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Density of colonies and foraging behavior of subterranean termites in palm plantation in Abo El-Rich Region, Aswan governorate, Egypt

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Abstract
The foraging behavior of subterranean termites represented as workers and soldiers on corrugated card board traps in four regions cultivated with palm trees was measured in Abu El- Rich region, Aswan Governorate. Four species of subterranean termites were identified, the harvester termite *Anacanthotermes ochraceus* (Burmeister), the sand termites *Psammotermes hybostoma* (Desneux), *Psammotermes fscofemoralis* (Desneux) and the desert termite *Amitermes desertorum* (Desneux), the number of workers year. The average number of termites (workers) per trap and the average number of soldiers per 1000 workers were determined. The population of *A.ochraceus* in 1st region had two peaks (2341&2562 workers) in April and November, respectively. The population activity of *P.hybostoma* in 2nd region had three peaks; the highest peak was attained in October with (3659 workers), the moderate peak was in November with (3511 workers), and the lowest peak was in April with (3268) workers. For the species of *P. hybostoma* and *P. fscofemoralis* in 3rd region, the population of *P.hybostoma* had two peaks, the highest peak was attained in May (3261 workers) and the other peak was in Oct. with (2987 workers), the species of *P.fscofemoralis* reach its peak (1321 workers) in Dec., in the same region, and in 4th region,the species of *A.desertorum* was first recorded in March, its population increased gradually from Sept. to Oct. and the highest peak were attained in Nov. (1256) workers. Soldiers /1000 workers represented 72.61%. Positive nonsignificant correlation was recorded between each of soil temperature and termite stage populations.

Keywords: Foraging, population, subterranean termites, corrugated board traps, activity

Introduction
Subterranean termites have become increasingly important pests of wood trees, horticultural trees and field crops as well as building in Egypt, where the desert and reclaimed lands are irrigated for cultivation. Subterranean termites feed on the live part of plant such as Palm trunk, Palm leaves and Olive trees (El-Hemaesy, 1976; Said, 1979) [11, 24]. Some species were able to reduce wooden structures to dust, and may be cause serious damage to buildings (Rizk *et al*. 1985) [23]. The cryptic nature of subterranean termites makes behavioral studies very difficult and consequently little is known about their foraging activity (Harris, 1967) [16].

The *A*. *desertorum* infested ten trees' species (sunt, tamarisk, acacia, mulberry, eucalyptus, caesarian, mango, citrus, olive and palm trees) and the highest percentage of infestation recorded in palm trees, while the least percentage recorded in olive and citrus trees furthermore, they detected that the palm fronds were attracted the highest number of termite individuals, while eucalyptus cutting attracted the minimum numbers in North Sinai governorate (Batt *et al*., 2006) [7]. Several attempts were however made to determine the foraging behavior of some species of subterranean termites either by applying the soil core method (Wood *et al*., 1977) [27] or baiting with attractive materials (Lafage *et al.,* 1973; Haverty *et al*., 1975; Ohiagu and Wood, 1976; Badawi *et al*., 1984; El- Sebay,1993; Ahmed, 2003) [2, 6, 13, 17, 19, 22]. Several studies on subterranean termites were conducted in arid and grassy lands have given accurate results in Egypt**.** (Abd El-Qawi *et al*., 2022) [1]. The monthly population of different castes of the termite, *Amitermes desertorum* individuals demonstrated that the worker castes recorded the highest number (5632 workers) during August, while the minimum number (487workers) was observed during January. Moreover, the highest number of soldiers was recorded during May (386 soldiers) and August (1160 winged adults), while the minimum number of soldier castes was recorded 116 individuals during October. The relation between worker and soldier castes showed that the ratio of soldiers /1000 workers represented 97.34%. Positive significant correlation was recorded between each of soil temperature and termite stage populations. Ahmed *et al*., (2023) [3].

Aswan governorate is one of the most common areas where subterranean termites are infested.

The objectives of this work are to study the relative abundance, foraging behavior and annual populations of subterranean termites' castes attracted to traps under climatic changes and prevalent dominant weather factors at Aswan governorate, identifying of subterranean termite species inside the date palm trees plantations in Aswan governorate, Egypt.

Materials and Methods
1. Field experiments sites.
The experiments area about 800 m ^{2} were carried out in four regions (each region, about 200 m^2) planted with date palm trees at Abu El-Rich region, Aswan Governorate from January 2023 to December, 2023.

1.1. Identify of subterranean termite species inside the date palm trees plantations in Aswan governorate, Egypt.
Termite Traps
Corrugated card board rolls termites traps were prepared in white termite research laboratory (Plant Protection Research Insatiate, dokki, Giza, Egypt) where, wrapped in rolls shape (each, 12cm high and 5-7 cm diameter), with the lower 2 cm

left exposed. To keep the moisture in the trap, a polyethylene covering was employed which was secured with a rubber band (El-Sebay, 1991) [12].
Rolls traps were placed inside perforated PVC (12cm height and 5-7cm diameter) and sent to the experimental regions.
The EL-Sebay modified trap was used to identify of subterranean termite species inside the date palm trees plantations in Aswan governorate, Egypt.

Field Experiments
The study area received 400 corrugated cardboard rolls traps each were distributed in four covering areas were 200 m^2 in four region allover the experimental regions (100 traps/ site). The method devised to observe foraging behavior involved cleaning all sources of cellulose and debris, the dead wood from ground, where, all superficial and partially buried dead debris were removed from the study four regions to prevent any nutrient interference with the applied traps. A randomized complete block design (RCBD) was used in this investigation, aligned as 10 columns and 10 rows with 2 meters intervals between palm trees. Wet traps were inserted into perforated Poly Vinyl Chloride tubes (P.V.C.). Traps were wetted with water before buried regularly inside holes, each 15 cm, depth in soil) and the traps were covered with plastic cover appear at surface ground. The Polyethylene sheaths were appeared above the soil being a marking sign for traps. Roll corrugated board traps were serve as a food source and humidity which attracted the termites to the surface.
To check for subterranean termites foraging behavior and individuals population, each trap was removed from its hole, shaken into a plastic container to remove all individuals of termites hanging to the bottom and inside of the trap and transferred to the laboratory at Plant Protection Research Institute.
Subterranean termite individuals were counted by using a fine hair brush, sorted into castes, and identified. Each roll trap was then placed back to its hole; severely attacked traps are left for two weeks then were replaced by new ones after two weeks in the same regions for collecting termite's species according to Thabit *et al*., (2019) [26].
Collecting termites species were kept for each trap involved the number of workers and soldiers of termite species, and determined both the date of first attack, and the average number of soldiers per 1000 workers (S/1000Wratio) for each species in each region. Identification of the collected termites in all regions was made by using the available termites Keys (Harris, 1967; Fontes, 1985; Myles1998; Sands1998 and Myles, 2004) [14, 16, 20, 21, 25].

3. Effect of soil temperatures on annual populations for different castes
The prevailing means of soil temperature (C°) in the experimental areas during the period of study were obtained from the central laboratory for Agriculture Meteorology, Agricultural Research Center and Ministry of Agriculture in Giza.
The relationships between soil temperature (C°) and each population densities of different castes (two weekly number of captured adults of different castes), were recorded.
Simple correlation (r.), partial regression values (b) were statistically analyzed using statistical program of costat (Costat, software, 1990) [8].

4. Statistical analysis.
Results were statistically analysed using a computer Costat programs (Costat, software, 1990) [8]. Where: analysis of variance, correlation and regression was performed. The utilized analysis of variance.

Results and Discussion
1. Relative abundance, foraging behavior of subterranean termites attracted to traps.
The recorded data for different castes individuals of subterranean termites, demonstrated the monthly relative abundance, foraging behavior of subterranean termites attracted to traps under climate and weather factors, identify of subterranean termite species inside the date palm trees plantations in Abo El-Rich region, Aswan governorate, during 2023 year
The obtained data in Table (1) and figures (1 and 2) showed that, the species of *A. ochraceus* was first recorded in January; the foraging behavior of *A. ochraceus* in region 1 st increased gradually from Feb. to reach its first peak (2341 workers) in April and started to decline in, May, Jun, July and August. The foraging behavior increased gradually again from Sept. to reach its second peak (2562 workers) in November then decreased in December and its first peak (45 soldiers) in May and second peak (54) in November. The species of *P. hybostoma* was first recorded in January, the population activity of *P. hybostoma* in region 2 nd had three peaks, the highest two peaks were attained in October and November with (3659 and 3511 workers), respectively, the other peak was in April with (3268 workers) workers, respectively and had two peaks, the highest were in November (198) and lowest in April (175) soldiers. In region 3 rd, the species of *P. hybostoma* and *p. fscofemoralis* was first recorded in January, the population of *P. hybostoma* had two peaks, the highest peak were attained in May (3261) and the other peak was in October with (2987) workers and started decline from November to Dec., and its first peaks in June (132) and second peaks in October (192) soldiers, the species of *P. fscofemoralis* was first recorded in Feb., its population increased gradually from Feb. to April and started declined from May to July, then increased gradually from August to reach its peak (1321) workers in Dec., and had two peaks first in May (67) and second peak was in Sept (89) Soldiers.
In region 4 th, the species of *A. desertorum* was first recorded in March, its population increased gradually from Sept. to Oct. the highest peak were attained in Nov. (1256) workers and three peaks in June (35), Sep (39) and Dec, (42) soldiers, respectively.
Results agreed with Ghoniemy, *et al*. (1999) [15] found that, the foraging activity of *A. ochraceus* increased gradually from January to reach its peak (1289) individuals in April then decreased sharply to disappear in June and increased again in the subsequent two months, decreased in Sept., then increased gradually during the remaining months. Amal (2019) [5]. obtained could be summarized as following: two species of subterranean at Ismailia governorate, the first and most widely distributed namely *A.ochraceus* (Burm),while the second and less distributed namely *Psammotermes hypostoma*(Desneux),the harvester subterranean termite *A.ochraceus* (Burm) had two peak of activity annually in both two years of study. The first and the highest one took place between January and April while the second was relatively small size, took placed between August and October.El-Bassyouni (2001) [10] mentioned that, the largest individuals of foraged workers of *Psammotermes hybostoma* was during winter, while the least one was during summer season. Ahmed (2003) [2] mentioned that, the foraging activity of *P. hybostoma* peaked in two periods; the

first and highest one peaked in period from 25 March to 6 May, while the second period of activity peaked at 5 November and Ahmed, *et al*., (2023) [3]. Demonstrated that the worker castes of *Amitermes desertorum* recorded the highest number (5632workers) during August, while the minimum number (487 workers) was observed during January. Moreover, the highest number of soldiers was recorded during May (386 soldiers), while the minimum number of soldier castes were recorded 116 individuals during October.

Table 1: Population of workers and soldiers collected from attacked traps in four regions at Abo El-Rich region, Aswan governorate, throughout the experimental period from January to December, 2023

Date of inspection	Regions										Total		Weather factor	
	1		2		3				4				Temp. Cº.	
	A. ochracus		*P.hybostoma*		*P.hybostoma*		*P.fscofemoralis*		*A. desertorum*				Max. Cº	Mini. Cº
	W	S	W	S	W	S	W	S	W	S	W	S		
Jan.	245	6	523	11	742	17	0	0	0	0	1510	34	23	8.7
Feb.	673	5	945	42	1128	34	397	23	0	0	3143	104	24	10
Mar.	1486	21	2154	134	543	29	643	39	765	11	5591	234	28	13.3
Apr.	2341	28	3268	175	658	71	897	59	897	9	8061	342	34	17.6
May	1483	45	2754	69	3261	56	342	67	345	22	8185	259	39	21.8
Jun.	873	23	1298	58	2172	132	231	23	432	35	5006	271	42	25.2
Jul.	532	17	1324	49	1521	94	128	38	129	28	3634	226	43	27.7
Aug.	238	21	1123	26	1231	37	386	75	453	23	3431	182	43	27.5
Sept.	1768	18	2548	38	2438	62	543	89	546	39	7843	246	41	25.4
Oct.	2436	33	3659	123	2987	192	789	82	987	32	10858	462	37	21.5
Nov.	2562	54	3511	198	2319	78	1219	26	1256	26	10867	382	29	15.3
Dec.	2173	29	1397	128	956	73	1321	19	985	42	6832	291	24	10.5
Total	16810c	300dc	23504a	1051aa	19956b	875bb	6896d	540cd	6795f	267ff	74961	3033		
Mean	1400.83	25	2180.09	87.58	1663	72.92	574.67	45	566.25	22.25			33.92	18.71
S.E.±	250.76	4.12	312.51	17.79	271.11	14.46	119.88	8.26	119.65	4.15			2.29	2.04

W=workers S=Soldiers Max., Temp. Co. =maximum temperature Minimum Temp. Co. = minimum temperature *P.=Psammotermes A.=Amitermes desertorum* Total applied corrugated traps were 100 per region per month *A. ochracus =Anacanthotermes ochracus*

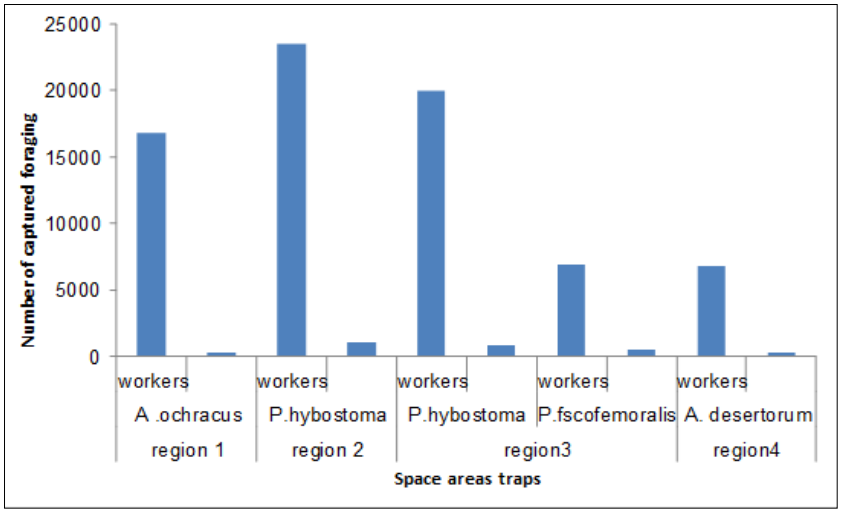

Fig 1: Numbers of captured workers and soldiers of different types subtermites termites, in roll corrugated traps placed in four regions in a date palm orchard at space level (800 m^2) at Abo-El-Rich, Aswan Governorate during 2023

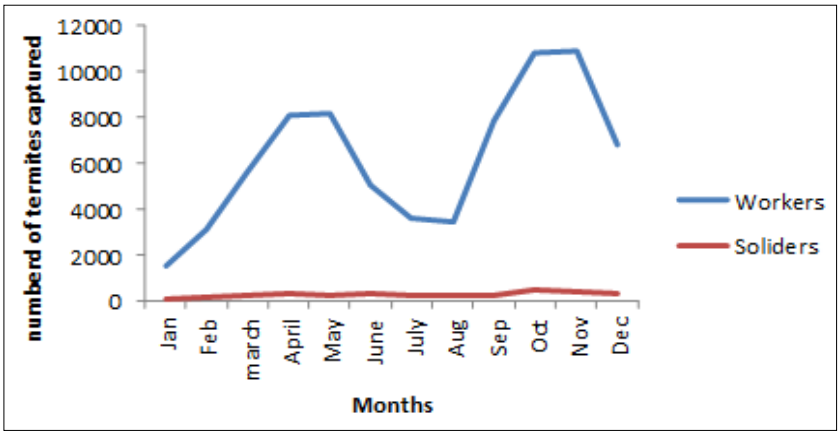

Fig 2: Total numbers of captured workers and soldiers of different types subtermites termites, in roll corrugated traps placed in space level (800 m^2) placed in a date palm orchard at Abo-El-Rich, Aswan Governorate during 2023

2. Effect of soil temperature on termites population.

The most prevalent environmental conditions were soil temperature degrees; these factors play an important role in population of different individuals of termite castes along year months.

Obtained monthly data on total individuals of termite castes under the effect of certain factors were illustrated in Figure (3, 4, 5 and 6). The highest numbers of population were recorded during November month (10867 individuals) when soil maximum temperature degrees were 29°C, while value of soil minimum temperature was 15.3 °C.

The statistical analysis of the interaction between maximum temperature and number of captured termites in Table (2) and Figure (3, 4, 5 and 6) revealed that effect of soil temperatures factors on capturing both simple correlation and regression values were nonsignificant positive effects for soil maximum temperature in 2023 season for workers where r value r=0.13 and b= 3.36 ^{ns} on the numbers of captures, respectively, and for soldiers where r value r= 0.28 and b =0.02 ^{ns} while it was nonsignificant positive effects for soil mini.Temp.in season,2023 for workers where r value = 0.12, and b= 2.83, and for soldiers where r value r=0.28 and b=0.02 ^{ns}.

Results agree with El-Bassiouny *et al*., (2012) [9] who found that *A*. *desertorum* termite in New Valley governorate at soil temperature between 20.6 to39.7°C, while in Aswan governorate, *A.desertorum* was found at soil temperature degrees between 17.7 to39.7°C. Throughout 2000 to 2010 years, foraging activity and population of castes of the subterranean termite *A*. *desertorum*, were differed according to the time of year (annual seasons), environmental conditions,

Amal (2019) [5] where founded that maximum of surface activity of subterranean termite occurred during the moderate weather prevailing in November and early spring (the maximum caught in the traps) while minimum caught of the traps occurred in the hot months. Aly *et*. *al*., (2022) [4]. founded that both maximum and minimum temperatures had a substantial positive effect on the worker *Psammotermes hypostoma* activity where r= 0.333 and 0.318, respectively and Ahmed *et al*., (2023) [3] reported that positive significant correlation was recorded between each of soil temperature and termite stage populations.

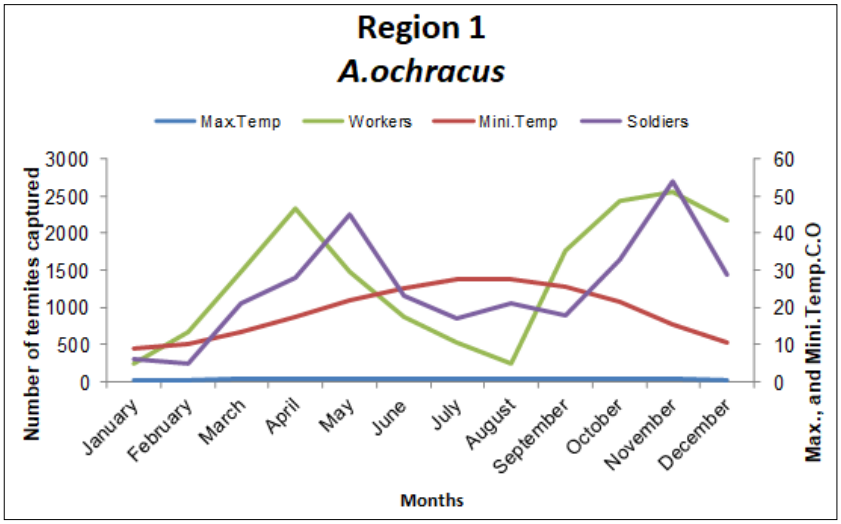

Fig 3: Monthly population fluctuations of foraging *Anacanthotermes ochraceus* (Burmeister) termite under environmental conditions at Abo-El-Rich region, Aswan governorate during, 2023 season

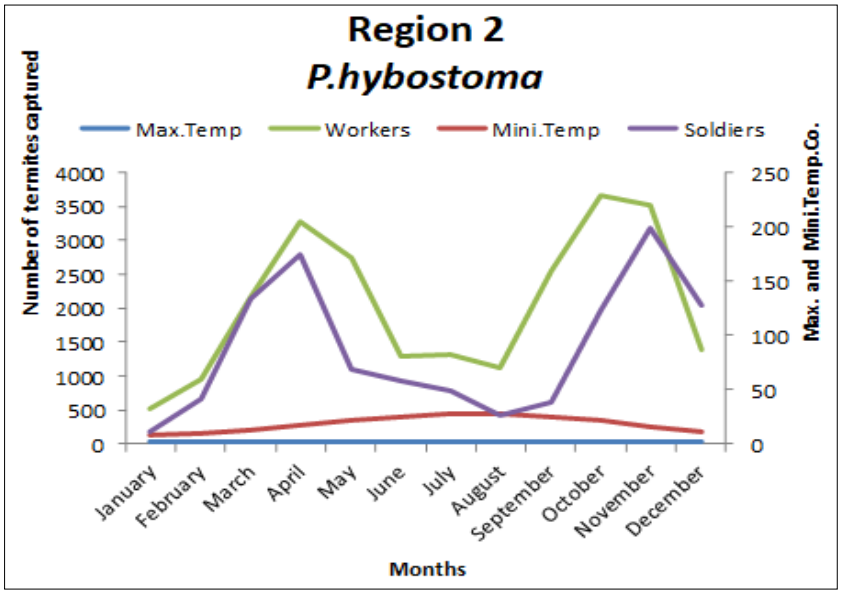

Fig 4: Monthly population fluctuations of foraging *Psammotermes hybostoma* (Desneux) termite under environmental conditions at Abo-El-Rich region, Aswan governorate during, 2023 season

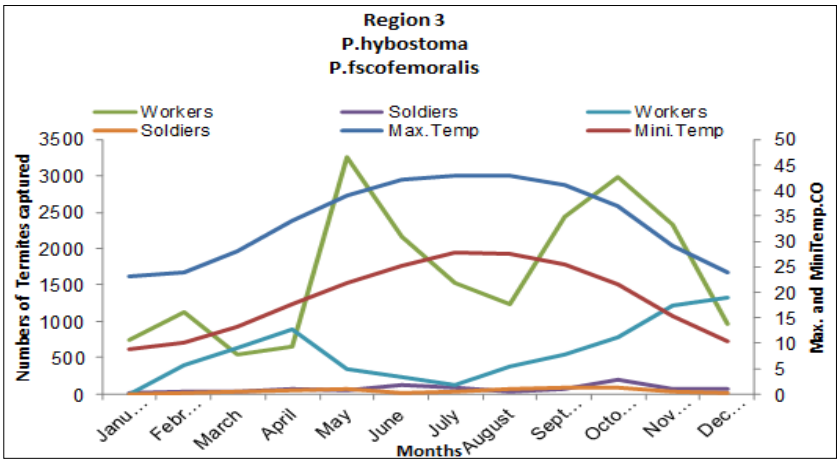

Fig 5: Monthly population fluctuations of foraging *Psammotermes hybostoma* (Desneux) and *Psammotermes fscofemoralis* (Desneux) termites under environmental conditions at Abo El-Rich region, Aswan governorate during, 2023 season

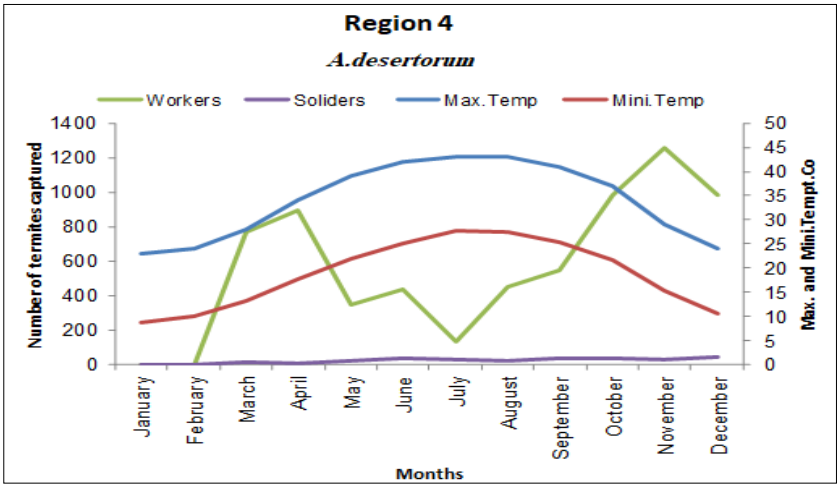

Fig 6: Monthly population fluctuations of foraging *Anacanthotermes ochraceus* (Burmeister) termites under environmental conditions at Abo El-Rich region, Aswan governorate during, 2023 season

Table 2: Statistical analysis for simple correlation and simple regression of different parameter affected by Max., and Mini., soil Temp. ºC, values and monthly population of foraging termites at Abo El-Rich region, Aswan governorate during, 2023 season

Season 2023						
Regions	**Number of forging termites in four regions**		**Weather factors**	**Simple correlation**		**Regression**
				r	**p**	
Region 1	*A. ochracus*	Workers	Max. Temp.ºC.	-0.13	0.67 ^{ns}	-0.001
			Mini.Temp.ºC.	-0.14	0.65^{ns}	-0.001
		Soldiers	Max. Temp. ºC.	0.16	0.62 ^{ns}	0.08
			Mini. Temp. ºC.	0.15	0.64ns	0.08
Region 2	*P. hybostoma*	Workers	Max. Temp.ºC.	0.18	0.57 ^{ns}	0.001
			Mini.Temp.ºC.	0.16	0.61^{ns}	0.001
		Soldiers	Max. Temp.ºC.	-0.26	0.42 ^{ns}	-0.04
			Mini.Temp.ºC.	-0.26	0.41^{ns}	-0.03
Region 3	*P.hybostoma*	Workers	Max. Temp.ºC.	0.52	0.09 ^{ns}	0.004
			Mini. Temp.ºC.	0.50	0.09^{ns}	0.004
		Soldiers	Max. Temp.ºC.	0.42	0.18 ^{ns}	0.07
			Mini. Temp.ºC.	0.42	0.18 ^{ns}	0.06
	P.fscofemoralis	Workers	Max. Temp.ºC.	-0.34	0.28 ^{ns}	-0.01
			Mini. Temp.ºC.	-0.31	0.33^{ns}	-0.005
		Soldiers	Max. Temp.ºC.	0.67	0.02*	0.19
			Mini. Temp.ºC.	0.66	0.02*	0.16
Region 4	*A. desertorum*	Workers	Max. Temp.ºC.	-0.08	0.81 ^{ns}	-0.001
			Mini. Temp.ºC.	-0.06	0.84 ns	-0.001
		Soldiers	Max. Temp.ºC.	0.49	0.098 ^{ns}	0.28
			Mini. Temp.ºC.	0.54	0.07 ^{ns}	0.26
Total		Workers	Max. Temp.ºC.	0.13	0.69 ^{ns}	3.36
			Mini. Temp.ºC.	0.12	0.71 ^{ns}	2.83
		Soldiers	Max. Temp.ºC.	0.28	0.37 ^{ns}	0.02
			Mini. Temp.ºC.	0.28	0.37 ^{ns}	0.02

3. Relationship between numbers of corrugated board traps attacked by three subterranean termites in four regions throughout the experimental period.

Data in Table (3) showed that, numbers of corrugated board traps attacked by three subterranean termites in four regions throughout the experimental period at Abo El-Rich region, Aswan governorate during, 2023 season, in region 1, the number of attacked traps by species *A. ochraceus* increased gradually from January to April and started decline during May, June, then increased again to reach its peak in October and decline again in the remaining months. Number of attacked traps by species *P. hybostoma* in region 2 increased gradually from January to May then decline from Jun to August, and increased gradually from September to reach its peak in October, and decreased again in the remaining months. The number of attacked traps by *P. hybostoma* in region 3 increased gradually from January to reach its peak in April and then decline from May to Jun, and fluctuated from September to December. Number of attacked traps by *P. fscofemoralis* increased gradually from February to May and reach its peak in November, then fluctuated from Jun to October. The peak of numbers attacked trap by species *A. desertorum* in region 4 was in September, while the least one was 0 in January and February, then increased gradually from March to April and increased again in from May to August, to reach its peak in September and decline again in the remaining months.

Data in Table (4) recoded that Simple correlation and regression between numbers of corrugated board traps attacked by three subterranean termites in four regions throughout the experimental period at Abo El-Rich region, Aswan governorate during, 2023 season were highly significant between *A. ochracus* in region 1st and *P. hybostoma* in region 2 rd which r=0.76, b=0.83 and p=0.0045** and highly significant between *A. ochracus* in region 1st and *P. hybostoma* in region 3 th which r=0.76,b= 0.83 and p=0.0045**and insignificant between *A. ochracus* in region 1st and *P. fscofemoralis* in region 3 th which r=0.19,b=0.21 and p=

0.54 ns and significant between *A.ochracus* in region 1 st and *A. desertorum* in region 4 th which r=0.58, b= 0.78 and p=0.047*.

This data agree with Amal *et al*., (2019) [5] where founded that maximum of surface activity of subterranean termite occurred during the moderate weather prevailing in November and early spring (the maximum caught in the traps) while minimum caught of the traps occurred in the hot months.

Table 3: Number of corrugated board traps attacked by three subterranean termites in four regions throughout the experimental period at Abo El-Rich region, Aswan governorate during, 2023 season

Date of inspection	Number of infested corrugated traps				
	Regions				
	1	2	3		4
	A. ochracus	*P.hybostoma*	*P.hybostoma*	*P.fscofemoralis*	*A. desertorum*
Jan.	24	36	52	0	0
Feb.	57	45	67	24	0
Mar.	62	87	78	36	36
Apr.	74	93	98	53	71
May	45	67	54	65	25
Jun.	27	54	53	53	36
Jul.	29	35	97	58	56
Aug.	30	32	32	64	43
Sept.	68	77	68	56	89
Oct.	89	84	97	45	83
Nov.	67	56	53	84	48
Dec.	48	28	86	36	36
Total	620	694	835	574	523
Mean	51.67	57.83	71.18	47.83	43.58
S.E.±	6.12	6.72	6.26	6.29	8.19

Total applied corrugated traps were 100 per region per month

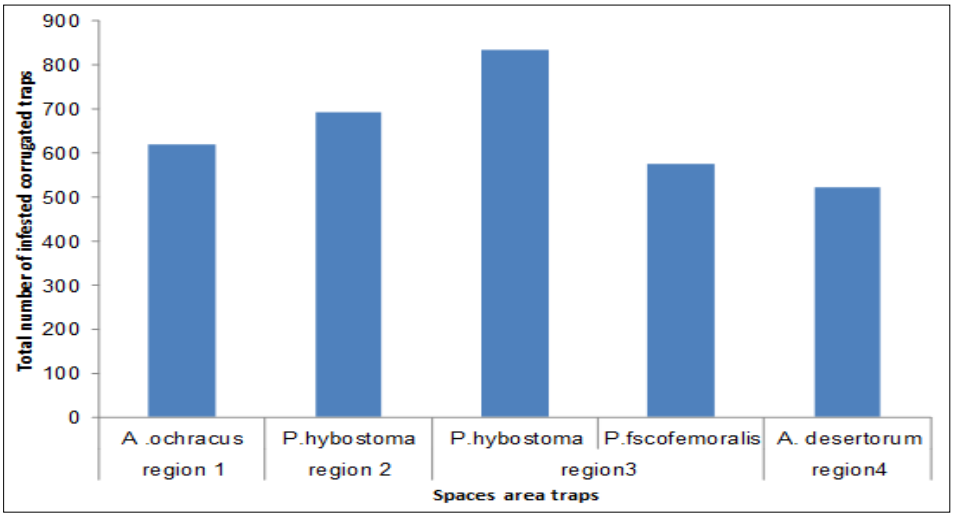

Fig 7: Number of corrugated board traps attacked by three subterranean termites in four regions throughout the experimental period at Abo El-Rich region, Aswan governorate during, 2023 season

Table 4: Simple correlation and regression between numbers of corrugated board traps attacked by three subterranean termites in four regions throughout the experimental period at Abo El-Rich region, Aswan governorate during, 2023 season

Regions	Number of infested corrugated traps	Simple correlation		Regression
		r	p	B
Region 1	*A. ochracus*	0.76	0.0045**	0.68
Region 2	*P. hybostoma*	0.76	0.0045**	0.83
Region 3	*P.hybostoma*	0.51	0.089 ns	0.52
	P.fscofemorali	0.19	0.54 ns	0.21
Region 4	*A. desertorum*	0.58	0.047*	0.78

4. Ratio of soldiers /1000 workers

Number of workers & soldiers, number of soldiers, number of attacked traps, and termites per trap and soldiers/1000 workers of subterranean termites species *A.ochraceus,P.hybostoma,P. fscofemoralis* and *A.desertorum* in four regions planted with Palm trees in Abu El-Rich region Aswan Governorate throughout the experimental period were clarified in Table (5).showed that, subterranean termites species, were recorded in four regions planted with palm trees at various levels of infestation, were harvester termites *Anacanthotermes ochracues* (Burmeister), (Fam.: Hodotermitidae) in region No.1, sand termites *Psammotermes hybostoma*(Desneux), in region No.2&3, *Psammotermes fscofemoralis* (Desneux) (Fam.: Rhinotermitidae) in region No. 3, and desert termites *Amitermes desertorum* (Desneux) (Fam.: Termitidae) in two region No. 4. Regions 1, 2 and 4 were each infested with a single subterranean termite's species; two species *P. hybostoma* and *P. fscofemoralis* were found in region No.3.The total number of all individuals(workers &soldiers) ranged from (17110) in *Anacanthotermes ochracues* to (24555) in *P. hybostoma.* in region No. 2 and (20831) in region No.3 The total number of all individuals (workers &soldiers) of *P. fscofemoralis* ranged from (7436) in region No.3 The total number of all individuals (workers &soldiers) of *A. desertorum* ranged from (7062) in region No.4 The total number of soldiers ranged from 300 individuals (17.53%) of all individuals in *A. ochraceus* to 1051 and 875 individuals represented (42.80%) and (42.00%) of all individuals in *P.hybostoma* in region(2&3), The total number of soldiers ranged from 540 individuals (72.61%) of all individuals in *P. fscofemoralis.* The total number of soldiers ranged from 267 individuals (37.80%) of all individuals in *A. desertorum.* These numbers were collected from (620 to 835) corrugated traps with range of (27.59 to 24.94) termites individuals for two species *A. ochraceus* and *P. hybostoma* per traps and (523 to 574) corrugated traps with range of (13.50 to 12.95) termites individuals for two species *P.fscofemoralis* and *A.desertorum*.The number of individuals termites per trap in this study was higher than those recorded previously by Hosny & Said 1980 [18], Badawi *et al*., 1984 [6]. Differences in the ratio of soldiers /1000 workers among different subterranean termite species indicated that, *A. ochraceus* had ratios of (17.58) in region No.1, the ratio of *P. hybostoma* reached (14.20) and (13.47) in regions No.2&3 respectively. The ratio of *A. desertorum* reached (4.64) and (5.21) in regions No.3&4, respectively. Badawi *et al*., 1984 [6], found that, ratios of (16.4) were recorded for *Amitermes* sp., lower ratio of (6.2) was recorded for *Anacanthotermes* sp. Ahmed, *et al*., (2023) [3]. Founded that the relation between worker and soldier castes showed that the ratio of soldiers / 1000 workers represented 97.34%.

Table 5: Distribution and foraging activity of *Anacanthotermes ochraceus, Psammotermes hybostoma, Psammotermes fscofemoralis* and *Amitermes desertorum* in four regions planted with Palm trees in Abu El-Rich region Aswan Governorate

Number of regions	Termites species	Number of workers & soldiers	Number of soldiers	Number of attacked traps	Termites per trap	Soldiers/1000 Workers
1	*A. ochraceus*	17110	300	620	27.59	17.53
2	*P. hybostoma*	24555	1051	694	35.38	42.80
3	*P. hybostoma*	20831	875	835	24.94	42.00
	P. fscofemoralis	7436	540	574	12.95	72.61
4	*A. desertorum*	7062	267	523	13.50	37.80

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