

Advancing Termite Control in Canada

by Timothy G. Myles

From a presentation to the Pesticide Management Regulatory Agency, June 2004

1. A multi-million-dollar plague

Subterranean termites, *Reticulitermes flavipes*, are an urban plague in southern Ontario and the Greater Toronto Area. They were first noticed in the Toronto waterfront area in 1938 and have since spread to about 1,000 city blocks. Assuming that the average city block has 40 residential properties and the average price of a Toronto home is about \$300,000, that represents \$12 billion worth of property at risk of infestation and damage by these pests. And if termite damage reduces the value of a property by 1% each year, this would be equivalent to a \$120 million worth of property devaluation annually in Toronto. Toronto cannot afford *not* to address the problem of termites.

2. The costs and risks of conventional treatment

At present, the only method permitted in Canada for termite control is the one developed in the 1940s – that of drenching the soil around the base of a house with litres of pesticides. Treatment usually includes several thousand dollars worth of structural renovation in addition to the \$1,500 to \$5,000 cost of chemical treatment, plus a further charge of 10% of the treatment cost per year thereafter as an annual maintenance fee to cover the cost of anticipated re-treatments. Under city bylaws, Toronto homeowners must bear these costs out of pocket. No financial assistance is currently offered from any level of government.

Until about 1990, the Canadian government approved highly toxic and persistent pesticides, such as

chlordane, aldrin, dieldrin, for use in the treatment of termites. In 1989 these chemicals were banned in favour of the organophosphate, chlorpyrifos. However, this in turn was phased out a few years ago. Now only the synthetic pyrethroid, permethrin is permitted.

(It is worth noting that five of the twelve chemicals listed for priority elimination by the 2000 Stockholm Convention of the United Nations Environmental Program on Persistent Organic Pollutants are pesticides that are or were at one time widely used as soil termiticides.)

Despite these improvements in pesticide chemistry, conventional termite control methods entail the use of large quantities of liquid pesticide to saturate the soil around a house in which people are living. Since pesticides and emulsifying solvents can migrate through foundation gaps, cracks, plumbing openings in slabs, and open crawl spaces and into the indoor air suggests that this practice may not be safe, especially when the basement is occupied by a family member or tenant. Almost all homes in Toronto have basements, which are often used as living quarters.

3. Conventional methods do not eliminate termites

Not only are conventional methods expensive and risky for homeowners, but they often fail to keep termites out of treated structures – hence the built-in annual “maintenance” charge. Soil termiticide application does not, in fact, control termite populations, which continue to spread. The treatments do no more than block the movement of termites within the soil

without eliminating the pests themselves. Thus these applications are pointless from a municipal perspective, in which the objective is to eradicate or contain the pests.

Soil termiticide applications could be called legalized pollution of the living environment, but cannot accurately be called “termite control,” because termite populations are usually not significantly suppressed by such treatments. Soil termiticide application is a sloppy and ineffective use of large amounts of toxic chemicals in the urban environment and should not continue to be tolerated as the sole treatment option in a scientifically enlightened society.

4. The alternative: “colony-level” control

Municipalities should have at their disposal control techniques and products that actually control termite populations over large areas, and that do so using much smaller quantities of pesticide. Such “colony-level” control methods include: Trap-Treat-Release, baiting, and bio-control with fungal pathogens. But no such low-toxicity alternatives are available to homeowners in Canada. Instead, they are forced to resort to expensive, antiquated methods that expose their families to excessive quantities of toxic chemicals. This situation is unacceptable.

The University of Toronto’s Urban Entomology Program was established at the University of Toronto in 1987 to develop more effective methods of termite control that would be more environmentally sensitive and that could be implemented on a larger scale to address the municipality’s need to eradicate or contain termites. Researchers in the program have produced several innovations:

- sand barriers;
- sheet metal barriers;
- bio-control;
- borates in wood composites;
- Trap-Treat-Release method.

At present, applied research work is focused on three main initiatives:

- testing a baiting method currently used in the United States;

- investigating fungal pathogens for termite bio-control;
- registration of Trap-Treat-Release (TTR).

It would be desirable to have at least one baiting system made available on the Canadian market. The Urban Entomology Program obtained a research permit to test Labyrinth, a registered U.S. termite bait, in 2004. The active ingredient in Labyrinth is the chitin synthesis inhibitor, diflubenzuron.

Another potentially effective approach to colony-level type of termite control would be bio-control with fungal pathogens. Termites live in humid soil into which a number of entomopathogenic fungi could potentially be introduced. The social interactions of termites could be exploited to spread the disease throughout the colony. Two such pathogens under study are *Metarhizium anisopliae* and *Antennopsis gallica*. The later is ready to advance to the field-testing stage.

The Trap-Treat-Release (TTR) approach, described in more detail in the following section, has a higher kill ratio than baiting. However, the preferred formulation for TTR would require registration of a new active agent and a new formulation and the market for the system in Canada is very small.

5. Trap-Treat-Release (TTR)

The unique patented methodology of Trap-Treat-Release involves applying the slow-acting toxicant sulfluramid directly to trapped termites as a resinous surface coating. The treated termites are then released back to their colonies and nestmates groom off the coating and then further spread it by regurgitative feeding. Because termites have a “social gut” and rapidly passing food between one another, the chemical is widely distributed before the toxic effects begin to act. Applying the formulation to termite’s cuticle or the “social skin” of the colony is a uniquely effective method of delivering control agents to a social insect population.

TTR has been the centrepiece of the research effort and represents a genuine breakthrough. TTR has been field tested for a number of years, culminating in three large eradication projects in Toronto, Pickering, and Guelph between 1999 and 2001. In all three projects,

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termites appeared to have been eradicated on the majority of blocks within the multi-block management areas.

This impressive level of termite control was achieved with only minute quantities of sulfluramid. It was conservatively calculated that at least a 100,000-fold reduction in pesticide usage was achieved compared to what would have been used in conventional treatments. A ten-fold reduction in pesticide usage is generally lauded as a major accomplishment, therefore a demonstrated 100,000-fold reduction in pesticide usage is a significant development. When the magnitude of the pesticide volume reduction, in combination with direct termite treatment and the greater distance of treatment from inhabited structures the risk to human health from TTR would appear to be much lower than the risk associated with currently approved practices.

6. *The quest for regulatory approval*

To implement TTR commercially requires getting regulatory approval of the chemical used for Trap-Treat-Release from Health Canada's Pest Management Regulatory Agency (PMRA). The Toronto area market is too small to justify proceeding with the expensive and lengthy Canadian registration process by the manufacturer of sulfluramid. However, the manufacturer has agreed to support registration by providing to the PMRA the toxicological package used to secure registration by the Environmental Protection Agency in the United States. Sulfluramid has been approved in the United States for outdoor, below-ground termite baits through 2016, and a similar extended, restricted-use as the active in TTR would be desirable in Canada.

Trap-Treat-Release is best implemented through publicly coordinated programs. Although it is unlikely to produce large commercial profits in Canada, it does have strong potential to benefit the public. Because of the unique way in which the system was developed, it does not fit the typical model for registration and commercialization. An innovative means of registration may be needed to allow its implementation in those areas of Canada affected by termites.

The City of Toronto, which has been the major sponsor of the research to date, and the Urban Entomology Program are considering creative options for covering the cost of registration of the TTR system. One option would be to trade a portion of the future royalty interest in the system to cover the cost of registration. Another might be to secure a special "minor-use" provision permitting the use of TTR in specific termite-infested areas of Ontario.

The question is now: How can the Urban Entomology Program, the City of Toronto, and PMRA work more effectively together to make TTR available for use so that pockets of termite infestations can be eradicated before they spread, and existing infested areas contained?

If the PMRA requires that TTR be subject to the standard registration process, then the Agency may, in effect, be defending the status quo against innovation because of the cost, complexity, and uncertainty of registration. This would not serve the public interest, but would instead benefit the manufacturers, distributors, and appliers of conventional termiticides.

Since no other research group is doing applied termite control research in Canada, progress in termite control and the protection of the health of Canadians from undue exposure to termiticides, in effect, depends on the success of these initiatives at the University of Toronto. One would hope that the approval of pest control products would be driven proactively by societal needs rather than the profit motive of private chemical companies. More could be done to promote and finance public interest research on less-toxic approaches to pest management.

The affected parties – infested municipalities and the PMRA – should be partners in pest management problem-solving. Ideally, the PMRA will take on a participatory and assisting role in advancing termite control from the primitive, high-toxicity, high-exposure, soil termiticide methods of the 1940s to the more entomologically sophisticated, area-wide, low-toxicity, low-exposure methods appropriate for the 21st century.

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ISBN 0-7727-xxxx-x © Centre for Urban and Community Studies, University of Toronto 2004