

TERMITES IN WESTERN CANADA

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Summary

Subterranean termites (*Reticulitermes* spp.) have world-wide distribution across the temperate latitudes of the Northern Hemisphere. There are at least 7 species in North America, four of which occur in Canada – southern Ontario and in British Columbia. Old records indicate a small infestation existed in Medicine Hat. An infestation of eastern subterranean termite was apparently eliminated from a neighbourhood in the City of Winnipeg in 2001.

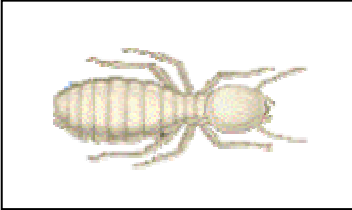
Subterranean termites are social insects like ants, living in large colonies consisting of a few hundred to thousand individuals. In nature subterranean termites consume dead and dying trees and other sources of cellulose. Unfortunately when wood-framed buildings replace the native food sources, termites attack the wood framing and other finished wood products. This is the case in southern Ontario and in British Columbia where urban development provides the favourable conditions that support termite population spread. Preventative and remedial methods are available to protect buildings, including the use of preserved wood. However, no one tactic alone is sufficient to prevent termite attack. Therefore long-term protection will only be successful where an integrated application of several tactics is used supported by up-dated local building codes.

1. Introduction

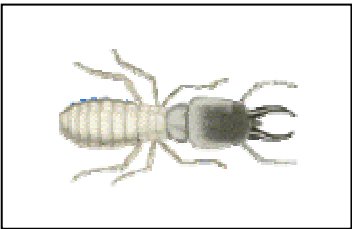
Termites occur on all continents except the Antarctic. As of 1995, specialists have identified about 285 genera and 2,753 of species of termites (Myles, <http://www.utoronto.ca/forest/termite/iso1.htm>). Only four named species are currently known from Canada: the rottenwood or dampwood termites *Zootermopsis augusticollis* (Pacific dampwood termite) and *Z. nevadensis*, and the subterranean termites *Reticulitermes flavipes* (eastern subterranean termite), and *R. hesperus* (western subterranean termite). They are one of nature's major plant recyclers but also one of the major pests of wood-framed structures. Pest control companies, homeowners and building inspectors report new infestations each year in southern Ontario and in British Columbia where urban development provides the favourable conditions for the spread and establishment of native or introduced termites. This presentation will focus on subterranean termites because of their ability to spread quickly into new areas, their preference for sound wood, and their proximity to major population centres in Canada.

2. What are Termites?

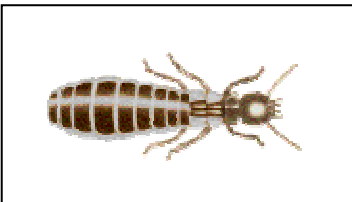
Termites are social insects like ants, wasps and bees. They are also known as white ants because the workers closely resemble worker ants. Termites help recycle the abundance of dead trees, needles and limbs that accumulate in the forests each year. They live in colonies that vary in size from a few hundred individuals to thousands. Individual termites belong to one of three castes – worker, soldier, and reproductives.



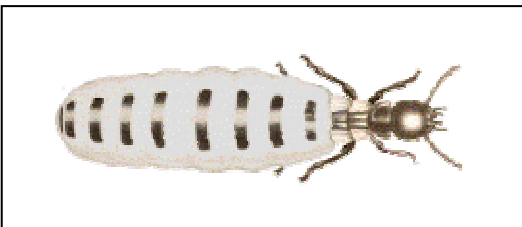
Workers are small (3-4 mm long) and white. They forage up to 75 meters for food to feed the young termites and other members of the colony as well as look after the nest and tunnels.



Soldiers, as the name implies, protect the nest and its inhabitants from several predators such as ants, ground beetles and centipedes.

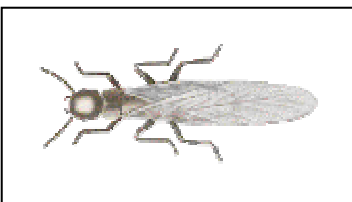


Primary reproductives (5-6 mm long) include the ‘king’ termite which mates with the queen and tends to her every need. Supplementary reproductives provide additional reproductive capacity.



The queen lays millions of eggs over her life-span of up to 25 years.

As colonies grow, smaller colonies bud off where foraging workers find new food sources and favourable conditions.

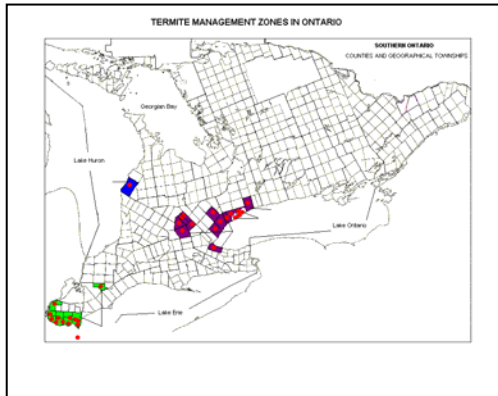


Populations also expand by winged reproductives that swarm from existing colonies in the spring and late summer to establish new colonies.

(Source of images: <http://www.pestproducts.com/termites.htm>)

3. Where are they in Canada?

In Canada, active infestations of the eastern subterranean termite (*R. flavipes*) are present in south western Ontario (Fig. 1). An infestation of eastern subterranean termite appeared in a neighbourhood of Winnipeg in 1987. City officials believe the termites were accidentally

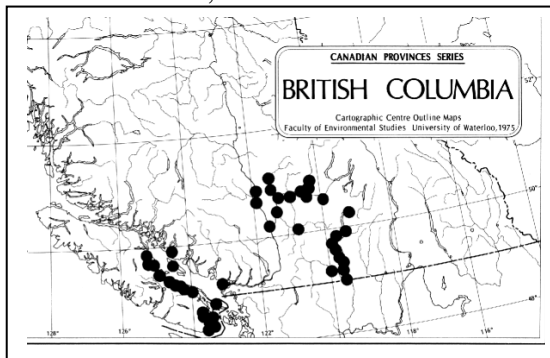


introduced at least 5-10 years prior to discovery. The City of Winnipeg treated the properties with an experimental baiting system (Sentricon®) which has kept the area termite-free since 2001. Old records indicate a small infestation existed in Medicine Hat.

Fig.1 Distribution of eastern subterranean in Southern Ontario.

(<http://www.utoronto.ca/forest/termite/Reticdis.htm>)

A possibly new species is present in the dry southern Interior of British Columbia (Allen Szalanski, pers. comm.), and western subterranean termite (*R. hesperus*) is reported on Vancouver Island, on the Sunshine Coast north of Vancouver, and in the city of Vancouver



(Fig. 2). Only the species in the southern Interior of BC is believed to be native, with all other populations introduced as a result of importation of infested wood or wood products.

The two species of rottenwood termites are present in Vancouver and south to the US border. One or both species are also on Vancouver Island.

Fig. 2 Distribution of subterranean termites in British Columbia.

(<http://www.utoronto.ca/forest/termite/Reticdis.htm>)

Reports of subterranean termite infestations are on the increase in the Sechelt area (Ron Dickinson, Sunshine Coast Pest Control Ltd., pers. comm.). According to Mr. Dickenson, this is a result of more public awareness of their presence, and possibly because subterranean wood sources are no longer plentiful so the termites are turning their attention to buildings.

In Vancouver, termite control companies receive few new reports of subterranean or rottenwood termite infestations each year (Dave Pallin, Integrated Pest Supplies Ltd., pers. comm.).

On Vancouver Island, subterranean termites occur from Victoria north to Nanaimo along the eastern side of the island. Their distribution is scattered in the Victoria area where local termite control companies detect several new infestations each year as a result of homeowner requests for inspections. Increased public awareness and housing values are mainly responsible for the continued detection of new infestations (Victoria Pest Control, pers. comm.). These infested areas were forests prior to urban development.

In the dry BC Interior, termite control companies receive many reports of new infestations each year from Kamloops south to the US border. This is likely due to expanding urbanization into forested areas and subsequent spread of termite colonies due to increased sources of permanent water (underground irrigation systems, water features, pools) combined with adequate food (wood) sources (roots, building debris, unprotected outdoor wood structures).

4. What do they do?

Both types of termites live on the cellulose which protozoa and bacteria breakdown in their digestive tract. Subterranean termites feed on dead plant material (wood, leaves, roots, dead plants, dung and organic matter in the soil) including sound lumber. Rottenwood termites use damp or rotten wood for food and nesting sites. Because they attack dry wood, subterranean termites require a reliable source of water which is available from sub-soil moisture sources and above-ground from rain, sprinklers and leaking irrigation systems.

Subterranean workers construct diffuse networks of 0.5 – 2.5 cm-wide mud tubes between food and water sources and the colony nursery and reproductive chambers (Fig. 3). The tubes protect the workers and soldiers from predators and also maintain the humid atmosphere they require.



Fig. 3. Mud tubes

Once they have located a source of food, the workers excavate out the softer summer wood tissue, creating a honey-comb effect in cross section (Fig. 5).



Fig. 4 Wood damaged by subterranean termites.

(Graphic source: <http://www.ces.ncsu.edu/depts/ent/notes/Urban/termites/termites.htm#tubes>)

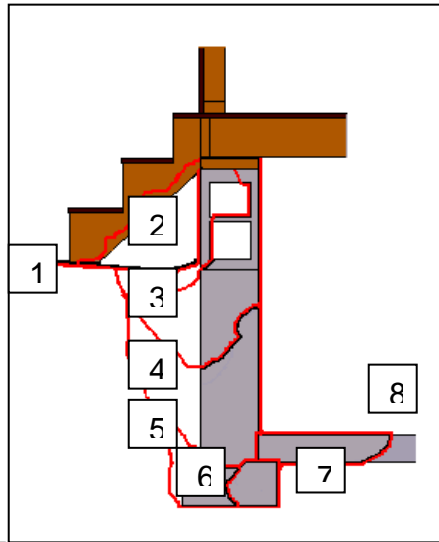
They leave the exterior surfaces intact to avoid exposure to predators and to maintain adequate humidity inside the material as they harvest the wood tissue. It is estimated 60,000 workers can consume a 30 cm-long piece of 2 x 4 in 103-157 days based on a consumption rate of 0.08 mg dry wood/day/worker (Myles, <http://www.utoronto.ca/forest/termite/termite.htm>.) Termite feeding can reduce structural strength of lumber within 3-4 years. This is the same amount of time termites feed before the first swarms emerge, often the first time building owners are aware of their presence.

Unlike carpenter ants and rottenwood termites, subterranean termites do not nest in buildings. However, they will establish nurseries in timbers and under sub-floors and cement slabs near

furnaces, hot water tanks and other sources of heat. These same heat sources allow activity to continue throughout the winter.

5. What can be done about them?

Subterranean termites have many pathways into buildings as illustrated in the following graphic (Fig.5).

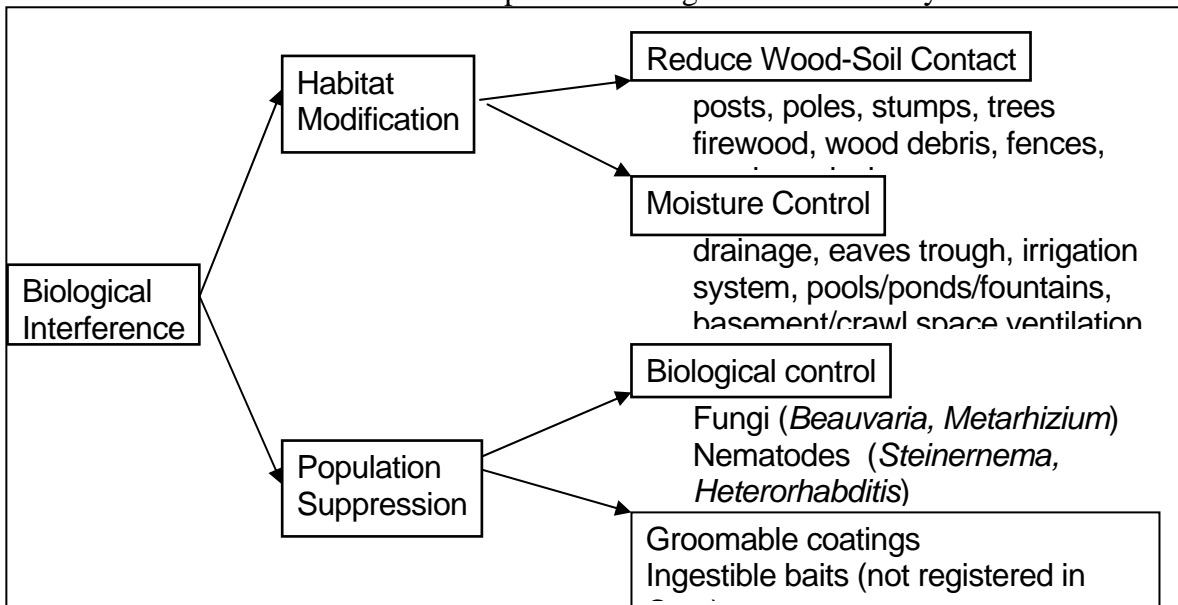


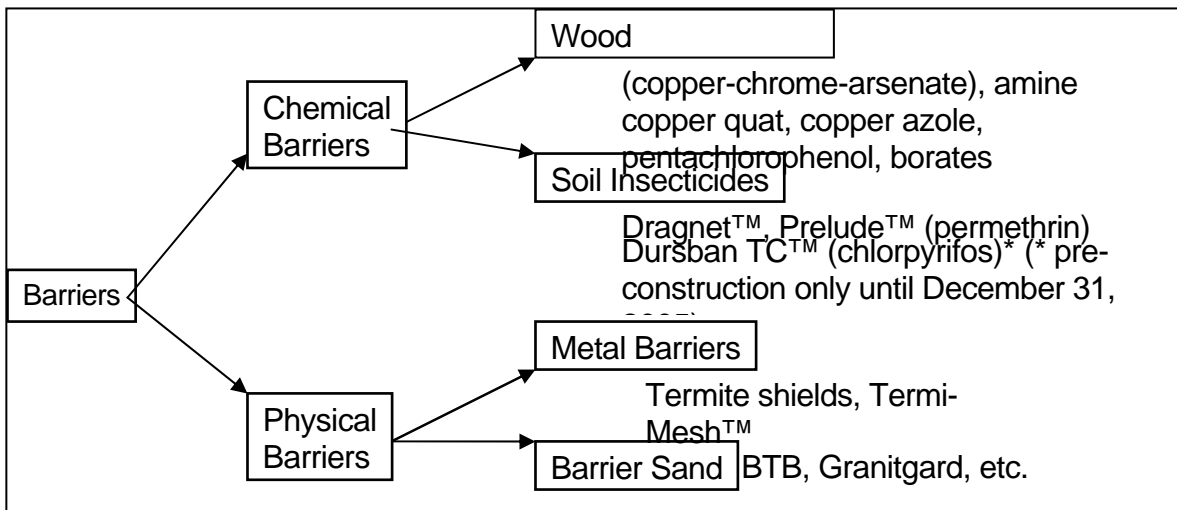
1. Wood soil contact
2. Exposed foundation above grade
3. Hollow spaces in foundation walls
4. Cracks in poured concrete walls
5. Joint between footing and foundation wall
6. Cracks in the footing
7. Cold joint between footing and the floor slab and the shrinkage gap between the floor slab and the wall.
8. Cracks in the floor slab

Fig. 5. Points of entry to buildings by subterranean termites.

Rottenwood termites attack damp and decaying timbers which are usually limited to the periphery of buildings and to outdoor structures.

According to Dr. Tim Myles, Director, Urban Entomology Program, University of Toronto, there are a number of tactics available to protect buildings from termite entry as follows:





Preventing or eliminating pathways into buildings will greatly reduce the risk of infestations. However these pathways will not pose as large a risk if an integrated approach is adopted that involves termite management practices described in the 6 S Program (Morris, PI) that involves:

1. **Suppression** – check with local home inspectors and pest control companies if termites are active in area of interest; alternatively, inspect area for signs of termite activity (bait stations of damp cardboard or wood) and eliminate infested wood and potential food sources where possible.
2. **Site management** – destroy existing colonies on property along with removal of all cellulose sources (tree stumps and root, wood construction debris, wood used in cement forms); do not store cellulose products in crawl spaces (cardboard, lumber, etc.) or on the ground (e.g. firewood, used lumber); do not apply bark or pea gravel mulches to base of building; use preserved wood or termite resistant wood (heartwoods of red cypress, redwood, red cedar) for outdoor structures and landscaping (fences, ties, decks, arbours, etc.)
3. **Soil barrier** – preventing termites’ access to the house by applying a pre-construction termiticide under the foundation and slab, sand or metal screen barrier around foundation, metal shields between wall bases and foundation (although not always reliable).
4. **Slab/foundation** – prevent termite entry through cracks and joints (see Figure 5 below) in the slab and foundation; ensure expansion joints are properly cured and that no spaces exist around entry holes of utility services (sewer, electricity, natural gas lines).
5. **Structure durability** – use preserved wood or apply borate products in construction where risks of termite attack and injury are greatest; ensure no potential pathway between attached structures (fences, semi-detached garages, out-buildings) and building.
6. **Surveillance** – monitor property for re-infestation by termites using qualified inspectors or setting out bait stations (rolled cardboard, wood stakes); inspect buildings annually for signs of termite activity (mud tubes, damaged wood); watch for emergence of winged termites in spring (and sometimes fall).

Current building standards in BC require use of preserved wood where the lumber will be within 45 cm of the soil surface. This should also apply where fences, decks, etc. attach to the

building. Currently registered wood preservation active ingredients for buildings and related structures include copper 8-quinolinolate, a combination of chromic acid, arsenic pentoxide and cupric oxide (CCA), which is being phased out in favor of amine copper quat (ACQ) and copper azole (CA), and copper and zinc naphthenate.

More builders the Vancouver area are applying inorganic borate compounds to lumber at the time of construction to provide longer protection from attack by wood-destroying fungi and termites (Dave Pallin, Integrated Pest Supplies Ltd., pers. comm.). Because subterranean termites construct mud tubes over exposed surfaces, a combination of structural barriers plus preserved lumber is necessary to prevent or delay termite infestations. It is also very important to treat cut ends and bored holes with preservatives to maintain the protective integrity of preserved wood products. Management of rottenwood termite infestations involves simply replacing the infested wood and any damp or decayed wood and ensuring the new wood remains dry.

In the Interior, some builders are having pre-construction termiticides applied where termite activity is common. One First Nations band requires pre-construction treatment for all new buildings on reserve land (Dudley Gordon, Rid-It Pest Control, pers. comm.). Most termiticide treatments involve full perimeter and under-slab injections; some applicators will apply spot treatments where termite activity is restricted to a small area adjacent to the building. Interior treatments to infested walls may be done, usually involving a borate product.

Post construction infestations require application of a registered termiticide such as Dragnet™ or Prelude™ (both contain the insecticide permethrin) under the slab and around the foundation of the building. This process can be very disruptive and expensive, and does not eliminate the colonies. It is simply a chemical barrier. Additional costs include replacement of damaged wood (studs, moldings, door frames, etc.). A number of termite bait products are available in the US that use a very small amount of a reduced-risk compound to eliminate colonies within 1-2 years. Efforts are underway to register at least one of these products in Canada.

There are a number of issues that need addressing to eliminate or minimize the risk of subterranean termite attack and damage:

1. Registration of baits such (e.g. Sentricon®, FirstLine®, Exterra™) and alternative soil termiticides (Premise™, Termidor™).
2. Improved knowledge of termite distribution and dispersal pathways in Canada.
3. Increased awareness and understanding of the threat posed by termites by the public, realtors, developers, building inspectors and construction trades.
4. Acknowledgement by municipal and real estate officials that termites are present in southern BC.
5. Update building codes to include latest construction standards that prevent or delay termite attack and facilitate remediation methods.

Figure 6 below shows examples of building standards that deal with termite prevention, detection and management in the Florida Building Code. Chapter 23, Section 2304. The Florida Building Code – Protection Against Decay and Termites - provides greater detail of the

construction standards for wood standards (http://www2.iccsafe.org/florida_building_code/changed/ch-23/sec-2304.pdf)

Similar code requirements in termite-active regions in Western Canada would help minimize the risk of termite infestations and structural damage.

2303.1.1	Construction Practices	Sites must be graded to provide drainage
2303.1.2		Cellulose debris must be removed from foundation
2303.1.3		Wooden grade stakes, form boards, etc. must be removed
2303.1.4		No cellulose material can be buried within 15 feet of foundation.
2304.1	Wood Construction - Protection against Decay and Termites	Requires preservative or naturally decay resistant wood in certain areas
2304.2.5	Clearance between wood siding and ground	Clearance between wood siding and ground must be 6 inches
2304.2.7		Decks fences and patios must have an inspection clearance or be built to allow inspection for termites
2603.3.1	Foam Plastic Insulation	Plastic foam insulation cannot be installed below grade.
2603.3.2	Foam Plastic Insulation	A 6 inch clearance is required between foam plastic insulation on the exterior of buildings and earth grade

Figure 6. Sections of the Florida Building Code that contain building standards dealing with termites.

6. Useful References

The following web sites are provide a small selection of publication with more detailed information on the biology, damage, and management of subterranean termites.

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