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EVALUATION OF THE LONG TERM EFFICACY OF TERMITIUM® IN PREVENTING THE PENETRATION OF THE GIANT TERMITE *Mastotermes darwiniensis* THROUGH MORTAR JOINTS

ONE STUDY, TOWNSVILLE, QUEENSLAND, AUSTRALIA, 2009/2010

Interim 7.5 Month Report

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1. SUMMARY

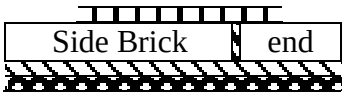
One small plot replicated field trial was conducted during September 2009 to May 2010 to evaluate the efficacy of TERMITIUM® for the prevention of termite penetration through mortar joints over a 3 year period against termites of economic importance in the building industry in Australia. The trial was conducted at Townsville, Queensland, Australia. This report contains the experimental methods used and presents the results obtained for the first 7.5 months of the trial.

The following treatments were evaluated against *Mastotermes darwiniensis*:

Treatment	Dilution Rate per mL/100 L	Application Rate L/m² of Brickwork	Application Timing Days After Bricks Laid	Replicates	Code
1. TERMITIUM®	Nil	1 L per $2m^2$ x 2 coats	7-14 days	5	1.1-1.5
2. Untreated control	NA	No treatment	NA	5	2.1-2.5

The treatments were applied by paint brush to 4 bricks and associated mortar joints for each replicate as shown below:

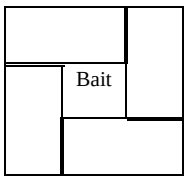
Side View



35.5 cm

	Mortar	1.0-1.2 cm
	Bricks	7.5 cm
	Compressed fibro base	2.0 cm
	Perspex sheet	10 mm

Top View



The Perspex sheet on all replicates of both treatments was fixed in place using Termite Proof Silicone sealant.

The study was set up as a randomised complete block design with five (5) replicates at one level in the soil, 8 cm to 20 cm. Five trenches having dimensions of 134 cm long x 25 cm deep x 45 cm wide were excavated 2 to 3 m out from stumps with confirmed active healthy giant termite nests. Each trench was lined with pieces of radiata pine.

At 7.5 months after installation the treatments were carefully removed from the trenches, with extreme care taken to avoid damaging them.

Individual treatment replicates were assessed for penetration and the timber (radiata pine) bait inside the bricks and mortar was assessed for damage by recording the percentage timber consumed by the termites. All mortar joints were assessed and any termite damage to the mortar was recorded.

There was no damage to mortar on any of the TERMITIUM® treated mortar joints at 7.5 months after installation in giant termite (*Mastotermes darwiniensis*) infested soil.

All the TERMITIUM® treated bricks and mortar were dry compared to the untreated bricks and mortar.

There were no termites observed in the bait within the TERMITIUM® treated or the untreated brick and mortar constructions at 7.5 months post-installation.

There were 4 of the 5 untreated replicate structures that had sustained damage to the mortar due to giant termite (*Mastotermes darwiniensis*) attack. The damage to the mortar was generally minor with the exception of the replicate 4 structure that had a 15 mm hole in the mortar.

There was a moderate level of damage to the radiata timber pieces lining the trenches holding the treatments with 62%, 20% and 40% of the timber pieces lining the top, base and ends of the trenches damaged respectively. It is suspected that a high water table during the wet season contributed to lower than expected damage to the timber and subsequently the mortar joints of the untreated structures.

2. INTRODUCTION

One small plot replicated field trial was conducted during September 2009 to May 2010 to evaluate the efficacy of TERMITIUM® for the prevention of termite (*Mastotermes darwiniensis*) penetration through mortar joints over a 3 year period against termites of economic importance in the building industry in Australia. The trial was conducted at Townsville, Queensland, Australia.

This report contains the experimental methods used and presents the results obtained for the first 7.5 months of the trial.

The trial was conducted under Agrisearch project ALTERM/09/01.

3. EXPERIMENTAL DETAILS

3.1 Site Details

Trial site details are presented below:

Co-operator Name	Kym Bathe
Address	Forestry Road
Location	Bluewater via Townsville Australia
Termite Genus and Species	*Mastotermes darwiniensis* and also present in one stump were *Schedorhinotermes* spp.
Nest Situation	Stumps
Soil Type	Brown sandy loam
Site History	Macadamia nut farm
Activities in 100 m radius	Sheds, home, macadamia stumps and healthy trees
Start Date	Treated bricks and mortar on 24 September 2009, installed into ground on 25 September 2009
7.5 Month Assessment	6-7 May 2010

3.2 Treatment List

The following treatments were evaluated against *Coptotermes acinaciformis*:

Treatment	Dilution Rate per mL/100 L	Application Rate L/m² of Brickwork	Application Timing Days After Bricks Laid	Replicates	Code
1. TERMITIUM®	Nil	1 L per $2m^2$ x 2 coats	7-14 days	5	1.1-1.5
2. Untreated control	NA	No treatment	NA	5	2.1-2.5

3.3 Formulations

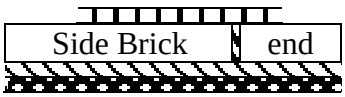
TERMITIUM® – a single part formulation containing Styrene Acrylate Polymer and Siloxane Hydrocarbon Solvent as marketed by Alterm National Pty Limited. The Batch Number was 1A2/21.2/35/06/AUS20350 with a Date of Manufacture of 30/04/07.

3.4 Treatment Method

The treatments were applied by paint brush to 4 bricks and associated mortar joints as shown in Figure 1 below:

Figure 1:

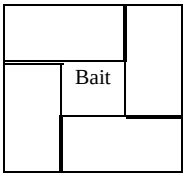
Side View



35.5 cm

	Mortar	1.0-1.2 cm
	Bricks	7.5 cm
	Compressed fibro base	2.0 cm
	Perspex sheet	10 mm

Top View



The bait inside the bricks, mortar, Perspex and compressed fibro structure consisted of a block of radiata pine.

The Perspex sheet on all replicates of both treatment groups was fixed in place using Termite Proof Silicone sealant, grey in colour.

3.5 Application Details

Date	24 September 2009
Time of Day	1500-1630
Temperature	27.9°C
Relative Humidity	29%
Cloud Cover	Indoors
Wind	Indoors
Rainfall	Indoors

3.6 Trial Design

The study was set up as a randomised complete block design with five (5) replicates at one level in the soil, 8 cm to 20 cm. A trench having dimensions of 134 cm long x 25 cm deep x 45 cm wide was excavated 2 to 3 m out from tree stumps with confirmed active healthy giant termite (*Mastotermes darwiniensis*) nests. Five lengths of trench were prepared to house the 2 treatments x 5 replicates and they were positioned equidistant around the nests.

Each treatment replicate was 35.5 cm long x 35.5 cm wide x approximately 12 cm deep as shown in Figure 1. There was a 20 cm spacing left between each replicate as well as at the ends, therefore, each length of trench was 134 cm long.

The 25 cm deep x 45 cm wide trench was lined with pieces of radiata pine having dimensions of, 40 cm long x 3.5 cm deep x 7.0 cm wide.

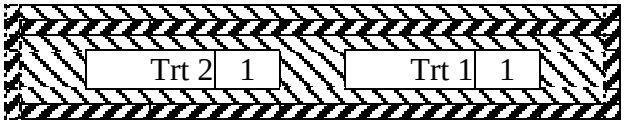
The gap between each piece of timber was around 0.5 cm so that termites could travel easily through it.

A layer of soil approximately 3 cm deep was placed over the timber lining in the base of the trench and then the treatment replicates were placed on top of the soil, 20 cm apart and 20 cm from each end and 5 cm from each side. Soil was placed into the trench until it covered the block of replicates with approximately 3 cm of soil. Then another layer of radiata pine timber was placed over the top of the soil and another 2-3 cm of soil was placed over the layer of timber. A black plastic sheet was placed over the soil to retain the moisture in the trench and another 2-3 cm of soil added to bring it to ground level.

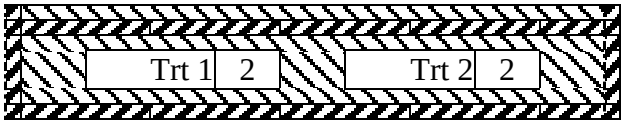
The soil was dampened after it was added to the trench each time using a new watering can and new 20L plastic drums containing potable tap water.

Figure 2:

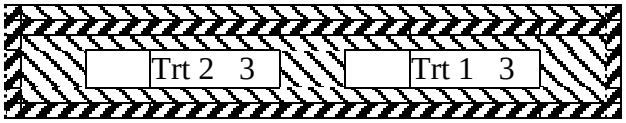
Block 1 – Replicate 1 – Side view



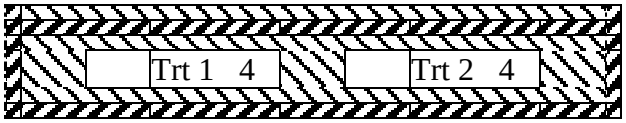
Block 2 – Replicate 2 – Side view



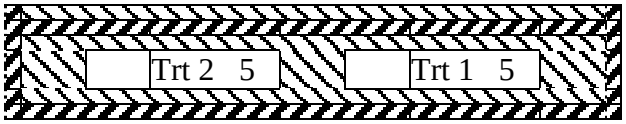
Block 3 – Replicate 3 – Side view

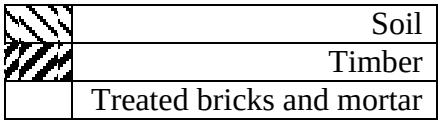


Block 4 – Replicate 4 – Side view



Block 5 – Replicate 5 – Side view





Following the 7.5 month assessment it was decided to raise the brick structures in the trenches due to high soil moisture content. An extra layer of timber, 3.5 cm deep was placed under the structures giving 2 layers of timber in the base of the trench.

3.7 Assessments

3.7.1 Efficacy

Efficacy was assessed at 7.5 months after installation. The treatments were carefully removed from the trenches, with extreme care taken to avoid damaging them. Individual treatment replicates were assessed for penetration and the timber bait inside the bricks and mortar was assessed for damage by recording the percentage timber consumed by the termites. All mortar joints were assessed and any termite damage to the mortar was recorded.

Pieces of radiata pine timber lining damaged by termites was recorded and replaced.

The trenches were re-installed with the same treatment randomised complete block design as at the start of the study and the same type of radiata timber lining and soil was re-installed as it was at the start of the study.

3.8 Building Code of Australia

In the opinion of Agrisearch Services Pty Ltd, the systems described and installed under the conditions listed in this Technical Assessment will satisfy the Performance Requirements BP1.1 and BP1.2 (Volume 1 – Class 2-9 buildings) P2.1 and QLD P2.1.1 (Volume 2 – Class 1 and Class 10 buildings Housing Provisions) of the Building Code of Australia (2009). This declaration is only relevant for the system as described in this Technical Assessment and installed under the conditions listed in this Technical Assessment.

To meet the requirements of Clause P2.1.1 (relevant to QLD only) (Volume 2 – Class 1 and Class 10 buildings) of the Building Code of Australia (2009), the applicant has provided a declaration of system design life, which is set out in the Durability section of this Technical Assessment (3.11). This declaration is only relevant for the system as described in this Technical Assessment and installed under the conditions listed in this Technical Assessment.

Notes:

(1) The inclusion of this clause with reference to the BCA is aimed at assisting those involved in the design, specifying and building approval/permit process to relate the Appraisal to the relevant Performance Requirements of the BCA.
(2) Any changes made to the BCA will be reviewed during the term of this Technical Assessment.
(3) AS 3660.1-2000 is referenced by the BCA as a deemed to satisfy solution for the protection against concealed entry by subterranean termites.

3.9 Relevant Documents

Alterm National Pty Ltd, 'Installation Instructions for Termitium System' (10th October 2009).

Standards Australia, AS 2870-1996 'Residential slabs and footings - Construction' (Amdt 4 May 2003).

Standards Australia, AS 3660.1-2000 'Termite management – New building work'.

Standards Australia, AS 3660.3-2000 'Termite management – Assessment criteria for termite management systems'.

Standards Australia, AS 3700-2001 (including amendments) 'Masonry structures'.

3.10 Durability

Agrisearch Services Pty Ltd does not assess the durability of termite barriers.

The applicant, Alterm National Pty Ltd, declare under its sole responsibility that:

- The TERMITIUM® Physical Termite Barrier has been designed to achieve a service life of 50 years during which period the TERMITIUM® Physical Termite Barrier, including its constituent components, is expected to maintain efficacy and function as a termite barrier in accordance with AS 3660.1-2000;
- The TERMITIUM® Physical Termite Barrier has been designed in accordance with a quality management system that incorporates a set of rules for the design, manufacture, installation and maintenance of all elements of the system; and
- The components used in the manufacture of the TERMITIUM® Physical Termite Barrier have been selected for their intended purpose and are expected to operate in accordance with their specification for the duration of the design life of the TERMITIUM® Physical Termite Barrier

4. RESULTS AND DISCUSSION

Results are summarised in Tables 1 and 2.

4.1 Bait, Mortar and Brick Assessment

Table 1 Agrisearch Services Summary of Results – 7.5 Months
Bait, Mortar and Brick Assessment Records

Treatment	REP	Termites in Bait	% Bait Damaged	Shelter Tube on Mortar	Mortar Damaged	Shelter Tube on Bricks
1	1	No	0	No	No	No
TERMITIUM®	2	No	0	No	No	No
	3	No	0	No	No	No
	4	No	0	No	No	No
	5	No	0	Yes	No	Yes
2	1	No	0	Yes	Yes	No
Untreated	2	No	0	Yes	Yes	Yes
	3	No	0	No	No	No
	4	No	0	Yes	Yes	Yes
	5	No	0	Yes	Yes	Yes

There was no damage to mortar on any of the TERMITIUM® treated mortar joints. All the TERMITIUM® treated bricks and mortar were dry compared to the untreated bricks and mortar.

The untreated replicates 1, 2 and 5 had minor damage to the mortar caused by the giant termite (*Mastotermes darwiniensis*). The damage to the mortar of the replicate 4 structure was more significant reaching a depth of 15 mm.

4.2 Timber Lining Assessment

Table 2 Agrisearch Services Summary of Results – 7.5 Months
Timber Lining Assessment Records

Treatment	REP	No. Timber Top Damaged	No. Timber Base Damaged	No. Timber Ends Damaged
	1	3/13	0/11	2/10
TERMITIUM®	2	4/14	1/12	2/9
And Untreated in the	3	9/13	3/12	5/11
Same Trench	4	11/12	3/11	3/8
	5	13/13	5/13	7/9
Percentage Timber Pieces Damaged		62	20	40

The damage to the radiata timber pieces lining the trenches holding the treatments was less than expected during the 7.5 month period of exposure to the natural termite population foraging through the soil. It is thought that during the wet season the structures and the timber lining were extremely wet with a raised water table. As the data above indicates there were a greater percentage of the timber pieces damaged on top of the structures compared to the base timbers deeper in the ground.

5. CONCLUSIONS

There was no damage to mortar on any of the TERMITIUM® treated mortar joints at 7.5 months after installation in giant termite (*Mastotermes darwiniensis*) infested soil.

All the TERMITIUM® treated bricks and mortar were dry compared to the untreated bricks and mortar.

There were no termites observed in the bait within the TERMITIUM® treated or the untreated brick and mortar constructions at 7.5 months post-installation.

There were 4 of the 5 untreated replicate structures that had sustained damage to the mortar due to giant termite (*Mastotermes darwiniensis*) attack. The damage to the mortar was generally minor with the exception of the replicate 4 structure that had a 15 mm hole in the mortar.

There was a moderate level of damage to the radiata timber pieces lining the trenches holding the treatments with 62%, 20% and 40% of the timber pieces lining the top, base and ends of the trenches damaged respectively. It is suspected that a high water table during the wet season contributed to lower than expected damage to the timber and subsequently the mortar joints of the untreated structures.