FIELD STUDIES ON FORAGING ACTIVITY AND CAST COMPOSITION OF SUBTERRANEAN TERMITE, *ANACANTHOTERMES OCHRACEUS* (BURM.) AT AL-QASSASIN REGION, ISMAILIA GOVERNORATE

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ABSTRACT

Foraging activity and cast composition of the harvester termite, *Anacanthotermesochraceus*were studied during 2015-2017 years at Ismailia Governorate. Results revealed the presence of two peaks per year. The first and higher one occurred in March with total number of 373 and 557 individuals caught in 105 traps, representing 13.37 and 20.99 %, during 2015-2016 and 2016-2017 respectively. The second and lower peak occurred in September with total numbers of 34 and 174 individuals caught in 105 traps, representing 1.3 and 6.55%, during both years, respectively. The effect of weather factors (i.e. mean temperature, relative humidity, wind speed, solar radiation and rain fall) was determined using multiple regressions. Results showed highly significant effect in the first year. Multiple regression values explained 77.04% of foraging activity (P= 0.0001). In the second year regression analysis was mostly significant. Multiple regressionexplained61.26% of foraging activity (P= 0.0001). The average percentages of different castes of *A. ochraceus* were 67.1, 32.7, 0.18 and 0.0 % for workers, nymphs, soldiers and alates during the first year, respectively. Related values were 72.97, 26.65, 0.226 and 0.15 %, respectively in the second year. The food consumption was recorded as 1967.49 and 1651.35 gm in both years, representing 77.16 and 78.22 %,respectively of the offered food. The rate of food consumption during 1st year was 15.63 g/m^2 or 65.687

kg/feddan while, at the second one it was 13.1g/m^2 or 55.138 kg/feddan.*A. ochraceus* translocate 14,714.1 g of soil in the first year. The weight of constructed soil was 116.96 gm/m^2 and 491.23 kg/feddan, while it was 9,034.17 gmthroughout the second year. It was 71.81 g/m^2 or 301.617 kg/feddan.Constructed soilrecorded higher rates in April and September representing 15.81 and 10.46% fold as food consumption in the other months. Statistical analysis showed that in both years multiple regression was 91.3 and 86% respectively, of constructed soil can be explained by both food consumption and all weather factors measured together (P= 0.0001). The most influential factors were food consumption among other measured weather factors which were significant positive (P= 0.0001).

Keywords: *Anacanthotermesochraceus*, Foraging activity, Cast composition,Food consumption,Constructed soil,Weather factors**.**

INTRODUCTION

Termite assemblages are considered as complicated systems containing species with several modes of feeding and nesting, plus cannot be used to map gallery systems or determine where one colony ends and another begins (David and Eggelton 2000). On the other hand,we have to consider clearly itsrole in decomposition and C mineralization processes and increased containing of organic matter (Ahmed *et al.* 2011).Ecological studies on the subterranean termites in arid regions are scares. The absolute density of subterranean termite population in any particular habitat had not been reliable.Relative density, caste composition and foraging activity of subterranean termites have been studied by different methods (wooden stakes and wood blocks) (Jones,1990),toilet paper rolls (Lafage*et al*., 1973 and Said 1979), corrugated card board rolls (Lafage*et al*., 1983 El-Sebay, 1991 and Ahmed, 2003).Subterranean termite,*Anacanthotermesochraceus* (Burm.)(Isoptera: Hodotermitidae) is of agreat economic importance in

Egypt. It causes a great damage to the rural buildings constructed with mud bricks as well as furniture and farmed wood within new buildings (Ahmed, 2008and Mohany and Ali, 2010). This species is a widely dispersed all over the two sides of the River Nile and all Oases in both Eastern and Western deserts (Rizk*et al*,. 1985). Such methods which carried out in the same arid grass land have given agood results such as Saudi Arabia (Badawi*et al*., 1986) and in Egypt (Hosny and Said,1980). Ismailia Governorate is one of the most infested localities with sand subterranean termites. The present investigation is an attempt to study the caste composition and foraging populations for this species under Ismailia conditions.

MATERIALS AND METHODS

Experiments were carried out in Al-Qassasindistrict, Ismailia Governorate from December 2015 to December. 2017. This study amidatobserving foraging activity of *Anacanthotermesochraceus* (Burm.). All superficial, weeds, grassland and other cellulose sources were removed from the chosen area (125.8 m^2) to prevent any nutrient interference with the applied traps. One hundred and five traps were distributed throughout the chosen area.Rolls corrugated card board were prepared inthe laboratory. They were wrapped as roll shape (10 cm high and 5-7 cm in diameter). Each roll of corrugated card board was placed inside perforated poly Vinyl Chloride (P. V. C.) Can (12 cm high and 5-7 cm in diameter). Tarps were distributed all over the area and aligned as 5 columns and 21 rows with 80cm left by the wall and 1 m intervals between each one. Traps were wetted with water and closed with plastic cover before buried down in holes (15-20 cm depth in

soil). Each trap was marked by an earth dome above the buried trap. Rolls of corrugated card board were served as food source of cellulose material to attract the subterranean termite. To check for foraging activity,traps were collected every two weeks and replaced by new ones. Traps wereshaken into a plastic container to remove all individuals of subterranean termite handing to the bottom and inside of the trap. Traps contents were transferred to laboratory of Termite Research Unit,attached to Plant Protection Research Institute,Dokki,Giza. Individuals of subterranean termite were counted by using a fine brush. Collected insectswere sorted as workers, nymphs, soldiers, and adults. Consequently acquired information about foraging activity, caste composition,food consumption and constructed soil were determined. Weather factors data wereobtained from the Bulletin of Agriculture Extension, Ministry of Agriculture. Statistical analysis of the obtained results wascarried out using SAS software (SAS Institute 1998).

RESULTS AND DISCUSSIONS

Foraging activity: Results of foraging activityand cast composition over the two successive years (2015/2016 and 2016/2017) are presented in Table (1). Results revealed the presence of two periods of activity. The first broad and higheroccurred between November and April with maximum number of 890 individual/105 traps in March 2016 while the second broad of activity occurred between August and Novemberwith relatively small individual/105 traps. All casts were disappeared in all traps between May and July.

In the second year, 2016/2017, the same trend was observed, whereas the first broad was occurred between December and April with maximum

number of557 individualsin March; while the second broad occurred during August and September with less numbers as compared with the first year. Also data recorded show that all workers and nymphs were present all over the year. Insect individuals disappearance during the hottest months is not an indicator to

Table (1): Foraging activity and caste composition of *A. ochraceus* during two successive years (2015/2016 and 2016/2017) at Ismailia Governorate.

Season	Date of inspection	Cast Composition									
		Workers		Nymphs		soldiers		Alates		Total	
		Number	%	Numb-er	%	Number	%	Numbe-r	%	Nume-r	%
2015-2016	Dec.	489	69.46	213	30.25	2	0.28	0	0	704	25.93
	Jan.	43	70.49	18	29.51	0	0	0	0	61	42.07
	Feb.	424	68.16	197	31.67	1	0.16	0	0	622	23.46
	Mar.	565	63.48	325	36.52	0	0	0	0	890	33.57
	Apr.	34	69.38	15	30.61	0	0	0	0	49	8.80
	May	0	0	0	0.00	0	0	0	0	0	0.00
	Jun.	0	0	0	0.00	0	0	0	0	0	0.00
	Jul.	0	0	0	0.00	0	0	0	0	0	0.00
	Aug.	38	82.6	8	17.39	0	0	0	0	46	51.69
	Sep.	44	55.69	32	42.11	0	0	0	0	76	23.53
	Oct.	15	88.23	2	11.76	0	0	0	0	17	7.08
	Nov.	169	67.6	79	31.60	2	0.8	0	0	250	9.21
	Total	**1821**	**67.1**	**889**	**32.74**	**5**	**0.18**	**0**	**0**	**2715**	
2016-2017	Dec.	96	65.75	48	33.1	1	0.69	0	0	145	5.47
	Jan	397	79.56	97	19.44	3	0.60	2	0.40	499	18.82
	Feb.	253	70.87	105	29.41	1	0.28	0	0.00	357	13.47
	Mar.	419	75.22	136	24.42	0	0.00	2	0.36	557	21.01
	Apr.	209	77.70	60	22.30	0	0.00	0	0.00	269	10.15
	May	42	87.50	6	12.50	0	0.00	0	0.00	48	1.81
	Jun.	91	73.39	33	26.61	0	0.00	0	0.00	124	4.68
	Jul.	74	83.15	15	16.85	0	0.00	0	0.00	89	3.36
	Aug.	209	64.71	114	35.29	0	0.00	0	0.00	323	12.18
	Sep.	146	60.83	93	38.75	1	0.42	0	0.00	240	9.05
	Oct.	0	0.00	0	0.00	0	0.00	0	0.00	0	0
	Nov.	0	65.75	0	33.1	0	0.69	0	0	0	0
	Total	**1936**	**72.9**	**707**	**26.65**	**6**	**0.226**	**4**	**0.15**	**2651**	

The insect inactivity can be explained as heat negative behavior for high soil temperature. It is well known that termites can live in the dark and modify the temperature and humidity of the microclimate within its living space.

The effect of weather factors (Mean Temperature at 2 Meters (°C), Precipitation (mm day-1), Wind Speed at 2 Meters (m/s), Relative Humidity at 2 Meters (%) and Solar Radiation (MJ/m^2/day)seem to havesignificant positive and negative effect on the activity of subterranean termite.Statistical analysis of the data presented in Table (2) shows thatsimple correlation values (r) between all considered factors and foraging activity where highly significant positive or negative. During the first season, the simple correlation values of different factors revealed the following; Bothrain and relative humidity% has a positive effect on foraging activity (r= 0.509 and 0.585) respectively, while wind speed,solar radiation and mean temp.has a negative effect (r=-614, -0.702 and -0.735) respectively. Multiple regression (E.v.%= 77.04%) indicated that 77.04% of foraging activity was due to the effect of all measured factors. The most influential factors were wind speed and solar radiation,both of them were significantly negative. Statistical analysis in the second year revealed the weak insignificant positive or negative correlation between different factors and foraging activity, where (r) values were - 0.006, -0.145, -0.441, -0.37 and -0.510 for rain fall,wind speed, %R.H.,solar radiation and mean temp., respectively. Ahmed (1997) and Ghoniemy*et al*. (1999) reported that foraging activity of *A. ochraceus* reached a peak in April while Ahmed (2003) reported

That it reached peak in March. On the contrary Abdel-Latife*et al*.,(2003) mentioned that the high peak of *A. ochraceus* was in summer and early autumn and relatively less during the winter and spring seasons of the year.

Table (2): Simple correlation and multiple regression values for foraging activity as affected by weather factor during 2015-2017 at Ismailia Governorate (Al-Qassasin location).

Year	Weather Factors	Simple relations			Multiple regression				
		r	b	P	b	P	F	P	EV %
2015-2016	Rain	0.509	376.1	0.0093	-185.2	0.1870	12.75	<0.0001	77.04
	Wind	-0.614	-332.4	0.0011	-348.5	0.0006			
	% RH	0.584	11.34	0.0022	-6.19	0.3640			
	SRad	-0.702	-18.30	0.0001	-4.22	0.7380			
	TMean	-0.735	-20.74	<0.0001	-22.0	0.0160			
2016-2017	Rain	-0.006	-	0.9700	-1.207	0.318	6.01	0.0017	61.26
	Wind	-0.145	-	0.4880	3.57	0.346			
	% RH	0.441	5.11	0.0200	0.341	0.291			
	SRad	-0.37	-	0.0620	0.067	0.866			
	TMean	-0.510	-6.85	0.0080	-0.401	0.134			

Cast composition: The average percentages of different castes of *A. ochraceus*(Table 1 and Fig. 1) were 67.1, 32.7, 0.18 and 0.0 % for workers, nymphs, soldiers and alates,respectively.Relative values were 72.97, 26.65, 0.226 and 0.15 %,in the second year, respectively (Table 2 and Fig. 2). Data in Table (1) also revealed the absence of alate during the first season (2015/2016) while it appeared during the second season in few numbers,it is well known that appearance of alateform occurred in the time of reproduction specially during the most suitable weather factors.Ahmed (2003) mentioned that average percentage of the different castes of *A. ochraceus* were 71.32,

28.02, 0.56 and 0.02 % for workers, nymphs, soldiers and alates, respectivelyin 2000-2001.

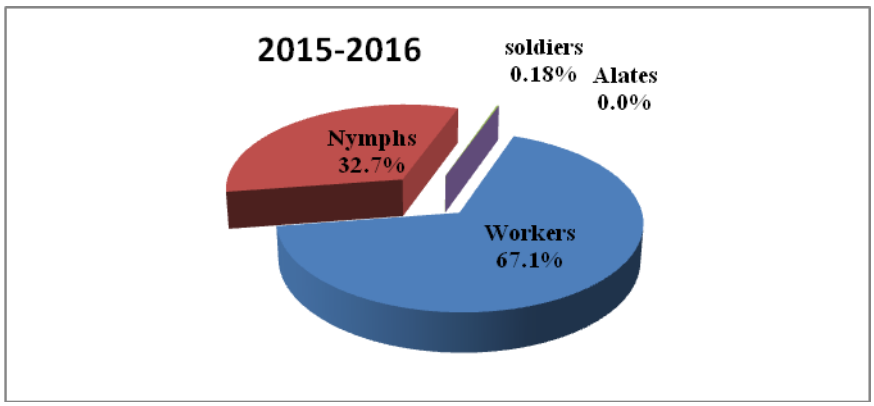

Fig. 1. Percentages of cast composition of *A. ochraceus* (Burm.) during 2015-2016 at Ismailia Governorate.

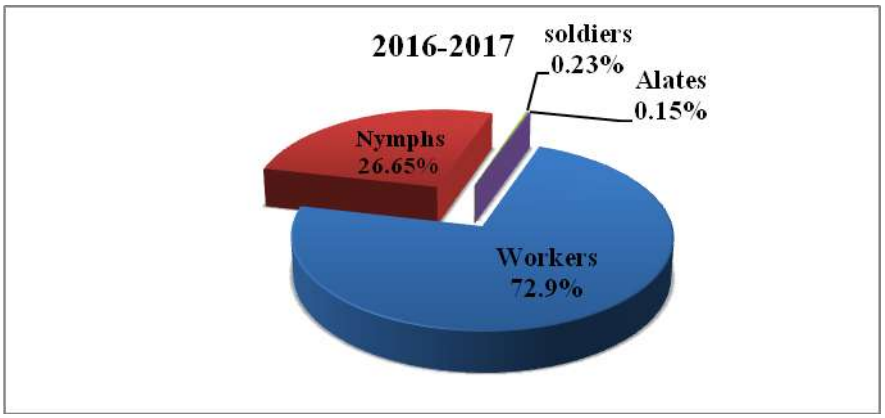

Fig. 2. Percentages of cast composition of *A. ochraceus* (Burm.) during 2016-2017 at Ismailia Governorate.

Rateof Food Consumption: Results of food consumption over the two studied years are presented in Table (3). Results reveled the total weight of food consumedper year for total traps was 1,967.49 and 1,651.35 g,representing 77.16 and78.22 % of the offered food. The rate of food

consumption during 1st year was 15.63 g/m^2 or 65.687 kg/feddan, while at the second year it was 13.1g/m^2 or 55.138 kg/feddan. El-Sebay (1993) reported that weight of food consumed reached 11,674 g loss in offered food. The consumptionfood was 12.5 g/m^2 and 52,385g/feddan in Ismailia Governorate during November 1990 to October 1991.

Statistical analysis of the first year presented in Table (5) showed that, the simple correlation ofall factorswas insignificant except %R.H.it was significant (P= 0.0270). The correlation values of different factors ranged between 0.439 and -0.36. Both solar radiation and wind speedhad negative effect and other factors had positive effect. Multiple regression indicated that 66.6% of food consumption can be explained by the total number of factors measured together (P= 0.0005). The most influential factor wasmean temp.(P= 0.0005). Statistical analysis in second year showed that, simple correlation of wind speed and solar radiation were significant (P= 0.04). While other factors were insignificant.The correlation values of different factors ranged between 0.405 and -0.38. Effect of R.H. was negative and other factors had positive effect. Multiple regression indicated that 39% of food consumption can be explained by the total number of factors measured together (P= 0.067). The most influential factor was solar radiation as significant and positive.

Table (3): Estimation loss of food consumption during two consecutive years of harvester subterranean termite,*A. ochraceus*at Ismailia Governorate (Al-Qassassin location).

Year	Total of offered food (g)	Weight of food consumption (g)	%	Estimated food consumption (g/m^2)	Loss of food consumption (Kg/feddan)
2015-2016	2549.83	1967.49	77.16	15.63	65.687
2016-2017	2111.31	1651.35	78.22	13.1	55.138

Rate of Constructed soil: Results in Table (4) reveled that in the first year,this subterranean termite translocatetotal soil of 14,714.1 g. The weight of constructed soil was 116.96 g/m^2or 491.23 kg/feddan. It was 9,034.17 gm.during the second year. It was 71.81g/m^2 or 301.617 kg/feddan.El-Sebay, (1993) mentioned that *A. ochreceus*did translocate soil as 58 g/m^2 or 243 kg/feddan,in Ismailia Governorate during November 1990 to October 1991.

Statistical analysis of the data in first year presented in Table (5) showed that simple correlation with all factors was insignificant. The correlation values of different factors ranged between 0.359 and -0.23. Only wind speedhad negative effect and other factors were positive ones. Multiple regression indicated that 61% of constructed soil can be explained by the total number of factors together (P=0.0018).The most influential factor was mean temp.(P= 0.0011).Statistical analysis in second year showed that, the simple correlation of all factors were significant except rain and mean temp.whichwere insignificant, the correlation values of different factors ranged between 0.561and -0.649. R.H.effect was negative; while other factors were positive. Multiple regressionindicated that 55% of constructed soil can be explained by the total number of factors together (P= 0.005).El-Sebay (1993) mentioned that *A.*

*ochreceus*can translocate soil as 58 g/m^2 and 243 kg/feddan in Ismailia Governorate during November 1990 to October 1991.

Table (4): Estimation of translocated soil during two consecutive years by harvester subterranean termite,*A. ochraceus*in Ismailia Governorate (Al-Qassassin location).

Year	Constructed soil (g)	Constructed soil (g/m^2)	Constructed soil (Kg/feddan)
2015-2016	14,714.10	116.96	491.23
2016-2017	9,034.17	71.81	301.617

Table (5): Simple and multiple regression values for the relations between food consumption and constricted soil as affected by weather factors during 2015-2017 at Ismailia Governorate (Al-Qassasin location).

		Weather Factor	Simple relations			Multiple regression				
			R	B	P	B	P	F	P	EV %
2015-2016	Food consumption	Rain	0.229	-	0.075	48.6	0.439	7.58	0.0005*	66.6
		Wind	-0.361	-73.72	0.027	17.29	0.657			
		% RH	0.439	-	0.314	2.39	0.438			
		SRad	-0.209	-	0.98	-11.4	0.056			
		TMean	0.176	-	0.399	16.14	0.0005			
	Constructed Soil	Rain	0.063	-	0.764	430.2	488	5.96	0.0018*	61
		Wind	-0.23	-	0.265	240.9	0.533			
		% RH	0.25	-	0.226	26.91	0.38			
		SRad	0.0039	-	0.985	-79.6	0.17			
		TMean	0.359	-	0.077	144.3	0.001			
2016-2017	Food consumption	Rain	0.234	-	0.25	18.88	0.06	2.5	0.067	39
		Wind	0.4	49.91	0.04	16.9	0.58			
		% RH	-0.38	-1.77	0.05	1.58	0.55			
		SRad	0.405	2.19	0.04	6.96	0.045			
		TMean	0.231	-	0.266	-3.1	0.15			
	Constructed Soil	Rain	0.229	-	0.269	85.58	0.08	4.81	0.005*	55
		Wind	0.533	377.7	0.0068	32.61	0.83			
		% RH	-0.649	-17.1	0.0004	-17.55	0.18			
		SRad	0.561	17.4	0.0035	12.21	0.45			
		TMean	0.427	12.89	0.0329	-13.52	0.2			

The relation between the rate of food consumption andconstructed soil: Translocatesoil in attracted traps is presented in Tables (6 and 7) and illustrated in Figs.(3 and 4).Itrecorded highest rate on Octoberand represented 12.9 folds as food consumption.The lowest one was recorded as 3.29 fold as food consumption on February throughout the first year.

Table (6): Relationship between weight of food consumed and constructed soil induced by harvester subterranean termite,*A. ochraceus* during two seasons at Ismailia.

	Date	N. of attracted traps	Weight of food consumption /g	Weight of constructed soil/g	Fold
Season 2015-2016	12/2015	9	164.05	861.95	5.25
	1/2016	4	79.41	390.17	4.9
	2/2016	8	79.62	262.43	3.29
	3/2016	21	171.51	1464.95	8.54
	4/2016	3	52.51	509.80	9.708
	5/2016	9	188.29	856.75	4.55
	6/2016	0	0	0	0
	7/2016	16	310.81	3145.12	10.11
	8/2016	6	113.39	846.92	7.46
	9/2016	11	221.21	1734.11	7.84
	10/2016	11	170.49	2199.58	12.90
	11/2016	19	416.20	2443.29	5.87
Season 2016-2017	12/2016	5	83.32	697.73	8.37
	1/2017	14	85.90	909.46	10.58
	2/2017	5	28.12	190.13	6.76
	3/2017	8	43.67	208.68	4.7
	4/2017	9	64.36	867.05	5.27
	5/2017	12	135.86	1099.87	8.09
	6/2017	10	191.99	475.99	2.47
	7/2017	6	123.99	637.83	5.14
	8/2017	14	262.03	1606.02	6.13
	9/2017	4	63.01	297.41	4.7
	10/2017	10	216.62	931.51	4.3
	11/2017	1	11.76	112.79	9.59

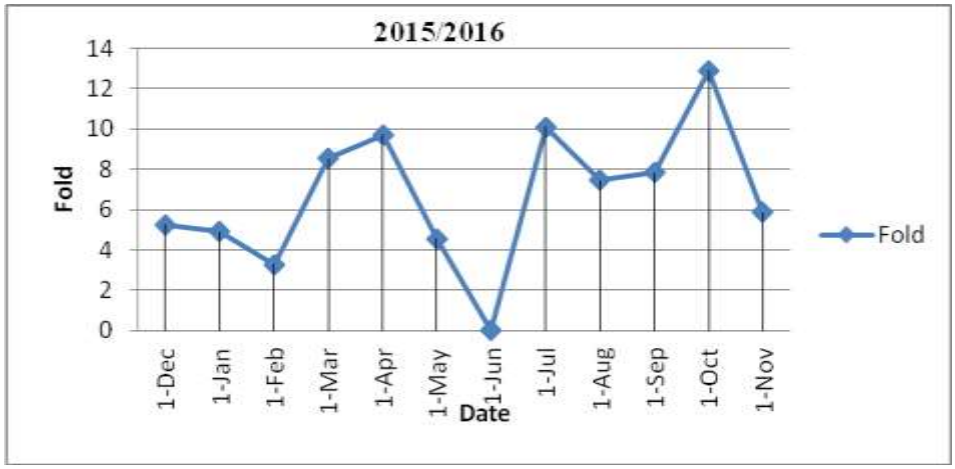

Fig. 3. Rate ofincreasing in constructed soil as food consumption for *A. ochraceus* during 2015-2016.

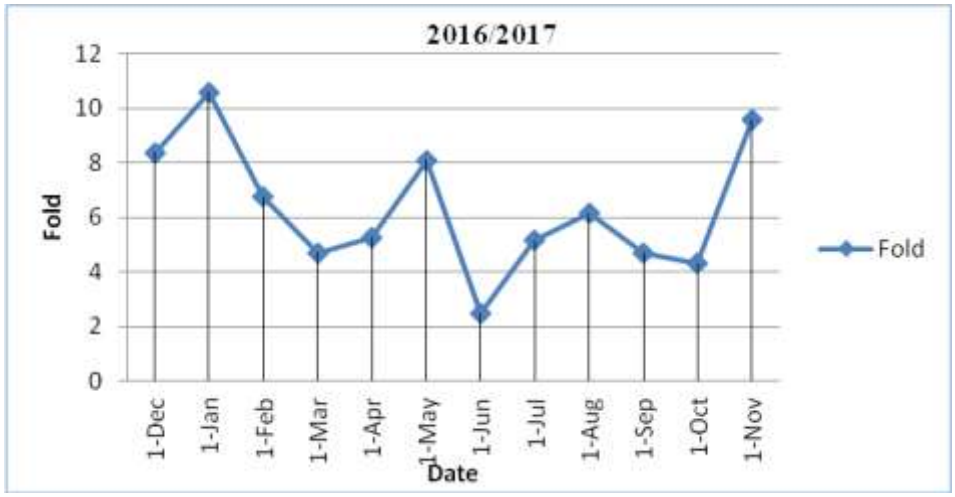

Fig. 4. Rate of increasing in constructed soil as food consumption for *A. ochraceus* during 2016-2017.

In the second year the translocate soil was recorded as highest rate in Jan. as 10.58 folds as food consumption while, the lowest one was recorded as 2.47 folds as food consumption on JuneThe presentobservation indicated

that this termite built in the traps during and after food process on cellulose material maybe due to some of the following causes:

1- Termiteconsiders the traps as a shelter or nest to protect it from soil heat and its natural enemies.

2- Termite considers the traps as center for surface assembly and activity.

Table (7). Multiple regressions for constructed soil as affected by food consumption and weather factors during two seasons at Ismailia Governorate (Al-Qassasin location).

Year		Factors	Multiple regression				
			b	P	F	P	EV %
2015-2016	Constructed soil	Rain	5.65	0.98	5.96	0.0018*	61
		Wind	89.85	0.63			
		% R.H.	5.99	0.68			
		SRad	20.74	0.49			
		Mean Temp.	3.31	0.89			
		Food Consumption and above factors	8.736	0.0001*	31.86	0.0001*	91.3
2016-2017	Constructed soil	Rain	8.53	0.77	4.81	0.005*	55
		Wind	-36.35	0.67			
		% RH	-24.02	0.003			
		SRad	-16.19	0.123			
		Mean Temp.	-0.59	0.92			
		Food Consumption and above factors	4.07	0.0001*	19.49	0.0001*	86%

Statistical analysis in Table (7) showed that in both year multiple regressions 91.3 and 86% of change of Constructed soil can be explained by the effect of both food consumption and all of weather factorstogether (P= 0.0001and <0.0001).The most influential factors were food consumption of measured factors which were significant positive (P= 0.0001and <0.0001). For the translocate soil, the results obtained werein agreement with those reported by El-Sebay (1993) and Ahmed *et al.* (2011), who showed that the

correlation between the quantity of food consumption and quantity of constructed soil increased in parallel.

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دراسات حقلية لنشاط السروح السطحي وتركيب المستعمرة للنمل الأبيض تحت أرضي في منطقة القصاصين بمحافظة الإسماعيلية

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المستخلص

أوضحت الدراسات الإيكولوجية علي النمل الأبيض التحت أرضي (الحاصد) في منطقة القصاصين بالإسماعيلية وجود قمتين لنشاط السروح السطحي للأفراد، كانت الأولي وهي الأعلي في مارس بينما القمة الثانية و الأقل تعدادا في ستمبر خلال السنتين (٢٠١٥–٢٠١٧) وتشير نتائج التحليل الإحصائي المتمثل في معامل الإرتباط المتعدد أن ٧٧,٠٤ % و٦١,٢٤ % من التغير الحادث في نشاط السروح السطحي راجع إلي تأثير العوامل الجوية مجتمعة (حرارة ورطوبة وسرعه رياح ومعدل الإشعاع الأرضي ومعدل سقوط الأمطار) في كلا السنتين علي التوالي. وقد كانت النسبة العامة المكونةلأفراد المستعمرة ٦٧,١% للشغالات و٣٢,٧% للحوريات و ٠,١٨% للجنود ٠,٠% للأفراد المجنحة في السنة الأولي بينما السنة الثانية كانت ٧٢,٩٧% للشغالات و٢٦,٩٥% للحوريات ٠,٢٢٦% للجنود و٠,١٥% للأفراد المجنحة. كانت كمية الإستهلاك الغذائي من المصائد الورقية (١٠٥ مصيدة) في مناطق الإصابة بالحشرات إلي ١٩٦٧,٤٩ و١٦٥١,٣٥ جرام سنويا بنسبة استهلاك قدره ٧٧,١٦% و ٨٧,٢٢% سنويا خلال العامين علي التوالي. بإجمالي إستهلاك قدره ١٥,٦٣ جرام / م^{٢} أو ٦٥,٦٨٧ كجم/ فدان أما السنة الثانية وصلت إلي١٣,١ جرام / م^{٢}٥٥,١٣٨ كجم/ فدان كما استطاعت الأفراد السارحة من الحشرات نقل ١٤٧١٤,١ جرام من التربة في السنة الأولي بينما السنة الثانية قلت لتصل إلي ٩٠٣٤,١٧ جرام في السنة . أثبتت النتائج المتحصل عليها أن النمل الأبيض له القدرة علي البناء تفوق استهلاكه للغذاء حيث سجل أعلي معدل بناء في شهري أكتوبر ويناير بمعدل ١٢,٩ و١٠,٥٨ ضعف معدل الإستهلاك الغذائي في كلا السنتين علي التوالي. كما بين التحليل الإحصائي لوجود ارتباط متعدد حيث ان ٩١,٣% و٨٦ % من التغير الحادث في معدل بناء التربة راجع إلي تأثير العوامل الجوية مجتمعة بالإضافة إلي تأثير معدل الإستهلاك الغذائي في كلا السنتين علي التوالي وذلك بسبب إتخاذ الأفراد السارحة من النمل الأبيض المصيدة كمأوي لها لحمايتها من حرارة حبيبات التربة وأيضا حمايتها من الأعداء الطبيعية لها كما تعتبرها مركز للنشاط السطحي للمستعمرة ككل.

الكلمات الدالة: (*Anacanthotermes ochraceus*)، نشاط السروح، تركيب المستعمرة، الإستهلاك الغذائي، التربة المنقولة، العوامل الجوية.