

Influence of Hot Water Dipping on the Fruit Quality of Organic Produced 'Topaz' Apples

D.A. Neuwald¹ and D. Kitemann²

Abstract

Organic 'Topaz' apples can show a high incidence of fungal rots (Neofabraea spp) after storage. Hot water dipping (HWD) after harvest but before longer-term storage provides an effective control of storage rots and is now widely used on commercial organic orchards. The fruit quality of 'Topaz' organic apples was assessed from two harvest dates after HWD and storage at 1 °C in either regular air (RA) or controlled atmosphere (CA). After 6 months storage plus 7d shelf-life at 20 °C the incidence of fungal rots was reduced in both the RA and CA HWD treatments when compared to untreated controls (UTC = no HWD). There were no changes in fruit firmness (FF), total soluble solids (TSS) and titratable acidity (TA). FF under RA storage was lower when compared to CA. No negative effects from the HWD treatment (e.g. peel damage) were observed. HWD is an effective treatment to reduce the incidence of fungal rots on organic 'Topaz' apples without a negative influence on fruit quality.

Keywords: regular air, controlled atmosphere storage, rots, fungal diseases, *Malus domestica*

Introduction

Organic 'Topaz' can appear free of rot symptoms at-harvest, but the apples have open lenticels that are often contaminated with fungal spores (*Neofabraea* spp.) in the orchard and these latent infections can develop strongly during storage and marketing (Mayr & Späth, 2008). A postharvest HWD treatment was developed in Southern Germany between 1999-2003 and has become established control measure to reduce fungal storage rots in organic apples produced in the Lake Constance region (Schirmer *et al.*, 2004). HWD is now common on organic orchards elsewhere in Europe to treat a range of rot susceptible apple cultivars (Maxim *et al.*, 2014). Bins of organic apples (~300 kg) are normally dipped in hot water at 52 °C (~50 to 53 °C) for 2 min before being placed in longer-term storage. The recommended treatment temperatures and dipping times can vary according to the cultivar because of the risk of heat damage to the fruit peel.

Materials and Methods

In 2009, fruit were picked at two harvest dates from the organic orchard at the Competence Centre for Fruit Growing at Lake Constance (KOB). After harvest, fruit were treated in a commercial HWD system for 2 min at 51 °C and then stored at 1 °C in either regular air (RA) or controlled atmosphere (CA: 1.0 kPa O₂, 2.5 kPa CO₂). After 6 months storage plus 7 d shelf-life at 20 °C the incidence of fungal rots was reduced in both the RA and CA HWD treatments when compared to the untreated controls (UTC = no HWD).

¹ Competence Centre for Fruit Growing at Lake Constance (KOB), Germany, 88213 Ravensburg, and University of Hohenheim, Germany, 70599 Stuttgart, neuwald@kob-bavendorf.de

² University of Applied Sciences Weihenstephan-Triesdorf, Germany, 85354 Freising, dominikus.kitemann@hswt.de

Results and Discussion

In fruit from both harvests and for both the RA and CA treatments the incidence of fungal rots was reduced by HWD when compared to the UTCs (Fig. 1). Riper fruit from the second harvest show a higher incidence of fungal rots for all treatments. Likewise, riper fruit under RA storage show an increase in fungal rots when compared to RA storage as CA.

FF, TSS and TA were not influenced by HWD (results not shown). CA storage maintained higher FF and showed a trend (ns) to slightly higher TA compared to RA storage. No negative effects from the HWD treatment (heat damage to the peel) were observed. HWD is an effective treatment to reduce the incidence of fungal rots on organic 'Topaz' apples without having a negative influence on fruit quality.

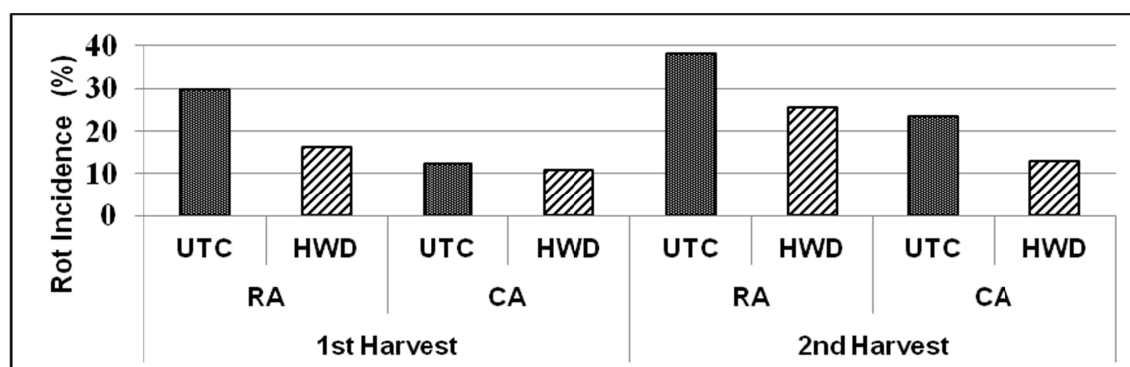


Figure 1: Effect of harvest date, storage condition and hot water dipping treatment (HWD) on the incidence of fungal storage rots in 'Topaz' organic apples after 6 months storage at 1 °C in regular air (RA) or controlled atmosphere (CA) and 7 d shelf life at 20 °C (~100 fruit per treatment, reps=1).

Acknowledgements

The Interreg IV project no. 7 'Comparison of Fruit Growing Production Systems' for financial support.

References

- Mayr, U. & Späth, S. (2008). Gesund rein - krank raus? Ökologische Bekämpfung von parasitären Lagerfäulen an Äpfeln—Ergebnisse aus 3 Jahren Versuchsarbeit am Kompetenzzentrum Obstbau – Bodensee. *Pflanzenschutz* **1**: 20-23.
- Maxin, P., Williams, M. & Weber, R.W. (2014). Control of fungal storage rots of apples by hot-water treatments: a Northern European perspective. *Erwerbs-Obstbau* **56**: 25-34.
- Schirmer, H., Gräf, V., Trierweiler, B. and Holland, E. (2004). Heißwasserbehandlung zur Reduzierung der Gloeosporium-Fäule. *Obstbau* **29**: 440-443.

Citation of the full publication

Neuwald, D.A. & Kitemann, D. (2015). Influence of Hot Water Dipping on the Fruit Quality of Organic Produced 'Topaz' Apples. Proceedings from III International Symposium on postharvest pathology (ISHS) "in press".