

Volatile detection for plant produce decay identification

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Dated: 14th June, 2023

Volatile Organic Compound (VOC) Detection: Why?

Detection of Volatile Organic Compounds (VOCs) emitted by plants is vital for understanding plant biology, ecology, and behavior. VOCs play essential roles in plant-plant and plant-animal interactions, including communication, the attraction of pollinators, defence against herbivores, and influence on microbial populations. Accurate VOC detection methods in plants require complex and sophisticated methods, such as Proton Transfer Reaction-Mass Spectrometry (PTR-MS) or large lab-level equipment like Gas Chromatography coupled Mass Spectrometry (GC-MS). These methods allow scientists to quantify the concentration of VOCs emitted by plants and to identify specific compounds. Detection of VOCs emitted by plants is crucial for addressing environmental and agricultural issues, such as air pollution, climate change, and the development of sustainable agriculture practices. For example, the detection of VOCs emitted by plants can be used to:

Monitor air quality: VOCs can accumulate in indoor environments, so detecting them can help monitor indoor air quality and prevent potential health problems.

Understand plant behavior and ecology: VOC detection can provide important information about plant-plant and plant-animal interactions.

Improve sustainable agriculture: VOC detection can be used to develop more sustainable agricultural practices, such as reducing chemical pesticides and improving crop yields.

To summarize, the detection of VOCs emitted by plants is a valuable tool for understanding plant biology, ecology, and behavior, and for addressing environmental and agricultural issues.

VOCs and Tomatoes: A case study

Tomatoes are an important food crop that is widely cultivated and consumed worldwide. The detection of VOCs emitted by tomatoes is important for understanding the physiology, quality, and safety of the crop.

Need for Detection of VOCs from Tomatoes:

- **Quality Assessment:** The VOC profile of tomatoes is indicative of their physiological status, ripeness, and quality. By detecting the VOCs emitted by tomatoes, it is possible to determine their quality and suitability for consumption.
- **Food Safety:** Tomatoes can become contaminated with harmful compounds, such as bacteria, fungi, and pesticides. Detection of VOCs emitted by tomatoes can be used to monitor food safety and detect the presence of harmful compounds.
- **Plant Physiology:** VOCs play an important role in the growth and development of plants, including tomatoes. By detecting the VOCs emitted by tomatoes, it is possible to understand their physiological status and how it is affected by environmental factors, such as temperature, light, and water availability.

- Agricultural Research:** Detection of VOCs from tomatoes can be used in agricultural research to study the effects of environmental factors, such as temperature, light, and water availability, on the plant's physiology and growth.

Tomato Plant VOCs	Tomato Fruit VOCs
2-Hexenal	Pentanal
3-Hexenal	Hexanal
2 Hexenol	(Z)-3-Hexenal
alpha-Pinene	(E)-2-Hexenal
beta-Pinene	(Z)-2-Heptenal
3-octanal	2-Octenal
3-Hexenyl acetate	Nonanal
Phellendrene	Geranial
Ocimene	Ketones
linalool	1-Penten-3-one
Terpinene	6-Methyl-5-hepten-2-one
nonanal	Geranylacetone
Methyl salicylate	β -Ionone
Decanal	Aldehydes
Elemene	1-Nitropentane
Elemene	2-Isobutylthiazole
β - Caryophyllene	Geraniol

In conclusion, the detection of VOCs from tomatoes is an important tool for understanding the physiology, quality, and safety of the crop. It can be used to improve quality control, enhance agricultural research, and monitor food safety.