

January 20, 2004

York Region Health Services
17250 Yonge Street, Newmarket,
Ontario, L3Y 6Z1

Dear Sir or Madam:

The Board of Health, at its meeting on January 19, 2004, had before it the attached report (December 31, 2003) from the Medical Officer of Health, providing information on the possible use of pesticides to prevent the further spread of the Asian Longhorned Beetle infestation in Toronto.

The Board of Health also had before it a communication (January 16, 2004) from Maria Pede.

Maria Pede appeared before the Board of Health in connection with the foregoing matter.

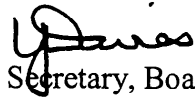
The Board of Health amended and adopted the attached report, and, in so doing:

- (1) supports actions to control the damage and further spread of the Asian Longhorned Beetle (ALB) through removal of known and suspected infested trees, judicious use of the pesticide imidacloprid via stem or soil injection methods (pending approval by the Pest Management Regulatory Agency (PMRA)), and an intensive tree re-planting program;
- (2) requests the Pest Management Regulatory Agency (PMRA) to either authorize emergency registration or provide a research permit for the use of imidacloprid by stem and soil injection methods to control the Asian Longhorned Beetle, but not to register its use via soil drenching methods;
- (3) recommends that City Council ensure that City staff consider only stem and soil injection (and not soil drenching) as appropriate application methods of the pesticide imidacloprid for use against the Asian Longhorned Beetle, and that stem injection of trees be the preferred method;
- (4) recommends to the Canadian Food Inspection Agency (CFIA), the Pest Management Regulatory Agency (PMRA) and the Ontario Ministry of the Environment (OMOE) that ALB management plans ensure that an Integrated Pest Management (IPM) approach is practiced, that adequate public notification and postings inform residents of pesticide application to trees, and that stem injection be the preferred method of pesticide application,

- (5) recommends to the Canadian Food Inspection Agency (CFIA) that the City of Toronto be reimbursed for the cost of ALB control measures, including the use of pesticides, if warranted;
- (6) recommends that the Ontario Ministry of the Environment undertake environmental monitoring for imidacloprid residues in the Humber River watershed;
- (7) directed that this report be forwarded to the Economic Development and Parks Committee, and the Works Committee for their meetings in February, 2004, in accordance with Recommendation No. (7) with a request that they forward their comments directly to Council for consideration with this matter;
- (8) directed that this report be forwarded to the Toronto and Region Conservation Authority, York Region Health Services, the Ontario Ministry of Natural Resources, the Canadian Forestry Service and the Association of Municipalities of Ontario, for their information; and
- (9) authorized and directed the appropriate City officials to take the necessary action to give effect thereto.

May I draw your attention, in particular, to Recommendation No. (8) above.

Yours truly,



Secretary, Board of Health
Y.Davies/jd
Item No. 5

Also sent to: Canadian Food Inspection Agency
Minister of the Environment
Toronto Region Conservation Authority
Pest Management Regulatory Agency
Minister of Natural Resources
Canadian Forestry Service
Association of Municipalities of Ontario

c. Medical Officer of Health
Jane Speakman, Legal Services
Interested Persons

 Toronto STAFF REPORT

December 31, 2003

To: Board of Health

From: Dr. Sheela V. Basrur, Medical Officer of Health

Subject: Use of Pesticides to Control the Asian Longhorned Beetle

Purpose:

This report provides information on the possible use of pesticides to prevent the further spread of the Asian Longhorned Beetle infestation in Toronto.

Financial Implications and Impact Statement:

There are no financial implications to Toronto Public Health arising from this report.

Recommendations:

It is recommended that:

- (1) the Board of Health support actions to control the damage and further spread of the Asian Longhorned Beetle (ALB) through removal of known and suspected infested trees, judicious use of the pesticide imidacloprid via stem or soil injection methods (pending approval by the Pest Management Regulatory Agency (PMRA)), and an intensive tree re-planting program;
- (2) the Board of Health request the Pest Management Regulatory Agency (PMRA) to either authorize emergency registration or provide a research permit for the use of imidacloprid by stem and soil injection methods to control the Asian Longhorned Beetle, but not to register its use via soil drenching methods;
- (3) the Board of Health request Council to ensure that City staff consider only stem and soil injection (and not soil drenching) as appropriate application methods of the pesticide imidacloprid for use against the Asian Longhorned Beetle;
- (4) the Board of Health recommend to the Canadian Food Inspection Agency (CFIA), the Pest Management Regulatory Agency (PMRA) and the Ontario Ministry of the

Environment (OMOE) that ALB management plans ensure that an Integrated Pest Management (IPM) approach is practiced, that adequate public notification and postings inform residents of pesticide application to trees, and that stem injection be the preferred method of pesticide application,

- (5) the Board of Health recommend to the Canadian Food Inspection Agency (CFIA) that the City of Toronto be reimbursed for the cost of ALB control measures, including the use of pesticides, if warranted;
- (6) the Board of Health recommend that the Ontario Ministry of the Environment undertake environmental monitoring for imidacloprid residues in the Humber River watershed;
- (7) the Board of Health forward this report to the Economic Development and Parks Committee, and the Works Committee for their consideration;
- (8) the Board of Health forward this report to the Toronto and Region Conservation Authority, York Region Health Services, the Ontario Ministry of Natural Resources and the Canadian Forestry Service for their information; and
- (9) the appropriate City officials be authorized and directed to take the necessary action to give effect thereto.

Background:

In September 2003, an Asian Longhorned Beetle (ALB) infestation was discovered for the first time in Ontario in a small area in Toronto and Vaughan. At present, the infestation appears to be localized in the area close to where Highway 407 intersects with Highway 400. As survey efforts by the Canadian Food Inspection Agency (CFIA) and the City's Urban Forestry section continue, it is possible that the zone currently designated as infested may increase in size.

Surveillance activities are helping to determine the potential host trees for the ALB in Toronto. The ALB is known to feed on maple, birch, elm, poplar, horsechestnut, hackberry, sycamore, mountain ash and willow trees and threatens to destroy up to 70% of the trees and canopy of Toronto's urban forest. If not contained, the ALB has the potential to destroy deciduous trees in the Humber River corridor with subsequent devastation of forests in Ontario and throughout Canada, causing massive ecological degradation and extensive damage to the maple syrup, fruit, and lumber industries.

CFIA is leading the federal-provincial process to control the ALB, and has the authority to issue control orders directed at municipalities and their residents to take measures to control ALB. The Economic Development, Culture and Tourism Department's Urban Forestry section has the lead responsibility in Toronto to implement ALB control measures, required by the CFIA. Toronto Public Health is working collaboratively with Urban Forestry by providing research support regarding the potential use of pesticides against the ALB. This report was prepared in consultation with staff in the Economic Development, Culture and Tourism Department, as well as Works and Emergency Services.

Comments:

Health and Environmental Benefits of Trees:

Trees provide a myriad of environmental, social, and economic benefits in the City of Toronto. Environmental attributes of trees include improving air quality by trapping pollution particles that contribute to respiratory illnesses, absorbing carbon dioxide that would otherwise exacerbate global warming, providing protection against the sun's ultraviolet rays, supplying wildlife habitat, enhancing biodiversity, and improving water quality. Trees also provide social attributes by buffering noise, encouraging psychological well-being, enhancing social interactions, and greatly enhancing the beauty and character of neighbourhoods. The economic benefits of trees include reduced heating and cooling costs of buildings, protection against flooding, and reduced stormwater management costs (City of Toronto, 2003; Dombeck, 2003; New Jersey Department of Environmental Protection 2003; USDA Forestry Service, 2003). Given the extensive value of trees to society, it is recommended that the Board of Health support the City's plan to prevent the further spread of the ALB, even if this plan involves the potential use of pesticides in a controlled manner that ensures minimal human and environmental impacts.

Background on the Asian Longhorned Beetle:

The ALB is native to China, Japan, and the Malaysian Peninsula (USDA Forestry Service, 2003). The species was first observed in North America in 1996. The United States has experienced outbreaks of the ALB in Illinois, New York, Seattle, and New Jersey. An infestation of ALB has also occurred in Austria. The ALB has entered North America in solid wood packaging materials such as crating, pallets, or packaging blocks originating in Asia. In order to reduce the risk of the ALB entering Canada, the CFIA has introduced a Directive that takes effect on January 2, 2004 and prohibits the importation of wood packaging materials into Canada from any area of the world excluding the United States, unless the materials have been heat or chemically treated (CFIA, 2003¹).

ALB larvae feed within the trunk and limbs of trees and eventually riddle the trees with holes, causing them to die. In some situations, mature trees may be killed in one or two growing seasons. The adult beetles can also feed on leaves, bark and shoots, causing considerable damage to the tree. No known natural predators to control the ALB exist in North America, and no biological controls are available at this time.

The United States Department of Agriculture (USDA) has developed an extensive program for eradication of the ALB that includes removal of infested trees and use of the pesticide imidacloprid on healthy host trees in the vicinity of infested trees. The cutting and subsequent chipping of trees is required in order to prevent the spread of the ALB. Trees cannot be saved once infested with the ALB. Consequently, imidacloprid is applied in the spring to protect healthy trees against the ALB from nearby trees that are infested.

The three primary application methods of imidacloprid that have been used against the ALB in the United States are stem injection, soil injection and, to a much lesser extent, soil drenching. With each application method, imidacloprid is transported from the area of application (either at

the root zone or into the bark) to the active growth areas where beetles are expected to feed and lay eggs. Imidacloprid kills many adult beetles as they feed on treated leaves and kills some larvae as they develop. The USDA reports that some trees that have been applied with imidacloprid have been protected against the ALB for up to one year (Poland, 2003).

Proposed Measures to Control ALB in Toronto:

Control measures for the ALB in Toronto are emerging and involve surveillance, tree removal, and potential use of the pesticide imidacloprid. Surveying activities undertaken by the CFIA and the City of Toronto's Urban Forestry section, in conjunction with Canadian Forestry Services, the Ministry of Natural Resources, Toronto and Region Conservation Authority, the City of Vaughan, and York Region are underway to delineate the area of the ALB infestation.

Recommendations for an ALB control strategy are being developed by a group of experts from the United States and Canada, whose membership includes representatives from the City of Toronto's Urban Forestry section. Discussion is currently underway regarding a possible ALB control strategy to remove all trees with visual evidence of infestation, as well as host trees in a surrounding band approximately 400 meters deep because of the lack of certainty regarding visual confirmation of infestation. In addition there is consideration of the use of the pesticide imidacloprid on host trees in a further 400 meter band around the area designated for tree removal. If pesticides are not used in the approximately 400 meter band beyond the known and potentially infested trees, it means that a much larger area of healthy host trees must be removed as a security measure to prevent the spread of ALB. While the use of pesticide may entail some environmental impact, large scale tree removal also contributes environmental impacts, such as increased erosion potential and siltation of aquatic habitats. These adverse effects may be more detrimental than the judicious use of pesticide. It is likely that tree surveillance and eradication measures will need to continue for another 4 to 5 years in the Toronto-area in order for the pest to be eliminated (Grant, 2003).

The CFIA has issued an Order for the City of Toronto to remove infested trees. Removal of infested trees that have been identified on public property during surveying activities began on November 20, 2003. As of December 15, 2003, 284 trees have been removed in Toronto. Infested trees are being destroyed to eliminate the risk of ALB spreading to uninfested trees. Once trees are cut, they are chipped into small pieces in order to kill larvae and are then composted. Trees on private property are scheduled for removal prior to the spring.

Toxicology of Imidacloprid:

Imidacloprid is a systemic, chloronicotinoid insecticide that kills insects by ingestion or contact (Bacey, 2000). The insecticide is possibly a weak mutagen, but does not have carcinogenic properties for humans (USDA, 2003). There is uncertainty surrounding imadacloprid's possible role as an endocrine disruptor (Rexrode et al., 2001).

Imidacloprid is toxic to birds; however, they tend to be repelled by the substance, thereby limiting their exposure (USDA, 2003). The pesticide is of moderately low toxicity to fish, but

may be very toxic to aquatic and soil invertebrates. Imidacloprid is highly toxic to bees (Extension Toxicology Network, 2003).

Imidacloprid is a non-volatile insecticide, which reduces the potential for the substance to be dispersed in air (Bacey, 2000). Imidacloprid is considered persistent in soil and has the ability to runoff to surface water and can leach to groundwater, depending on soil conditions (Bacey, 2000; Rexrode et al., 2001). The half-life of imidacloprid in soil varies from 48 to 190 days depending on the organic matter content, ground cover, and plant uptake (Extension Toxicology Network, 2003).

Environmental and Health Concerns Regarding Imidacloprid Application:

Soil drenching, soil injection, and stem injection are the most commonly used application methods of imidacloprid against the ALB. Soil drenching involves applying imidacloprid in solution to the soil at the base of trees. Soil injection of imidacloprid entails inserting a pressurized pipe containing liquid imidacloprid between 4 and 8 inches (20 cm) into the soil around the base of the tree. The number of holes around the tree depends on the size of the tree, as determined by its diameter. Stem injection involves inserting a cylinder into the tree that contains capsules of liquid imidacloprid.

While both soil drenching and soil injection create the potential for pooling and runoff, soil drenching provides a greater potential for these conditions because imidacloprid is applied directly onto the soil surface, as opposed to an injection occurring beneath the soil surface.

The type of soil to which imidacloprid is applied impacts the mobility of the insecticide. Imidacloprid tends to be more mobile in sand than clay. Concerns regarding imidacloprid applications to soil also relate to the specific surface and groundwater characteristics of the area of application. The ALB infestation encompasses sections of the Humber River watershed that traverse the City of Toronto and the City of Vaughan. Consequently, the application of imidacloprid to soil (particularly using soil drenching) could result in environmental effects to the Humber River ecosystem.

Residue monitoring undertaken as part of the US ALB Program has detected imidacloprid in shallow groundwater (Bright, 2003; Serafini, 2003). Concerns regarding soil drenching and the potential exposure to humans and other organisms have led the U.S. ALB Program to use soil drenching only in areas that provide limited potential for exposure to humans and other organisms, such as for potted trees on rooftop gardens (Lewis, 2003, Mastro, 2003).

Soil treatments also allow the uptake of imidacloprid by non-target plants (USDA, 2003). Adverse effects may occur to vegetation surrounding trees that have been treated using soil drenching or soil injection of imidacloprid. Given that the ALB is unlikely to be eradicated in the first year, subsequent applications of imidacloprid may be necessary (Invasive Species and Pest Management Staff, 2000; Poland, 2003). Repeated soil applications of the pesticide are a concern because its persistence may lead to accumulation of residues in the environment (PMRA, 2001).

Non-target invertebrates present in the treated soil or in the wood of the treated tree are exposed to imidacloprid. Mortality from exposure is expected for some invertebrates. The populations of insects directly exposed to imidacloprid are expected to decrease temporarily in the treatment area until the residues decline and recolonization occurs from surrounding areas.

The potential effects of soil application of imidacloprid on non-target organisms, on surface water and on groundwater support the recommendation that the OMOE implement a monitoring program for imidacloprid residues in the Humber River watershed.

Stem injection provides the lowest risk pesticide application route compared with soil treatment methods. Imidacloprid is contained within the tree during stem injection treatment and uptake, which virtually eliminates runoff potential, groundwater contamination concerns, soil residue, and minimizes exposure opportunity for non-target organisms. The United States experience has demonstrated that stem injection and soil injection are both effective methods for protecting non-infested trees against ALB.

To further reduce the potential for humans to be exposed to imidacloprid, adequate public notification and postings should be implemented to inform residents of pesticide application of trees.

Emergency Registration of Imidacloprid:

Imidacloprid (also known by the trade name 'Merit') is commonly used by lawncare companies in Toronto for the control of grubs in residential and commercial lawns. As such, imidacloprid has been registered by Health Canada's Pest Management Regulatory Agency (PMRA) for specific insect pests such as grubs. However, imidacloprid is not currently registered for use against the ALB in Canada, given that the ALB is a new exotic pest that was unknown in Canada at the time imidacloprid was registered. Consequently, the CFIA is supporting an application from the manufacturer of imidacloprid to Health Canada's Pest Management Regulatory Agency (PMRA) for emergency registration of the pesticide. Emergency registration involves "registering pesticides for emergency control of pest infestations where no other efficacious, registered pest control product or alternative method of control exists" (PMRA, 2001).

Toronto Public Health supports the use of imidacloprid via stem injection as the preferred pesticide application method because it poses the least risk of human exposure and the smallest potential releases into the environment, compared with either soil injection or soil drenching. Stem injection should be considered on a priority basis for emergency registration or a research permit by the PMRA, given that this method of applying imidacloprid results in the lowest probability of human exposure and minimizes environmental effects.

Based on the best information available to staff at this time, it appears that stem injection formulations are still under development in Canada, and may not be available for use in the spring of 2004. It is also uncertain at this time how quickly the PMRA will be able to grant emergency registration for stem injection methods. Alternatively, the PMRA could issue a research permit for stem injection of imidacloprid. In recognition that there may be practical

limitations associated with stem injection, Toronto Public Health also supports the emergency registration of soil injection.

Toronto Public Health does not support emergency registration of soil drenching, as this application method may create a much greater potential for human exposure and environmental impacts than either stem or soil injection. For example, the application of imidacloprid via soil drenching in residential or park areas where children play could result in significant exposure potential because of its persistence and presence at the ground surface. Accordingly, Toronto Public Health requests that Council ensure that only soil injection and stem injection of imidacloprid be considered for use against the ALB in Toronto.

Consistency with the Pesticide By-law:

The City of Toronto's Pesticide By-law comes into effect in April 2004. The by-law focuses on restricting the outdoor use of pesticide, particularly when alternative methods such as integrated plant health care and use of low-toxicity exempted pest control products are possible. Under the by-law, the routine use of imidacloprid (Merit) for preventing grub infestations in lawns would be discouraged in favour of promoting healthy lawn practices that reduce the likelihood of grub infestations.

The by-law exempts tree injections from restrictions under the by-law, given the low probability for human and environmental impacts. The by-law does permit the use of non-exempted pesticides, such as imidacloprid, for the control of infestations. The by-law defines infestation as "the presence of pests in numbers or under conditions which involve an immediate or potential risk of substantial loss or damage." The use of imidacloprid to control ALB is consistent with the Pesticide By-law, given that the outbreak of ALB is a serious infestation. However, any application of imidacloprid must be undertaken within an integrated pest management (IPM) framework, which means that a pesticide is used only when necessary and that pest control materials are selected and applied in a manner that minimizes risks to human health, non-target organisms, and the environment.

Conclusions:

The ALB poses a serious threat to about 70% of the City of Toronto's trees. The majority of Canadian broadleaf trees are at risk from this insect, including all species of maple along with elm, birch, poplar, willow, hackberry, sycamore, and mountain ash. Eradication activities have commenced in Toronto and include surveillance of host trees in the area surrounding the first observance of the ALB and removal of infested trees. Infested trees are being destroyed to eliminate the risk of ALB spreading to uninfested host trees. The ALB has no biological controls in North America that are capable of preventing its spread. A comprehensive and integrated pest management (IPM) plan for ALB control will need to involve tree removal, judicious use of the pesticide imidacloprid via stem or soil injection, and tree re-planting.

In order to have a pesticide formulation available for use against the ALB, a submission for emergency registration of imidacloprid is being made to the PMRA. Stem injection is the application method that should be given priority consideration for either emergency registration

or a research permit, given the substantially reduced exposure potential and fewer environmental risks that accompany this method. It is recommended that emergency registration of imidacloprid use via soil drenching not be supported, and that the City only consider soil injection or stem injection as appropriate application methods of imidacloprid for use against the ALB.

Given the environmental and health concerns of pesticide use, regulatory agencies must ensure that an IPM approach is used in the control of the ALB infestation. In addition, adequate public notification of pesticide applications should occur to minimize any potential for human exposure. Lastly, a residue monitoring study that is commensurate with the potential impacts from selected imidacloprid application method(s) should be implemented to monitor the movement and degradation of imidacloprid in the Humber River watershed.

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Dr. Sheela V. Basrur
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