

Emerald Ash Borer Insecticide Treatment Options

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Emerald ash borer impact:

Ash trees are popular trees in city and town in South Dakota. They are fast-growing trees that tolerant poor soils. Since they are so adaptable, ash is now about 30% of the mature trees in many South Dakota communities.

In 2002, an insect was discovered in Michigan killing ash trees. It was soon identified as the emerald ash borer, an insect native to China. Since then the insect and its destruction has spread to the many states and resulted in the loss of millions of ash trees. Emerald ash borer was confirmed in South Dakota in 2018 and is expected to spread across the state over the next two decades.

Emerald ash borer adult beetles fly during the summer and lay eggs on ash trees. Once hatched, the larvae

tunneling beneath the bark. The dense network of tunnels created by this tunneling severs the tissue that carries sugars from the leaves to the roots. As the roots starve, they slowly die so less water is moved up to the leaves. The shoots and leaves at the top of the tree and the edge of the canopy begin to decline and die. This process continues until the tree is dead. It may take anywhere from three to five years of infestations before a tree dies.

Emerald ash borer will kill all North American ash and their cultivars. This means all green, black, white ash, and their cultivars such as 'Patmore' and 'Summit' are attacked and killed by this insect. Treatments are the only means of protecting an ash tree from the emerald ash borer. Less than 1% of ash trees survive an infestation without treatments. Treatments are more than 98% effective if done properly.



Emerald ash borer is a lethal threat to ash in our state.



The female adult feeds on leaves before laying eggs on the bark.



The emerald ash borer larva tunnels beneath the bark.

Insecticide treatments:

Do not begin treatments until emerald ash borer has been confirmed within 15 miles of your tree's location. This is the farthest distance the adult beetle can fly though their actual flight distance is often much less, perhaps less than 100 yards as they move to nearby trees. There is little value in treating ash trees before the infestation is near.

Treatments are not a vaccine. They must be applied either annually or biennially depending on the application method and the insecticide used. Several products are used therapeutically, to kill an existing infestation in a tree. Others only protect a tree from becoming infested.

Many insecticides are effective at killing the adult emerald ash borers as well as the larvae. The adults fly during the summer with the peak flight near the end of June. The adult female beetles feed on ash leaves before laying eggs. Insecticide applied early in the growing season kill adults before they lay eggs.

Insecticides used for emerald ash borer will also kill the larvae as they tunnel beneath the bark. Insecticides applied early in the growing season are more effective than later in the summer as these kill the larvae before they are able to do much damage to the trees.

There are many different active ingredients, products, and application methods used to manage emerald ash borer. Some products are available for homeowner use, but the most effective products are restricted to commercial applicators. If a homeowner has a tree larger than 10 inches in diameter¹, they should hire a commercial service. Most insecticides available to the homeowner are not effective on larger trees.

There are three methods to apply insecticides: soil drenches/injections, bark sprays, and trunk injections. Most of the products listed in this bulletin are for commercial applicators only. Products available to homeowners are noted by a ² following the product name.

Soil treatments:

Requires annual applications, applied between leaf-out and mid-June, and protects trees from becoming infested.

Some insecticides are available to homeowners to apply as soil drenches. Insecticides delivered as a soil drench are applied within a foot of the base of the trunk. The sod or mulch must be pulled away before making the application. The sod or mulch is placed back after the insecticide solution soaks into the soil. These applications are best limited to small trees, those less than 10 inches in diameter. They are not as effective in larger trees.

Commercial applicators may use soil injections. Soil injections are made within 18 inches of the trunk base and the insecticide injected to a depth of 2 to 4 inches. Injections made farther from the trunk and deeper into the soil are less effective.



Soil injections can be used by professionals to manage emerald ash borer

The amount of insecticide used for soil drenches and injections is based upon trunk diameter. These treatments become less effective for tree larger than 15 inches diameter¹ and are best limited to trees less than 10 inches. There are some specific labels that allow commercial applicators to use a 2x rate for trees between 15 and 22-inch diameter¹.

There are two common active ingredients used for soil treatments, dinotefuran and imidacloprid. Soil applications of imidacloprid formulations are made starting just after the leaves have opened until mid-June with the exception of Xylect that can also be applied in the fall. Soil applications of dinotefuran

formulations move quicker through the tree so the application window for this insecticide is extended until the middle of July.

Soil application must be applied to moist soils, preferable soils that have been watered the day or evening before application. They should not be applied to wet soils as the insecticide can move in wet soils and contaminate nearby ponds, lakes and streams. Some labels restrict use within 100 feet of open water. Do not apply if heavy rains are forecasted within 24-hours.

Insecticides delivered via soil applications can be absorbed by bedding plants. Do not use soil treatments if flowering annuals or perennials, which may be attractive to pollinators, are beneath the canopy of the tree.

Soil treatments:

Active ingredient	Product
Dinotefuran	Transtect™ (70WSP)
	Safari™ (20 SG)
Imidacloprid	BioAdvanced 12 months Tree & Shrub Protect & Feed ²
	Merit® (5WP, 75WSP)
	Ortho Bug B Gone Insect Killer ²
	XyTECT™ (2F, 75WSP) (also can be applied in fall)

Bark sprays:

Requires annual application, applied between late May to late June, and protects trees from becoming infested.

Commercial applicators can spray some dinotefuran insecticides on the lower trunk of the tree (the lower 6 feet). These chemicals are absorbed through the bark. They are carried up by the sap flow to kill the larvae beneath the bark and adult beetles feeding on the leaves. Bark sprays are best limited to trees less than 15 inches in diameter¹.

Bark sprays:

Active ingredient	Product
Dinotefuran	Safari™ (20SG)
	Transtect™ (70WSP)
	Zylam®

Trunk injection:

Requires either annual or biennial application, wider window for application, and protects trees from becoming infested or can kill an existing infestation in a tree (depending on label).

Insecticides are also applied by directly injecting into the trunk. These injections do create small wounds in the tree, but if the injections are done at the trunk flare and not adjacent to a previous injection site, the injury is minimal and the insecticide will be distributed throughout the canopy.

The uptake and distribution of trunk injected insecticide is quicker than those delivered via the soil or a bark spray. The soil must be moist, not dry or wet, to improve uptake of the insecticide throughout the tree. Watering the ground around the tree a day before injection will sufficiently irrigate the soil.



Injection can also be made with capsules



Trees are injected completely around the lower trunk

The ideal time to do trunk injections is after the ash tree leaves have opened till mid-June. Applications made during this time will kill adults before they lay eggs and any larvae after they hatch. Application made later in the summer will kill only larvae that year. Summer applications require adequate soil moisture or the tree must be watered the day before the application is made. Autumn applications can be made with some products to provide for protection the following year, but these need to be completed before the leaves begin to drop.

Emamectin benzoate injections provide two years of protection for a tree. Emamectin benzoate insecticides can be applied to trees that are already infested. Trees that have less than 35% canopy decline due to an emerald ash borer infestation may be injected. If an infested tree has greater dieback or decline, then there will be insufficient distribution of the insecticide and the tree will continue to decline even with a treatment.

Trunk insecticides

Active ingredient	Product	Injection System
Azadirachtin	AzaSol™	Arborjet
Bidren	Inject-A-Cide B™	Mauget Micro-Injectors
Emamectin benzoate	ArborMectin™	Chemject Tree Injectors
	Boxer™	ArborSystem Wedgle Direct-Inject
	Mectinite™	Rainbow Treecare Scientific Q-connect
	TREE-age™	Arborjet
Imidacloprid	IMA-jet®	Arborjet
	Imicide™	Mauget Micro-Injectors
	Pointer™	ArborSystem Wedgle Direct-Inject
	Xytect™	Rainbow Treecare Scientific Q-connect

¹ diameter of the tree at 4.5 feet above the ground

² available to homeowners

SG – soluble granules

WP – wettable powder

WSP – water-soluble packets

Any treatment recommendations, including those identifying specific active ingredients, are for the convenience of the reader. The active ingredients mentioned in this publication are generally those that are most commonly available in pesticides used in South Dakota for Turf & Ornamentals and the inclusion of an active ingredient shall not be taken as an endorsement or the exclusion of one labeled for use a criticism regarding effectiveness. Please read and follow all label instructions and the label is the final authority for a product's use on a pest or plant. Not all active ingredients listed are in forms available to the public and some may require a commercial pesticide license. It is the reader's responsibility to determine if they can legally apply any product identified in this publication.