

RELATIONSHIP BETWEEN RHINOCEROS CAPTURES IN LIGHT AND BAITED TRAPS AND BOTH OF INFESTED PALM TREES NUMBER AND CAPTURES OF *RHYNCHOPHORUS FERRUGINEUS* IN PHEROMONE TRAPS

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Abstract

Relationship between rhinoceros beetles, *Oryctes* spp., *Phylloganathus* spp., and both *Rhynchophorus ferrugineus* and infested palm trees, and its capture number were carried out under field conditions.

Ecological studies on adult stage were carried out at El- Gala farm, El- kassassen district, Ismailia Governorate.

The relationship between rhinoceros beetles captures in light and baited traps and both number of infested palm trees and number of *R. ferrugineus* collected in pheromone traps was carried out during seasons 1997, 1998 and 1999 the following results were obtained .

1. Light traps

The number of infested palm was increased by increasing the number of *Oryctes* spp. and *Phyllognathus excavatus* adults in same zone, where the simple correlation (r) values between number of *Oryctes* spp. & *Phyllognathus excavatus* adults attracted to light trap and adult number of red palm weevils captured in pheromone traps were positive and significant during two seasons 1997 and 1998 and insignificant during 1999 in case of *Oryctes* spp. The highest average number of infested palm trees with red palm weevils during July (76) accompanied with the highest average number of *Oryctes* spp. adult attracted to light trap during June (421) accompanied with the highest average number of *R. ferrugineus* adult during May(188) in the second highest average number of infested palm trees with red palm weevils during October (118) accompanied also with the highest average number of *Oryctes* spp. Adult attracted to light trap (1300), accompanied with the highest average number of *R. ferrugineus* adult during October (225). While it was positive and significant during 1997, insignificant during 1998 and insignificant and negative during 1999 in *Ph. excavatus*. Also, the simple correlation between number of *Oryctes* spp. adults attracted to light trap and number of infested palm with red palm weevils was positive and significant during 1998 and positive and insignificant in 1997 and 1999. It was insignificantly and positive during 1997 and 1999 but it was significant during 1998 (in *Ph. excavatus*). The highest average number of infested palm trees with red palm weevils during July (76) accompanied with the highest average number of *Ph. excavatus* adult attracted to light trap during June (421) accompanied with the

highest average number of *R. ferrugineus* adult during May (188) in the second highest average number of infested palm trees with red palm weevils during October (118) accompanied also with the highest average number of *Ph. excavatus* adult attracted to light trap (860), accompanied with the highest average number of *R. ferrugineus* adult during October (225).

2. Baited traps

The simple correlation values were positive and insignificant between number of *Oryctes* spp. adults attracted to baited trap and both number of *R. ferrugineus* adult and the total number of infested palm trees with *R. ferrugineus* during 1997 and positive and insignificant in 1998 and 1999. The number of infested palm trees were increased by increasing the number of *Oryctes* spp. adults in baited trap in same zone where the highest average number of infested palm trees with red palm weevils during October (118) accompanied with the highest average number of *Oryctes* spp. adult attracted to baited trap during July (203) accompanied with the highest average number of *R. ferrugineus* adult during October (225) similar results were recorded for *Ph. excavatus* except in 1997, where the relation was positive and significant. The number of infested palm trees were increased by increasing the number of *Ph. excavatus* adults in baited trap in same zone where the highest average number of infested palm trees with red palm weevils during October (118) accompanied with the highest average number of *Ph. excavatus* adult attracted to baited trap during October (149) accompanied with the highest average number of *R. ferrugineus* adult during October (225).

INTRODUCTION

Date palm trees are liable to be attacked by many insect pests and diseases, the namely, *R. ferrugineus*, *Oryctes* spp. and *Phyllognathus excavatus* Forster which made a serious damages at the different parts of roots, trunks, leaves and fruits causing a most economic loss to date fruits yield, and were first recorded in date palm plantations of Sharkia and Ismailia Governorates by Salah (1993), Alfieri (1976) and Shalaby (1958) in the MOA collection, Plant Prot. Res. Institute.

The damage of all pests invading date palm trees and that of black palm beetle alone can not be comparable as *R. ferrugineus* is considered a destructive pest.

Little work has been done on *Oryctes* spp. and *Phyllognathus* spp., and *R. ferrugineus*, special stress, however has been laid by Nirula *et al* (1952 and 1956), Abd El-Hag and Akmal (1972), Bedford (1976), and Abd El-Hamid *et al.* (1996) Morin *et al.* (1997) and Hallett *et al.* (1999).

Therefore, it was found expedient to study the ecology of *Oryctes spp.*, *Phyllognathus spp.* and *R. ferrugineus* adults under field conditions in newly reclaimed areas at El-kassassen district, Ismailia Governorate.

MATERIALS AND METHODS

The experiments were carried out in field (80 feddans) area during three successive seasons, 1997, 1998 and 1999 in a heavily infested zone with both fruit stalk beetles and red palm weevils . Three types of insect traps were used in this study

1. Light trap

Monitoring of *Oryctes spp.* and *Phyllognathus spp.* adults were performed at Sabri village, Kassassen district, Ismailia Governorate during the period from March 31, 1997 to December 31, 1999. one light trap (Robinson light trap previously proposed by Williams (1923)) was placed on building at the height of 3 meters. Over areas of El- Kassassen district and fitted with a 200 watt ultraviolet lamp (Mercury – vapor lamp) operated daily from sunset to sunrise. Trap was weekly examined and the captures were identified and counted.

2. Baited traps

Attracting rhinoceros beetles and their immature were performed by making five rounds pits (80 cm. depth × 40 cm. diameter) during March 31, 1997 to December 31, 1999 in (El- Gala) farm a part 83 cm. from date palm trees. Every pit was provided with cattle dung at the depth of 80 cm, irrigated, examined and captures were counted weekly and sexed.

3. Pheromone traps

Aggregation (ferrugineol) of red palm weevils (*R. ferrugineus*) were performed by five pheromone traps placed in El- Gala farm at the distance every five palm tree during the period from March 31, 1997 to December 31, 1999 in El-Gala farm .The poisoned bait {sugarcane stem + insecticide(ethyl acetate with concentration30%)} was changed weekly. Capsules of aggregation changed every two months. Catches were weekly taken.

4. Relationship between the number of rhinoceros and (both infested palm trees and number of *R. ferrugineus* were performed at El-Gala farm, El-Kassassen district, Ismailia Governorate during three successive seasons 1997 , 1998 and 1999

Simple correlation (r) was calculated using statistical program of costat.

All the obtained data were statistically analysed according to Duncan`s (1955) and Littel and Hills (1975).

RESULTS AND DISCUSSION

1. Relationship between (the catches of rhinoceros beetles caught by light and baited traps) and both number of infested palm trees and number of *R. ferrugineus* collected by pheromone traps

Data tabulated in Tables (1 to 4) reveal that the relationship between (number of both *Oryctes* spp. and *Phyllognathus excavatus* adults captured in both light trap and baited traps) and both relation the number of *R. ferrugineus* adult captured by pheromone traps and the total number of infested palm with this latter pest weevils) at El-Gala farm, El-Kassassen district, Ismailia Governorate during three successive seasons, 1997, 1998 and 1999. The obtained data may be illustrated as following:

1. Light traps

The highest average number recorded in Tables (1&2) appeared that The highest average number of infested palm trees with red palm weevils during July (76) accompanied with the highest average number of *Oryctes* spp. adult attracted to light trap during June (421) accompanied with the highest average number of *R. ferrugineus* adult during May(188) in the second highest average number of infested palm trees with red palm weevils during October (118) accompanied also with the highest average number of *Oryctes* spp. Adult attracted to light trap (1300), accompanied with the highest average number of *R. ferrugineus* adult during October (225). While the highest average number of infested palm trees with red palm weevils during July (76) accompanied with the highest average number of *Ph. excavatus* adult attracted to light trap during June (421) accompanied with the highest average number of *R. ferrugineus* adult during May (188) in the second highest average number of infested palm trees with red palm weevils during October (118) accompanied also with the highest average number of *Ph. excavatus* adult attracted to light trap (860), accompanied with the highest average number of *R. ferrugineus* adult during October (225). The simple correlation values in Tables (3 & 4) show that the number of infested palm was increased by increasing the number of *Oryctes* spp. and *Phyllognathus excavatus* adults in same zone, where the simple correlation (r) values between number of *Oryctes* spp. and *Phyllognathus excavatus* adults attracted to light trap and adult number of red palm weevils captured in pheromone traps were positive and significant during two seasons 1997 and 1998 and insignificant during 1999 and positively and significant during 1997 and insignificant

during 1998 and negatively and insignificant during 1999 in *Ph. excavatus*. Also, the simple correlation of the relationship between number of *Oryctes* spp. & *Phyllognathus excavatus* adults attracted to light trap and number of infested palm with red palm weevils was positive and significant during all seasons, 1997, 1998 and 1999, and positively and insignificant during 1997 and 1999 while it was in significantly and positive during 1997 and 1999 but it was significant during 1998 in case of *Ph. excavatus*.

2. Baited traps

The highest average number recorded in Tables (1&2) appeared that the highest average number of infested palm trees with red palm weevils during October (118) accompanied with the highest average number of *Oryctes* spp. adult attracted to baited trap during July (203) accompanied with the highest average number of *R. ferrugineus* adult during October (225). While the highest average number of infested palm trees with red palm weevils during October (118) accompanied with the highest average number of *Ph. excavatus* adult attracted to baited trap during October (149) accompanied with the highest average number of *R. ferrugineus* adult during October (225). The simple correlation values in Tables (3 & 4) show that the simple correlation coefficients were positive and insignificant between number of *Oryctes* spp. adults attracted to baited trap and both number of *R. ferrugineus* adult and the total number of infested palm with *R. ferrugineus* during 1997 and positive and insignificant in 1998 and 1999, Similar results were obtained in case of *Ph. excavatus*, except in 1997, where the correlation was positive and significant between the number of this insect and *R. ferrugineus* and number of infested palm trees. The aforementioned results are in agreement with those of Abd El- Hamid, *et al.* (1996) who mentioned that the infestation occurred in date palm trees with both rhinoceros and rats caused many holes in trunks help red palm weevil to oviposit their eggs, therefore to reduce infestation with red palm weevil we must control both rhinoceros and rats by light traps for rhinoceros or by baits for rates, *R. ferrugineus* weevils oviposit their eggs in tunnels or pits which make *O. rhinoceros* or on purning green frond places and addition of their egg on pits depth 3 mm. Tunnels which made by *O. rhinoceros* on trunk and base fronds which habitat *O. rhinoceros* adult on it, red palm weevil considered as wound parasite pest which oviposit their eggs on the wound occurred by rhinoceros beetles or other pests on trunks.

Table 1. Monthly average number of *Oryctes* spp. adult attracted to light trap and baited traps, number of *Rhynchophorus ferrugineus* adult captured in pheromone traps and total number of infested palm with red palm weevils sited in date palm orchard at El- Gala farm, El- Kassassen district, Ismailia Governorate during three successive seasons, 1997, 1998 and 1999.

Date	Season 1997					Season 1998					Season 1999					General total				
	Adults <i>Oryctes</i> spp. attracted to two types of traps			Infestation with <i>R. ferrugineus</i>		Adults <i>Oryctes</i> spp. attracted to two types of traps			Infestation with <i>R. ferrugineus</i>		Adults <i>Oryctes</i> spp. attracted to two types of traps			Infestation with <i>R. ferrugineus</i>		Adults <i>Oryctes</i> spp. attracted to two types of traps			Infestation with <i>R. ferrugineus</i>	
Monthly	Light trap	Baited trap	Total	No. of infested trees	No. of captured adults to pheromone trap	Light trap	Baited trap	Total	No. of infested trees	No. of captured adults to pheromone trap	Light trap	Baited trap	Total	No. of infested trees	No. of captured adults to pheromone trap	Light trap	Baited trap	Total	No. of infested trees	No. of captured adults to pheromone trap
Jan.	0	0	0	21	35	0	0	0	41	67	0	0	0	34	60	0	0	0	96	162
Feb.	0	0	0	25	40	0	0	0	19	29	0	0	0	45	84	0	0	0	89	153
March	0	0	0	26	43	0	85	85	31	37	3	44	47	30	82	3	129	132	87	162
April	49	0	49	14	85	55	26	81	24	38	74	26	100	28	47	178	52	230	66	170
May	121	0	121	23	91	71	0	71	17	29	214	0	214	30	68	406	0	406	70	188
June	201	0	201	6	70	77	0	77	23	24	143	24	167	33	48	421	24	445	62	142
July	136	107	243	19	64	122	65	187	27	37	81	31	112	30	65	339	203	542	76	166
Aug.	127	0	127	20	49	78	0	78	26	37	314	0	314	28	55	519	0	519	74	141
Sep.	376	51	427	22	56	418	40	458	31	58	393	31	424	50	72	1187	122	1309	103	186
Oct.	649	36	685	41	112	609	12	621	50	65	42	30	72	27	48	1300	78	1378	118	225
Nov.	9	0	9	23	68	9	0	9	8	26	3	0	3	26	59	21	0	21	57	153
Dec.	0	0	0	21	32	4	0	4	12	20	4	0	4	18	27	8	0	8	51	79

Table 2. Monthly average number of *Phyllognathus excavatus* adult attracted to light trap and baited trap, number of *Rhynchophorus ferrugineus* adult captured in pheromone traps and total number of infested palm with red palm weevils sited in date palm orchard at El- Gala farm, El- Kassassen district, Ismailia Governorate during three successive seasons, 1997, 1998 and 1999.

Date	Season 1997					Season 1998					Season 1999					General total				
	Adults <i>Ph. excavatus</i> attracted to two types of traps			Infestation with <i>R. ferrugineus</i>		Adults <i>Ph. excavatus</i> attracted to two types of traps			Infestation with <i>R. ferrugineus</i>		Adults <i>Ph. excavatus</i> attracted to two types of traps			Infestation with <i>R. ferrugineus</i>		Adults <i>Ph. excavatus</i> attracted to two types of traps			Infestation with <i>R. ferrugineus</i>	
	Light traps	Baited traps	Total	No. of infested trees	No. of captured adults to pheromone trap	Light traps	Baited traps	Total	No. of infested trees	No. of captured adults to pheromone trap	Light traps	Baited traps	Total	No. of infested trees	No. of captured adults to pheromone trap	Light traps	Baited traps	Total	No. of infested trees	No. of captured adults to pheromone trap
Jan.	2	0	2	21	35	0	0	0	41	67	0	0	0	34	60	2	0	2	96	162
Feb.	45	0	45	25	40	20	0	20	19	29	13	0	13	45	84	78	0	78	89	153
March	36	0	36	26	43	41	0	41	31	37	43	44	87	30	82	120	44	164	87	162
April	90	0	90	14	85	60	16	76	24	38	54	10	64	28	47	204	26	230	66	170
May	98	0	98	23	91	90	78	168	17	29	61	25	86	30	68	249	103	352	70	188
June	83	0	83	6	70	69	0	69	23	24	73	18	91	33	48	225	18	243	62	142
July	124	43	167	19	64	113	28	141	27	37	62	0	62	30	65	299	71	370	76	166
Aug.	203	0	203	20	49	118	0	118	26	37	89	0	89	28	55	410	0	410	74	141
Sep.	116	35	151	22	56	134	40	174	31	58	128	19	147	50	72	378	94	472	103	186
Oct.	432	101	533	41	112	247	12	269	50	65	181	26	207	27	48	860	149	1009	118	225
Nov.	18	0	18	23	68	21	0	21	8	26	20	0	20	26	59	59	0	59	57	153
Dec.	2	0	2	21	32	2	0	2	12	20	2	0	2	18	27	6	0	6	51	79

3. Simple correlation between different population parameters affected by number of *Oryctes* spp. and both of captured adult of *Rhynchophorus ferrugineus* in pheromone traps and the total number of infested palm with red palm weevils at El- Gala farm, El- Kassassen district, Ismailia Governorate during 1997, 1998 and 1999.

X	Y	1997		1998		1999		General total	
		Simple correlation		Simple correlation		Simple correlation		Simple correlation	
		r	p	r	p	r	p	r	p
1) Adults of <i>Oryctes</i> spp. attracted to light traps	No. of infested palm trees	0.493	n.s. 0.104	* 0.644	0.024	0.423	n.s. 0.171	* 0.617	0.033
	No. of <i>R. ferrugineus</i>	* 0.659	0.019	* 0.635	0.026	0.106	n.s. 0.742	* 0.637	0.026
2) Adults of <i>Oryctes</i> spp. attracted to baited traps	No. of infested palm trees	0.139	n.s. 0.668	0.259	n.s. 0.417	0.162	n.s. 0.615	0.350	n.s. 0.264
	No. of <i>R. ferrugineus</i>	0.188	n.s. 0.559	0.148	n.s. 0.645	0.196	n.s. 0.541	0.364	n.s. 0.245
3) Total	No. of infested palm trees	0.477	n.s. 0.117	* 0.666	0.018	0.436	n.s. 0.157	* 0.632	0.027
	No. of <i>R. ferrugineus</i>	* 0.639	0.025	* 0.641	0.025	0.129	n.s. 0.689	* 0.653	0.021

r = Correlation coefficient.

p = Probability.

* = significant

n.s. = non significant

Total 4. Simple correlation between different population parameters affected by number of *Phyllognathus excavatus* and both of captured adult of *Rhynchophorus ferrugineus* in pheromone traps and the total number of infested palm trees with red palm weevils at El- Gala farm, El-Kassassen district, Ismailia Governorate during 1997, 1998 and 1999.

X	Y	1997		1998		1999		General total	
		Simple correlation		Simple correlation		Simple correlation		Simple correlation	
		r	p	r	p	r	p	r	p
1) Adults of <i>Ph. excavatus</i> attracted to light traps	No. of infested palm. trees	0.575	n.s. 0.050	* 0.599	0.039	0.178	n.s. 0.579	* 0.593	0.041
	No. of <i>R. ferrugineus</i>	* 0.694	0.012	0.484	n.s. 0.110	- 0.040	n.s. 0.899	* 0.682	0.014
2) Adults of <i>Ph. excavatus</i> attracted to baited traps	No. of infested palm trees	* 0.662	0.018	0.021	n.s. 0.996	0.081	n.s. 0.801	* 0.590	0.043
	No. of <i>R. ferrugineus</i>	* 0.584	0.045	0.117	n.s. 0.716	0.307	n.s. 0.330	** 0.784	0.0025
3) Total	No. of infested palm trees	* 0.608	0.035	0.511	n.s. 0.088	0.174	n.s. 0.587	* 0.612	0.034
	No. of <i>R. ferrugineus</i>	* 0.689	0.013	0.442	n.s. 0.149	0.037	n.s. 0.907	** 0.724	0.0077

r = Correlation coefficient.

p = Probability.

* = significant

** = highly significant

n.s. = non significant

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العلاقة ما بين عدد الجعال المنجذبة للمصائد الضوئية وتلك المنجذبة للمصائد الجاذبة وتأثير ذلك على تعداد سوسة النخيل بالمزرعة والمنجذبة للمصائد الفرمونية وكذا تعداد النخيل المصاب بسوسة النخيل الحمراء

لفت السيد عرفة^١ ، حلیم حسن هاشم^١ ، منصور محمد الزهيري^٢ ، محمد علی الدیب^٢

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اجريت الدراسات الايكولوجية للعلاقة ما بين عدد جعل النخيل المصادة بالمصائد الضوئية والجاذبة وعدد حشرات سوسة النخيل الحمراء المصادة بالمصائد الفرمونية والعدد الكلى للنخيل المصاب بالسوسة في مزرعة الجلا بالقصاصين محافظة الإسماعيلية خلال ثلاثة مواسم ١٩٩٧-١٩٩٨-١٩٩٩م وكانت النتائج كما يلي :-

١- المصائد الضوئية :-

وجد زيادة في عدد النخيل المصاب بزيادة أعداد الأوريكتس ، والفيلوجناسس ايكزوكافاتس في نفس المنطقة حيث كانت قيمة الارتباط البسيط بين أعداد الأوريكتس والفيلوجناسس ايكزوكافاتس المنجذبة للمصائد الضوئية وعدد حشرات سوسة النخيل الحمراء المصادة بالمصائد الفرمونية موجبة ومعنوية أثناء موسمي ١٩٩٧-١٩٩٨ وغير معنوية في ١٩٩٩ لأنواع الأوريكتس وكانت موجبة ومعنوية في ١٩٩٧م وغير معنوية في ١٩٩٨ وسالبة وغير معنوية في ١٩٩٩ في الفيلوجناسس ايكزوكافاتس. أيضا الارتباط البسيط للعلاقة ما بين عدد الأوريكتس والفيلوجناسس ايكزوكافاتس المنجذبة للمصائد الضوئية وعدد النخيل المصاب بسوسة النخيل الحمراء موجبة ومعنوية في موسم ١٩٩٨ وموجبة وغير معنوية في موسمي ١٩٩٧م و ١٩٩٩م وموجبة وغير معنوية في ١٩٩٧م ومعنوية في ١٩٩٨ في الفيلوجناسس ايكزوكافاتس.

٢- المصائد الجاذبة :-

وجد أن الارتباط البسيط كان موجب وغير معنوي بين أعداد حشرات الأوريكتس ، والفيلوجناسس ايكزوكافاتس المنجذبة للمصائد الجاذبة وكلا من حشرات سوسة النخيل ومجموع أعداد النخيل المصابة بها في موسم ١٩٩٧ وموجبة وغير معنوية في ١٩٩٨ و ١٩٩٩ والنتائج المسجلة متشابهة في الفيلوجناسس ايكزوكافاتس ما عدا موسم ١٩٩٧ حيث كانت العلاقة موجبة ومعنوية . وجد ان قيم الارتباط البسيط كانت موجبة و غير معنوية بين أعداد أشجار النخيل المصابة وأعداد حشرات سوسة النخيل في كل فترات الدراسة حيث أعلى معدل لأعداد أشجار النخيل المصابة بسوسة النخيل الحمراء يصاحبها أعلى معدل لأعداد حشرات الأوريكتس والفيلوجناسس ايكزوكافاتس المنجذبة لكلاً من المصيدة الضوئية والمصائد الجاذبة .