CHAPTER-5

RESULTS

I.Taxonomical status of termites in study area:

The field key for species identification is given in **Annexure**.
During the study total 15 termite species belonging to 7 genera and 2 families were recorded from the study area **(Table I)**.

Site specific taxonomic status:

Site wise taxonomic status of termites revealed, maximum number of 13 species from 6 genera and 2 families were present in Karjan area, followed by Dabhoi with 9 species 5 genera from 2 families, Padra had 8 species with 5 genera and 2 families. Minimum number of seven species belonging to 5 genera and 2 families were recorded at Savli **(Table II)**.

Taxonomic status of crop pest species:

Out of 15 species recorded in the study area only five species belonging to 3 genera 2 sub families and 2 families were identified as pests of the selected crops *viz.* Sugarcane, Cotton, Wheat and Castor. The species which were recorded as pests were found in all the four study sites.

Crop wise taxonomic status of termites:

Among the four crops selected for study, Sugarcane recorded maximum of five number of termite pest species that were from 3 genera and 2 families. A wheat crop was infested with four species of 3 genera and 2 families, while Cotton was attacked by three species of 2 genera and one family. From Castor, least number of two termite pest species were recorded belonging to 2 genera and 1 family **(Table III)**

Table I

Termite species recorded from study area.

No.	Family	No.	Subfamily	No.	Genus	No.	Species
1	**RHINOTERMITIDAE** Froggatt, 1896	1	**COPTOTERMITINAE** Holmgern, 1911	1	**Coptotermes** Wasmann, 1896	1	*Coptotermes heimi* (Wasmann, 1902)
		2	**HETEROTERMITINAE** Froggatt, 1896	2	**Heterotermes** Froggatt, 1896	2	*Heterotermes indicola* (Wasmann, 1902)
2	**TERMITIDAE** Westwood, 1934	3	**AMITERMITINAE** Kamner, 1943	3	**Amitermes** Silvestri, 1901	3	*Amitermes belli* (Desneux, 1906)
				4	**Microcerotermes** Silvestri, 1901	4	*Microcerotermes beesoni* Snyder, 1933
						5	*Microcerotermes tenuignathus* Holmgren, 1913
		4	**MACROTERMITINAE** Kemner, 1934	5	**Odontotermes** Holmgren, 1912	6	*Odontotermes assmuthi* Holmgren, 1913
						7	*Odontotermes bhagwathi* Chatterjee & Thakur, 1967
						8	*Odontotermes feae* (Wasmann, 1896)
						9	*Odontotermes guptai* Roonwal & Bose, 1961
						10	*Odontotermes obesus* (Rambur, 1842)
						11	*Odontotermes redemanni* (Wasmann, 1893)
				6	**Microtermes** Wasmann, 1902	12	*Microtermes mycophagus* (Desneux, 1905)
						13	*Microtermes obesi* Holmgren, 1911
						14	*Microtermes unicolor* Snyder, 1933
		5	**NASUTITERMITINAE** Hare, 1937	7	**Trinervitermes** Holmgren, 1912	15	*Trinervitermes biformis* (Wasmann, 1902)

Table II

Site specific taxonomic status of termite species in the study area

Site Name	Family	Subfamily	Genus	Species
Padra	2	4	5	8
Savli	2	3	5	7
Dabhoi	2	4	5	9
Karjan	2	4	6	13
Total	**2**	**5**	**7**	**15**

Table III

Crop wise taxonomic status of termite species in the study area

Site Name	Family	Subfamily	Genus	Species
Sugarcane	2	2	3	5
Wheat	2	2	3	4
Cotton	1	1	2	3
Castor	1	1	2	2
Total	**2**	**2**	**3**	**5**

II. Account of Termite Species and their Ecological Status in the study area :

FAMILY I RHINOTERMITIDAE Froggatt, 1896

In the study area, this family was represented by only two species from two genus. Only one species from this family was found as pest of selected crop.

GENUS 1 - Coptotermes Wasmann, 1896

Only one species *Coptotermes heimi* of this genus was recorded in study area.

1. Coptotermes heimi Wasmann, 1902 **(Plate 1.1, Photo 1)**

Distribution: It was reported from all four sites of the study area.

Pest status: During the present study, it was found to be a serious pest of Sugarcane and Wheat.

Nature of damage:

This species was recorded damaging Sugarcane at 'seed cane' stage whereas in Wheat crop it was observed infesting from early to full grown stage.

In Sugarcane the worker castes of *C. heimi* enters through the two cut ends of setts (planting stalk) as well as by tunnelling through the eye bud of the setts at seedling stage thus inhibiting the plant germination..

In case of Wheat, *C. heimi* attacks the root portion making the entire plant weak. Since roots are eaten up, the entire plant becomes loose. With a slight pull the plant comes out. Since the wheat crop is weak, wind force or other disturbances can bend the Spikelet to an extent that the ear head falls or touches the ground resulting in death of the plant even before it reaches the harvesting stage. Pest continues its infestation and starts infesting the ear head fallen on the ground.

Field ecology and Biology:

Coptotermes heimi was found to be a subterranean species. Other than the agriculture fields this species was abundant in the surrounding areas also. A worker tunnels into the wood and eats the inner wood completely leaving the outer shell intact. The nests of *C. heimi* were found under opaque bark of trees, logs and wooden supporters of houses. Large *Tamarindus indica* and *Peltoforum* trees were found surrounding the fields. Percentage of soldiers of *C. heimi* was comparatively higher as compared to other species. Soldiers are aggressive, and exude milky white fluid from fontanelle when disturbed. After heavy rains, this species constructs nest capillaries under opaque bark of dead trees. Capillaries (mud tubes) of more than 6 metres were also recorded. This species was also found attacking the logs of *Acacia senegal* and *Prosopis juliflora*.

GENUS 2 - Heterotermes Froggatt, 1896

Only one species *Heterotermes indicola* of this genus was recorded from the study area.

2. Heterotermes indicola Wasmann, 1902 **(Plate 1.2, Photo 2)**

Distribution: It has been reported only from Dabhoi study site.

Pest status: During study, it was not found to be a pest of any of the crops.

Remarks: Recorded for the first time from study area.

Field ecology and Biology:

H. indicola was found as subterranean species with nest diffused in soil. This species was collected from tree stumps of *Acacia* sp. and *Calotropis procera* present near the fields.

FAMILY II TERMITIDAE Westwood, 1934

This family was represented by 13 species belonging to five genera in the study area. Four species of termites were found as pests of crops from this family.

GENUS 3 - Amitermes Silvestri, 1901

Only one species from this genus was recorded.

3. Amitermes belli (Desneux, 1906). **(Plate 1.3, Photo 3)**

Distribution: It has been documented from Savli and Karjan study sites.

Pest status: During this study, it was not found to be a pest of any crop.

Field ecology and Biology:

Amitermis belli was collected from surroundings of fields from dead tree stumps. It was found constructing sponge like nests inside the stumps of cut trees, *Melia azadirachta* and *Eucalyptus trees* were around the Agricultural fields.

GENUS 4 - Microcerotermes Silvestri, 1901

Only 2 species from this genus are recorded.

4. Microcerotermes beesoni Snyder, 1933. **(Plate 2.4, Photo 4)**

Distribution: It was reported from study sites of Savli and Karjan.

Pest status: During this study, it was not found to be a pest of any crop.

Field ecology and Biology:

M. beesoni was recorded making narrow galleries in the soil connected to the dry and moist logs surrounding the fields.

5. Microcerotermes tenuignathus Holmgren, 1913. **(Plate 2.5, Photo 5)**

Distribution: It was reported from Padra and Dabhoi study sites.

Pest status: During present study, this species is not found as pest of any crop.

Field ecology and Biology:

M. tenuignathus was found as soil dwelling species in the surroundings of the fields where it builds under ground nests with narrow galleries under logs.

GENUS 5 - Odontotermes Holmgren, 1912.

This genus was represented by six species in the study area.

6. Odontotermes assmuthi Holmgren, 1913. **(Plate 2.6, Photo 6)**

Distribution: It was recorded from Padra and Karjan study sites.

Pest status: During the present study, this species was not found as pest.

Field ecology and Biology:

O. assmuthi is one of the subterranean species and constructs diffused and narrow galleries in the soil. This species was also found under logs.

7. Odontotermes bhagwathi Chatterjee & Thakur, 1967. **(Plate 3.7, Photo 7)**

Distribution: This species was recorded only from only Karjan study site.

Pest status: During present study, this species was not found to be a pest of any crop.

Field ecology and Biology:

O. bhagwathi was collected under boulders and huge logs. It was found constructing under ground galleries in the moist places.

8. Odontotermes feae (Wasmann, 1896). **(Plate 3.8, Photo 8)**

Distribution: This species was recorded only from study site of Karjan.

Pest status: During the present study, this species was not found infesting any crops.

Field ecology and Biology:

O. feae was present under huge logs and under boulders in high moisture places.

9. Odontotermes guptai Roonwal & Bose, 1961. **(Plate 3.9, Photo 9)**

Distribution: It was present in study sites of Dabhoi and Karjan.

Pest status: This species was not found to be a pest of any of the crops during present study.

Remarks: This species was first time recorded from Gujarat state.

Field ecology and Biology:

O. guptai is subterranean in habit and was documented from ground galleries, logs and dung around the agriculture fields.

10. Odontotermes obesus (Rambur, 1842). **(Plate 4.10, Photo 10)**

Distribution: This species was very common in the study area and recorded from all four sites.

Pest status: It was found attacking young plants as well as crops nearing maturity. Infestation was seen in all the crops i.e. Cotton, Sugarcane, Wheat and Castor.

Nature of damage:

Sugarcane requires considerable amount of water during the period of active growth. Sugarcane propagates vegetatively by stem cuttings of three to five joints termed seed cane or seed pieces or by ratooning. The dormant buds on the portion of the cane left underground after harvesting, sprout in two or three weeks time producing a new crop known as stubble.

In Sugarcane, at seedling stage this species enters into the setts through the cut ends and also by making tunnels through the root system into the shoot. At maturing stage it damages the root as well as makes soil sheet on outer side of the shoot under which it consumes the crop.

In Wheat, it attacks the tender roots of young plant and results in failure of growth. This leads to dislodgement of the plant. A full grown plant also gets the infestation from roots to the stem reaching up to the top of the plant. Plants bend; ear head touches the ground and dies.

In cotton, it attacks both roots and shoot. In seedling stage it affects the root system while at maturing stage it attacks by tunnelling the stem and also makes soil sheet on outer side of the stem which is nearer the ground. If young roots are attacked plant fails to grow.

Similarly, in castor also both roots and shoots are attacked. From the tap roots the infestation continues till the shoot. In case of castor crop stems up to one ft. above the ground are most vulnerable to termite attack. Fruit of the infested Castor crop becomes loose and falls down. *O. Obesus* makes a soil sheath on the fallen fruit and starts consuming it.

Field ecology and Biology:

O. *obesus* was found to be the main mound building termite in study area. It constructs dome shaped mounds which may be unilocular or multilocular. This species was widely distributed and very common, damage was also of various types. Ecologically it was found to be a variable species commonly found in almost all the micro habitats. It was also recorded from wooden structures surrounding the agricultural fields which were in contact with the soil, bark of living trees, under stones and logs, under leaf litter, under heap of weed and crop residues, stumps of dead trees and also from fuel

wood material. It was found making soil sheeting on fallen tree branches and twigs. .*Polyalthia longifolia* and shrub like *Vitex nigundo* were seen in the surroundings.

11. Odontotermes redemanni Wasmann, 1893 **(Plate 4.11, Photo 11)**

Distribution: This was recorded from all four sites of the study area.

Pest status: This species was found to be the pest of Sugarcane and Wheat crops.

Remarks: This species has been recorded as pest of agriculture crop for the first time from Gujarat.

Nature of damage:

In Sugarcane, this species tunnels the stem of maturing Sugarcane. This results in premature death of the plant. Plant becomes weak due to less conduction of nutrients. It sometimes enters the stem through the holes in the stem made by Sugarcane stem borer.

In Wheat, this species is found to damage the root system both at seedling stage and maturing stage, whereas damage to stem is only at mature stage.

Field ecology and Biology:

O. redemanni was also widely distributed in the study area. The mound chambers were internally connected by tunnels. This was a mound building termite. The outer wall of the mound was thick and solid. It is reported from the logs of many tree species, dead tree stumps and under stones.

GENUS 6 - Microtermes Wasmann, 1902.

Three species were present belonging to this genus.

12. Microtermes mycophagus Desneux, 1905 **(Plate 4.12, Photo 12)**

Distribution: It was documented in all the four study sites.

Pest status: During the present study, this species was found to be the pest of cotton, sugarcane and castor.

Nature of damage:

In Sugarcane, this species tunnels through the eye bud and cut ends of sowed setts, due to which sett fails to grow. *M. mycophagus* also damages the root system of newly emerging shoots.

In Cotton, this species damages the root system at seedling as well as fully grown stage.

In case of Castor, this was found to be the most important pest of this crop. In tender plants it attacks the roots tunnelling into the stem. It nibbles the

tap root. In the grown up plants the termites were seen around the root zone and in certain cases up to 2 feet of the stem. The fine roots showed more damage. Some times galleries were also found in the roots. It also attacked the fallen fruits of the crop.

Field ecology and Biology:

M. mycophagous was found as a subterranean species, living under stones, logs, cow dung, heap of weed and crop residues, dead tree stumps, under leaf litter etc. and makes small chambers for fungus combs. These chambers are connected with each other through communicating galleries.

This species has also been collected from *Acacia tortolis, Calotropis procera, Zizyphus numularia, Euphorbia caducifolia.*

13. Microtermes obesi Holmgren, 1913. **(Plate 5.13, Photo 13)**

Distribution: It was reported from all the four sites of study area.

Pest status: It was recorded as crop pest of cotton, sugarcane and wheat.

Nature of damage:

Severity of damage in Sugarcane crop due to *M. obesi* was more as compared to Wheat and cotton.

In Sugarcane it is found to tunnel through internodes of the cane in maturing stage and was found causing damage to the root system of Sugarcane at seedling stage.

This species was found damaging the root system of wheat at seedling as well as maturing stages while sometimes found cutting the stem near ground level at maturing stages of the crop. It attacks the roots of the germinated shoot leading to drying and ultimately results in failure of growth. In mature plants infestation was observed in the root portion, Ear head becomes dry and results in no grain or failure in grain production.

In case of cotton this species was found tunnelling the stem near ground and root portion only at maturing stage. In a full grown crop or crop near maturity through the roots *M. Obesi* reaches the stem finishing the entire plant.

Field ecology and Biology:

M. obesi was one of the most common and widely distributed species in the study area. This species had wide tolerance to various ecological factors in all the four study areas.

It was found as a subterranean termite and constructs diffused type of nest in soil. The nests have small, round chambers connected by means of thin, long capillaries. It was also recorded from stumps of dead trees, logs,

bamboo fencing, tree bark, under leaf litter, under opaque tree bark, dung, under heap of weed and crop residues in the crop fields.

14. Microtermes unicolor Snyder, 1933. **(Plate 5.14, Photo 14)**

Distribution: It was recorded from Dabhoi and Karjan study sites.

Pest status: During this study, it was not recorded as pest of any of the crops studied.

Field ecology and Biology:

Being subterranean *M. unicolor* constructs diffused type of nest in soil. This species was found present under logs within dead tree stumps.

GENUS 7 - Trinervitermes Holmgren, 1912

Only one species of this genus was recorded.

15. Trinervitermes biformis Wasmann, 1902 **(Plate 5.15, Photo 15)**

Distribution: This species was recorded from only Padra and Karjan.

Pest status: During this study, it was not seen infesting as pest of agricultural crops.

Remarks: It was not widely distributed species in study area.

Field ecology and Biology:

Nests of *T. biformis* were subterranean with small chambers and coated with black matter inside, usually recorded from rock crevices and under boulders.

Significant research effort is in progress to understand the ecology of field margins at a range of spatial scale.

III. PERCENT PRESENCE OF PEST SPECIES:

Table IV

Overall percent presence of termite pest species in different crops

Pest species	Castor	Cotton	Sugarcane	Wheat
Coptotermes heimi	0.00	0.00	75.86	24.14
Odontotermes obesus	10.19	27.42	42.88	19.51
Odontotermes redemanni	0.00	0.00	26.80	73.20
Microtermes mycophagus	52.91	29.09	18.01	0.00
Microtermes obesi	0.00	5.61	57.76	36.64

Percent presence of all pest species are calculated and listed in table **(Table VI).**

Incidence and attack of *Coptotermes heimi* was maximum in Sugarcane (75.86) and Wheat (24.14) crops.**(Table IV).** It was found attacking the seedling stage of Sugarcane and maturing stage of Wheat **(Table V, Graph 1)**

Odontotermes obesus was found pest of all four crops at both stages. *O. obesus* was more prominent in the Sugarcane (42.88) than Cotton (27.42), Wheat (19.51) and Castor (10.19) **(Table IV)**. This species was much more during seedling stage (82.4) as compared to maturing stage (17.6) of Sugarcane crop. Such difference in occurrence between the two stages is only within Sugarcane as compared to other crops **(Table V, Graph 2)**.

Odontotermes redemanni shows notable difference between Sugarcane (26.80) and Wheat (73.20) **(Table IV)**, but seriousness of attack was much more at maturing stage of Sugarcane crop **(Table V, Graph 3)**.

Microtermes mycophagus was found attacking Castor more (52.91) than Cotton (29.09) and Sugarcane (18.01) crops **(Table IV)**. This species infested the seedling stage of Sugarcane, Castor and Cotton much more than maturing stage **(Table V, Graph 4)**.This was not recorded in Wheat crop.

Microtermes obesi was found to be a serious pest of Sugarcane crop (57.76) than wheat (36.64) and Cotton (5.61) crops **(Table IV)**. In Castor this species was not recorded .*M. obesi* was found more destructive at seedling stage of Sugarcane than maturing stage while found more damaging at maturing stage of wheat than seedling stage, but was found infesting only the maturing stage of Cotton crop **(Table V, Graph 5)**.

Percent presence of the species, present outside the agriculture fields is calculated and listed. **(Table VI, Graph 6).** Pest species *Odontotermes obesus*

had higher incidence of occurrence (28.16) in all the study areas over remaining 14 species.

Microtermes obesi and *Microtermes mycophagus* had 25.26 & 16.69 percent presence respectively. *Odontotermes redemanni* had 9.03 and *Coptotermes heimi* had 5.38 percent occurrence **(Table VI, Graph 6)**.

Table V

Percent presence of pest species at seedling and maturing stage of various crops

Termite pest species	Crop stage / Crop	CASTOR	COTTON	SUGARCANE	WHEAT
Coptotermes heimi	Seedling Stage	0.0	0.0	100.0	0.0
	Maturing Stage	0.0	0.0	0.0	100.0
Odontotermes obesus	Seedling Stage	58.6	44.2	82.4	40.5
	Maturing Stage	41.4	55.8	17.6	59.5
Odontotermes redemanni	Seedling Stage	0.0	0.0	0.0	40.2
	Maturing Stage	0.0	0.0	100.0	59.8
Microtermes mycophagus	Seedling Stage	84.8	62.9	100.0	0.0
	Maturing Stage	15.2	37.1	0.0	0.0
Microtermes obesi	Seedling Stage	0.0	0.0	78.3	28.6
	Maturing Stage	0.0	100.0	21.7	71.4

Table VI

Percent presence of all species recorded from study area

Sr. No.	Termite species	% Presence
1	*Coptotermes heimi*	5.38
2	*Heterotermes indicola*	0.87
3	*Amitermes belli*	1.33
4	*Microcerotermes beesoni*	2.03
5	*Microcerotermes tenuignathus*	1.61
6	*Odontotermes assmuthi*	1.82
7	*Odontotermes bhagwathi*	0.91
8	*Odontotermes feae*	1.16
9	*Odontotermes guptai*	2.24
10	*Odontotermes obesus*	28.16
11	*Odontotermes redemanni*	9.03
12	*Microtermes mycophagus*	16.69
13	*Microtermes obesi*	25.26
14	*Microtermes unicolor*	2.53
15	*Trinervitermes biformis*	0.99

IV.Factors promoting termite activity: (Table VII)

Food availability:

It was observed that the food availability promotes the activity of termites since wooden structures, tree bark, leaf litter, crop residue, and dry weed heaps are good food for termites. Pre infested dung manure with termites is also one of the factors for termite attack to crops.

Moisture:

During study it was observed that, shelter places, soil type and plant cover were providing optimum temperature and moisture to the termites.

Shelter

It was noted that, big objects lying outside the field like big boulders, manure heaps, huge wooden logs, opaque tree bark and tree stumps provide shelter for termites. They can construct galleries and number of tubes under this. Sometimes these tubes extend towards the fields and during the time of accessing the food the roots of crops are encountered, which they start infesting.

Soil type

In study area, the crop fields of Padra, Savli and Dabhoi were composed of sandy loam soil where as crop fields of Karjan were composed of deep black soil. Incidence of termite attack was more at Padra, Savli and Dabhoi than Karjan. It may be due to high water evaporation rate and low water holding capacity of sandy loam soil which forces the termite towards the root system of crop where it can access moisture.

Plant cover

It was found that, more plant cover of the crop increases the ground shade and reduces the water evaporation rate thus increasing the humidity and moisture of the soil which was the main factor that promoted the termite activity. Crops like Sugarcane provide maximum ground shade and are more susceptible to termite attack, which is evident from five numbers of species being recorded as pest on it. Castor provides least ground shade and had only two species. Next to Sugarcane, Wheat provides more ground shade

than cotton, which was apparent from four species being reported as pest on Wheat while three pest species were reported to attack Cotton.

Influencing secondary infestation

Crops that were already suffering from infestation by pests like Aphids, Jassids, White grubs, Gryllus sp. and many others were more vulnerable to attack by termites. Crops which suffered from mechanical injury, fungal infections or lack of irrigation etc. catch termite infestation easily.

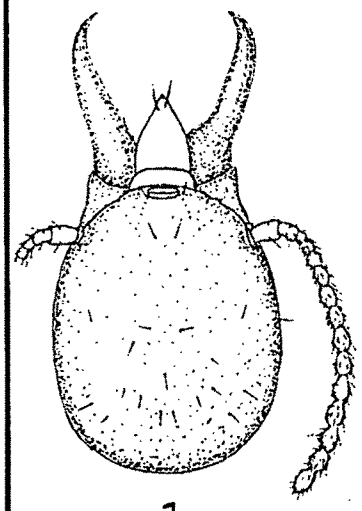
Results of the study clearly indicate that the termite fauna has become an integral part of Agricultural fields and their surrounding areas and requires special attention and control.

Table VII **Occurrence of termite species in different microhabitats in the study area**

No.	Termite species	Micro habitat
1	*Coptotermes heimi* Wasmann, 1902	nest in soil, under moist bark, under logs and wooden supporters of houses
2	*Heterotermes indicola* (Wasmann, 1902)	dead tree stumps
3	*Amitermes belli* (Desneux, 1906)	dead tree stumps
4	*Microcerotermes beesoni* Snyder, 1933	from galleries in soil and dry and moist logs
5	*Microcerotermes tenuignathus* Holmgren, 1913	from ground galleries and logs
6	*Odontotermes assmuthi* Holmgren, 1913	from soil galleries
7	*Odontotermes bhagwathi* Chatterjee & Thakur, 1967	under stone and logs, from ground galleries
8	*Odontotermes feae* (Wasmann, 1896)	under log and boulders
9	*Odontotermes guptai* Roonwal & Bose, 1961	from ground galleries, logs and dung
10	*Odontotermes obesus* (Rambur, 1842)	mound, log, bamboo fencing, under stone, under leaf litter, bark of living tree, dead tree stumps, under grass weed and crop residues, under dung, fallen tree branches and twigs, fuel wood, under leaf litter
11	*Odontotermes redemanni* (Wasmann, 1893)	mound, logs, tree stumps, tree bark, under stones
12	*Microtermes mycophagus* (Desneux, 1905)	galleries under stones, under dung, heap of weed and crop residues, under logs, tree stumps, under leaf litter
13	*Microtermes obesi Holmgren, 1911*	diffused soil chambers, dead tree stumps, logs, bamboo fencing, tree bark, under, under leaf litter, opaque tree bark, dung, heap of weed and crop residues
14	*Microtermes unicolor* Snyder, 1933	under logs and dead tree stumps
15	*Trinervitermes biformis* (Wasmann, 1902)	rock crevices and under boulders

PLATES (1 TO 5)

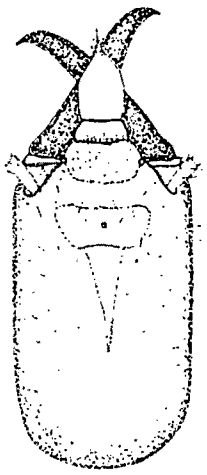
(LINE DIAGRAMS)



1

Coptotermes heimi (Wasmann, 1902)

Heterotermes indicola (Wasmann, 1902)



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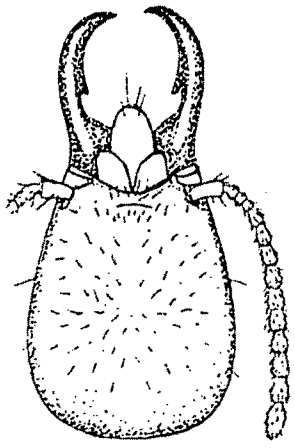
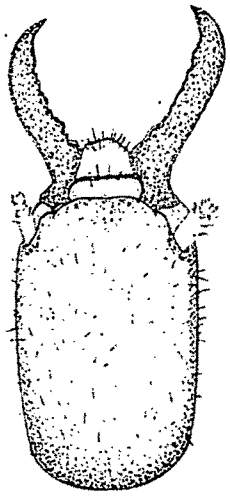


3

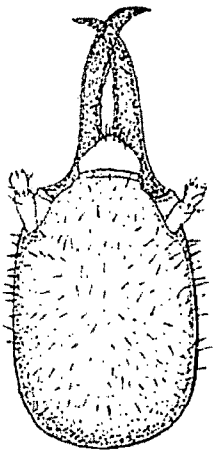
Amitermes belli (Desneux, 1906)

PLATE 1



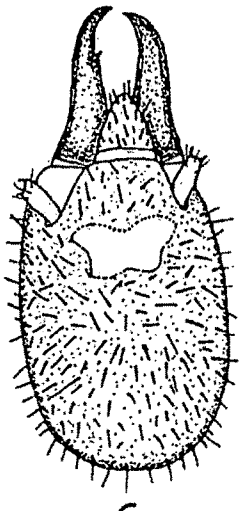
4

Microcerotermes beesoni Snyder, 1933



5

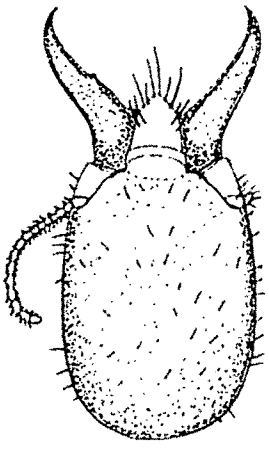
Microcerotermes tenuignathus Holmgren, 1913



6

Odontotermes assmuthi Holmgren, 1913

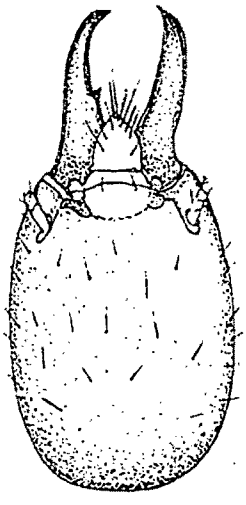
PLATE 2



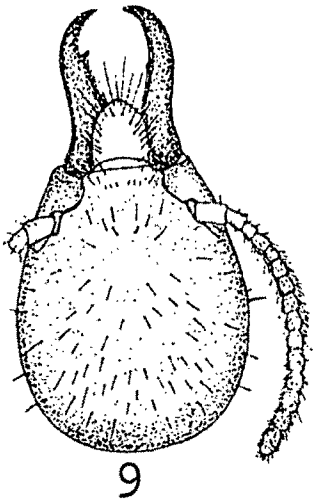
7

Odontotermes bhagwathi Chatterjee & Thakur, 1967

Odontotermes feae (Wasmann, 1896)



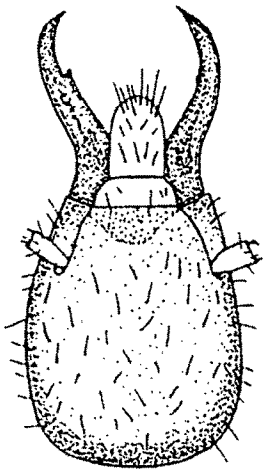
8



9

Odontotermes guptai Roonwal & Bose, 1961

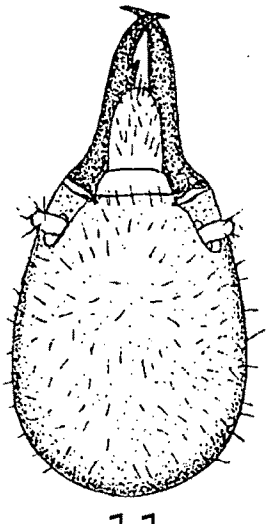
PLATE 3



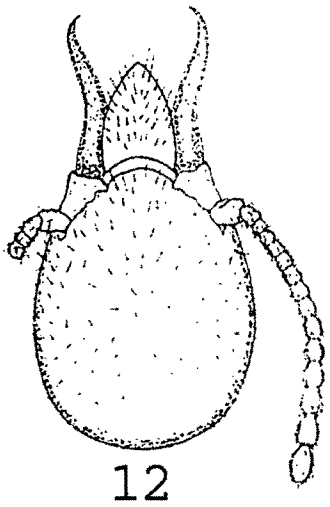
10

Odontotermes obesus (Rambur, 1842)

Odontotermes redemanni (Wasmann, 1893)



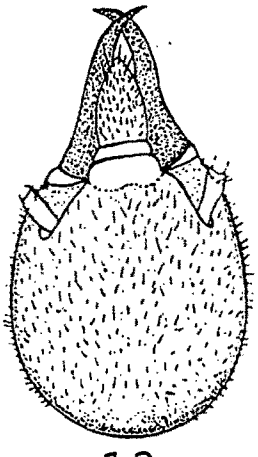
11



12

Microtermes mycophagus (Desneux, 1905)

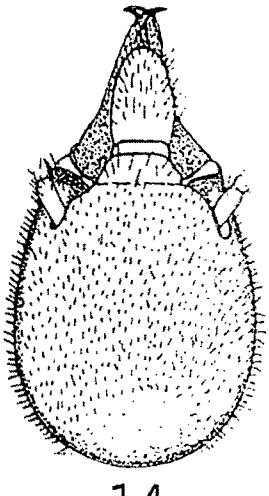
PLATE 4



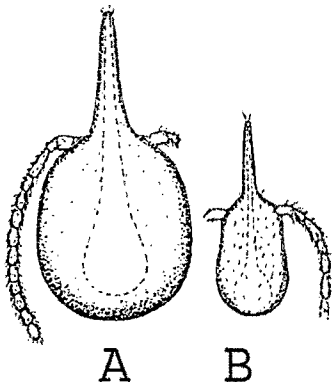
13

Microtermes obesi Holmgren, 1911

Microtermes unicolor Snyder, 1933



14



A B

15

Trinervitermes biformis (Wasmann, 1902)

A. Major, B. Minor

PLATE 5

PHOTOGRAPHS

(1 TO 16)

Photo. 1 *Coptotermes heimi*

Photo. 2 *Heterotermes indicola*

Photo. 3 *Amitermes belli*

Photo. 4 *Microcerotermes beesoni*

Photo. 5 *Microcerotermes tenuignathus*

Photo. 6 *Odontotermes assmuthi*

Photo. 7 *Odontotermes bhagwathi*

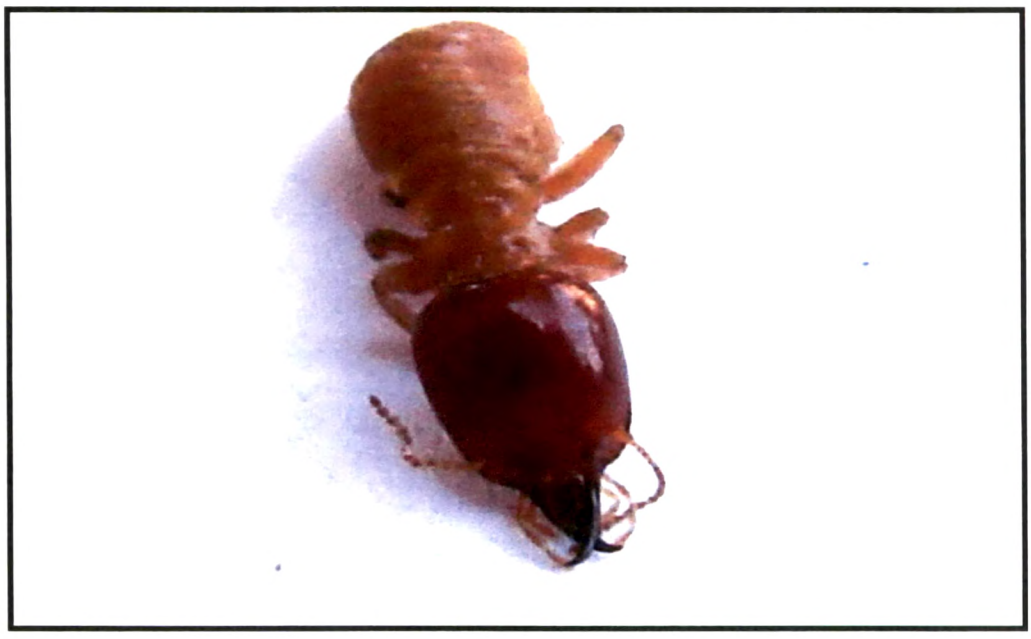


Photo. 8 *Odontotermes feae*

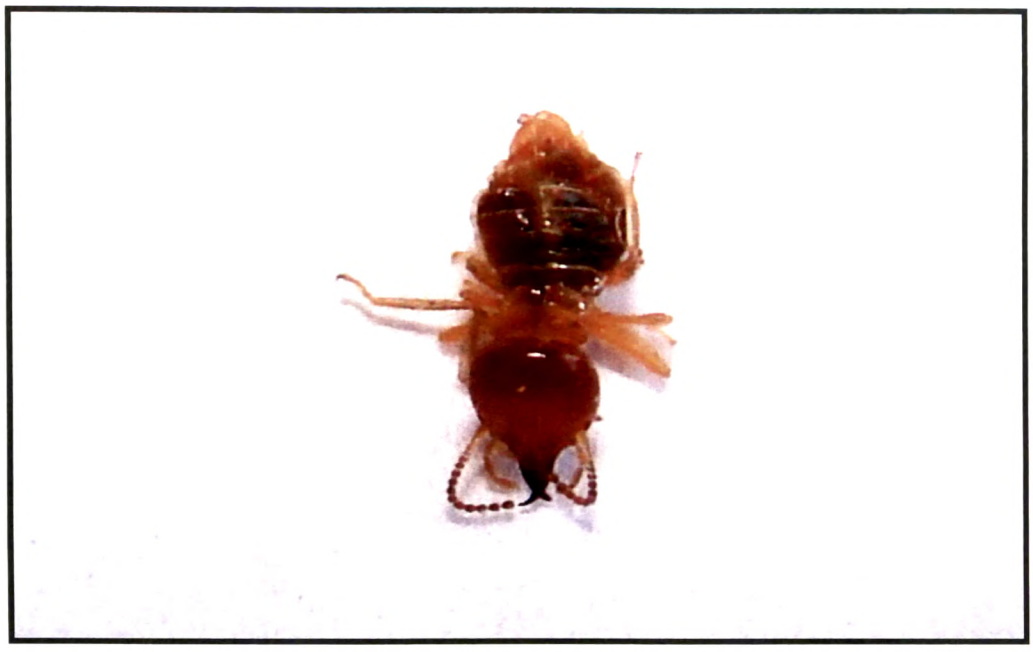


Photo. 9 *Odontotermes guptai*

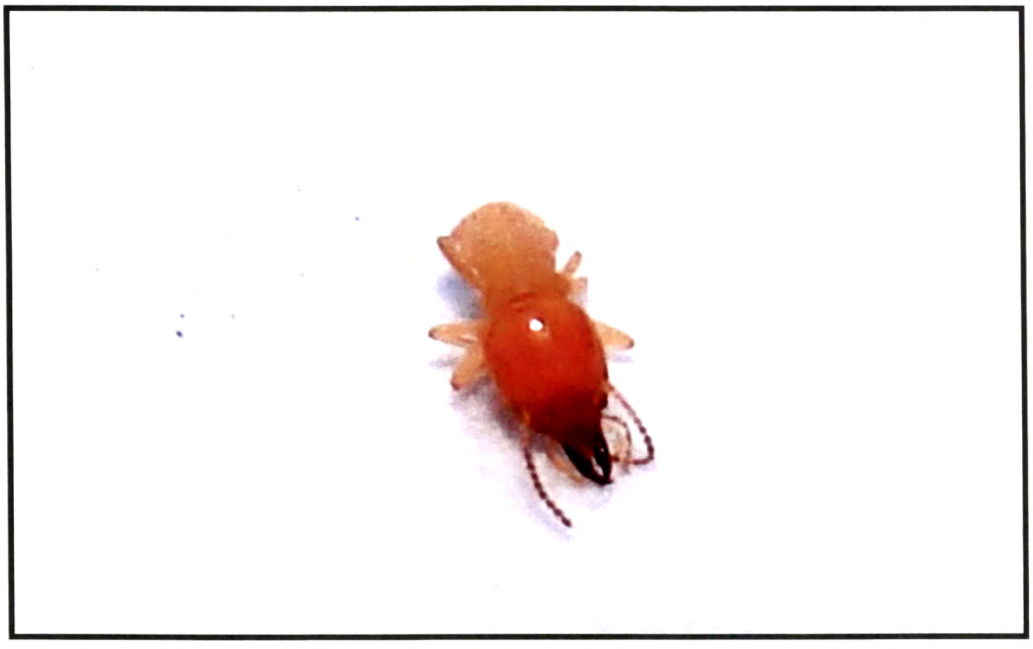


Photo. 10 *Odontotermes obesus*

Photo. 11 *Odontotermes redemanni*

Photo. 12 *Microtermes mycophagus*

Photo. 13 *Microtermes obesi*

Photo. 14 *Microtermes unicolor*

Photo. 15 *Trinervitermes biformis*

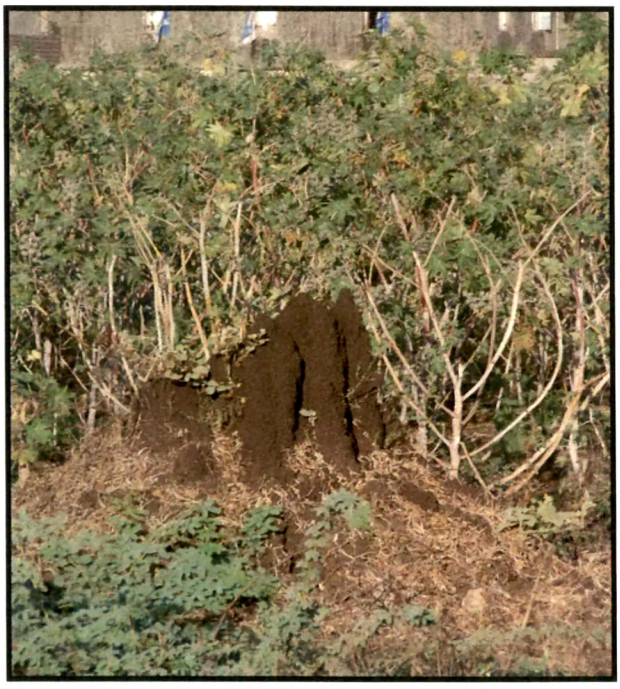
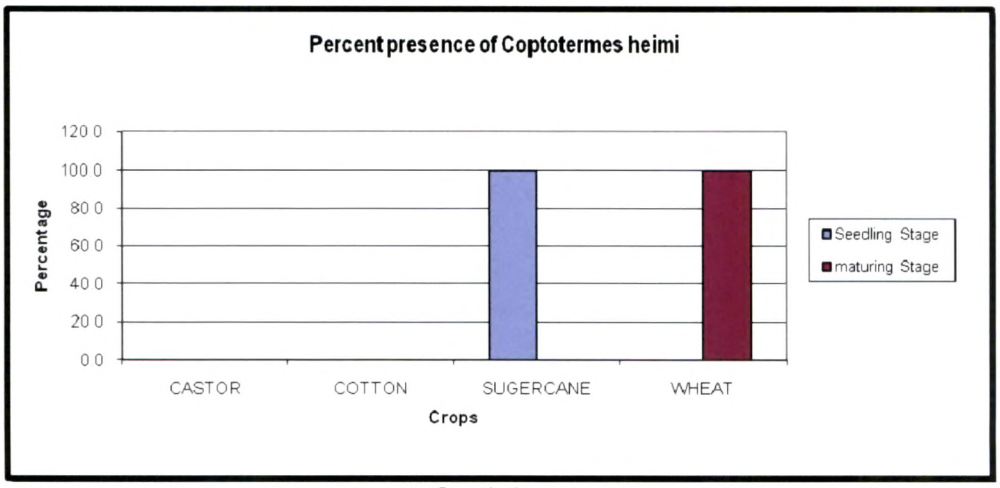


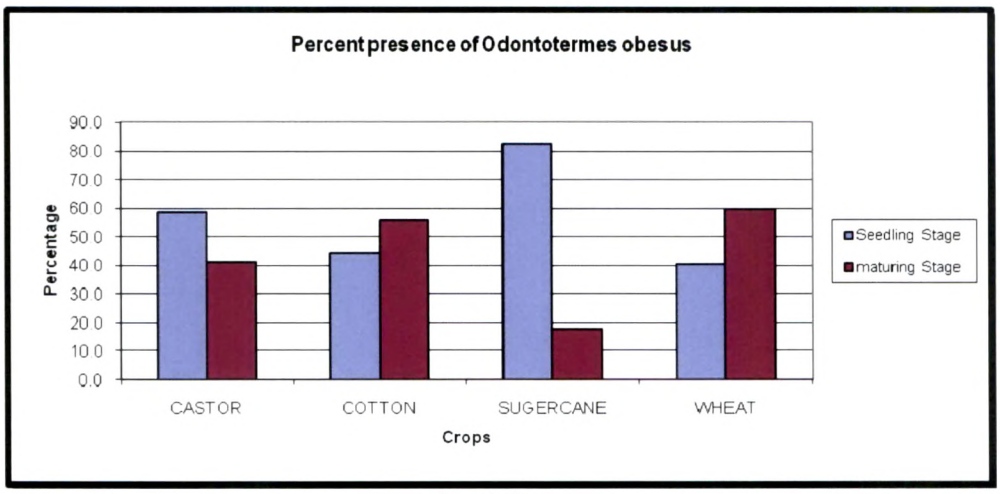
Photo. 16 Mound of *Odontotermes obesus* in Castor field.

GRAPHS

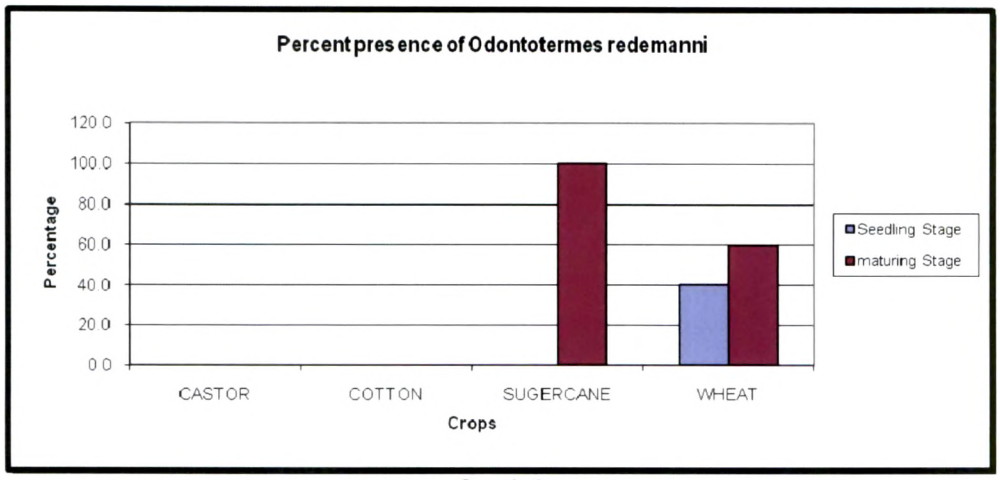
(1 TO 6)



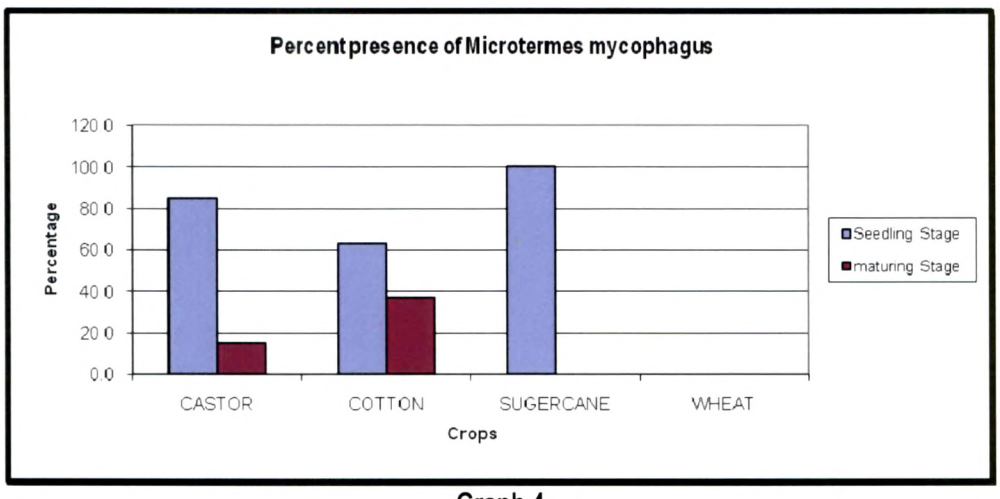
Graph 1



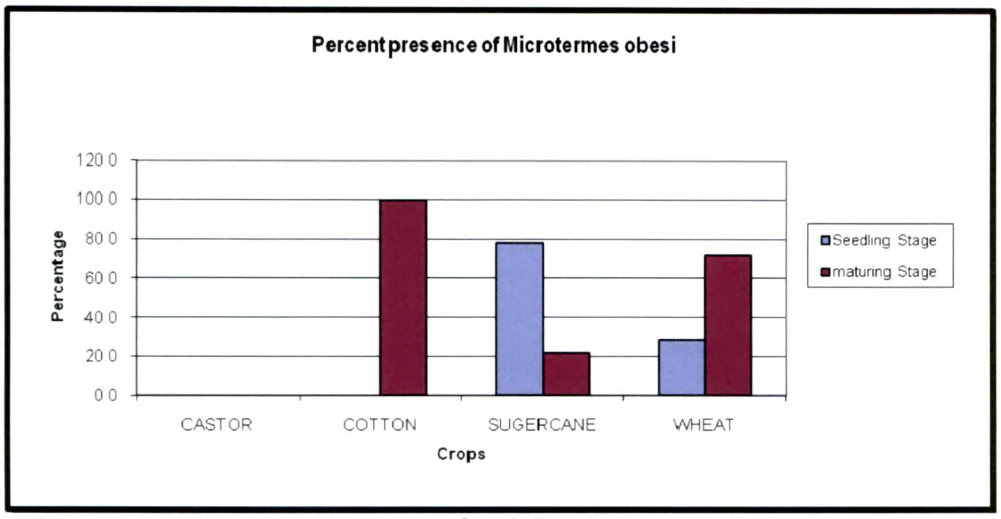
Graph 2



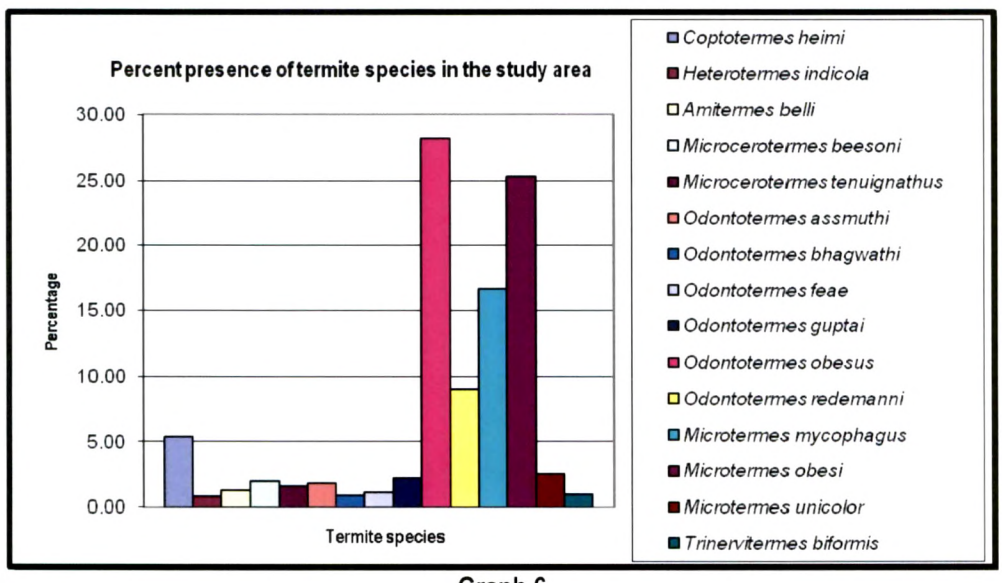
Graph 3



Graph 4



Graph 5



Graph 6