Postharvest ozone treatment on strawberries

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Introduction

Strawberries are very sensitive to the development of decay and are therefore generally commercialized rapidly after harvest to avoid substantial losses. Nevertheless, retailers and consumers are regularly confronted with rotten fruit. As the application of fungicides is more and more restrictive, alternative methods are needed to prolong storage life of strawberries after harvest while maintaining fruit quality.

Objective

To evaluate the effect of a treatment with gaseous ozone on decay reduction on strawberries during cold storage.

Material and methods

Fruit from 4 cultivars ('Murano', 'Cléry', 'Irma' and 'Laetitia') issued from organic and conventional crops and different harvest dates in 2016 and 2017 were treated or not with 2 to 3 ppm ozone for 3 hours per day during 1 week of storage at 8 °C. Influence of ozone was evaluated on percentage of decayed fruit and fruit quality (firmness, skin color, total soluble solids (TSS) and acidity) after cold storage and 2 days at 20 °C.

Results

Fungal decay was on average delayed with ozone treatment applied during storage at a concentration of 2 to 3 ppm, but not inhibited (Fig. 1, A and B). The repetition of the same experiment on fruit from the same crop but harvested at different dates showed that ozone influence varied according to harvest date (Fig. 1, A). Efficacy of ozone was particularly visible after 1 week of storage at 8 °C and an application of the treatment during 2 days showed no impact during shelf life (Fig. 1, B).

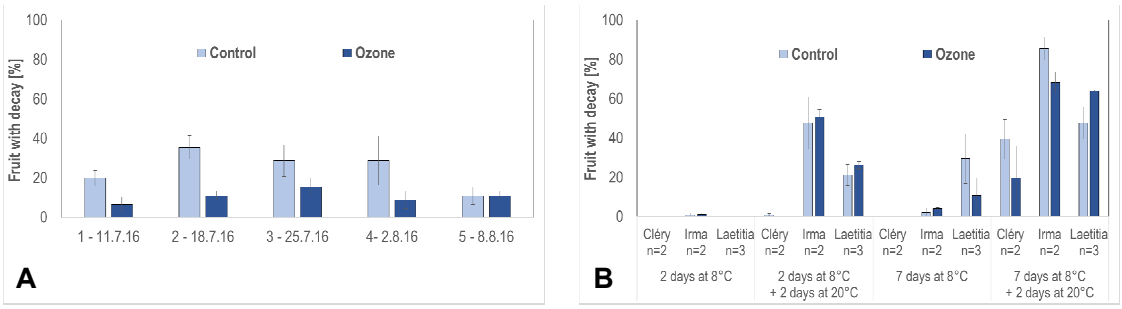

Fig. 1. Influence of ozone treatment on percentage of fruit with decay **A**: after 8 days of storage ('Murano', harvested at 5 dates in 2016) and **B**: after 2 and 7 days of storage at 8 °C and 2 days at 20 °C ('Cléry', 'Irma' and 'Laetitia', 2017). n: number of experiments with the same cultivar.

Fruit quality was on average not affected by ozone treatment (Tab. 1). Firmness was slightly lower with ozone, although the difference was significant only for fruit of the cultivar 'Murano' harvested in 2016. Skin color, TSS and acidity were not influenced by the treatment.

Year	Days of storage 8°C/20°C	Treatment	Firmness [ID50]	Skin color [L*]	[a*]	[b*]	TSS [°Brix]	Acidity [g/kg citr. ac.]
2016 (n=4)	8/0	Control	63.2^{b}	35.6^{a}	34.5^{a}	21.9^{a}	8.6^{a}	8.1^{a}
		Ozone	65.5^{a}	35.7^{a}	34.2^{a}	21.7^{a}	8.7^{a}	8.0^{a}
2017 (n=7)	2/2	Control	70.9^{a}	31.3^{a}	27.3^{a}	18.1^{a}	nd	nd
		Ozone	72.2^{a}	31.2^{a}	27.8^{a}	17.8^{a}	nd	nd
2017 (n=7)	7/2	Control	58.3^{a}	31.6^{a}	29.0^{a}	19.6^{a}	nd	nd
		Ozone	59.6^{a}	31.5^{a}	28.9^{a}	19.5^{a}	nd	nd

Tab. 1. Firmness, skin color [L*, a* and b*], TSS and acidity of strawberries treated or not with ozone. Values are means of n experiments. Means with the same letters are not significantly different at p≤0.05 according to Fisher test. nd: not determined.

Conclusions

- Fungal growth was on average delayed but not entirely inhibited with ozone treatment applied at 2 to 3 ppm for 3 hours per day during storage of strawberries at 8 °C.
- Efficacy of ozone treatment was strongly influenced by the cultivar and / or harvest date.
- Fruit skin color, TSS and acidity were not affected by ozone treatment, while firmness was slightly lower in treated fruit.