Application Note No. 056

Time Course of the Emission of Volatiles from Damaged Broad Bean Leaves

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Introduction

The analysis of volatiles in the gaseous phase is often difficult, with many opportunities for sample losses both in sample collection, transportation and on analysis. The emission of volatiles from a pair of healthy leaflets on a 4-week old broad bean plant was sampled before and after damage. Sampling takes place onto a packed Optic liner, allowing thermal desorption directly onto the head of the column, therefore no manual sample handling is required.

Instrumentation & Conditions

- ATAS Optic 2-200 programmable injector
- Agilent HP6890 GC with FID

Optic Conditions

Liner: Tenax packed PTV
Mode: Desorption
Initial temperature: 30 °C
Ramp rate: 16 °C/s
Final temperature: 220 °C

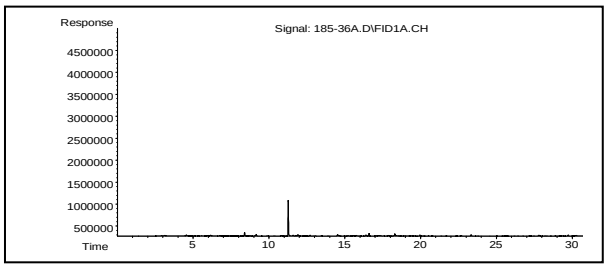
GC conditions:

Column: HP-1 50 m x 0.32 mm i.d. x 0.52 µm film
Initial Temperature: 30 °C hold 1 min
Ramp 1: 5 °C/min to 150 °C hold 0.1 min
Ramp 2: 10 °C/min to 250 °C hold 10 mins

Method

- Enclose leaflets in a 100 ml entrainment vessel and introduce purified air at a rate of 750 ml/min
- Draw air out through a Optic tube packed with 50 mg Tenax TA (60/80) at a rate of 500 ml/min for 5 mins
- Remove, cap and store the tube in a freezer until analysis
- Make 25 holes in each leaf with a syringe needle
- Collect six samples for 5 mins each, as before
- Place the liner in the Optic injector
- Desorb the volatiles from the packing material
- Transfer the components onto the head of the column in splitless mode
- At the end, remove the liner and introduce the next sample

Chromatograms



A) -5 to 0 mins

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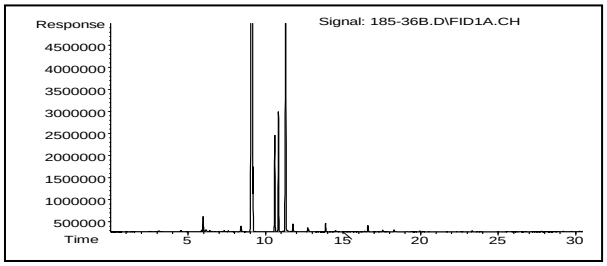
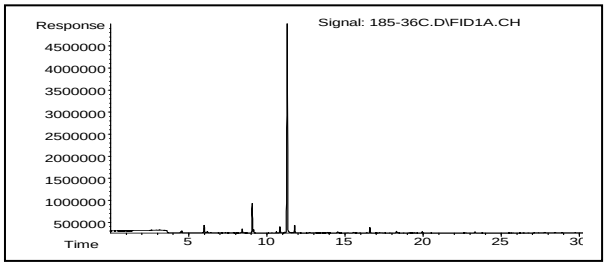
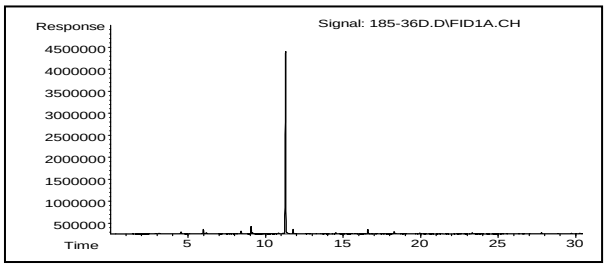


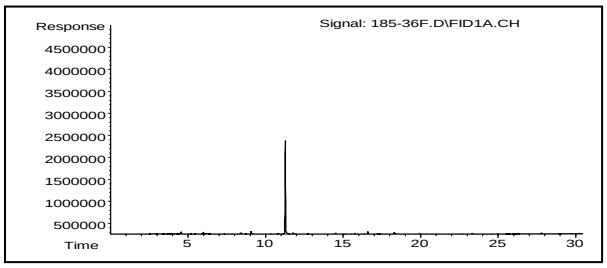
B) 0 to 5 mins



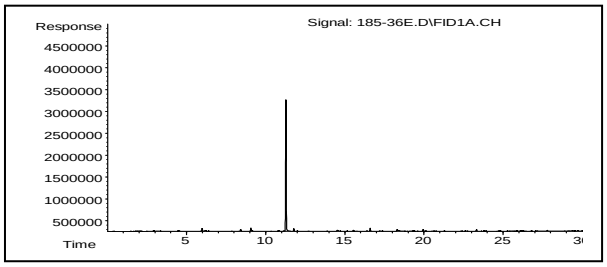
C) 5 to 10 mins



D) 10 to 15 mins



E) 15 to 20 mins



F) 20 to 25 mins

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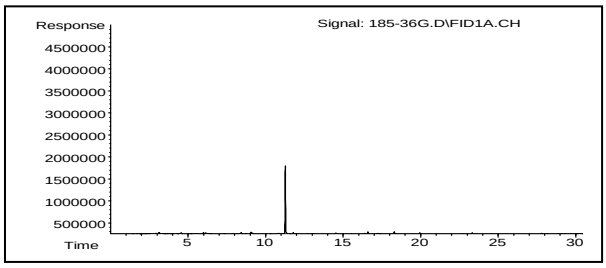

G) 25 to 30 mins

Figure: *Time course for the emission of volatiles before (A) and after (B-G) damage of leaflets*

Conclusions

This method is suitable for volatile sampling. It clearly demonstrates the rapid release of 'green leaf volatiles' after physical damage of broad bean leaflets and the rapid return to pre-damage levels after 30 minutes.

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