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Postharvest ozone treatment on raspberries

Gabioud Rebeaud S., Varone V., Vuong L., Cotter P.-Y., Ançay A. and Christen D.
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Introduction

Highly appreciated by the consumers for their taste, color and health benefits, raspberries have a short shelf life principally caused by the rapid development of fungal diseases. A short time from harvest to commercialization allows to mitigate the risks of fruit losses, but cannot fully exclude the growing of mold during the postharvest life of the 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 of the study

To evaluate the effect of a treatment with gaseous ozone on decay and quality of raspberries during cold storage.

Material and methods

'Tulameen' raspberries harvested 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 (total soluble solids (TSS), acidity and color) after storage.

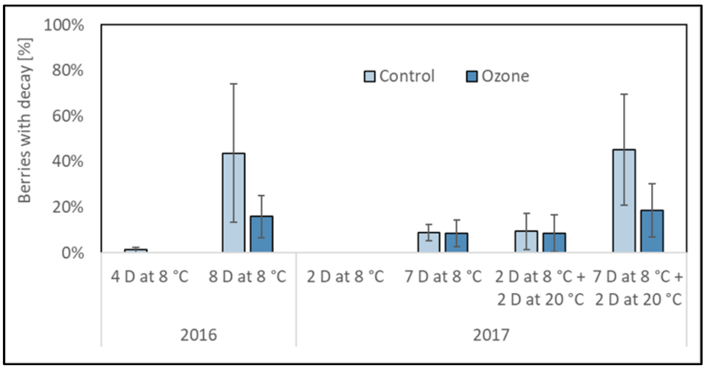

Fig. 1. Influence of ozone treatment on percentage of berries with decay after 4 and 8 days of storage at 8 °C (2016) or 2 and 7 days of storage at 8 °C with and without 2 supplementary days at 20 °C (2017). Data are means of 3 experiments. D: days.

Results

Ozone treatment reduced on average by half the percentage of **decayed berries** after 8 days of storage at 8 °C in 2016 (fig. 1). In the experiments conducted in 2017, this effect was only observed after one week of storage at 8 °C followed by 2 days shelf life at 20 °C, which suggests that ozone treatment reduced the spores load on these fruit during cold storage. The pathogens developing on the berries were, nevertheless, at the tested concentration, time of exposure and frequency of application, not entirely deactivated.

Fruit quality in terms of TSS, acidity and color remained stable during the 4 first days and decreased up to 8 days of storage at 8 °C (tab. 1). Ozone treatment did not affected these quality parameters (tab. 2).

	Day 0	Day 4	Day 8
TSS [°Brix]	12.08 ab	12.51 a	11.85 b
Acidity [g citric acid/kg]	25.32 a	25.96 a	22.73 b
Color [h]	27.16 a	26.99 a	25.51 b

Tab. 1. Total soluble solids (TSS), acidity and color at harvest (Day 0) and after 4 and 8 days of storage at 8 °C (experiments conducted in 2016). Means with the same letters are not significantly different at p ≤ 0.05 in Tukey's multiple range test.

		Day 4	Day 8
TSS [°Brix]	Control	12.51 a	11.85 a
	Ozone	12.31 a	11.77 a
Acidity [g citric acid/kg]	Control	25.96 a	22.73 a
	Ozone	27.48 a	23.12 a
Color [h]	Control	26.99 a	25.51 a
	Ozone	27.19 a	25.66 a

Tab.2. Influence of ozone treatment on total soluble solids (TSS), acidity and color after 4 and 8 days of storage at 8 °C (experiments conducted in 2016). Means with the same letters are not significantly different at p ≤ 0.05 in Tukey's multiple range test.

Conclusions

- Gaseous ozone treatment applied daily at 2 to 3 ppm during 3 hours was effective to reduce microbiological growth, especially when applied during one week of storage at 8 °C
- Fruit quality in terms of TSS, acidity and color was not affected by ozone treatments. These attributes however decreased with storage duration.
- These results bring evidences that ozone is a suitable alternative method to limit fruit losses after harvest by acting efficiently on microbiological growth, a major cause of fruit loss.