

Title Highly sensitive ethylene detector for on-line measurements on kiwifruits
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Citation ISHS Acta Horticulturae 913:651-656.2011.
Keywords laser-based ethylene detector; wound; *B. cinerea*

Abstract

Kiwifruit are extremely sensitive to ethylene (C₂H₄); as little as 5-10 ppbv (1 ppbv = 1 part per billion volume = 1:10⁹) of C₂H₄ will induce fruit softening and make them much more susceptible to pathogen attack (such as *Botrytis cinerea*); maintaining fruit firmness can significantly reduce pathological breakdown. Biological research on the plant hormone ethylene is often hampered by the poor detection limit of available instrumentation. Pre-concentration steps need to be included in the measuring scheme, making traditional methods (GC, GC-MS or dispersive IR absorption techniques) not very specific and time-consuming, resulting in a low time resolution. Since C₂H₄ concentrations in kiwifruit are extremely low, it has to be measured with highly sensitive methods. In comparison to conventional methods, optically based detectors, using lasers in combination with modern spectroscopic techniques, are an excellent option for sensitive monitoring of C₂H₄ in kiwifruit. Sensor Sense developed a highly sensitive on-line laser-based ethylene detector (type ETD-300) that is more than an order of magnitude more sensitive and much faster than other commercially available detectors. With its detection limit of 300 pptv (1 pptv = 1 part per trillion volume = 1:10¹²) and time resolution of 5 s it is unique. Many dynamic processes in single fruit can now be monitored in real time without incubation periods. The suitability of ETD-300 for monitoring the ethylene response in real time from kiwifruit under stress conditions, such as mechanical wounding and *B. cinerea* infection, is demonstrated.