

## ARBORJET APPROACH AND USE OF STEM MICRO-INFUSION TREATMENTS FOR THE MANAGEMENT OF SPECIFIC INSECT PESTS AND PHYSIOLOGICAL DISEASES IN FOREST, LANDSCAPE AND PLANTATION TREES

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### ABSTRACT

Four posters present a cross section of injection methodology by Arborjet, Inc. Poster #1 summarizes a study conducted in 2003-2004 to assess the efficacy of Arborjet's micro-infused IMA-jet (5% SL) with the Tree I.V. system in the management of hemlock woolly adelgid (*Adelges tsugae* Annand). In this study, sixteen (16) 41 cm HWA infested Eastern hemlock (*Tsuga canadensis* Carriere) were injected with a 1.6mL per cm DBH rate (0.8 gm A.I./cm DBH) IMA-jet formulation of imidacloprid. Four 9mm-diameter Arborplugs (differential septa) were set into the active transport (xylem) tissues as the micro-infusion interface. Eight non-treatment trees served as controls. Evaluations were performed in the fall 2004. Eight 45-60cm branch samples were taken from the mid-canopy of the study trees. Five branchlets were cut from each twig sample. HWA mortality was determined by microscopic examination. Viable HWA/linear cm was calculated for each sample examined. Annual twig extension (last three years) was also measured as an indicator of hemlock health. Live HWA pressures on treated trees equaled 0.04/linear cm compared to 1.8/linear cm for untreated trees, a 45X reduction in HWA pressure. Percent mortality on treated trees equaled 98.4%, compared to 26.6% for the controls. Treatment tree growth response was 5.78 cm versus 4.19 cm in the controls, a difference that has biological significance.

Poster #2 summarizes the cooperative work with Michigan State University studying the efficacy of trunk injections in the treatment of emerald ash borer (*Agilus planipennis* Fairmaire). Peak ELISA imidacloprid residues for Arborjet's 5% IMA-jet treated trees was 350 ppb versus 42 ppb for Mauguet's 10% Imicide. EAB adults feeding assay was also conducted to assess the relative efficacy of the injected imidacloprid formulations. Populations of EAB were fed branches from injected trees at 15, 28, 49, 59, and 70 days. EAB adult mortality was consistently higher in Arborjet's 5% IMA-jet treated trees than Mauguet's 10% Imicide and/or controls. Observed mortality was highest at 49 days: 90% in Arborjet-treated trees, 50% for Mauguet-treated trees, and 40% in the controls.

Poster #3 presents some of the plant health studies performed in the process of formulation development. Current studies include the response of chlorotic pin oak (*Quercus palustris* Muench) to MIN-jet Iron treatments. Of interest are efficacy and duration; 3x, 6x, and 9x dose rates were used to assay dose-rate responses. A pin oak severity rating was developed as a tool to aid in the assays. Physiological disease presents a range of symptomology from mild leaf yellowing to severe interveinal chlorosis, canopy dieback, epicormic dieback and ultimately, death as carbohydrate storage is depleted. Assays of plant health response are sched-

uled in 2005, 2006, and 2007. In a study performed in London plane trees (*Platanus x Acerifolia*) susceptible to defoliation by anthracnose, trees were injected with MIN-jet Copper and compared with two systemic fungicides that are labeled for trunk injection. In this unique study, we are interested in tree health response despite the presence of the causal agent. In previous injection work, we observed trees superior recovery and higher health indices (including more rapid development of woundwood at the injection sites) compared to fungicide treatments.

Poster #4 illustrates the relative wound response in trees using Arborjet technology. A digital assessment was developed to help the practitioner to rate wound response in trees. The scale uses a -1, 0, and +1 rating system, where '-1' indicates wounds sites with cracking, oozing, '0' indicates no observable response, and '+1' is indicative of wound closure. Three factors influence wound response: the tree species (including xylem anatomy and wood density), the nature of the physical injury (methodology), and the formulation used (relative phytotoxicity).