

## **Emerald Ash Borer Insecticide Treatment Guide**

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Several insecticides that are currently used for the treatment of and protection against emerald ash borer (EAB) are described in this guide. Most of these products are only available for professional use; however, one option is available for homeowner application. There are four types of insecticides employed, (1) soil applied systemic insecticide, (2) trunk injected systemic insecticide, (3) systemic basal trunk sprays, and (4) protective cover sprays.

### **Soil Applied Systemic Insecticides**

Systemic insecticides that are applied to the soil are taken up by the roots and dispersed throughout the entire tree by the vascular system. When EAB feeds on the leaves or wood of a tree treated with systemic insecticides the insect will eventually die. However, it is important to consider that soil applied systemic insecticide is generally used as a preventative measure and has been observed to be less effective when applied after a plant has been infested with EAB.

Soil drenches and soil injection treatments are available for both professional and homeowner use (see Table 1). Timing of application is crucial to maximizing results as tree phenology, soil conditions, and weather conditions have an effect on insecticide efficacy. Treatments should be applied in mid- to late spring or early to mid-fall when the soil is somewhat moist but not saturated. Healthy, unstressed trees that have not previously been damaged or infested by EAB are the best candidates for treatment. For continued protection, treatments must be reapplied every 1 to 2 years per product direction.

Thus far, there has been mixed success in controlling EAB with soil applied systemic insecticides. Research conducted by Michigan State University and Ohio State University on the efficacy of these products in varying conditions and using multiple application methods has been inconclusive and the results inconsistent. Currently some consistent success has been achieved by increasing the rate of application per tree diameter. However, this option is not available for all formulas as the product labels have not yet been modified to allow for an increased rate of application.

### **Trunk Injected Systemic Insecticides**

Systemic insecticides that are injected directly into the trunk are also translocated throughout the tree by the vascular system. This application method can be advantageous in areas where soil or weather conditions are not conducive to soil applied treatments. It is important to keep in mind that each injection contributes a new wound site to the tree trunk area which with repeated annual applications can become unsightly or sites of pathogen infection. A number of professional use only formulations are readily available (see Table 1).

Good timing is also a necessity for optimal protection. Trunks should be injected after the trees leaf out in the spring but prior to the hatching of EAB eggs in mid-summer. Therefore, optimal timing is between mid-May and mid-June. Soil should be moist but not saturated and best results are seen when applied in the morning during warm and clear days to take advantage of active transpiration.

Research has found varying control success with trunk injected systemic insecticides depending on the active ingredient. Products containing emamectin benzoate (see Table 1) have been shown to provide excellent control of EAB for a minimum of 2 years between applications. Products containing imidacloprid have been less effective and research has produced varying results.

### Systemic Basal Trunk Sprays

Safari® is the only systemic basal trunk spray available for the control of EAB and for use by professionals (see Table 1). This insecticide is sprayed on the lower six feet of the trunk where it permeates through the bark and into the vascular system of the tree. The advantages of using this product is that it can be easily applied with an ordinary low pressure garden sprayer and requires little time for application. Research has also shown that when applied correctly, the insecticide does not enter the soil. This may be important depending on land management values and intended land use.

Control of EAB using systemic basal trunk sprays has been varied. Research has determined that

these insecticides are more effective when used on smaller trees and reapplied every year.

### Protective Cover Sprays

Unlike systemic insecticides, protective cover sprays do not penetrate into the interior of the tree or foliage. These insecticides are sprayed directly onto the trunk, branch or foliage surface depending on each product's label and are intended to kill EAB larvae and adults as they feed on the woody tissue or the leaves.

Protective cover sprays are designed as a preventative measure and have little to no effect on larvae, eggs, or adults that have previously penetrated into the tree and are feeding or breeding under the bark. Timing of application should correspond with the emergence of adults and adult feeding on the foliage. Where applicable, this period typically coincides with the blooming of black locust.

For many of the products listed in Table 1, including Onyx™, Tempo®, and Sevin® SL, studies have shown that good control against EAB is provided by these sprays. Other products have produced mixed or less encouraging results.

Table 1: Insecticide options for professionals and homeowners for controlling EAB. Some products may not be labeled for use in all states. (Table Source: Herms DA, McCullough DG, Smitley DR, Sadof C, Williamson RC, and Nixon PL. 2009. Insecticide options for protecting ash trees from emerald ash borer. North Central IPM Center Bulletin. 12 pp.)

Insecticide Formulation	Active Ingredient	Application Method	Recommended Timing
<i>Professional Use Products</i>			
Merit® (75WP, 75WSP, 2F)	Imidacloprid	Soil injection or drench	Mid-fall and/or mid- to late spring
Xytect™ (2F, 75WSP)	Imidacloprid	Soil injection or drench	Mid-fall and/or mid- to late spring
IMA-jet®	Imidacloprid	Trunk injection	Early May to mid-June
Imicide®	Imidacloprid	Trunk injection	Early May to mid-June
TREE-äge™	Emamectin benzoate	Trunk injection	Early May to mid-June
Inject-A-Cide B®	Bidrin®	Trunk injection	Early May to mid-June
Safari™ (20 SG)	Dinotefuran	Systemic bark spray	Early May to mid-June
Astro®	Permethrin	Preventative bark and foliage cover sprays	2 applications at 4-week intervals; first spray should occur when black locust is blooming
Onyx™	Bifenthrin		
Tempo®	Cyfluthrin		
Sevin® SL	Carbaryl		
<i>Homeowner Formulation</i>			
Bayer Advanced™ Tree & Shrub Insect Control	Imidacloprid	Soil drench	Mid-fall or mid- to late spring

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