2 ± 6.7 (25- 101)	335.2 ± 9.1 (123- 493)	66.5 ± 2.1 (37- 135)	347 ± 8.1 (201- 450)
June	110.1 ± 6.7 (30- 205)		147.1 ± 3.2 (39- 293)	
Average Spring Percentage	67.3 (25.4%)	209.6 (43.0%)	48.9 (26.7%)	216.2 (43.2%)
July	136.8 ± 8.1 (49- 277)		182.6 ± 6.1 (45- 290)	
August	139.2 ± 6.3 (55- 211)		159 ± 5.3 (49- 283)	
September	151.5 ± 6.1 (61- 250)		173.5 ± 6.1 (55- 274)	
Average Summer Percentage	142.5 (53.8%)		171.7 (53.9%)	
General Total	794.5	1462.5	955.3	1503.2
Grand %	35.2	64.8	38.9	61.1

Table 2. The monthly mean number of *M. Obstructa* on apple trees and Egyptian clover per feddan during two successive seasons (1997/1998) and (1998/1999) at Giza Governorate.

Months/ Seasons	Mean number of snails/ Feddan					
	First season 1997/1998			Second season 1998/ 1999		
	Apple	<i>E.clover</i>	Total	Apple	<i>E.clover</i>	Total
October	28366	25200	53566	24180	20800	44980
November	3926	132400	136326	8632	180400	189032
December	1612	501200	502812	2210	389200	391410
Mean Autumn	11301	219600	230901	11674	196800	208474
Percentage	4.90%	95.10%	100%	5.60%	94.40%	100%
January	390	714000	714390	0	720400	720400
February	1898	901200	903098	3016	956000	959016
March	6708	1060800	1067508	10114	1148000	1158114
Mean Winter	2999	892000	894999	4377	941467	945844
Percentage	0.30%	99.70%	100%	0.50%	99.50%	100%
April	10062	1174400	1184462	10712	1205600	1216312
May	13832	1340800	1354632	17290	1388000	1405290
June	28626		28626	38246		38246
Mean Spring	17507	838400	855907	22083	864533	886616
Percentage	2.10%	97.90%	100%	2.50%	97.50%	100%
July	35568		35568	47476		47476
August	36192		36192	41340		41340
September	39390		39390	45110		45110
Mean Summer	37050		37050	44642		44642

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رصد التغيرات في تعداد مجاميع قوقع البرسيم
Monacha obstructa
في حدائق التفاح وحقول البرسيم المصري

جو زيف متری نخله ، انطون ولسن تادرس ، نادية الهواشي

معهد بحوث وقاية النباتات - مركز البحوث الزراعية - الدقي - الجيزة

يعتبر قوقع البرسيم موناکو اوبستراکتا من الآفات شديدة الخطورة على العديد من النباتات الحقلية والخضر والزينة بالإضافة إلى بعض أشجار الفاكهة. تم تتبع تعداد قوقع البرسيم في حديقة تفاح محملة بالبرسيم المصري في منطقة الصف - محافظة الجيزة خلال عامين متتاليين من أكتوبر ١٩٩٧ حتى سبتمبر ١٩٩٩. لوحظ تواجد قوقع البرسيم على أشجار التفاح طوال العام بأقصى تعداد خلال الفترة من يونيو/ يوليو إلى سبتمبر ١٩٩٨ ، ١٩٩٩. وكان تتابع النشاط الموسمي للقوقع في حدائق التفاح خلال فصل الصيف (٥٤٪) يليه الربيع (٢٦٪) ثم الخريف (١٥٪) وأخيراً الشتاء (٥٪). ويهاجم قوقع البرسيم حقول البرسيم المصري منذ بداية زراعته في أكتوبر ليصل إلى أقصى تعداد له في نهاية موسم البرسيم في شهر مايو من العام التالي. وكان أقصى نشاط موسمي للقوقع خلال فصل الشتاء (٤٦٪) والربيع (٤٣٪) في حين كان اقل تعداد خلال الخريف (١١٪). وهذه الدراسة تساعد علي وضع الخطة الناجحة لبرنامج مكافحة هذه الآفة. وعليه من المفضل عدم زراعة محصول البرسيم المصري أو غيره محملا في مزارع التفاح حيث ان البرسيم المصري عائل مفضل لآفة قوقع البرسيم *M. obstructa*.