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Termites as a threat to buildings and the current physical and chemical methods for their control

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About the Speaker

Ted Taylor has almost 40 years of experience in pest control in NSW. He is a specialist in the identification and control of termites in buildings. He worked in the Pest Control industry for 5 years and later with State Forests of NSW as an Information Officer and Entomologist for 23 years. Tertiary qualifications include entomology, wood technology and pest control. He teaches Pest Control at TAFE and assesses correspondence lessons in Pest Control as part of the Associate Diploma in Applied Science (Health and Building) Since retiring, he now runs various private courses and seminars on Termite Control, Wood Technology and Tree Care, and is a consultant in termite, tree and general entomological problems.

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About Termites

Termites are highly specialised social insects. They form colonies or nests and have three distinct forms or castes. The reproductive caste includes the parent king and queen, supplementary queens (neotenics), and immature reproductives which develop wings (alates) to fly from the parent colony to start new colonies. The worker caste, which is the food gatherer and builder, is sterile, wingless and lacks pigmentation in most species. The soldier caste has an enlarged pigmented head which often includes a pair of massive jaws – used for defence of the colony.

There are a wide diversity of mature colony population sizes ranging from several million down to about 50 individuals, depending on the termite species.The colony may be a large and obvious mound, or it may be completely hidden inside a tree or underground. All of the large colony builders are subterranean – in that they can travel underground to a source of food some distance away. Another group known as dampwood or drywood termites, make their small colonies inside dead branches on trees and do not move beyond their host tree. In Australia all the major pest species are of the subterranean type.

Termites have a gradual life cycle which, unlike true ants, lacks the pupal stage. The mature reproductives have two pairs of almost equal sized wings – in ants the hind wings are always much smaller than the fore wings. At the right moment, usually during a warm evening in late spring or early summer when the humidity is very high, the alates fly out from the parent colony. The right conditions can trigger a massive alate release from many same species colonies over a wide area. Each one of these alates is a potential king or queen of a new colony but fortunately very few survive long enough to do so.

Termite Species

Termites belong to the Order Isoptera. This Order is one of the smallest, containing less than 2,500 species world-wide. In Australia there are an estimated 350 termite species in five Families. *The Atlas of Australian Termites* has a list of 267 named Australian species with maps showing the known distribution of each one.

Termites as Pests

Most termite species are not pests of buildings. Many feed only on plant stems, ground surface debris or organic material in the soil.

In the Sydney region there are just four species which can be classed as major pests in buildings. *Coptotermes acinaciformis* is estimated to cause up to 80% of building damage in Australia. *C..frenchi,Schedorhinotermes intermedius* and *Nasutitermes exitiosus* are the other serious pests. There are perhaps another four or five species which occasionally enter buildings but seldom cause much damage to them. Above the Tropic of Capricorn *Mastotermes darwiniensis* – the giant northern termite (one of the few termite species with a specific common name), is probably one of the most damaging termites in the world. It is fortunate that this termite inhabits the parts of Australia with the lowest human population.

Termites have their natural place in Australia, the few species that cause problems to us should not condemn the majority which form a vital part of the land with their nutrient recycling and food-chain contribution.

Buildings and Termites

Termites enter buildings for one reason only, and that reason is food. The basic food of termites is cellulose but they don't mind if it contains other materials such as starch which can be present in sapwood of timber, cotton clothing and paper. Their protein requirement is taken care of when they eat wood and other materials affected by decay fungi.

It is a rare building that lacks any timber in its structure and rarer still is the building which contains no cellulose materials at all – certainly not residential buildings which will always have some timber built –ins, furniture and books.

In the case of older buildings the timber floors are often placed low to the ground so that it is impossible to get underneath to inspect for termites or to treat them. Poor ventilation under such floors raises the moisture content of the floor timbers to a point (24%) where decay fungi can cause damage – making a very attractive feast for termites close to the ground.

Termite inspections

It is vital for buildings to be regularly inspected for termites. This ensures that any termite activity is located before serious damage has been caused to the structure of the building. The normal maximum interval between inspections should be no more than 12 months.

Termite Control : Eradication of the invading termite colony

The destruction of the termite colony responsible for damage in a building can be achieved through the use of the arsenic dust technique of treatment and/or the use of a baiting system. Prior to any treatment being applied it is essential to inspect the whole building to note all areas of termite activity.

This must be done with minimum disturbance to the active galleries because the arsenic dust technique requires active termites at the points of application. Very small amounts of arsenic trioxide applied by a skilled pest controller can kill a termite colony containing more than a million termites. It works because contaminated termites return to the hidden colony which can be at up to 50 metres away, passing on the dust particles to other termites through their normal grooming habits. This kills the grooming termites as a stomach poison. The form of arsenic used is not a contact poison so they are unaware of the skin surface contamination. It is normal to leave such treatments undisturbed for two or three weeks to allow enough time for it to have a full effect.

During an initial termite inspection, a search is made of any areas where the colony may be concealed. Such areas can include the interior of trunks or stumps of trees, behind retaining walls and under the floors in buildings. If the colony can be located, direct treatment can be applied to solve the problem.

A baiting system can be applied as an initial eradication treatment but this form of treatment generally takes longer to get a result with a chance it will not work at all. Baiting usually requires susceptible timber blocks to be placed below ground level in the garden or grounds around the infested building, and they can also be installed in the ground underneath buildings.

The latest baiting systems use a specific insect growth retardant chemical (chitin inhibiting) as the active ingredient. The chemical is only added to a bait when it becomes infested by the termites. Baiting can be the only possible treatment where building owners refuse to allow the application of pesticides inside the affected building. It can also be a treatment of last resort where all other treatments have failed.

Termite Control : Preventive Measures – Chemical and physical

Chemical

Chemical soil barrier treatments can be applied to soil in the foundation areas of existing buildings and buildings under construction to stop the entry of termites. Where they can be properly applied they have a life of around five years in fully weather –protected areas, obviously needing further applications at intervals to maintain protection. During construction, a reticulation system of pipes can be installed under concrete floor slabs so that the chemical barrier can be maintained. Where termite problems arise in existing buildings from under concrete slab floors which are on the ground or on fill it is possible to apply a chemical barrier under them by drilling through them. The problem with this drill and flood method is that there can be no guarantee of a full and complete chemical barrier.

At present there are three chemicals approved for use as chemical soil barriers. These are Chlorpyrifos mostly marketed as Dursban, Bifenthrin marketed as Biflex, and the latest one which is marketed as Premise.

Another form of chemical barrier using Deltamethrin as the termiticide is incorporated into a plastic moisture barrier which can be used under new concrete slab floor construction and is marketed as Kordon TMB.

Physical

Physical barriers are usually regarded as termite resistant for the life of the building. They can only be properly installed during the construction stage of buildings but can be used under new additions or where major repairs are in progress. This would only qualify as a partial barrier.

The three physical barrier systems included in the Australian Standard 3660.1-1995, are stainless steel mesh marketed as Termi-mesh, graded stone marketed as Granitgard and the metal sheeting system(ant caps). The last of the three systems is only suitable for suspended floors.

Stainless steel mesh and graded stone barriers usually incorporate the concrete floor slab as part of the barrier. Whichever system is used it is vital to maintain good quality control to ensure they are installed as required by the Standard and that they are not damaged during the rest of the construction.

Making old buildings more termite proof

Where old timber floors are being replaced always make sure that structural pest inspections can be carried out from underneath. This may entail making openings in foundation walls so that access can be gained under the whole undersurface from one entry point. If the ground clearance is less than 400 mm beneath the floor, it is recommended that steps should be taken to rectify this by removal of soil to allow proper access to all parts of the sub-floor area.

This sort of advice is contained in the book *Building Out Termites* by Robert Verkerk.

USEFUL REFERENCES

The following list of books provide further information about Australian termites and include those cited in this paper:

*Atlas of Australian Termites.(*1993) J.A.L. Watson and Hilda M Abbey. Published by CSIRO
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The following books deal with termites as a World wide problem:

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