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Monitoring of **volatile organic compounds** in packaged wild rocket

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INTRODUCTION

Odor is an important sensory attribute of fresh fruit and vegetables. In modified atmosphere packaged (MAP) fresh produce, volatiles organic compounds (VOC) and off-odors may develop in response to packaging oxygen transmission rate (OTR), storage temperature and storage time. There are limited studies on the VOC composition of MAP fresh fruit and vegetables. While aroma volatiles can be of great importance for the sensory quality of fresh produce, information on VOC may also be used as an indicator of product freshness and response to different packaging and storage conditions.

AIM

To investigate the influence of OTR of the packaging material, storage temperature and storage time on the headspace VOC composition of packaged wild rocket.

MATERIALS AND METHODS

Wild rocket samples:
Commercially available packages with wild rocket were used:
- **Control** – high OTR film stored at 1 °C
- **High OTR** – high OTR film stored at 20 °C
- **Low OTR** – low OTR film stored at 20 °C

Gas analysis:
VOC were analyzed by solid phase microextraction for 5 min at room temperature followed by GC/MS.
O2 and CO2 were measured by a portable gas analyzer (CheckPoint, Dan-Sensor A/S, Denmark) every day for up to 4 days.

RESULTS

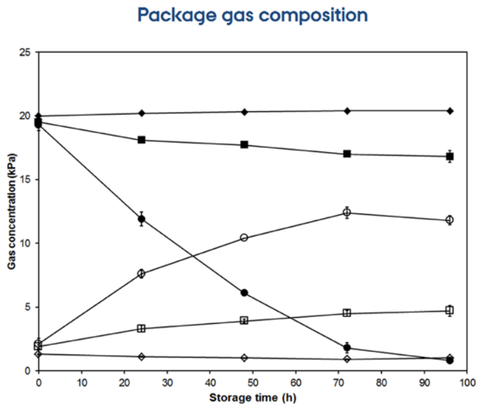
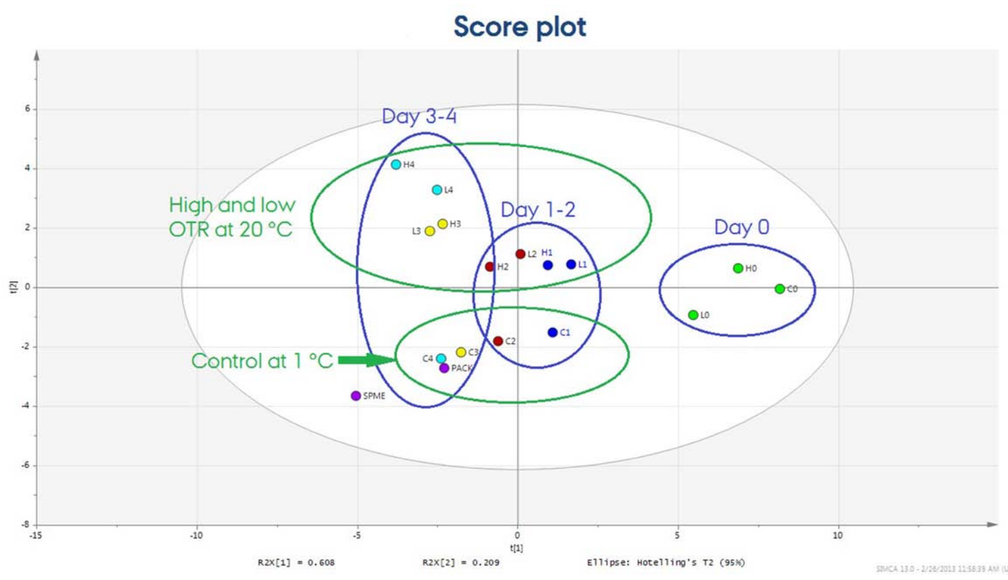


Fig 1. O_2/CO_2 gas concentrations inside packages with wild rocket Control (◆/◇); high OTR at 20 °C (■/□); low OTR at 20 °C (●/○).



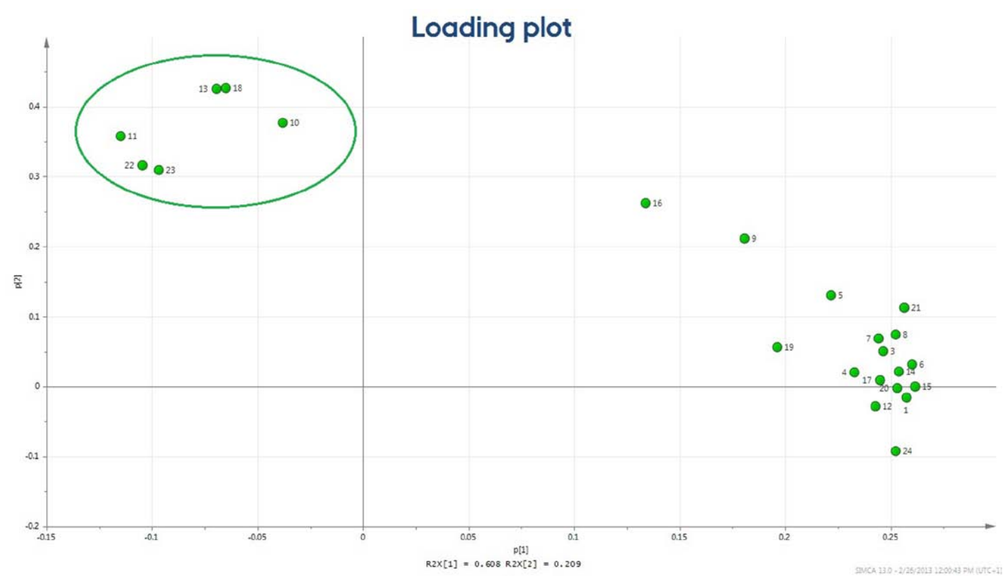


Fig 2. Score and loading plot from PCA of the data. C/H/L represent control, high OTR and low OTR. 0/1/2/3/4 represent 0, 1, 2, 3, and 4 days of storage, respectively. Symbols in the loading plot are numbered according to Table 1.

Table 1. List of VOC compounds used for quantification.

No	Name of compound	Retention time (min)
1	Unknown 1	14.09
2	Methanol	14.95
3	Acetaldehyde	15.05
4	Butane	16.46
5	Acetonitrile	17.24
6	Unknown 2	17.66
7	Furan	17.67
8	Propanal	17.87
9	Acetone	18.02
10	Carbon disulfide	18.05
11	Dimethyl sulfide	18.15
12	Unknown 3	18.43
13	Unknown 4	18.54
14	Pentane	18.85
15	2,3-dihydrofuran	19.05
16	Unknown 5	19.92
17	Tetrahydro-furan	20.07
18	Unknown 6	20.09
19	2-Butanone	20.15
20	Acetic acid	21.03
21	Benzene	21.10
22	Dimethyl disulfide	22.33
23	Dimethyl sulfoxide	24.42
24	Butyrolactone	25.52

Fig 3. Sensory quality of low OTR, control and high OTR packaged wild rocket samples after 4 days of storage. Photo: Jens Michael Madsen, Aarhus University.

CONCLUSION

Storage temperature (1 and 20 °C) and storage time (up to 4 days) were the major factors influencing the formation of VOC in packaged wild rocket.

OTR had less effect on formation of VOC since the gas concentration inside packages remained above 2 kPa O2 during the 4 day storage period.

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