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Assessment of the effectiveness of low-cost ethanol detectors in determining flood stress in dogwood (*Cornus florida* L.) to facilitate on-site detection of trees vulnerable to ambrosia beetles

The ornamental tree nursery faces a significant challenge from ambrosia beetles (Coleoptera: Scolytidae), a pest that attacks and damages stressed trees. These beetles locate their hosts primarily by detecting ethanol emissions, which are a result of tree stress. In this study, we aimed to evaluate the ethanol emission of flood-stressed trees using three different detectors: Alco-strip, Draeger, and solid phase microextraction gas chromatography-mass spectrometry (SPME-GC-MS). The Alco-strip and Draeger detectors are low-cost options, while SPME-GC-MS is the standard device for verification. To evaluate the efficacy of low-cost ethanol detectors for assessing flood stress in dogwood (*Cornus florida* L.), a total of 48 native dogwood in 3-gallon containers were used in this study. The trees in 3-gallon containers were placed in 5-gallon buckets lined with plastic to maintain the pot-in-pot experimental setup. Of the 48 plants, 24 were subjected to a flood stress treatment, while the other 24 were non-flooded controls. The treatments were arranged using a randomized complete block design (RCBD), with four replications per sampling date. The flooding treatment was maintained by irrigating the plant pot until standing water pooled around the base of the trees, while the controls were allowed to drain freely through a hole in the plastic liner at the bottom of the container. Ambrosia beetle attacks were recorded every other day throughout the experiment. Volatile samples were collected from root, bark, and twig tissues at 1, 3, 5, 8, 15, and 25 days after the ambrosia beetle attack. The Alco-strip and Draeger detectors were used to test the efficacy of low-cost field ethanol detectors, and the ethanol production was verified using solid-phase microextraction gas chromatography-mass spectrometry (SPME-GC-MS). The results of this study suggest that low-cost ethanol detectors can be an effective tool for evaluating ethanol production in the field. However, further work is needed to optimize these tools for use in ornamental nursery ambrosia beetle management plans. This may include investigating alternative methods for determining the optimum time for sample collection and refining the procedures for using low-cost detectors in the field. Future studies could also explore the use of other volatile organic compounds as potential stress indicators in ornamental trees and their relationship to ambrosia beetle attacks. Overall, this research provides valuable information for developing effective strategies for managing ambrosia beetles in the ornamental tree nursery.