Changes in volatile emission of cucumber plants after inoculation with the root pathogen *Pythium aphanidermatum*

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In greenhouses, cucumber (*Cucumis sativus*) is grown on rockwool supplied with nutrient solution that is continuously recirculated to the crop. This recirculation can rapidly spread the pathogen *Pythium aphanidermatum* throughout the greenhouse causing extensive and devastating root rot. An early-warning system for *P. aphanidermatum* infection would be advantageous as it would provide additional time for effective disease management planning and earlier fungicide application strategies. At this moment, no method is available to detect this pathogen in an early and non-destructive way. The objective of this study was to determine whether changes occur in the emission of volatiles by cucumber plants after inoculation with the root pathogen *P. aphanidermatum*. This information can be used to develop a non-invasive method to detect *P. aphanidermatum* infection in greenhouse practice in an early stage. Cucumber plants were grown in rockwool blocks placed in individual glass vessels. Twelve days after inoculation, volatile compounds were collected by purging the air surrounding the plants through tubes containing an adsorbent. The trapped volatiles were released from the tubes using thermal desorption and analysed using gas chromatography coupled to a quadrupole mass spectrometer. The data were subjected to baseline correction, noise elimination and alignment algorithms for automated data comparison. In addition, the total leaf area was calculated to correct for differences in emission due to variation in leaf surface. Infected plants emitted up to 10-fold more of the compound 3-methyl-butanal-*O*-methyloxime. Interestingly, this compound has previously been reported to be induced in cucumber plants by herbivore feeding, suggesting a common defence signalling pathway for these two different types of biotic stress. These promising results suggest it would be worthwhile to test if the oxime could be detected in a greenhouse compartment containing infected cucumber plants. A number of new experiments inside a greenhouse have recently been undertaken to test this premise.