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Effect of plant defense elicitor in preventing ambrosia beetle attacks in flowering dogwoods exposed to simulated flood stress condition

Ambrosia beetles (*Xylosandrus* spp.) are an economically important wood-boring pest of flowering dogwoods (*Cornus florida* L.). They preferentially infest trees weakened by abiotic and biotic stressors. Acibenzolar-S-methyl (ASM), a plant defense elicitor, was evaluated for effectiveness in inhibiting ambrosia beetle tunneling (i.e., attacks) into dogwoods exposed to simulated flood stress. Three-year-old container-grown dogwood trees of size ranging from 1.8 to 2 cm diameter were assigned to ASM drench + flooding, ASM foliar + flooding, ASM drench + no flooding, ASM foliar + no flooding, no ASM + flooding, and no ASM + no flooding conditions. ASM was applied preventatively 3 days before the initiation of water stress. The trials were conducted near the edge of a deciduous forest. The experiment was arranged in a completely randomized design with six single-plant replications. Trees were flooded for 14 days and were then drained and watered as needed. Ambrosia beetle attacks were counted every other day for 28 days. Plant tissue core samples were collected at 7 and 14 days after flood initiation to determine ethanol content using solid-phase microextraction–gas chromatography–mass spectrometry (SPME-GC-MS). Ambrosia beetle-attacked trees were collected at the end of the trial. The number of attacks with successful gallery formation, gallery depth, galleries with fungal colonization, galleries containing egg, larvae, and adult was recorded by dissecting the trees. Result showed that trees exposed to no ASM + flooding had the highest number of ambrosia beetle attacks, but the number of attacks was significantly reduced in ASM treated trees assigned to flooding. Trees assigned to no flooding conditions had the least or no beetle attacks. Only the plant tissues collected from the flooded trees produced ethanol. Moreover, ASM significantly reduced attacks with gallery formation, gallery depth, galleries with fungal colonization, galleries containing egg, larvae, and adult. Our results indicate ASM can induce plant defense response to ambrosia beetles attack and tunneling into dogwoods under stress conditions.