Cavity Enhanced Absorption Spectroscopy for the Detection of Plant Volatile Organic Compounds

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We are using cavity enhanced absorption spectroscopy to develop a sensor to detect and quantify plant volatile organic compounds (VOCs). Plants constantly emit a variety of VOCs, with the composition of the mixture changing in response to external stresses such as water deficiency, nutrient deficiency, and herbivore and pathogen attacks. Understanding the correspondence between the emitted VOCs and the various environmental triggers, and developing sensors to detect and quantify these VOCs, has the potential to yield a step change in agricultural sustainability. Such sensors will be used by crop farmers to monitor crops at a local level, allowing the provision of targeted nutrition and pest control as well as early intervention in the event of drought, disease or pest infestation. We will report our progress on a proof-of-concept study on detection of the compound geraniol. Geraniol has been chosen as a suitable first target molecule due to the availability of genetically-modified crop plants that emit geraniol at increased concentrations relative to wild-type plants. Such plants should therefore yield relatively high signal levels for our first prototype sensor.