

## Measuring of Surface Activity For Subterranean Termite Species *Amitermes desertorum* (Desneux) (Isoptera: Termitidae) by Three Cellulose Traps Under Aswan Conditions

Ahmed, H.M. and Hashim, S. Mahrour  
Plant protection Research Institute Dokki, Giza

Received on: 23/1/2012

Accepted: 2/4/2012

### ABSTRACT

Study of subterranean termite *A. desertorum* under Aswan conditions clarified that, a total number of 31245 individuals was collected from the (40) P.V.C. traps of the experimental area (400m<sup>2</sup>) all over the year with an average of 6.50 individuals / m<sup>2</sup> or 27339.37 (individuals as estimated number) /feddan., the total number of 10266 individuals was attracted from Card board traps at the same experimental area with an average of 25.66 individuals/m<sup>2</sup> or 107793 individuals as estimated number/feddan., the total number of attracted termites with toilet paper roll traps was 2064 individuals with an average of 5.16 individuals/m<sup>2</sup> or 21672 individuals as estimated number /feddan. The average percentages of different castes of *A. desertorum* were 66.02, 0.68, 29.64 and 3.64% for workers, soldiers, nymphs and alates, respectively in P.V.C. traps, and were 68.11, 0.30, 31.45 and 0.12% for workers, soldiers, nymphs and alates, respectively in card board traps, while they were 66.08, 0.77, 31.10 and 2.03 % for workers, soldiers, nymphs and alates, respectively in toilet paper roll traps.

**Keywords:** Subterranean termites, traps, caste composition, surface activity, foraging.

### INTRODUCTION

Subterranean termites in natural settings, work as beneficial insects by breaking down cellulose-containing material, such as dead trees. They live in the soil and must maintain contact with the ground or some other moisture source to survive. Subterranean termites become a problem to humans when structures containing cellulose are built over or near their colonies on the ground. They are able to find weakened areas in the structure, or areas of direct wood-to-ground contact, and feed on the cellulose. Subterranean termites build earthen shelter tubes from the ground into the structure for protection from predators and to help maintain a moist environment. Many times these tubes are built on inside walls, porches or chimneys where they cannot be seen. In some rare situations, if water and wood are available from a source other than the soil, subterranean termites can establish a colony with no ground contact. Isolated, above-ground infestations may occur in buildings where termites have access to water from condensation, leaking pipes, roofs or other sources. Subterranean termite, *Amitermes desertorum* (Desneux) (Fam. Termitidae) is considered to have a great economic importance in Aswan. This subterranean termite species is widely dispersed all over the two sides of the River Nile and all Oases in western deserts (Rizk *et al.* 1985). Aswan governorate is one of the most infested localities with subterranean termites. In some villages, houses of rural areas are built with mud bricks (mud plus straw) or of masonry with mud mortar, in addition to the local timbers (palm trunk,

palm leaves, olive trees). The objectives of this work were to measure the surface activity of subterranean termite species (*Amitermes desertorum*) by three cellulose traps under Aswan field conditions.

### MATERIALS AND METHODS

Experiments were carried out in Abou El-Rich region, Aswan Governorate from January 2011 to December 2011. An area of about (400m<sup>2</sup>) heavily infested by subterranean termite *Amitermes desertorum* (Desneux) was chosen for this study. All superficial and partially buried dead and debris were removed from this area to prevent any nutrient interferences with the applied traps. The area was straightened and irrigated then left to full dry. 120 holes were dogged with small axe, where, the holes were arranged in 10 rows and 12 column, the distance between holes was 2 m. and the hole depth was 12cm. 40 traps from three cellulose baits (P.V.C. trap consists of cylindrical container from a thermo plastic polymer, length 12cm and 7cm in diameter, the cylindrical container was drilled 6-9 drills and inside it corrugated card board roll at the same measure, (Ahmed 2003), card board trap length 12cm and 5-7cm in diameter (Lafage *et al.* 1983), and (El-Sebay 1991), toilet paper rolls length 12cm and 10cm in diameter (Lafage *et al.* 1973), and (Said 1979), were prepared in the laboratory, and send to the experimental area. All traps were distributed randomly all over the area and arranged as 12 columns and 10 rows with 2m intervals between each ones. All traps were wetted with water and buried in the holes (12cm depth in soil), the plastic cover of P.V.C traps appeared at the same

level of soil surface and numbered for a marking sign of traps. Toilet paper roll traps were marked by metallic sticks and numbered, while, the polyethylene sheaths appear above the soil surface being a marking sign for corrugated card board traps. Rolls of corrugated card board and toilet papers served as food source of cellulose material and humidity which attracted the subterranean termite to the soil surface. Traps were collected every fortnightly, and replaced by new ones, and kept in tightly closed plastic bags then transported to the laboratory to examination. Collected traps were inspected and individuals were separated from the traps by using a small fine brush, then the different castes were counted.

#### RESULTS AND DISCUSSION

Data in tables (1, 2 and 3) show that, a total number of 31245 individuals was collected from the (40) P.V.C. traps of the experimental area (400m<sup>2</sup>) all over the year with an average of 6.50 individuals / m<sup>2</sup> or 27339.37 (individuals as estimated number)/feddan. A total number of 10266 individuals was attracted from card board traps at the same experimental area with an average of 25.66 individuals/m<sup>2</sup> or 107793 individuals as estimated number/feddan. The total number of attracted termites with toilet paper roll traps was 2064 individuals with an average of 5.16 individuals/m<sup>2</sup> or 21672 individuals as estimated number/feddan. The largest number of attracted termites (4964) was found during Mar. followed by Nov. (4806). While the least number (841) was found during June of P.V.C. traps. It was found that, the largest number of attracted termites (1430) was found during Mar., while the least number (271) occurred during June of card board traps. Concerning toilet paper roll traps, the largest number of attracted termites (300) was found during Mar. while the least number (59) occurred during Dec., El-Bassiouny (2001) stated that, the largest number of attracted termites (16818, represented 31.3%) was found during Dec. in 1995 followed by Nov. (12536, represented 23.3%) while the least number (31) was found during June. He mentioned also that, the largest number of attracted termites (11743, represented 37.1 %) was found during Jan. in 1996 followed by Dec. (4744, represented 14.9 %) while, the least number (51) was found during June. EL-Sebay (1993) mentioned that, the highest number of workers occurred during Dec. while, the lowest one occurred during June, nymphs were highest during Mar., while the lowest one occurred during June and Jan. He revealed also that, soldiers were highest during Oct. and the lowest one occurred during June, the highest number of alates occurred during Dec., while were nearly absent the rest of months. Concerning P.V.C. traps, the maximum number of foraged workers reached 3409 during Nov. represented (16.53 %), the minimum number was 533 at June representing

2.58 %. In case of card board traps, the maximum number of foraged workers was 1068 during Feb. representing 15.27%, the minimum number was 224 at June (3.20 %). In toilet paper roll traps, the maximum number of foraged workers was 184 during Mar. (13.48%), the minimum number was 33 at Sept. (2.41 %). This result is in agreement with that of Rizk *et al.* (1985) who stated that, workers of *Psammotermes hybostoma* were found all over the year except from May to August. He mentioned that, the workers population curve has two peaks during Feb./Mar. and August/Sept., and two bottoms during May/July and Nov. / Dec. The maximum number of nymphs (1587) occurred during Mar. representing 17.13 %, while the minimum number was 219 during June (2.36%) of P.V.C. traps. The maximum number of nymphs of 586 occurred during Mar. (18.14%), while the minimum number figured 45 during June (1.39%) of card board traps. The maximum number of nymphs was 142 during Nov. (22.11%), while the minimum was 18 during June (1.39 %) in toilet roll traps. The maximum number of soldiers (45) occurred during May representing 21.13 %, while the minimum number (5) was recorded during Jan. representing 2.34 % in P.V.C. traps. The maximum number of soldiers (6) occurred during Dec. (19.35%), while the minimum number was (0) during August (1.39 %) in card board traps. The maximum number of soldiers (4) occurred during Jan. and represented 25.00 %, while the minimum number was (0) during May, Jul., Aug. and Dec. that represented 0.0 % of toilet roll traps. The maximum number of alates (198) occurred during Oct. and represented 17.36 %, while the minimum number was (24) during Aug. (2.10%) in P.V.C. traps. The maximum number of alates (4) occurred during Apr. (30.76 %), while the minimum number was (0) during Aug. (0.0%) in card board traps. The maximum number of alates (15) occurred during Mar. representing 35.71 %, while the minimum number was (0) during Jan., Feb., June, Jul., Aug., Nov. and Dec. representing 0.0% in toilet roll traps. The average percentages of different castes of *A. desertorum* were 66.02, 0.68, 29.64 and 3.64 % for workers, soldiers, nymphs and alates, respectively in P.V.C. traps, and were 68.11, 0.30, 31.45 and 0.12 % and 66.08, 0.77, 31.10 and 2.03 % for the same casts in card board traps and toilet roll traps, respectively. Data in table (4) revealed that, in P.V.C. traps, the maximum number of foraged workers was attracted during autumn season followed by winter season (6745 and 5948 individuals), the lowest number was 2148 found during summer season. Nymphs were found all over the year, their peak during autumn and spring seasons represented 3522 and 3144 individuals). Soldiers were abundant during spring and autumn seasons represented by 79 and 66 individuals, while the lowest soldiers number was estimated during

winter and represented by 27 individuals. Alates were found all over the year, their peak during autumn and spring seasons was represented by 534 and 295 individuals. Concerning card board traps, the maximum number of foraged workers occurred during spring season (2283) followed by winter season 2263 individuals), the lowest number of 727 individuals was found during summer season. Nymphs were found all over the year, and peaked during autumn (1157) and spring (1092) seasons. Soldiers were abundant during winter and spring seasons representing 11 and 10 individuals, while the lowest soldiers number was estimated during summer represented by 3 individuals. Alates were found during spring and autumn seasons represented by 7 and 6 individuals). Concerning toilet paper roll traps, the maximum number of foraged workers

occurred during spring season (439) followed by winter season (345 individuals), the lowest number was 280 found during autumn season. Nymphs were found all over the year, and peaked during autumn and spring seasons (represented 229 individuals for both seasons). Soldiers were abundant during winter, spring and autumn seasons represented by 5 individuals for these seasons, while, the lowest soldiers number was estimated during summer represented by one individual. Alates were found during spring and autumn seasons represented by 32 and 10 individuals. Ali *et al.* (1982) and Salman *et al.* (1987) reported that, the maximum number of sand termite *P. hybostoma* and harvester termite *A. ochraceus* occurred during summer season, while the lowest number occurred during winter season.

**Table 1: Surface activity of subterranean termite *A. desertorum* as indicated by attracted individuals to the P.V.C. traps at Abou- El-Rich region, Aswan Governorate.**

Inspected dates	Caste activity								Total
	Workers		Soldiers		Nymphs		Alates		
	Number	%	Number	%	Number	%	Number	%	
Jan.	1963	9.52	5	2.34	331	3.57	28	2.45	2327
Feb.	2911	14.11	9	4.22	461	4.97	36	3.16	3417
Mar.	3246	15.73	11	5.16	1587	17.13	120	10.52	4964
Apr.	1787	8.66	23	10.79	1126	12.15	141	12.36	3077
May	754	3.65	45	21.13	431	4.65	34	2.98	1264
Jun.	533	2.58	15	7.04	219	2.36	74	6.49	841
Jul.	655	3.17	14	6.57	468	5.05	26	2.28	1163
Aug.	960	4.65	12	5.63	296	3.19	24	2.10	1292
Sept.	1616	7.83	15	7.04	765	8.25	182	15.96	2578
Oct.	1720	8.34	27	12.67	1538	16.60	198	17.36	3483
Nov.	3409	16.53	24	11.26	1219	13.15	154	13.51	4806
Dec.	1074	5.21	13	6.10	823	8.88	123	10.79	2033
Total	20628	66.02	213	0.68	9264	29.64	1140	3.64	31245

**Table 2: Surface activity of subterranean termite *A. desertorum* as indicated by attracted individuals to the corrugated card board traps at Abou- El-Rich region, Aswan Governorate.**

Inspected dates	Caste activity								Total
	Workers		Soldiers		Nymphs		Alates		
	Number	%	Number	%	Number	%	Number	%	
Jan.	915	13.08	2	6.45	356	11.02	0	0.0	1273
Feb.	1068	15.27	3	9.67	238	7.37	0	0.0	1309
Mar.	838	11.98	5	16.12	586	18.14	1	7.69	1430
Apr.	820	11.72	4	12.90	379	11.73	4	30.76	1207
May	625	8.93	1	3.22	127	3.93	2	15.38	755
Jun.	224	3.20	2	6.45	45	1.39	0	0.0	271
Jul.	262	3.74	1	3.22	128	3.96	0	0.0	391
Aug.	241	3.44	0	0.0	152	4.70	0	0.0	393
Sept.	418	5.97	1	3.22	123	3.80	2	15.38	544
Oct.	566	8.16	2	6.45	542	16.78	1	7.69	1111
Nov.	736	10.52	4	12.90	492	15.23	3	23.07	1235
Dec.	280	4.04	6	19.35	61	1.88	0	0.0	347
Total	6993	68.11	31	0.30	3229	31.45	13	0.12	10266

Table 3: Surface activity of subterranean termite *A. desertorum* as indicated by attracted individuals to the toilet paper roll traps at Abou- El-Rich region, Aswan Governorate.

Inspected dates	Caste activity								Total
	Workers		Soldiers		Nymphs		Alates		
	Number	%	Number	%	Number	%	Number	%	
Jan.	180	13.19	4	25.00	34	5.29	0	0.0	218
Feb.	124	9.09	1	6.25	47	7.32	0	0.0	172
Mar.	184	13.48	3	18.75	98	15.26	15	35.71	300
Apr.	130	9.53	2	12.50	86	13.39	11	26.19	229
May	125	9.16	0	0.0	45	7.01	6	14.28	176
Jun	183	13.41	1	6.25	25	3.89	0	0.0	209
Jul.	51	3.73	0	0.0	37	5.76	0	0.0	88
Aug.	66	4.83	0	0.0	23	3.58	0	0.0	89
Sept.	33	2.41	1	6.25	54	8.41	3	7.14	91
Oct.	124	9.09	2	12.50	33	5.14	7	16.66	166
Nov.	123	9.02	2	12.50	142	22.11	0	0.0	267
Dec.	41	3.01	0	0.0	18	2.80	0	0.0	59
Total	1364	66.08	16	0.77	642	31.10	42	2.03	2064

Table 4: Surface activity of subterranean termite *A. desertorum* as indicated by attracted individuals with three cellulose baits at Abou- El-Rich region, Aswan Governorate.

Cellulose baits	Seasons	Caste activity			
		Workers	Soldiers	Nymphs	Alates
P.V.C. traps	Winter	5948	27	1615	187
	Spring	5787	79	3144	295
	Summer	2148	41	983	124
	Autumn	6745	66	3522	534
Card board traps	Winter	2263	11	655	0
	Spring	2283	10	1092	7
	Summer	727	3	325	0
	Autumn	1720	7	1157	6
Toilet roll traps	Winter	345	5	99	0
	Spring	439	5	229	32
	Summer	300	1	85	0
	Autumn	280	5	229	10

## REFERENCES

- Ahmed, H .M. (2003): Ecological and control studies on subterranean termites under Fayoum condions. Ph. D. Thesis Fac. Agric. Fayoum, Cairo University. pp.148
- Ali, A. M. F. Abou-Ghadir and N.A. Abdel hafez (1982): Surfce activity of termite *Psammotermes hybostoma* (Desneux) in the New Valley. Assuit, J. Agric. Sci. 13 (3): 73-78.
- El-Bassyouni, A.R., (2001): A study on the ecology and biological control of subterranean termites. M.sc. Thesis, Fac. Agric. Al-Azhar Univ. pp. 145.
- El-Sebay, Y. (1991): Amodified trap for El-Sebay subterranean termite. Fourth Arab Congress of plant protec. Cairo. 1-5. Dec., 1991 pp. 245-247.
- El-Sebay, Y. (1993): Ecological studies on the harvester termites *Anacanthotermes ochraceus* (Burm.) in Egypt. Assuit J. Agric. Sci., 24 (4) 35- 47.
- Lafage, J. P., Nutting, W. L. and Haverty, M. I. (1973): Desert subterranean termites: a method for studying foraging behaviour. Environ. Entomol., (2): 954-956.
- Lafage, J. P., Su, N.Y.; Jones, M.J., and Esenther, R. (1983): A rapid method for collecting large numbers of subterranean termites from wood. Sociobiology (7): 305-309.
- Rizk, M.M.; El-Sayed, A.R.; Ali, A.M and Eraky, S.A. (1985): Flight activity and annual caste fluctuation of sand termite *Psammotermes hybostoma* (Desneux) in western desert-Egypt. Assuit. J. Agric. 16 (2): 137-148.
- Said, W. A., (1979): Ecological and toxicological studies on Fam. Hodotermitidae M.Sc. Thesis Fac. of Agric. Ain Shams Univ. pp. 128.
- Salman, A.G.; Morsy, A.A. and Sayed, A.A., (1987): Foraging activity of the sand termite *Psammotermes hybostoma* (Desneux) in the New Valley, Egypt. Assuit. J. Agric. Sci. 18 (4): 84-90.

## المخلص العربي

قياس النشاط السطحي للنمل الابيض تحت الارضى (*Amitermes desertorum* (Desneux)

## بواسطة ثلاث مصائد سليلوزيه تحت ظروف محافظة اسوان

حسن محمد احمد على، صلاح محروس هاشم

معهد بحوث وقاية النباتات- الدقى- الجيزه

أوضحت الدراسة التي أجريت على نوع النمل الابيض تحت الارضى *Amitermes desertorum* تحت ظروف محافظة أسوان أن التعداد الكلى للأفراد المتحصل عليها من أربعين مصيدة P.V.C. والمطعومة بالسيليلوز فى مساحة 400 متر خلال العام كان 31245 فرداً وذلك بمتوسط 6.50 أفراد للمتر المربع أو 27339.37 فرد للفدان. بينما كانت قيمة هذا التعداد 10266 فرداً بمتوسط 25.66 فرد للمتر المربع أو 107793 فرد للفدان فى مصائد الكرتون الورقيه. ووصلت قيمته أيضا الى 2064 فرد بمتوسط 5.16 فرد للمتر المربع أو 21672 فرداً للفدان وذلك فى مصائد ورق التواليت. وكانت النسبة العامة للأفراد المكونة لمستعمرة هذا النوع هى 66.02 للشغالات، 29.64 للهوريات، 0.68 للجنود، 3.64% للأفراد الخصبة المجنحة وذلك فى مصائد P.V.C. بينما كانت هذه النسبه 68.11 للشغالات، 31.45 للهوريات، 0.30 للجنود، 0.12% للأفراد الخصبة المجنحة فى مصائد الكرتون الورقيه، بينما كانت 66.08 للشغالات، 31.10 للهوريات، 0.77 للجنود، 2.03% للأفراد الخصبة المجنحة وذلك فى مصائد ورق التواليت. وبينت الدراسه أن تعداد السروح للشغالات كان أعلى خلال موسمي الشتاء والخريف فى مصائد P.V.C. حيث وصل الى 6745، 5948 فرد. بينما كان اقل خلال أشهر الصيف حيث سجل 2148 فرداً وكان هذا التعداد أعلى خلال موسمي الربيع والشتاء (2283، 2263 فرداً) وأقل فى موسم الصيف (727) فى مصائد الكرتون الورقيه وأيضاً كان أعلى خلال موسم الشتاء والربيع (439 و 345 فرداً) وأقل فى موسم الخريف (280) فى مصائد ورق التواليت.