

Reaction of the Ambrosia Beetle *Platypus quercivorus* to Gallic Acid and Ellagic Acid in Oak Sapwood

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Abstract The ambrosia beetle, *Platypus quercivorus* (Coleoptera: Platypoididae) (Maruyama), is a critical vector of the fungus, *Raffaelea quercivora*. Inoculation of *R. quercivora*, causes necrosis in sapwood, stops water conductance, and kills host trees. *Platypus quercivorus* constructs galleries in oak sapwood, avoiding necrosis formed by attacks of the same species in the previous year. Reproductive success of *P. quercivorus* was greatly decreased on host trees that were attacked in the previous year because there was less space for galleries in the second year. In most cases, *P. quercivorus* could not reproduce at all on trees with a previous infestation history. If *P. quercivorus* avoid necrosis in response to chemical substances, then these chemicals may be useful tools for preventing *P. quercivorus* attacks. Gallic acid is not detected from healthy sapwood but is detected (0.001% wet weight) in necrotic tissue. Concentration of ellagic acid is higher (0.050% wet weight) in necrotic tissue than in healthy sapwood. To test the effect of gallic acid and/or ellagic acid on behavior of gallery construction by *P. quercivorus*, male beetles were introduced to oak xylem in which gallic acid and/or ellagic acid concentrations were experimentally elevated. Results indicated that *P. quercivorus* avoided high concentrations of gallic acid and ellagic acid. These results coincided with previous reports obtained by field observations and by inoculation experiments indicating that *P. quercivorus* avoiding necrosis when constructing galleries. Gallic acid did not disturb gallery construction of *P. quercivorus* at the same low concentration found in necrosis. In contrast, ellagic was capable of terminating gallery construction completely. These results suggest that ellagic acid plays a critical role in the avoidance of necrosis during *P. quercivorus* gallery construction.