Who said it's not a priority?

Maybe Giorgi should contact one of the United State Golf Association agronomists who spend most of their waking hours making sure that the golf courses we walk, or drive on, aren't killing us.

The USGA spends millions of dollars on pesticide research as well alternative methods to golf course care. Its agronomists, as well as others from around the country, pass on their knowledge to golf course superintendents who are part of one of the strongest and smartest groups - the Golf Course Superintendents Association of America — in the entire golf community.

What is most impressive about our local golf course superintendents is how much time they spend attending symposiums sponsored by the Wisconsin Turfgrass Association or private companies like Reinders that include discussion about pesticide use.

That's why study after study after study shows that golf courses are much safer for you to walk on than your neighbor's lawn after he overdoses his grass with weed killer and pours whatever is left down the sewer drain.

Zaleski's research led him to UW horticulture professor John Stier, who gave the Madison parks department a high grade for not using toxic pesticides on its golf courses. He also pointed out that golf courses serve as valuable green space and wildlife habitat in urban areas. He also said that lots of research exists that proves pesticide runoff from golf courses is "virtually nil."

Giorgi countered with an 11-year-old report that showed that golf course superintendents have higher incidents of brain cancer, prostate cancer and non-Hodgkins lymphoma than the general population. And another report claimed that mice that drank water with low levels of common weed and feed fertilizer experienced a 20 percent increase in failed pregnancies.

I have great reservations about the latter report and so do most superintendents who use all the hours they spend getting rid of an abundance of mice, moles and gophers as proof that critter pregnancies are up ... way up.

As for the cancer report, I talked to at least a dozen respected golf course superintendents after it was first published in 1996 and they all questioned the research of it. In the years that followed I never read another report claiming it was right.

What it all boils down to is that golf course superintendents can fill the back of a pickup truck with all the research that proves they are not harming the environment or themselves with the way they take care of their golf courses. Yet they continually have to defend themselves every time another faux-scientist hatches a bad idea or puts his mitts on a piece of fiction that has not been credibly backed up.

I agree that golfers need to change their attitudes about what makes a golf course attractive. I think golf courses should cover much of their land with native grasses and leave them in a natural, uncut state. If that includes dandelions, so be it.

Golfers need to understand that every inch of a golf course's grass needn't be mowed down to its shortest possible length so they can find their drive that sliced over two fairways. Believe me, that's an issue at many golf courses and too many superintendents are pressured by foolhardy members to mow, mow and mow some more. That's really wrong.

Just don't tell me that golf courses are harming the environment or aren't protecting the people who walk them. Where are the studies that prove that people who play golf every day are dying at an early age? They don't exist and never will.

But that won't stop somebody from holding up a baseless report claiming that golfers who lick their golf balls after a fungicide has been sprayed have an 80 percent chance of becoming a werewolf.

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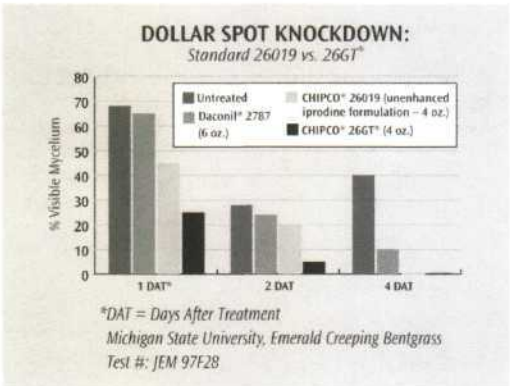

. . . or getting short changed.

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Emerald Ash Borer: Insecticide Options for Protecting Ash Trees and Their Effectiveness

By Dr. R. Chris Williamson, *Associate Professor, Department of Entomology, University of Wisconsin-Madison*

Although, to date, the emerald ash borer (EAB) has not been discovered in Wisconsin, many questions have been asked by homeowners and Green industry professionals regarding the capability and need of insecticides for protecting ash trees from EAB. There has been much confusion surrounding the question of whether insecticides are an effective management option for EAB. Research and experience has shown that insecticides can protect ash trees from being killed by EAB. However, success in not guaranteed! In some university trials, insecticide treatments were effective, but in other trials the same treatments failed. Some studies conducted over multiple years revealed that EAB infestations continued to increase despite ongoing treatment programs. Insecticides are **not** effective in eradicating EAB infestations, which is why they have not been used as an eradication tool by the Cooperative EAB program in other states. Research suggests that best control can be achieved when insecticide treatments are started in the earliest stages of infestation before visible symptoms are present or possibly the year before trees are infested. It is important to understand that insecticide treatments must be repeated each year. As a result, in some cases, it may be more cost-effective to remove and replace the tree.

There are several insecticide options available for those people who want to treat their trees. It is important to understand that controlling wood-boring insects with insecticides has always been a difficult proposition. This is especially true with EAB because our native North American ash trees have no natural resistance to this pest. Insecticide research programs are showing promise, but research on chemical control of EAB is still in early stages. Scientists from universities, government agencies, and companies are conducting intensive studies to understand the circumstances under which insecticide treatments will be most effective.

Insecticide Options for Controlling EAB

Insecticides used for control of EAB fall into three categories: 1) systemic insecticides that are applied as soil injections or drenches; 2) systemic insecticides applied as trunk injections or trunk implants; and 3) protective cover sprays that are applied to the trunk, main branches, and (depending on the label) foliage. Insecticide formulations and application methods that have been evaluated for control of EAB are listed in Table 1. Some products can be purchased and applied by homeowners while other can only be applied by professional applicators. Strategies for their effective

Table 1. Insecticide options for professionals and homeowners for control of EAB.

INSECTICIDE FORMULATION	ACTIVE INGREDIENT	APPLICATION METHOD	TIMING
Professional Use Products			
Merit® (75WP, 75WSP, 2F)	Imidacloprid	Soil injection or drench	Mid-April to mid-May
IMA-jet®	Imidaclorprid	Trunk injection, Arborjet™	Mid-May to mid-June
Imicide	Imidacloprid	Trunk injection, Mauget®	Mid-May to mid-June
Pointer™	Imidacloprid	Trunk injection, Wedgle™	Mid-May to mid-June
Inject-A-Cide B®	Bidrin®	Trunk injection, Mauget®	Mid-May to mid-June
Astro®	Permethrin	Preventative Bark and Foliage Cover Sprays	2 applications at 4 week intervals with the first application when black locust is blooming
Onyx™	Bifenthrin		
Sevin® SL	Carbaryl		
Tempo®	Cyfluthrin		
Homeowner Products			
Bayer Advanced™ Tree & Shrub Insect Control	Imidacloprid	Soil drench	Mid-April to mid-May
ACECAP® 97 Systemic Insecticide Tree Implants	Acephate	Trunk implant	Mid-May to mid-June
Bonide Bullets®	Acephate	Trunk implant	Mid-May to mid-June

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- **Grand Geneva, Lake Geneva, WI** - Winner of Golf Week Magazine's prestigious 2005 Silver Medal for the 8th consecutive year.
- **University Ridge, Verona, WI** - Home of the UW Badgers, ranked #8 in Wisconsin by Golf Week Magazine 2006.
- **Whisper Creek Golf Club, Huntley, IL** - Located within the award winning Sun City, a Del Webb community, and one of the many, very fine courses managed by Billy Casper Golf.

Pumpstation Professionals was founded by Robert L. Cross in November 2001. Bob's background includes a degree in Machine Science along with his experience as a master electrician and electro/mechanical design with an emphasis in high-tech water pumping systems.

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use are described below. It is important to note that pesticide labels and registrations may change. It is the pesticide applicator's legal responsibility to read, clearly understand, and follow all current label directions for the specific pesticide product being used.

Using Insecticides to Control EAB

Soil-applied Systemic Insecticides

Systemic insecticides applied to the soil are taken up by the roots and translocated (moved) throughout the tree. The most widely tested systemic insecticide for control of EAB is imidacloprid. It is available for use by homeowners and professional applicators. The homeowner formulation of imidacloprid is Bayer Advanced™ Tree & Shrub Insect control. Professional use formulations of soil-applied imidacloprid include Merit© 75WP, Merit© 75WSP, and Merit© 2F. Additional formulations of imidacloprid with different brand names are also becoming available.

All imidacloprid formulations can be applied as a drench by mixing it with water and pouring it directly on the soil at the base of the trunk. The application rates for both the homeowner and professional formulations of imidacloprid are quite similar (1.3 and 1.5 grams of active ingredient per inch of trunk diameter, respectively). Soil drenches offer the advantage of requiring no special equipment to apply (other than a bucket or watering can). However, surface layers of organic matter, such as mulch or leaf litter, can bind the insecticide and reduce uptake. Prior to applying soil drenches, it is important to remove or pull back any mulch or dead leaves so the insecticide solution in poured directly on mineral soil.

Imidacloprid formulations can also be applied as soil injections, which require special equipment, but offer the advantage of placing the insecticide directly into the root zone. Soil injections should be made only deep enough (2-3 inches) to place the insecticide under the turf or mulch layer. Soil injections can be made either at the base of the trunk or on a grid pattern extending to the edge of the tree canopy. Recent research studies have revealed that soil injections made immediately adjacent to the trunk (within 6-18 inches) are more effective than those made on a grid pattern under the tree canopy. Density of fine root hairs is very high at the base of the trunk and declines quickly as you move away from the tree. This pattern of root distribution can be clearly observed on trees that have been recently uprooted in a storm or when taking soil cores under the tree canopy.

Optimal timing for imidacloprid soil drenches or injections is mid-April to mid-May (treat on the early side in southern Wisconsin and on the later side in northern Wisconsin), which allows the 4-6 weeks necessary for uptake and distribution of the insecticide before EAB larvae begin to establish in mid- to late June.

EAB larvae damage the vascular system (a.k.a. tree plumbing) as they feed, which interferes with the translocation of systemic insecticides. Soil drench or injections are aimed primarily at preventative treatment applications, however; in some cases, this approach may provide corrective control of low populations of EAB infested ash trees. Studies are ongoing to determine how much injury a tree can sustain before systemic insecticide treatments are no longer effective. Research results suggest that ash trees showing >50 percent dieback are not likely to be salvaged, and any damage can reduce the effectiveness of systemic treatments.

Trunk-applied Systemic Insecticides

Several systemic insecticides can be injected or implanted directly into the trunk of ash trees. Some formulations are applied by professionals, while others are available to homeowners. Imidacloprid is available in sev-

eral professional use formulations that are injected directly into the trunk using various application systems. These include IMA-jet©, which is injected using various Arborjet™ injection systems; Mauget Imicide© micro-injection capsules; and Pointer', which is injected using Arborsystems Wedgle™ Direct-Inject™ injector system. Another option is Mauget Inject-A-Cide B© micro-injection capsules, which contain Bidrin© (dicrotophos). Systemic trunk implants available for purchase and application by homeowners and professionals include ACECAP© 97 Systemic Insecticide Tree Implants and Bonide© Systemic Insecticide Bullets, both of which contain acephate as the active ingredient. Both products are applied by inserting insecticide-containing capsules into holes drilled in the base of the tree trunk.

Trunk injections and implants have the advantage of being absorbed by the tree more quickly than soil applications, and can be applied where soil treatments may not be practical or effective, including trees growing on excessively wet, compacted, or restricted soil environments. However, trunk injections and implants do injure the trunk, which may cause long-term damage, especially if treatments are applied annually.

Optimal timing of trunk injections and implants is between mid-May to mid-June. Research studies have shown that Inject-A-Cide B injections made as late as August can kill insects in the tree, although substantial feeding damage will have already occurred. If the option exists, applications should be made earlier to prevent EAB larval establishment.

Most efficient uptake of trunk-injected insecticides occurs when tree are actively transpiring. Best results will occur when injections are made on sunny days in the morning when good soil moisture conditions prevail. Uptake will be slow on cloudy days, during hot afternoons, and when the soil is dry.

Protective Cover Sprays

The objectives of protective bark cover sprays are to kill newly hatched EAB larvae on the bark before they enter the tree, and depending on the label, adults as they feed on the foliage prior to laying eggs. Products that have been evaluated as cover sprays for control of EAB include Onyx™ (bifenthrin), Tempo© (cyfluthrin), Sevin© SL (carbaryl), Orthene© (acephate), and BontaniGard© (contains spores of the insect-killing fungus *Beauveria bassiana*). Some of these insecticides have been more effective than others (see discussion below).

Protective cover sprays are designed to prevent EAB infestations and must be timed precisely to be effective. Because protective residues must be present on the tree bark before egg hatch to prevent infestation, applications must be timed to coincide with adult emergence and oviposition (egg laying), which is difficult to monitor because there are no effective pheromone traps for EAB adults. However, first emergence of EAB adults typically corresponds closely with full bloom of black locust (*Robinaia psuedoacacia*), which can serve as a useful phenological indicator for accurately timing applications. Best results with cover sprays have been obtained when two (sequential) applications are made, with the first as black locust reaches full floral bloom (mid-May in southern Wisconsin and late-May to early-June in northern Wisconsin), and the second four weeks later. It is recommended that homeowner hire professional applicators to apply protective bark cover sprays as homeowners typically do not have the appropriate application equipment, especially on larger trees > 15 feet tall.

When Should EAB Treatments Begin?

It is quite difficult to determine exactly when to initiate insecticide treatments. Research suggests that best control of EAB will be obtained when treatments are initiated in the earliest stages of EAB infestation before visible symptoms are present, or perhaps even the year before trees are infested. Treatment programs that begin too early represent an unnecessary expense. We suggest that those who want to protect their ash trees initiate EAB insecticide treatments if they are located within an EAB quarantine, or outside a quarantine but within the immediate vicinity (i.e., 10-15 miles) of a known EAB infestation. Since, to date, EAB has not been discovered in Wisconsin and it is not within 10-15 miles of Wisconsin, it not suggested that any insecticide treatments be made at this time! Locations of EAB infestations, current quarantine maps, and other important information regarding EAB can be found at the following websites: http://www.aphis.usda.gov/planthealth/plantpestinfo/emeraldashb/downloads/multistateeab.pdf, www.entomology.wisc.edu/emeraldashborer, and http://www.emeraldashborer.wi.gov

How Effective Are Insecticides for Control of EAB?

Extensive testing of insecticides for control of EAB has been performed by researchers at Michigan State University and The Ohio State University. Results of many of the Michigan State University trials are posted at the following website: www.emeraldashborer.info.

Soil-applied Systemic Insecticides

Efficacy of imidacloprid soil injections for controlling EAB has been inconsistent, with some trials providing excellent control, and others yielding poor results. Differences in application protocols and conditions of the trials have varied considerably, making it difficult to reach firm conclusions about sources of variation in efficacy. For example, McCullough et al. (2004) found that low-volume soil injections of Merit 75WP applied to small caliper trees (four-inch trunk diameter) using the Kioritz applicator (a hand-held device for making low-volume soil injections) provided very good control at one site. However, control was poor at another site where the same application protocols were used to treat large caliper (13 inch diameter at breast height [DBH]) trees. McCullough et al. (2004) raised the possibility that imidacloprid levels may have been too low in the larger trees to provide adequate control. Much higher pest pressure (populations) may also have contributed to poor control in the larger caliper trees.

In the same trials, high pressure soil injections of Merit 75WP (applied in two concentric rings, with one at the base of the tree and the other halfway to the dripline of the tree canopy) provided excellent control at two sites (McCollough et al. 2004). However, at a third site, soil injections applied using the same rate,

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timing, and application method were completely ineffective, even though the tree size and EAB larval infestation pressure were very similar to those at the other sites where control was excellent. It should be pointed out that recent research studies have shown that Merit soil injections made at the base of the tree trunk resulted in more effective uptake than applications made on grid or circular patterns extending to the dripline of the tree canopy.

Imidacloprid soil drenches have also generated varied results. In one trial, infestation levels of EAB in trees (with trunk diameter ranging from 7-24 inches) drenched with Merit 75WP did not differ from untreated control trees (Smitley et al. 2005a). In another study, Merit 75WP soil drenches applied to EAB infested ash trees with trunk diameters ranging from 6-30 inches were only slightly more effective, providing 38 percent control (Smitley et al. 2005b). However, control improved after two consecutive years of treatment. In a third study with small trees, soil drenches were very effective. When applied to smaller caliper trees, soil drenches with Merit 75WP and Bayer Advanced Tree & Shrub Insect Control have provided excellent control of EAB when applied in May, June, or October (Smitley et al. 2005b, 2006).

Smitley et al. (205 a, b) concluded that a combination of tree size and degree of pest pressure provides the best explanation for variable efficacy of imidacloprid soil drenches, with soil drenches being most effective when applied to smaller trees, and least effective when applied to larger trees experiencing heavy pest pressure. Recent research studies suggest that for larger trees, imidacloprid soil drenches may have to be applied two years consecutively before dependable control can be achieved.

Trunk-applied Systemic Insecticides

Imidacloprid trunk injections also provided mixed degrees of control in trials conducted at different sites (McCollough et al. 2004). Degree of control obtained with Mauget Imicide trunk injections varied from 60 to 96 percent, with no apparent relationship between efficacy and trunk diameter or infestation pressure. In 2004, McCullough et al. (2005) initiated additional trials to determine the effects of tree size (8 versus 20 inch DBH) and application date (May 24 versus July 19) on efficacy of Mauget Imicide and Arborjet IMA-jet trunk injections. Several patterns emerged from this study. First, trunk injections made on May 24 were more effective than those made on July 19. Second, the Arborjet IMA-jet trunk injections provided higher levels of control than did the Mauget Imicide trunk injections, likely due to the greater amount of active ingredient injected using the Arborjet method. Finally, they found no definitive pattern with respect to effect of tree size on efficacy of trunk injections. The Arborjet method provide similar levels of control on small and large caliper trees, possibly because the IMA-jet pesticide label recommends the application rate be increased when treating larger caliper trees. Imicide trunk injections were actually less effective on small compared to large caliper trees, likely due to the intensity of pest pressure as it was much higher at the site with small caliper trees.

Smitley et al. (2005a) treated trees with ACECAP 97 Systemic Insecticide Tree Implants for two consecutive years, and found them to be effective the first year under relatively low EAB pressure. However, they were not effective the second year under more intense EAB pest pressure.

In a discouraging study, McCollough et al. (2005) discovered that ash trees continued to decline from one year to the next despite being treated both years with imidacloprid or bidrin trunk injections. Mauget Imicide, Wedgle Pointer, and Inject-A-Cide B trunk injections all suppressed EAB infestation levels in both years, with Imicide generally providing best control under high pest pressure in both small (6 inch DBH) and large (16 inch DBH) caliper trees. However, in all treatments, EAB larval density increased in treated trees from the

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