

DISTRIBUTION PATTERNS OF IMIDACLOPRID IN SAPLINGS AND LARGE TREES

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ABSTRACT

Eradication of Asian longhorned beetle (*Anoplophora glabripennis*) populations in the United States is reliant on effective applications of the systemic insecticide imidacloprid. Most of the applications are made by low-pressure soil injection of a concentrated solution directed at the base of the tree. This study looked at imidacloprid distribution in saplings of elm, green ash, red and silver maple, and several shade trees growing in a cemetery.

Greenhouse Study

Dormant saplings were soaked in a 20-ppm imidacloprid solution for 4 days (100 mL/sapling) and then individually potted along with any remaining solution. After leaf-out, plants were variously dissected and compared. One group compared whole plant extractions of the four plant species, a second divided plants into aboveground and belowground portions, and a third compared residue present within stems to leaves of the same plant.

The significantly higher imidacloprid residue levels seen in silver maple saplings compared with the other three species in the greenhouse study may be due to a difference in the physiology of trees of this species that allows them to take up more imidacloprid or to take it up more quickly as they break dormancy. The generally higher pesticide residues found in the roots compared with that in the leaves + stems of Group 1 plants may be an indication that the saplings were not given sufficient time to leaf out so that the pesticide could fully translocate.

Future investigations will look at sampling several trees over an interval of time to determine whether imidacloprid levels in roots drop off with a corresponding increase in leaf residues. Significantly higher residues seen in leaves compared with stems are probably due to the general translocation of materials to younger and growing tissues. This was observed with imidacloprid in a study by Mendel et al. on xylem transport in citrus (*Acta Hort.* 531, pp. 129-134). Our recent studies have found that residues in twigs were about six to seven times lower than that seen in leaves.

Shade Tree Study

Four 10- to 12-inch d.b.h. Norway maple trees were treated by trunk injection with imidacloprid and intensively sampled 3 months after treatment. Twelve samples per tree were taken at three heights--low, middle, and upper canopy—and from each cardinal direction.

There was no significant effect on imidacloprid residue levels due to sampling from different heights or sides of a tree, which justifies ground-based sampling with pole pruners. Residue levels varied greatly within a tree. The largest range between two sampling points in a tree was about 400 ppm. The high variation suggests that a large number of small samples can be taken from multiple points throughout the lower half of the canopy to best reflect the imidacloprid level present in a particular tree.