Pest control technical note- Termites

Number 7 Updated March 2018

Termites belong to the cockroach order Blattodea. Termites are often wrongly referred to as 'white ants', however, as they are neither white; nor ants, therefore this term should not be used. Termites are cockroaches that have learned to live and work with a high degree of cooperation.

All termites feed on cellulose plant fibres. Their digestive system is a complex composting system typically relying on a variety of micro-organisms which assist in digestion.

Over 350 species of termites are found in Australia, only approximately 20, commonly cause damage to buildings. In Victoria there are five species that cause problems to buildings and wooden structures.

Although termites are generally considered to be destructive timber pests, they play important ecological roles: providing nest holes for lizards, birds and possums; assisting in the breakdown of organic matter; returning nutrients to soil and; assisting with soil aeration.

Castes

Termites are social insects, living and working together within nests or colonies of various sizes, with only a few involved in reproduction.

Termites take several different forms. Each form, or *caste*, has different functions to perform within the colony. Termites communicate by smell and touch.

Alates

Alates, meaning '*winged ones*', are the true adult termites. They have eyes, wings, darker colouring and are fertile.

Their wings are equal size and shape and twice the length of their body. The wings are snapped off after the colonising flight is made.

Reproductives

These are the sexual forms of the colony including future queens and kings of colonies yet to be established.

The reproductive's on the main pest species live in a central chamber in the nest where a female, or 'Queen', will lay many thousands of eggs each year over her life span of approximately 10 years. Male, or 'Kings', are responsible for fertilising the Queens. Multiple reproductives are commonly observed.

The young termites develop in the colony by shedding skin at the end of each growth stage, gradually changing until they reach the worker, soldier or adult (winged form). If queens die, some supplementary reproductive's may carry on the colony as neotenics.

Reproductives are generally darker than workers and soldiers. They have functional eyes and their more robust skin (cuticle) is able to resist the outside environment. After flight, unlike other insects, the deciduous wings of termites are discarded; and piles of shed wings are a good clue to termite infestations.

Soldiers

Soldiers have darker, larger heads than the other castes. They are blind, wingless, and have undeveloped reproductive organs. Soldiers are tougher than the other castes and take longer to die from most toxins, exposure, or starvation. It is their role to defend the colony, if disturbed, while the damage is repaired by the workers.

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Soldiers exist in different forms. Most species have soldiers, with well-developed jaws (mandibles) used to crush attackers, such as ants.

Jawless soldiers with pointy heads occur in the genus Nasustitermes and are only rarely found as pests in Victoria where they mainly eat degraded hardwoods. They have a nasus (snout) from which they eject a fine irritating spray which helps them defend against attacking ants and echidnas.

Drywood termites, which live in small colonies entirely within a single piece of wood, are only occasional pests in Victoria, where their usual habitat is in parts of standing dead trees in near-coastal and other reliably moist areas.

Workers

The workers account for the largest number of termites within the colony and are therefore responsible for the most damage.

They gather food, groom other termites, construct tunnels and repair damage; in addition to tending to the Kings, Queens, and their young. These termites are believed to be able to work 24 hours a day throughout their 2 to 4 year life span.

Worker termites are generally unpigmented. They are blind, wingless and have undeveloped reproductive organs.

Eggs and young

Termites hatch from eggs that have been tended by their nest mates in specially constructed nurseries. As soon as they are old enough, the young work within the colony where jobs change with age and maturity.

Colonising flight

Once a single colony becomes sufficiently large it produces winged reproductives which wait in specially constructed chambers until ready to leave the nest and undertake a colonising flight.

They leave the nest as a swarm under conditions of high humidity, still air, and sometimes low light. Termites are not strong fliers and usually only fly up to one kilometre, although breezes and updrafts can carry them a lot further.

Upon landing near a suitable nest site, the female sheds her wings and emits a calling scent. Males quickly respond.

They dig in and over the next few weeks, mate and take care of their young until enough workers develop to take over the care roles.

New colonies are sometimes established via budding. This is believed to occur when the extremities of the colony lose contact and become independent.

The Primary King and Queen are believed to emit hormones which suppress the sexual development of the rest of the colony, however this control breaks down if the territory is too large or contact with groups is lost.

Lifecycle

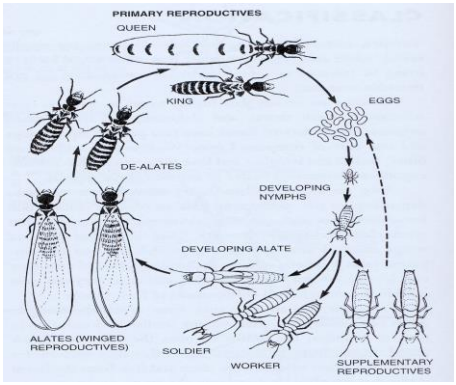
Termites undergo a gradual metamorphosis and do not have a pupal stage.

The lifecycle of a termite consists of four stages of development with young termites developing into four different castes. The temperature, food quality, and activity of the colony affect the interval over which termites develop from egg to adult.

Termites develop by moulting or shedding their outer cuticle once a growth period ceases. The Queen adds a new set of ovaries at each moult, her abdomen eventually becomes quite large, a condition referred to as physogastry.

Shortages of a particular caste create a hormonal imbalance within the colony. This is then corrected by the development of new young termites into that caste.

Figure. 1 – Termite Life Cycle



Habitat

Termite nests and tunnels are kept moist as the workers cannot stand low humidity for very long. The temperature within the nursery of a large *Coptotermes* nest ranges between 10°C and 35°C but rarely varies more than one degree a day. The relative humidity is approximately 100%. The moisture required to maintain the temperature and humidity is obtained from the soil, leaking plumbing or decaying timber.

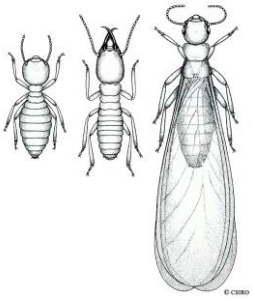
Common species

It is important to correctly identify the type of pest termite before beginning treatment. The identification will help in understanding the habits of the colony, the location of the nest and will indicate the most appropriate method.

As the soldiers of each colony possess such prominent features the termite species is most easily identified by examination of an individual of this caste.

Coptotermes

This genus of termites is widely distributed throughout Victoria. They are responsible for more than 80% of the termite damage caused to buildings.



Coptotermes build nests in trees, favouring eucalypts, stumps, under concrete flooring, in wall cavities, or enclosed verandahs.

More than a million termites may be present within a single colony, however, half a million is a more commonly encountered maximum size.

These termites usually travel at least 50m from the colony in search of food via a series of underground tunnels.

Coptotermes acinaciformis tend to recruit strong numbers to new food sources and respond strongly to baits.

Coptotermes frenchi tend to explore widely for new food sources and often feed lightly at multiple points. They respond less strongly to baits.

The soldier caste of *Coptotermes* is mandibulate with simple brown saber-like jaws. Soldiers measure between 3.5mm and 6.5mm in length. When disturbed these soldiers eject a white rubbery glue-like substance from their pear-shaped heads as a defence mechanism.

Coptotermes lacteus are forest termites that can build big mounds and will not attack a well-constructed building.

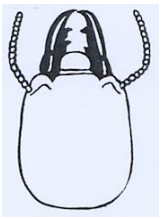
Nasutitermes

The *Nasutitermes* are widely distributed throughout Australia, however, these species are of minor importance in Victoria where they are most commonly found attacking garden timbers.

Nasutitermes exitiosus is common north of the dividing ranges. They construct dark, thin-walled mound nests between 30cm and 75cm above ground. These mounds are generally up to 1m in diameter.

The nasute soldiers of this genus are easily identified, particularly as they tend to appear when tunnels are damaged, rather than hiding inside like other pest types.

Porotermes adamsoni



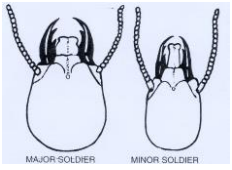
The largest termite species is commonly found nesting in large pieces of timber, particularly older trees, and is most common in wet mountainous areas. This preference earns it the common name of Dampwood Termite. However, *Porotermes* are also commonly found in the dry foothills of Melbourne.

Porotermes are much larger than the other pest species, but tend to live in smaller colonies and do not construct shelter tubes or travel far underground. The colony will often die once discovered and their food dried, although remedial timber preservatives such as boron salts are often used to ensure control.

Schedorhinotermes

This genus occurs throughout Australia but is only found in the north of Victoria.

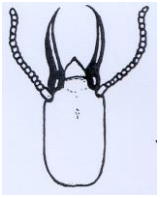
Schedorhinotermes are destructive and relatively nomadic, rather than maintaining a fixed central nest.



A mature colony of *Schedorhinotermes* will have mandibulate soldiers of two distinct sizes, referred to as “major” and “minor”.

The major soldiers are up to 5.6mm in length while the minor soldiers are only 3.6mm. The absence of major soldiers indicates that the colony is either weak or young.

Heterotermes ferox



Heterotermes are widely distributed throughout Australia, however, they are not considered to be a major pest species except in the Northern Territory.

The small colonies attack fence posts, timber flooring, and paling fences within a small radius of the nest. *Heterotermes ferox* specialize in feeding on small timbers on the soil surface and as a result are very commonly found.

The soldiers of this species are up to 4.75mm in length with long, dark jaws and distinctly long parallel-sided heads.

Control methods

Where possible, it is preferable to control attacking colonies before rebuilding or installing preventative measures.

Colony controls

Insect growth regulator dusts (such as Fipronil), non-repellent termiticides or commercial baiting systems are often used to control termites by slowly killing off the colony. The use of fine dusts as a treatment method exploits the habits of termites as they ingest and distribute the insecticide among the colony during grooming. The use of Arsenic Trioxide dust, though still legal, is discouraged and it is excluded from the Australian Standard for managing termite colonies (AS 3660.2).

Baits for colony control

Termite bait stations provide a means to collect samples for species identification, and monitor termite activity in addition to assisting in termite control. Baiting is often the best way to kill an attacking colony and it is commonly used where the main nest site(s) cannot be located.

Bait stations consist of containers of cellulose materials such as timber, paper or cellulose gel which are either buried in the ground near the building under attack or carefully placed inside near known damage.

Baits generally use slow-acting, non-detectable toxins so that nearly the whole colony can be poisoned before adverse effects appear. Repellent termiticide formulations such as those of pyrethroids are not used as colony control agents. Care must be taken not to cross contaminate baits with even tiny residues of other pesticides.

Baiting does not provide a useful barrier. The baits do not isolate the building as termites are still able to access the structure. For long-term structural protection, other systems are preferred (where applicable).

Chemical Systems

Soil chemical treatments may be used to attempt to isolate the termite colony from the building under attack. The purpose of termite management systems according to Australian Standards AS3660, is to work against the termites being able to enter a building unseen.

The application of a soil chemical around or under the exterior of a structure is intended to provide a protective zone or band of toxic soil.

The applied chemical should be unbroken ensuring that the termites cannot find a gap to use as a point of entry. Application typically involves trenching around foundations, and the injection of the chemical into the soil through holes drilled in concrete where necessary. Some buildings will have piping systems that permit simpler re-application.

Repellent chemicals, such as Bifenthrin, are commonly used but the barrier must be complete and continuous for effective control. Non-repellent termiticides such as Imidacloprid and Fipronil are also used, and may be more resilient where coverage is uncertain, such as where rod injection is required. Termites work through the treated soil unaware that they are picking up a toxic dose and will die without the colony becoming aware of the risk. This tends to greatly reduce the termite population and may result in colony death.

The soil may also be treated with a chemical prior to building construction but only where there is available access for reapplication. Bifenthrin is commonly used for this purpose with Imidacloprid often used for the exposed perimeter of a new structure.

Chemically impregnated sheet

Chemically impregnated sheet materials incorporate a repellent termiticide into a polymer film or a geotextile fabric held between two polymer films. The dosage is set to suit the expected life of buildings. Several types using either deltamethrin or bifenthrin are commonly used. These are sometimes described as physical systems, but as they rely on the chemical to work, they are chemical systems and must be installed by a licenced pest control operator.

Physical systems

Physical systems attempt to isolate the termite colony from the building under attack so that their only method of entry, is over a designated inspection zone, such as at the external damp course of a wall or on a stump or pier under a floor.

In practice, termites will avoid constructing shelter tubes up the side of walls unless provided with ample water or additional shelter, so physical barriers provide a means of termite management for new buildings.

If the barrier is incomplete or broken, termites may gain concealed access to the building.

The oldest physical systems are the metal caps seen on top stumps under suspended timber floors. These don't actually prevent termite attack. However, if installed properly, the termites will have to construct an obvious mud tube over the cap to penetrate the building. These tubes are easily identified during an inspection.

Similarly, metal sheeting or woven mesh is often used through brick piers and masonry walls to force termites to the outside.

Granite aggregate

Crushed granite of a particular particle shape and size range, is also used as a physical termite barrier. The termites are unable to penetrate the granite as the particles are too large and heavy for them to move.

Granite aggregate is most often used with concrete slabs where it is applied around pipes and behind the lower bricks at the building perimeter.

Reduced timber risk

Timber at risk can be reduced by controlling moisture, using resistant timbers below floor level, avoiding timber in ground contact or using non-timber elements such as concrete masonry and steel. It is important to note that the Australian Commonwealth Scientific and Industrial Research Organisation (CSIRO) has identified that attack rates on homes is independent of frame type and steel-framed homes are also attacked as termites invariably find other food sources inside.

Naturally resistant timber

Certain species of timber, such as Red Gum and White Cypress Pine are naturally resistant to termite attack. However, not every piece of timber cut from a resistant species will be equally resistant and so while these timbers may be used in ground contact or for sub-floor framing, strip shielding is still needed to isolate them from the structure above. Re-growth timbers of resistant species are generally less resistant than old-growth timbers and plantation grown timbers may be even less so.

Chemically treated timber

Following a review by the Australian Pesticide and Veterinary Medicines Authority (APVMA), timber treated with CCA (copper, chromium and arsenic) is listed as a restricted chemical product. This restricts persons able to purchase and use the product, and the areas in which it can be used. However, other effective treatments, especially quaternary ammonium compounds are gradually replacing the arsenic components and have a similar green appearance.

General measures

Termites require water to maintain the high humidity within the nest in addition to food, or wood. By removing these needs, homeowners can do their part to prevent these pests from becoming a problem in their home.

Pest control operators and termite inspectors will suggest ways to reduce overall risk such as:

- ensuring soil is not in contact with susceptible building timbers or impinging upon inspection zones
- ensuring subfloors are well ventilated and remain dry
- using only resistant timbers below floor level
- avoiding storage of wood directly on soil, under, around or in contact with buildings
- improving drainage and fixing leaky plumbing in order to reduce available soil moisture.

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Available at https://www2.health.vic.gov.au/public-health/environmental-health/pesticide-use-and-pest-control