

0504 - Emerald Ash Borer Efficacy Test in South Troy, 2004-2005

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'Marshall Seedless' green ash trees growing between the sidewalk and street in a neighborhood in Troy, MI were used for this test (Oakland Co, MI T2N R1E Sec 7 SE). These trees were between 12 and 26 years old and ranged in size from 7-24 inches diameter at breast height (DBH). The mean DBH was 14 inches. Trees were spaced a minimum of 50 ft apart. The tree canopies ranged from 15 to 30 feet in diameter, and in no case did they overlap. Tree trunks were measured and marked with a metal tag during the last two weeks of April. Lawns in the neighborhood were well maintained, but very few had an irrigation system. The trees were grouped into 10 blocks of twenty trees based on the location in the neighborhood. Each treatment was replicated 10 times with each replicate consisting of an individual tree. The treatments in the test consisted are listed below by the 2005 treatment. The 2004 treatment of the same trees are also described under each treatment below.

None-A: 2nd year follow-up sample of an IMA-jet AAD-jet Trunk Injection (5% imidacloprid with 5% ArborJet Aqueous Dilutant (AAD)) made in 2004.

Imidacloprid was delivered via the Arborjet Tree IV system at 35psi. Trees with less than 12" DBH received four #3 plugs and trees with greater than 12" DBH received 8 #3 plugs. The amount of solution to be delivered was 4ml/inch DBH on trees with a DBH less than 12" and 8ml/inch DBH on trees greater than 12" DBH. The trees were treated on 27 May 2004 but not in 2005.

Onyx 16 oz Trunk and Limb Spray Once (bifenthrin 2 lb ai/gal). Onyx was applied once at a rate of 32 oz/100 gal in 2004 and once again in 2005 with 16 oz/100 gal. In 2005 Onyx was mixed at a concentration of 16 fl oz/100 gal. The trunk and larger branches were sprayed once with a commercial hydraulic sprayer on 3 June, 2004 and on 1 June, 2005. Each tree received 6-9 gal of spray solution, depending on its size.

Merit Soil Drench (75% imidacloprid) applied in both 2004 and 2005. Merit 75W was applied at a rate of 1.42g AI/inch DBH. The appropriate amount of Merit was mixed in 1.5 gal of water and poured around the base of the tree within 2 feet of the trunk on 21 Apr 2004. The same trees were treated again a year later on 4 May 2005.

None-B: 2nd year follow-up sample of an IMA-jet Trunk Injection (5% imidacloprid solution) made in 2004. Four ml of IMA-jet solution per inch of DBH were injected into trees with a DBH of less than 12 inches, while trees with a DBH larger than 12 inches received 8 ml per inch DBH. Injections were applied with an **ArborJet Air Hydraulic VIPER** (Volume Injection Pressure Enhanced Reservoir) apparatus. Injection holes were 9/32 inches in diameter and 15mm deep into the sapwood. The injection pressure was set at 125 psi. The number of injection sites was determined by inches of DBH/2. **The trees were treated on 27 May 2004 but not in 2005.**

ACECAP Trunk Implants (0.875 grams acephate per cap) applied in both 2004 and 2005. A single cap was placed every 4" around the base of the tree in a 3/8 inch diameter, 3/4 inch deep hole and sealed with a plastic cap on 3 May 2004. The same trees were treated again in the same way on 4 May 2005.

Onyx 8 oz Foliar Spray Once (bifenthrin 2lb ai/gal). Onyx was applied once on 3 June, 2004 at a rate of 12.8 oz/100 gal and once on 1 June, 2005 at a concentration of 8 fl oz/100 gal. The entire canopy, trunk and branches were sprayed. Each tree received 16-20 gal of spray solution, depending on its size.

Untreated Check. These trees were not treated with any insecticide.

BotaniGard Foliar Spray (11.3% *Beauveria bassiana* Strain GHA) - BotaniGard was mixed at a concentration of 6 quarts/100 gal. The entire canopy, trunk and branches were sprayed with a commercial hydraulic sprayer on 3 Jun and again on 24 Jun 2004. Each tree received 16-20 gal of spray solution, depending on its size. The same trees were treated on 1 Jun 2004 and 24 Jun 2005.

Canopy die-back ratings were made for each tree on 8 Jun 2005. Die-back ratings were made visually by comparing the canopy of each tree with photographs in various stages of canopy die-back going from 0% (healthy) to 100% (dead) in 10% increments.

Branches from the upper 1/3 of the tree canopy were sampled between 12 Sep and 22 Nov., 2005. Three branches were removed from each tree by the arborists of the City of Troy. Branches selected for pruning were spaced as far apart as possible to maintain canopy balance. EAB galleries and larvae were counted after removing bark with a drawknife and chisel. Bark-scraping was done at Michigan State University's Entomology Field Research Station where scraping could be done in an indoor environment. Each of the branches was then examined to determine how many old galleries, new galleries and live larvae were present. The surface area of each sampled branch was measured.

Results

The ash trees in this subdivision in Troy experienced a more severe attack from emerald ash borer in 2005 than in 2004. The mean number of EAB galleries per m² in control trees in 2005 was 65.4 compared with 10.1 in 2004. As a result all the trees had more EAB attacks and the percent control of EAB dropped in 2005 compared with 2004 for most treatments (Table 1). The highest level of control was from the 2004 carry-over of IMA-jet trunk AAD-jet trunk injection of imidacloprid with the Arbor-Jet system (15.2 larvae/m²), followed by Onyx spray once at 16 oz (22.0), Merit soil drench (22.5), carryover of the IMA-jet trunk injection of imidacloprid from 2004 (24.3), ACECAP trunk implants (37.4), Onyx 8 oz spray once (41.0), untreated control trees (65.4) and BotaniGard (75.7).

The carry-over of imidacloprid trunk injections with the Arborjet system gave about 63-77% control in the second year following a single trunk injection in 2004, suggesting that an every-other year treatment may be possible. Onyx at the higher rates (16 or 32 oz) worked well as a single spray each year (66% control). The Merit soil drench, consisting of mixing it in a bucket of water and pouring it around the base of each tree in early May of each year gave 66% control in 2005 after not working in the first year of the test in 2004. This drench treatment with Merit applies the same amount of imidacloprid that homeowners would apply with the Bayer Tree and Shrub Insect Control product and should work the same way. Apparently the imidacloprid soil drench works better after two years of treatments. The ACECAP implants gave 43% control in 2005 compared with 72% control in 2004.

With the exception of the Merit soil drench, most treatments did not work as well in 2005 as they did in 2004, most likely because of the increased pressure from EAB in 2005, and the decrease in tree health. In contrast the Merit soil drench worked better in 2005 than in 2004. The modest levels of canopy dieback in June 2005 for the best treatments give us hope that some of these treatments will provide enough protection against emerald ash borer to keep trees healthy (Fig. 1-4). However, the increased level of attack in 2005 is likely to cause greater levels of dieback in 2006, especially for the untreated trees or trees receiving a treatment that did not provide a very high level of control. We will return early next summer to rate all trees for canopy dieback again. The dieback in summer of 2006 should reflect the amount of damage the trees suffered in late summer and fall of 2005. So, the most critical results of this test are still to come.

Table 1. Emerald ash borer larvae/m² in fall of 2004 and 2005, and % canopy dieback in June of 2005.

2004 Treatment	2005 Treatment	Larvae/m² in Fall of 2004	% dieback in Fall of 2004	Larvae/m² in Fall of 2005
IMA-jet AAD-jet trunk injection	None-A	0.5	21.1	15.2
Onyx 32 oz spray once	Onyx 32 oz spray once	1.9	38.9	22.0
IMA-jet trunk injection	None-B	0	24.3	24.3
ACECAP trunk implants	ACECAP trunk implants	2.8	27.5	37.4
Onyx 12.8 spray twice	Onyx 12.8 spray once	3.1	30.3	41.0
Untreated Control	Untreated Control	10.1	50.3	65.4
BotaniGard Spray	BotaniGard Spray	4.7	35.6	75.7
Merit soil drench	Merit soil drench	10.0	46.8	22.5