TOPICALLY APPLIED CHEMICALS PROVE INEFFECTIVE IN STIMULATING WOUND COMPARTMENTALIZATION

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In 1982, little was known about the processes by which some wounded trees were capable of building a strong "Compartmentalization" Wall 2 in the xylem that resisted the inward spread of discoloration that could lead to decay. It appeared, however, that most Wall components were probably complex phenolic compounds. Would the application of simple phenolics to wounds enhance the tree's ability to compartmentalize?

Phenolic compounds are formed via the shikimic acid pathway and many enzymatic steps are involved in the transformation of simple compounds to more complex (some polymeric) insoluble Wall materials. Even simple phenolics have a low solubility in water and there could be problems in achieving and maintaining effective concentrations of phenolics as wound treatments.

Red maple trees of known genetic compartmentalization potential (determined by increment boring through chisel wounds made in 1974) were wounded by removing rectangular bark patches (1.2 cm x 2.6 cm) from the trunk using a pecan budding tool. Four bark patches were removed around the circumference of each tree at each of four levels (about 60 cm vertical distant apart). Thus, each tree received 16 wounds.

Twelve different chemicals were tested: 1) gallic acid, which can give rise to ellagitannins, and we had noted ellagic-type compounds in the Walls of several species; 2) protocatechuic acid, which can produce dilactones; 3, 4, 5, 6) L-phenylalanine, L-tyrosine, *p*-coumaric acid, and *trans*-cinnamic acid which are considered to be major precursors of lignans and flavonoids; 7, 8, 9, 10) ferulic acid, *p*-coumaric acid, caffeic acid, and *o*-coumaric acid, which are simply substituted cinnamic acids; 11) dihydrofisetin, which we had identified as a major Wall material in *Gleditsia triacanthos;* and 12) quercetin, a common flavonol.

All chemicals were made up as saturated aqueous solutions and gum arabic was added to the solutions at a rate of 5g per 10 ml. The chemical-gum mixture was liberally applied to the wound within 30 min. after wounding. We hoped that the inert hydrophyllic polysaccharide gum would maintain the chemical on the wounds and allow a slow and steady diffusion into the wood. Treatments were randomized and a gum-only control wound was included at each wounding level. Ten trees (six weak compartmentalizers and four strong compartmentalizers) were wounded and treated on May 23, 1983.

The treated trees were harvested on December 17, 1984 and were sawn into sections to determine the extent of Wall 2 compartmentalization. *All* wounds on weak-compartmentalizing trees, regardless of chemical treatment, showed the typical wedge-shape pattern of discoloration inward toward the pith. An effective Wall 2 was built in response to *all* wounds in strong-compartmentalizing trees.

Thus, under the conditions of this study, no chemicals were found that would stimulate Wall 2 formation in weak-compartmentalizing trees. With our current knowledge that Wall 2 is built by utilizing carbohydrates *interior* to the wound (J. Arboric. 13:262-266, 1987), it is problematical that any externally applied chemicals would influence Wall 2 formation.

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