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## **BLEEDING CANKERS ON EUROPEAN BEECH: A continual progress report on management.**

In the spring of 2004, we began tests of a fungicide sold as Agri-Fos®, one of several formulations of phosphorous acid that have recently become available to tree care professionals in the U.S. We applied the material as a bark drench (to a height of 6-8 feet) with a mixture of 31.2 fl. oz. Agri-Fos® plus 31.2 fl. oz. water plus 1.6 fl. oz. of Pentra-Bark™; the latter is an adjuvant that promotes absorption of Agri-Fos® through outer bark and into vascular tissue – xylem *and* phloem. Most trees we treated were 30-40 inch diameter, and we used about 1/2 gallon of mixture per tree. When we examined the trees five months later (October 2004), there was no evidence that the treatments had been effective. However, observations during a second exam in August 2005 were more encouraging. Cankers less than about 1 square foot in area were no longer oozing fluid and - in comparison to pictures taken just before treatment - were the same size that they were at the beginning of our observation period. During a second exam in 2006, all trees infected at the time of treatment showed no symptoms of disease. In fact, the only way we could confirm previously diseased areas was via presence of notches made while sampling 2 years earlier.

Unfortunately, our experimental design was far from optimal inasmuch as we had no untreated trees on the same properties as the treated trees, and all but one of 12 properties we worked on had only one or two diseased trees. Thus, in an effort to gain additional insight into the efficacy of selected fungicides, we conducted additional experiments on small (1/4 – 1/2 inch diameter), 2-3 year old saplings growing in pots in a greenhouse. The advantage here was that we could have enough replications of any given treatment to conduct meaningful statistical analyses. Results of those experiments clearly showed that Agri-Fos® + PentraBark® applied as a bark drench at rates adjusted for the small sizes of the trees didn't necessarily prevent colonization by any of the *Phytophthora* species tested, but the treatment reduced canker growth by 34-82%. A full description of our seedling treatments and the results thereof appear in the journal Plant Disease as Weiland, J.E., Nelson, A.H., and Hudler, G.W. 2009. *Effects of mefanoxam, phosphonate, and paclobutrazol on in vitro characteristics of Phytophthora cactorum and P. citricola on canker size of European beech.* *Plant Disease* 93: 741-746.

In the meantime, Agri-Fos® for Phytophthora-caused beech cankers, applied either as a bark drench or injected directly into the trunks of trees was approved by the EPA and the NYS-DEC. Other phosphorous acid formulations also approved for *Phytophthora* on beech include Arborfos®, Whippet®, and Alude®. We continue (now 9 years after the fact) to get positive reports from arborists who use phosphorous acid derivatives in the field on a regular basis. Several people have reported to us that their results were even better if they scribed the bark from the surface of small (e.g. dinner plate size) cankers prior to applying Agrifos®. I don't know if that practice would make any difference with a different application procedure.

The bottom line is that if you are caring for European beech trees with bleeding cankers, use of one of the phosphorous acid products is a viable option for slowing canker growth. Smaller cankers will likely be easier to contain, and treatment is likely to be most effective when trees are actively growing. We have not seen any evidence of phytotoxicity on beech, but we do know that if the bark drench mix of Agri-Fos® gets on herbaceous plants or moss, it will burn or kill the plants. If there are valuable groundcovers around trees you're treating, be sure to cover them with a tarp during application.

Important update: Reliant®, a product that is nearly identical to Agri-Fos® has recently been introduced to the arboricultural market, and it should provide comparable results. Reliant® also performs best when Pentra-bark is added®. Use either product with confidence.

(revised/updated February 5, 2015, GWH)