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Feeding Preferences of *Microcerotermes championi* (Snyder) for Different Wooden Blocks Dried at Different Temperatures under Forced and Choice Feeding Conditions in Laboratory and Field

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Abstract.- *Microcerotermes championi* (Snyder) was exposed to eight commercial wood species for studying the drying effect of temperature on natural resistance of wood and feeding preferences of *M. championi* under forced and choice conditions in the laboratory and the field. Wooden blocks of *Cedrus deodara, Tectona grandis, Acacia arabica, Morus alba, Ficus religiosa, Melia azederach, Mangifera indica, Azadirachta indica* were dried at 40, 50, 60, 70 and 80°C. It was observed that wood consumption was proportional to the degree of drying temperature, increase in drying temperature would increase consumption percentage. The feeding propensity of *M. championi* was *Acacia arabica* > *Ficus religiosa* > *Azadirachta indica* > *Morus alba* > *Melia azederach* > *Mangifera indica* > *Cedrus deodara* > *Tectona grandis.*

Key words: Feeding preferences, *Microcerotermes championi*, drying temperature effect, commercial wood species.

INTRODUCTION

When the natural habitat of termites is altered by humans only then they become pest (Pearce, 1997). Damage to the wooden structures and other cellulosic materials by termites has been estimated to exceed $ 3 billion annually worldwide (Su and Scheffrahn, 1990). The termite species are different in different ecological zones of Pakistan and may have different feeding preferences. For example, *Anacanthotermes vagans* does maximum damage to woodwork in buildings in Chaman, district Quetta, but is absent from the Punjab, where *Coptotermes heimi, Microcerotermes unicolar, Odontotermes obesus* and *Heterotermes indicola* play havoc (Akhtar, 1983).

In South-East Asia, termite attack is more commonly known to occur on older trees, and the termites responsible are *C. curvignathus* (Cowie *et al.*, 1989; Tho and Kirton, 1992; Kirton and Wong, 2001; Kirton and Cheng, 2007) and *M. dubius* (Tho, 1982; Chey, 1996; Kirton and Cheng, 2007), which have more specialized abilities to kill trees.

With the rising cost of repairs and replacements for the timber structures, a sound knowledge of the natural resistance of the native timbers and feeding preferences of native species of termite is essential (Aihetasham, 2008). Several investigators have made their contributions regarding feeding preferences of termites (Howick, 1975; Amburgy and Beal, 1977; Ruyooka, 1978; Akhtar and Ali, 1979; Afzal, 1981; Roonwal, 1982; Lenz, 1982; Akhtar and Raja, 1985; Waller, 1988, Delaplane and Lafage, 1989; Waller *et al*., 1990; Akhtar and Kausar, 1991; Wilkins, 1992; Grace and Yamamoto, 1994; Bustamante and Martius, 1998; Cornelius and Osbrink, 2001; Ripa *et al.*, 2002; 2003; Cornelius *et al.*, 2004; Saran and Rust, 2005; Arango *et al*., 2006; Katsumata *et al*., 2007; Manzoor *et al*., 2009).

The factors affecting wood consumption by termites are numerous and highly interrelated. It has been widely accepted that wood species palatability is one of the influential parameters of termite wood consumption (Rasib, 2005, 2008). High temperature treatment could increase the preference of termites to treated woods as the strength of wood decreases with the increase in temperature and it becomes more vulnerable to termite attack (Aihetasham, 2008).

Based on the importance of drying temperature on timber resistance to termite, the present study was undertaken to investigate the feeding preference of *M. championi* to eight different commercial woods dried at different temperatures under forced and choice feeding

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conditions in the laboratory and the field.

MATERIALS AND METHODS

Termite collection

M. championi termite colonies were collected from the base of *Saccharum munja* from Wagha village.

Soil

The soil was taken from the garden area of Zoology Department, sieved and then oven dried for 24 hours at 70^{o}C.

Wooden species collection and preparation

Eight different trees *viz.*, *Cedrus deodara*, *Acacia arabica*, *Tectona grandis*, *Mangifera indica*, *Morus alba*, *Azadirachta indica*, *Ficus religiosa* and *Melia azederach* were selected to collect wood for observation of feeding effects of *M. championi*. Sixty blocks measuring 4.2×2.5×1.1 cm of each type of wooden species were cut, polished with sand paper and oven dried for 48 h at 40, 50, 60, 70 and 80^{o}C. The blocks were weighed after drying.

Laboratory feeding

Forced feeding

Each type of dried wooden block was placed in a glass Petri plate (9.8 cm diameter and 2 cm high) and 50 worker termites were added and observed for two weeks. The wooden block was kept moist and the whole experiment was held at constant 26^{o}C temperature. Three replicates of each wooden block were used. After 14 days the blocks were dried at the same temperature at which they were dried before exposure to termites, weighed and the amount of wood consumed calculated. The number of termites survived was also recorded. At the end, data was statistically analyzed.

Choice feeding

Two different wooden species were offered to the workers of *M. championi*. Combinations of wooden species were *C. deodara* / *M. alba*, *A. arabica* / *T. grandis*, *F. religiosa* / *M. azederach* and *M. indica* / *A. indica*. The wood blocks were placed side by side with an alternate block combination in a same Petri plates. Fifty worker termites were released in each plate for 14 days. At the end of the test, the wooden blocks were dried at their respective temperature, and weighed to determine the amount of wood consumed. The data was statistically analyzed.

Field feeding

Forced feeding

Each type of dried wooden block was tied with copper wire and buried for two weeks in the selected area where the colonies of termites were present. Three replicates of each wooden block were used. After two weeks, wooden blocks were removed from the field and re-weighed. At the end of the test, data of mean wood consumed were statistically analyzed.

Choice feeding

Two different wooden species were offered to the termite workers. Combinations of wooden species were the same as described above for laboratory feeding (choice feeding). Rest of the methodology was same as of described for the forced feeding field test.

Data analysis

Data for wood consumption, percent wood consumption and percent survival were subjected to analysis of variance (ANOVA) and mean values significantly different at 5 percent level were separated by Duncan's Multiple Range test (SPSS version 13).

RESULTS

Laboratory forced feeding

Table I shows wood consumption in milligrams and percent wood consumption, whereas Table II shows percent survival of termites confined to different wooden blocks dried at different temperatures, under forced feeding laboratory experiments. Maximum wood consumption was observed on the wooden blocks of *A. arabica* dried at 40, 50, 60, 70 and 80°C. However minimum consumption was recorded on wooden blocks of *T. grandis* dried at different temperatures. Survival of termites also showed an increase with increase in temperature at which the blocks were dried.

Table I.- Amount of wood consumed (mg) by *M. championi* (Snyder) in 14 days in no choice laboratory and field experiments. Figure in parenthesis indicate consumption.

Wood blocks used*	Laboratory experiments					Field experiments				
	40°C	50°C	60°C	70°C	80°C	40°C	50°C	60°C	70°C	80°C
Acacia arabica	1393.33± 96.09b (16.22%)	1593.33± 368.28b (16.47%)	1813.33± 136.13b (18.73%)	1943.33± 527.66b (19.85%)	2636.66± 208.40a (22.96%)	1063.33± 54.84d (10.27%)	2035.00± 35.00c (20.48%)	2672.00± 218.00b (29.50%)	2809.33± 89.50b (32.42%)	3242.33± 265.39a (32.51%)
Ficus religiosa	840.00± 557.58b (8.75%)	1033.33± 105.98b (10.63%)	1083.33± 162.89b (11.40%)	1590.00± 494.26b (15.53%)	2370.00± 470.85a (21.82%)	756.66± 231.58d (8,06%)	1856.66± 115.90c (18.02%)	2350.00± 95.39b (21.19%)	2776.66± 187.70a (25.41%)	2853.33 ±23.09a (26.30%)
Azadirachta indica	683.33± 166.53d (6.48%)	1026.66± 41.63c (9.16%)	1096.66± 15.27c (10.56%)	1763.33± 146.40b (15.07%)	2303.33± 153.73a (18.86%)	680.00± 280.00d (6.60%)	1850.00± 52.91c (16.38%)	2246.66± 321.29bc (17.46%)	2523.33± 377.53ab (21.63%)	2786.66 ±130.51a (23.19%)
Morus alba	533.33± 37.85d (4.95%)	1026.66± 140.11c (8.58%)	1040.00± 45.82c (8.68%)	1616.66± 565.89b (12.77%)	2300.00± 79.37a (18.30%)	660.00± 86.60d (6.10%)	1693.33± 150.11c (15.74%)	2136.66± 57.73b (18.77%)	2335.00± 125.00ab (21.99%)	2403.33 ±174.73a (19.95%)
Melia azederach	480.00± 26.45b (5.50%)	646.66± 180.09b (7.64%)	896.66± 604.34b (10.26%)	1116.66± 620.67b (11.78%)	1916.66± 240.06a (18.85%)	560.00± 268.51b (6.07%)	1393.33± 180.36a (14.44%)	1566.66± 283.78a (17.38%)	1673.33± 271.35a (17.47%)	1883.33 ±350.04a (19.44%)
Mangifera indica	490.00± 52.91c (4.49%)	590.00± 173.49c (5.29%)	880.00± 191.57b (7.69%)	1110.00± 157.16b (9.64%)	1983.33± 55.07a (15.59%)	540.00± 79.37d (4.80%)	1180.00± 34.64c (10.23%)	1510.00± 86.60b (14.62%)	1660.00± 0.00a (16.45%)	1750.00 ±51.96a (17.00%)
Cedrus deodara	346.66± 5.77b (4.31%)	483.33± 23.09b (5.98%)	500.00± 266.27b (6.55%)	1083.33± 135.76a (12.29%)	1300.00± 111.35a (15.51%)	170.00± 17.32 c (2.16%)	673.33± 120.55b (8.12%)	843.33± 259.67b (10.17%)	1483.33± 11.54a (16.74%)	1546.66 ±383.70a (18.13%)
Tectona grandis	123.33± 6.11c (1.30%)	356.66± 5.77b (3.60%)	498.00± 10.81b (5.57%)	1066.66± 10.40a (10.94%)	1163.33± 7.63a (11.13%)	140.00± 0.00b (1.40%)	620.00± 268.46b (6.84%)	650.00± 268.46 b (6.80%)	1493.33± 317.54a (15.62%)	1582.33 ±342.36a (15.71%)

*Three replicates (Mean±SD). Values in rows having no common superscript are significantly different ($P<0.05$) (Duncan's test).

M. championi consumed wood blocks dried at 40°C in the following preference order *A. arabica* > *F. religoisa* > *A. indica* > *M. alba* > *M. indica* > *M. azaderach* > *C. deodara* > *T. grandis*. Wooden blocks dried at 80°C were consumed with same preference.

Table II shows survival of termite workers on wood blocks dried at different temperatures. Generally survival of workers increased with the increase of temperature. None of workers survived *T. grandis* at 40°C. The survival on other wood blocks dried at 40°C was as follows in the ascending order: *T. grandis* < *C. deodara* < *M. indica* = *M. azaderach* < *M. alba* = *A. indica* < *F. religiosa* < *A. arabica*. When wood blocks were dried at 80°C the above trend was *T. grandis* < *C. deodara* < *M. indica* < *M. azaderach* < *M. alba* < *A. indica* = *F. religiosa* < *A. arabica*, but the percent survival was much higher compared to that of 40°C. The percentage increase of survival at 80°C compared to that of 40°C was 150% for *T. grandis*, 244% for *C. deodara*, 187% for *M. indica*, 215% for *M. azaderach*, 301% for *M. alba*, 456% for *A. indica*, 257% for *F. religiosa* and 106% for *A. arabica*.

Table II.- Survival (%) of *M. championi* (Snyder) under no choice feeding laboratory trials on wooden blocks dried at different temperatures after 14 days exposure.

Wood species	Survival (%) at different temperature				
	40°C	50°C	60°C	70°C	80°C
A. Arabica	32.7	32.7	46.0	51.3	67.3
F. religiosa	18.7	28.0	44.0	48.0	66.7
A. indica	12.0	19.3	19.3	32.0	66.7
M. alba	12.0	16.7	18.7	26.7	36.0
M. azederach	9.3	16.7	17.3	17.3	29.3
M. indica	9.3	11.3	17.3	24.0	26.7
C. deodara	2.7	6.0	6.0	8.0	9.3
T. grandis	0.0	4.0	4.0	4.7	6.0

Laboratory choice feeding

The termite workers easily identified the palatable wood. At 40°C maximum wood consumption was observed in *A. arabica* and minimum consumption was observed in *T. grandis* (Table IV).

At 50, 60 and 70°C the impact of temperature on the wood consumption of *A. arabica* was significantly different and the least preferred wood *T. grandis* wood consumption was increased with the increased temperature treatment and the survival rate also vary (Table IV).

At 80°C the maximum preferred wood *A. arabica* was consumed much more by termites. It showed increase in temperature had profound impact on the wood resistance against *M. championi*.

Table III shows percent survival of termite workers in choice feeding laboratory trials on different combination of wooden blocks at different temperatures. At 40°C the percent survival in descending order was as follows: *A. Arabica / T. grandis* > *F. religiosa / M. azaderach* > *M. India / A. indica* > *C. desdara / M. alba*. At 80°C this order was mainly retained as such *viz.*, 112%, 135%, 102% and 88%, respectively.

Table III.- Survival percentage of workers of *M. championi* (Snyder) under choice feeding laboratory trials on different combinations of wooden blocks dried at different temperatures after 14 days exposure.

Wood combination*	Percent survival at				
	40°C	50°C	60°C	70°C	80°C
CD / MA	31.3	32.0	44.7	44.7	58.7
AA/ TG	36.7	34.7	56.7	64.7	80.7
FR / MAZ	34.0	39.3	45.3	66.0	80.0
MI / AI	32.0	36.7	36.7	61.3	64.7

AA, *A. arabica;* AI, *A. indica*; CD, *C. deodara*; FR, *F. religiosa*; MA, *M. alba*; MI, *M. indica*; TG, *T. grandis* **;** MAZ, *M. azederach*

Field forced feeding

Field studies on wood consumption rate of eight wooden species by termites confirmed the feeding from laboratory evaluation. At 40°C the maximum wood consumption was observed at wooden blocks of *A. arabica*. The minimum consumption was observed on wooden blocks of *T. grandis*, its consumption rate was 123.33 mg (Table I).

Maximum consumption was observed at 80°C of *A. arabica* by termites was 2636.66 mg and the least preferred wood was *T. grandis* and its consumption rate was 1163.33 mg at 80°C (Table I).

Field choice feeding

In choice feeding field trials two different wooden blocks were given to the termites. At 40°C the maximum wood consumption was observed on the wooden blocks of *A. arabica* and minimum consumption was on *T. grandis* (Table IV). At 50°C the maximum consumption was also observed on *A. arabica* and minimum consumption was on *T. grandis*.

At 60°C the impact of temperature on wood consumption on *A. arabica* was significant. At 70°C the maximum wood consumption was on the combination of *A. arabica* and *T. grandis* that showed non-significant difference.

Similarly at 80°C the most preferred wood combination was *A. arabica* and *T. grandis*. It means increased temperature had significantly decreased the resistance of wood to termite attack.

DISCUSSION

Wood feeding preferences and resistance will vary with the hardness, lignin content or chemical constitution of the wood. The presence of organic chemicals, *e.g.* Phenol, quinones, terpenoids, and high concentration of lignins may also affect the areas where feeding takes place. The pH of wood content might also be important. Sapwood, which has more starch and sugar, is generally preferred to heartwood. Many of the indigenous trees are therefore more resistant to termite attack and have developed chemical defenses to protect themselves. These chemical defenses may be present to a greater level in immature trees and crops, making these even less susceptible. The chemical concentrations in trees can vary from the outside to the inside. Older trees may develop cracks in the bark, and the resistant chemicals may not reside near the outer layers of the tree potentially allowing termite attack to occur. **(**Pearce, 1997).

The preference of termites to a particular wood species could be altered by the wood combination offered to them (Smythe and Carter, 1970a; Morales-Ramos and Rojas, 2001). The choice feeding test was a more appropriate method to be used in determining termite wood preference than no choice test (forced-feeding) because in the later test method, termites were forced to feed on whatever resourse was available for survivorship (Smythe and Carter, 1970b). The results of present study were congruent with above findings as the workers of *M. championi* easily identified the palatable wood than the distasteful one when offered in choice feeding experiments. In the laboratory trials more termites were observed feeding on palatable wood. The results obtained in the field were in accordance with the laboratory studies.

The increased temperature significantly effected the consumption of non platable otherwise least attractive wooden blocks of *T. grandis*. In the field choice feeding trials, the consumption of *T. grandis* increased with the increase in temperature which resulted in decreased wood resistance. Similar drying temperature effect on feeding preferences of *Heterotermes indicola* (Wasmann) was studied by Aihetasham (2008). Ten different species of wood for their natural resistance were tested and feeding preferences of *H. indicola* (Wasmann) under the no choice and choice laboratory and field trials was revealed. The impact of drying temperature (60°C, 70°C, 80°C, 90°C and 100°C) was also studied. Maximum feeding was observed on *Populus euramericana* and minimum on *Cedrus deodara* and *Dalbergia sisso*. Based on the feeding propensity the woods arranged in decending order of preference were *Populus euramericana* > *Mangifera indica* > *Pinus roxburghii* > *Acacia arabica* > *Dalbergia sissoo* > *Cedrus deodara*. Natural resistance and feeding preferences of two termite species, *Coptotermes heimi* and *Microcerotermes championi*, for ten species of woods commonly used in wood work and furniture in Pakistan were tested by Manzoor *et al.* (2009) in the laboratory as well as in the field. Both choice and no-choice laboratory and field experiments were conducted to test the natural resistance of timbers commonly used in Pakistan. For *M. championi*, in no-choice laboratory and field tests, *Abies pindrow* was found to be most resistant and *Populus euramericana* was least resistant. In choice feeding tests, both in the laboratory and field, *M. championi* were offered a combination of two woods, but *M. champi*oni showed the same feeding preference as in no-choice feeding tests. For *C. heimi*, the feeding preferences and wood

Table IV.- Consumption of wood in mg (Mean±SD) by *M. championi* (Snyder) in choice feeding experiments under laboratory and field conditions. The wood combinations offered were *C. deodara/M. alba* (CD/MA), *A. arabica/T. grandis* (AA/TG), *F. religiosa/M. azederach* (FR/MA), *M. indica/A. indica* (MI/AI) dried at different temperatures.

Temperature (°C)	Wood combination*	Laboratory conditions			Field conditions		
		Wood 1 (n=3)	Wood 2 (n=3)	Probability[b]	Wood 1 (n=3)	Wood 2 (n=3)	Probability[b]
40	CD / MA	393.33±83.86	683.33±94.51	0.16	180.00±30.00	993.33±309.89	0.044*
	AA/ TG	829.00±83.14	330.00±34.64	0.001***	1320.00±127.67	160.00±10.00	0.000***
	FR/MAZ	713.33±116.76	480.00±60.00	0.37	1036.66±130.51	836.66±848.18	0.528
	MI / AI	456.66±49.32	683.33±25.16	0.002**	826.66±159.47	930.00±101.48	0.397
50	CD / MA	426.66±65.06	956.66±61.10	0.001***	726.66±243.78	1246.66±195.02	0.001***
	AA/ TG	1536.66±120.55	386.66±80.82	0.003**	1486.66±370.04	613.33±112.39	0.002**
	FR/MAZ	1066.66±55.07	773.33±179.53	0.653	1510.00±268.51	1233.33±180.09	0.200
	MI / AI	756.66±41.63	1023.33±30.55	0.00***	1140.00±138.56	1430.00±17.32	0.021*
60	CD / MA	533.33±207.44	1126.66±160.41	0.002**	567.33±447.30	1493.33±353.60	0.023*
	AA/ TG	1740.00±62.44	513.33±106.92	0.016*	2363.33±160.72	846.66±25.16	0.003**
	FR/MAZ	1313.33±98.65	996.66±65.06	0.021*	2156.66±128.58	1380.00±105.83	0.024*
	MI / AI	970.00±52.91	1290.00±170.00	0.001***	1326.66±201.08	1873.33±194.25	0.002**
70	CD / MA	646.66±145.71	1216.66±215.95	0.604	1206.66±110.15	2030.00±36.05	0.000***
	AA/ TG	1750.00±45.82	763.33±184.48	0.004***	2833.33±168.62	1103.33±132.03	0.111
	FR/MAZ	1603.33±66.58	1076.66±73.71	0.010**	2783.33±30.55	1786.66±87.36	0.001***
	MI / AI	1046.66±77.67	1486.66±72.34	0.00***	1626.66±257.16	2086.66±32.14	0.004**
80	CD / MA	966.66±41.63	1968.66±153.07	0.00***	1713.33±210.79	2456.66±315.64	0.006**
	AA/ TG	2526.66±380.04	920.00±70.00	0.221	3443.33±245.42	1523.33±342.39	0.390
	FR/MAZ	2163.33±200.33	1803.33±152.75	0.001***	2996.66±30.55	1983.33±95.03	0.001***
	MI / AI	1723.33±141.89	2020.00±81.85	0.00***	1973.33±221.88	2733.33±197.56	0.00***

[a]Each wooden block was paired with a wooden block of other species (wood-1/wood-2) in Petri plate containing 50 termites.
[b]Difference in mass loss for each pair of wooden block indicated by *=0.05, **=0.01; ***=0.001 are significantly different (Paired comparison t-test).

consumption rate was different from that of *M. championi*. *Tectona grandis* was found to be least preferred for *C. heimi* and *P. euramericana* was the most preferred. When wood consumption rate of *P. euramericana* was compared, *C. heimi* consumed more *P. euramericana* than *M. championi*. The impact of drying temperature (60, 70, 80, 90 and 100°C) on wood specimens were also studied and it was seen that the amount of wood consumed increased with the increase in temperature. At the end of the experiment, for *M. championi*, the wood specimens were arranged in the following descending order of preference: *Populus euramericana* > *Azadirachta indica* > *Cedrus deodara* > *Pinus roxburghii* > *Morus alba* > *Tectona grandis* > *Mangifera indica* > *Acacia arabica* > *Thuja occidentalis* > *Abies pindrow*. The ranking of the resistance of the ten woods against *C. heimi* (Wasmann) were *Populus euramericana* > *Mangifera indica* > *Abies pindrow* > *Pinus wallichiana* > *Morus alba* >*Dalbergia sissoo* > *Acacia nilotica* > *Azadirachta indica* > *Cedrus deodara* > *Tectona grandis*. Field studies on wood consumption rate of 10 wood species by two termite species, *C. heimi* and *M. championi*, confirmed the findings from laboratory evaluation of the present study.

Present study also indicated that increase in drying temperature (40, 50, 60, 70 and 80°C) decreased the resistance of eight different commercial wooden species. The most palatable wooden species for *M. championi* was *A. arabica* whereas the most deterent wooden species was *T. grandis*. The feeding propensity of *M. championi* (Snyder) was *Acacia arabica* > *Ficus religiosa* > *Azadirachta indica* > *Morus alba* > *Melia azederach* > *Mangifera indica)* > *Cedrus deodara* > *Tectona grandis*.

The food preference of termites is the base for developing baiting technology. Morales-Ramos and Rojas (2003) used the chemical composition of the most preferred wood species by the Formosan subterranean termite, *C. formosanus* (Shiraki), as basis for the development of a nutritionally based bait matrix against subterranean termites. Nagee *et al*. (2004) reported that by determining the wood preference of the Malaysian subterranean termite species, it would be possible to find a suitable wood species that can be used as part of bait matrix against a wide spectrum of termite pest species. Present findings will be valuable to develop baiting technology for termite control in Pakistan.

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Table I.- **Amount of wood consumed (mg) by *M. championi* (Snyder) in 14 days in no choice laboratory and field experiments. Figure in parenthesis indicate consumption.**

Wood blocks used*	**Laboratory experiments**					**Field experiments**				
	40°C	**50°C**	**60°C**	**70°C**	**80°C**	**40°C**	**50°C**	**60°C**	**70°C**	**80°C**
Acacia arabica	1393.33± 96.09b (16.22%)	1593.33± 368.28b (16.47%)	1813.33± 136.13b (18.73%)	1943.33± 527.66b (19.85%)	2636.66± 208.40a (22.96%)	1063.33± 54.84d (10.27%)	2035.00± 35.00c (20.48%)	2672.00± 218.00b (29.50%)	2809.33± 89.50b (32.42%)	3242.33± 265.39a (32.51%)
Ficus religiosa	840.00± 557.58b (8.75%)	1033.33± 105.98b (10.63%)	1083.33± 162.89b (11.40%)	1590.00± 494.26b (15.53%)	2370.00± 470.85a (21.82%)	756.66± 231.58d (8,06%)	1856.66± 115.90c (18.02%)	2350.00± 95.39b (21.19%)	2776.66± 187.70a (25.41%)	2853.33 ±23.09a (26.30%)
Azadirachta indica	683.33± 166.53d (6.48%)	1026.66± 41.63c (9.16%)	1096.66± 15.27c (10.56%)	1763.33± 146.40b (15.07%)	2303.33± 153.73a (18.86%)	680.00± 280.00d (6.60%)	1850.00± 52.91c (16.38%)	2246.66± 321.29bc (17.46%)	2523.33± 377.53ab (21.63%)	2786.66 ±130.51a (23.19%)
Morus alba	533.33± 37.85d (4.95%)	1026.66± 140.11c (8.58%)	1040.00± 45.82c (8.68%)	1616.66± 565.89b (12.77%)	2300.00± 79.37a (18.30%)	660.00± 86.60d (6.10%)	1693.33± 150.11c (15.74%)	2136.66± 57.73b (18.77%)	2335.00± 125.00ab (21.99%)	2403.33 ±174.73a (19.95%)
Melia azederach	480.00± 26.45b (5.50%)	646.66± 180.09b (7.64%)	896.66± 604.34b (10.26%)	1116.66± 620.67b (11.78%)	1916.66± 240.06a (18.85%)	560.00± 268.51b (6.07%)	1393.33± 180.36a (14.44%)	1566.66± 283.78a (17.38%)	1673.33± 271.35a (17.47%)	1883.33 ±350.04a (19.44%)
Mangifera indica	490.00± 52.91c (4.49%)	590.00± 173.49c (5.29%)	880.00± 191.57b (7.69%)	1110.00± 157.16b (9.64%)	1983.33± 55.07a (15.59%)	540.00± 79.37d (4.80%)	1180.00± 34.64c (10.23%)	1510.00± 86.60b (14.62%)	1660.00± 0.00a (16.45%)	1750.00 ±51.96a (17.00%)
Cedrus deodara	346.66± 5.77b (4.31%)	483.33± 23.09b (5.98%)	500.00± 266.27b (6.55%)	1083.33± 135.76a (12.29%)	1300.00± 111.35a (15.51%)	170.00± 17.32 c (2.16%)	673.33± 120.55b (8.12%)	843.33± 259.67b (10.17%)	1483.33± 11.54a (16.74%)	1546.66 ±383.70a (18.13%)
Tectona grandis	123.33± 6.11c (1.30%)	356.66± 5.77b (3.60%)	498.00± 10.81b (5.57%)	1066.66± 10.40a (10.94%)	1163.33± 7.63a (11.13%)	140.00± 0.00b (1.40%)	620.00± 268.46b (6.84%)	650.00± 268.46 b (6.80%)	1493.33± 317.54a (15.62%)	1582.33 ±342.36a (15.71%)

*Three replicates (Mean±SD). Values in rows having no common superscript are significantly different ($P<0.05$) (Duncan's test).

Table IV.- Consumption of wood in mg (Mean±SD) by *M. championi* (Snyder) in choice feeding experiments under laboratory and field conditions. The wood combinations offered were *C. deodara/M. alba* (CD/MA), *A. arabica/T. grandis* (AA/TG), *F. religiosa/M. azederach* (FR/MA), *M. indica/A. indica* (MI/AI) dried at different temperatures.

Temperature (°C)	Wood combination*	Laboratory conditions			Field conditions		
		Wood 1 (n=3)	Wood 2 (n=3)	Probability[b]	Wood 1 (n=3)	Wood 2 (n=3)	Probability[b]
40	CD / MA	393.33±83.86	683.33±94.51	0.16	180.00±30.00	993.33±309.89	0.044*
	AA/ TG	829.00±83.14	330.00±34.64	0.001***	1320.00±127.67	160.00±10.00	0.000***
	FR/MAZ	713.33±116.76	480.00±60.00	0.37	1036.66±130.51	836.66±848.18	0.528
	MI / AI	456.66±49.32	683.33±25.16	0.002**	826.66±159.47	930.00±101.48	0.397
50	CD / MA	426.66±65.06	956.66±61.10	0.001***	726.66±243.78	1246.66±195.02	0.001***
	AA/ TG	1536.66±120.55	386.66±80.82	0.003**	1486.66±370.04	613.33±112.39	0.002**
	FR/MAZ	1066.66±55.07	773.33±179.53	0.653	1510.00±268.51	1233.33±180.09	0.200
	MI / AI	756.66±41.63	1023.33±30.55	0.00***	1140.00±138.56	1430.00±17.32	0.021*
60	CD / MA	533.33±207.44	1126.66±160.41	0.002**	567.33±447.30	1493.33±353.60	0.023*
	AA/ TG	1740.00±62.44	513.33±106.92	0.016*	2363.33±160.72	846.66±25.16	0.003**
	FR/MAZ	1313.33±98.65	996.66±65.06	0.021*	2156.66±128.58	1380.00±105.83	0.024*
	MI / AI	970.00±52.91	1290.00±170.00	0.001***	1326.66±201.08	1873.33±194.25	0.002**
70	CD / MA	646.66±145.71	1216.66±215.95	0.604	1206.66±110.15	2030.00±36.05	0.000***
	AA/ TG	1750.00±45.82	763.33±184.48	0.004***	2833.33±168.62	1103.33±132.03	0.111
	FR/MAZ	1603.33±66.58	1076.66±73.71	0.010**	2783.33±30.55	1786.66±87.36	0.001***
	MI / AI	1046.66±77.67	1486.66±72.34	0.00***	1626.66±257.16	2086.66±32.14	0.004**
80	CD / MA	966.66±41.63	1968.66±153.07	0.00***	1713.33±210.79	2456.66±315.64	0.006**
	AA/ TG	2526.66±380.04	920.00±70.00	0.221	3443.33±245.42	1523.33±342.39	0.390
	FR/MAZ	2163.33±200.33	1803.33±152.75	0.001***	2996.66±30.55	1983.33±95.03	0.001***
	MI / AI	1723.33±141.89	2020.00±81.85	0.00***	1973.33±221.88	2733.33±197.56	0.00***

[a]Each wooden block was paired with a wooden block of other species (wood-1/wood-2) in Petri plate containing 50 termites.
[b]Difference in mass loss for each pair of wooden block indicated by *=0.05, **=0.01; ***=0.001 are significantly different (Paired comparison t-test).