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Identification of volatile organic compounds as biomarkers for early detection of storage rots in sugar beets.

Postharvest storage rots in sugar beets can result to significant sucrose losses during storage and in processing streams thus resulting in negative economic impact to the sugar industry in the U.S. Several pathogens including *Penicillium* and *Leuconostoc* species have been previously identified as important storage pathogens in beet piles in the U.S. Early detection of infection process of postharvest pathogens in sugar beet roots would be a promising approach to implement effective disease control strategies. This study aimed to profile the volatile organic compounds (VOC) released during the infection process of major storage pathogens in sugar beet roots. An *in vitro* assay was conducted to assess the VOC profiles of sugar beet root tissues inoculated with major storage pathogens including *Penicillium expansum*, *Penicillium paneum* and *Leuconostoc mesenteroides*. The VOCs were sampled on day 0, 3, 7 and 15 post inoculation at 30 °C using the solid-phase microextraction method and thereafter profiled using gas chromatography-mass spectrometry (GC-MS). The GC-MS analysis showed that ethanol and propanoic acid were the common VOCs in both uninoculated control and inoculated sugar beet root tissue samples. *Penicillium expansum* infections further resulted in increased amounts of ethanol compared to both *P. paneum* and *Leuconostoc mesenteroides*. Meanwhile, ethyl acetate was only observed in artificially inoculated sugar beet root tissues. Dimethyl ether and acetic acid were unique to *P. expansum* and *P. paneum* infected tissue. Our further studies using different sugarbeet cultivars are underway. Our ultimate goal is to develop the smart sensor platform to detect VOC biomarkers early on which will be helpful employing mitigation strategies to minimize the sucrose loss in postharvest sugar beets.