

Branching Out for Tree Education

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Without a doubt we live on a beautiful part of our planet. Trees produce many material things: sap for syrup, fruits & nuts, wood for building, pulp for paper. They also produce shade, homes to animals, compost for the forests, natural beauty, and inspiration to all that choose to look. Sometimes the trees we look after have insect and disease problems. Sometimes we can help them and sometimes Mother Nature and Father Time are in control. We have to work hard to keep the trees in our backyards, at the library, on the hospital grounds, and in our parks healthy and around for future generations.

-What are tree injections / Are they safe-

Tree injections can be used for many different reasons such as treating/preventing disease & insect infestations and supplying essential nutrients. Injection sites are typically at the base of the tree trunk or at DBH (**D**iameter at **B**reast **H**eight/about 4.5' up the trunk). When injecting, a hole is drilled just deep enough for the solution to be taken up by the tree's vascular tissue. It is the phloem and usually the first 1-5 growth rings (the xylem) that move the solution, water, and nutrients throughout the entire tree.

Tree injections last on average two to three years in aiding trees. Tree injections are similar to how we humans receive an antibiotic. Just as we take an antibiotic to fight off an infection, so do trees. The injection works to kill the pests and diseases harboring inside of the tree helping the tree to become stronger and get back to its original healthy state. American Tree Experts, Inc. (2023) states, "Injection treatment is like an IV for trees that helps bring a diseased or dying tree back to life. These injections deliver antibiotics, growth regulators, and nutrients directly into a tree's vascular system." The vascular system of a woody plant is made up of xylem and phloem.

Tree injections are a safe route when choosing a course of action for treating your trees. Injections allow for solutions to be given directly into the tree's system, avoiding potential leeching of the solution into the soil or it drifting on air currents if a spray is used. When treating trees close to a shoreline, it is beneficial to choose an injection method versus a spray or soil method. Aquatic life plays a major role in a lake's ecosystem. If an insecticide were to leech into a lake or a nearby buffer zone, it could cause serious implications to the building blocks of the lake's ecosystem (such as phytoplankton, zooplankton, and others on up the food chain).

American Tree Experts, Inc. (2023) says, "Unlike other treatments for trees, tree injections limit the use of chemicals on topsoil and the exposure to the natural environment. Tree injections are a fast and efficient way to treat a tree. . . Overall tree injections are a safe, effective, and environmentally friendly way to maintain the health and vitality of your trees." As stated by the International Society of Arboriculture (2010), "When systemic pesticides are applied by soil or injection, there is less environmental exposure than with spraying... Implants and injections are two techniques employed to introduce chemicals directly into the xylem of trees."

-Injections for Insect Pests-

An invasive insect that is on rise and concerning many, is the Emerald Ash Borer (EAB) *Agrilus planipennis*. Our warming/milder winters have allowed the range of the EAB to expand north to our backyards. The EAB attacks ash trees in the genus *Fraxinus* (in our area: green ash, white ash, black ash). Although Mountain Ash has the word "Ash" in it, Mountain Ash belongs to the genus *Sorbus* and is not affected by the EAB.

Signs of EAB in an ash tree include small holes in the bark that appear to be "D" shaped, dead branches, crown dieback, tunneling patterns underneath tree bark, and an increase in activity of wood peckers in the ash trees (the birds are looking to eat the larvae that are tunneling/feeding in the tree). The larvae stage of the EAB lives and feeds in the phloem, found just under the bark. This feeding breaks the movement of nutrients and water and causes the tree to exert extra energy to try to heal itself.

The Minnesota Department of Natural Resources (2024) states, "Once symptoms have started to show, trees generally die within one to three years." The University of Minnesota and the Minnesota Department of Agriculture collaborated to conduct research about EAB through a 4-year study that was completed in 2021. The University of Minnesota Invasive Terrestrial Plants and Pests Center (2024) stated the researched outcomes as: "During the 4-year study, the research team found that deploying the right types of insecticides to ash trees in the right ways can offer tree conservation and protection with minimal risk to non-target organisms such as bees that visit flowers and worms that decompose leaves." The University of Minnesota Invasive Plants and Pests Center also says: "Today's recommended treatment for an EAB-infested ash tree is injection of insecticide into the trunk. We also think that by treating enough trees in a local population with injection, it may be possible to achieve "herd immunity" against EAB. Herd immunity refers to the phenomenon through which treating a certain portion of a population confers protection to untreated members as well." These findings of chemical injection use for EAB are groundbreaking and accredited to the research team that consisted of Brian Aukema, principal investigator, and Dorah Mwangola, PhD student.

-Injections for Disease Problems-

If you are a lover of oak trees, you probably have been hearing more about oak wilt lately. Oak wilt is a fungal disease (*Bretziella fagacearum*) that kills thousands of oak trees every year. If your oak trees are suddenly exhibiting signs of crown dieback or wilted leaves that drop rapidly (leaves with green centers and brown edges), you may have oak wilt. The fungus that causes Oak Wilt lives inside an oak tree; the tree can sense it is there (chemical imbalances etc.). The tree shuts down and blocks the cells containing the Oak Wilt fungus within them. When the tree does this enough, it begins to shut down itself, eventually killing itself. The spores of this fungal disease are spread by sap beetles similar to flower pollen being spread by pollinators.

Infected oak trees can emit a smell that sap beetles are attracted to. When oak trees are wounded (pruning, construction damage, felling) there is also a scent released that the sap beetles are attracted to. When the sap beetles get to the wound sites they can receive the oak wilt fungal spores. Then those

beetles visit other oak trees, and the fungal spores and infection are spread. To help prevent the spread of these sap beetles, pruning guidelines have been implemented. Pruning, wounding, or felling any oak trees during April to July should be avoided at all costs. If any pruning or wounding happens during this time, wound spray should be applied immediately afterwards (latex-based paint or shellac as noted by the University of Minnesota Extension). Oak trees have lengthy root systems that often reach ninety feet in spread and connect to one another through root grafts. When one oak tree is infected with Oak Wilt it can spread the fungal infection through the connecting roots to other trees.

Chemical injections with propiconazole by educated professionals are shown to prevent oak wilt symptoms up to two years in healthy oaks. Chemical injections are not only used for preventative measures but also are used in actively treating diseased and infected trees. Eli Sagor et. al (2024), in "Oak Wilt in Minnesota" for the University of Minnesota Extension, state, "Propiconazole treatment of white oaks (both *Q. alba* and *Q. macrocarpa*) already exhibiting early symptoms of oak wilt (less than 30% of crown affected) can prevent further disease development for at least two years." Being able to prevent oak wilt with chemical injections is another groundbreaking discovery in the world of arboriculture!

-Hire those with knowledge-

Not all trees need to be injected. When hiring an individual or company to work on or assess your trees, be sure to check they have the proper licensing and understanding/education in arboriculture. Hiring someone to do work on your trees for removal, trimming, treating or any sort of work should not be taken lightly.

Hiring those who are not educated in tree care can lead to further problems down the road with your trees. For example, if a pruning wound is made on an oak tree during April to July and the hired trimmer doesn't know to cover the wound properly, your trees are now at serious risk for developing and aiding in the spread of oak wilt. Hiring an educated professional will also give you the opportunity for questions you may have regarding your tree's health to be accurately answered. Caring appropriately for your trees adds substantial value to your property. Taking the proper steps during your hiring process can save you money in the long run.

-About Us-

We both reside within Crow Wing County and share a passion for all things related to trees. Theri Wasniewski is in her 31st year teaching in the Horticulture program at Central Lakes College/Brainerd Campus and Nicole Atwater is continuing her studies at North Dakota State University B.S. to Ph.D. track in Plant Science. Having the opportunity to branch out and spread our knowledge of trees is a passion of ours. Thank you for taking the time to read this article.

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