

Effects of market access treatments on export blueberry quality during storage

John Golding, James Freriechs, Mark Bullot, Madeline Kavanagh, Penta Pristijono and Baogang Wang (NSW Department of Primary Industries, University of Newcastle and Beijing Academy of Forestry and Pomology Sciences (China))

- There were generally no differences in fruit quality between the different market access treatments (cold treatment, methyl bromide and irradiation) across the different assessment times.
- The market access treatment utilised needs to be considered based upon the supply chain fruit will be marketed through. Cold storage treatment gave the highest fruit quality, but the need to hold fruit in it for 14 days precludes its use for air freight but both methyl bromide and irradiation are suitable alternatives for air freight supply chains.

End-point market access treatments are essential for the export of blueberries into phytosanitary export markets. As reported in the previous edition (Australian Berry Journal, Autumn 2022), the three market access treatments (cold treatment, methyl bromide fumigation and irradiation) have different benefits and issues with their use in the export supply chain. However, the effects of these different treatments on fruit quality have not been adequately compared, particularly comparing the treatments on the same batch of fruit.

In a Federal Government funded project through the Agricultural Trade and Market Access Cooperation (ATMAC) program, a research trial to compare the fruit quality out-turns following phytosanitary treatment using commercial quantities of fruit was conducted at the Centre of Excellence for Market Access at NSW Department of Primary Industries.

Blueberry fruit (cultivar '1111') from three different growers in the Coffs Harbour region were harvested on the same morning, pre-cooled and packed in the same packing house (Figure 1a and b).

A pallet of fruit from each grower was then re-stacked into different pallets and treated with either irradiation, methyl bromide, cold treatment or left untreated (Figure 2).

1. Irradiation

Irradiation treatment was conducted at Steritech's commercial X-ray facility in Melbourne. The minimum irradiation treatment dose was 150 Gy and the correct temperature of the fruit was maintained throughout the handling and irradiation treatment at Steritech and through the handling chain.

2. Methyl bromide fumigation

Fumigation of the blueberry pallet was conducted at a commercial fumigation facility in Melbourne. The fumigation treatment was 32g/m³ at 17°C for 2 hours. After treatment, fruit were de-gassed and cooled before transport.

3. Cold treatment

Cold treatment was conducted at a commercial packing facility. The pallet of fruit was enclosed in a commercial modified atmosphere (MA) bag and treated for 14 days at 1°C.

These three market access treatments were compared to a batch of fruit from the same pallets which remained untreated. After treatment, all fruit were transported under refrigeration to NSW Department of Primary Industries and stored at 5°C and fruit quality was assessed twice a week for up to 3 weeks.



Figure 1a and b. '1111' blueberry fruit from three different growers were harvested on the same morning and packed for treatment and storage. Photo credit: John Golding.

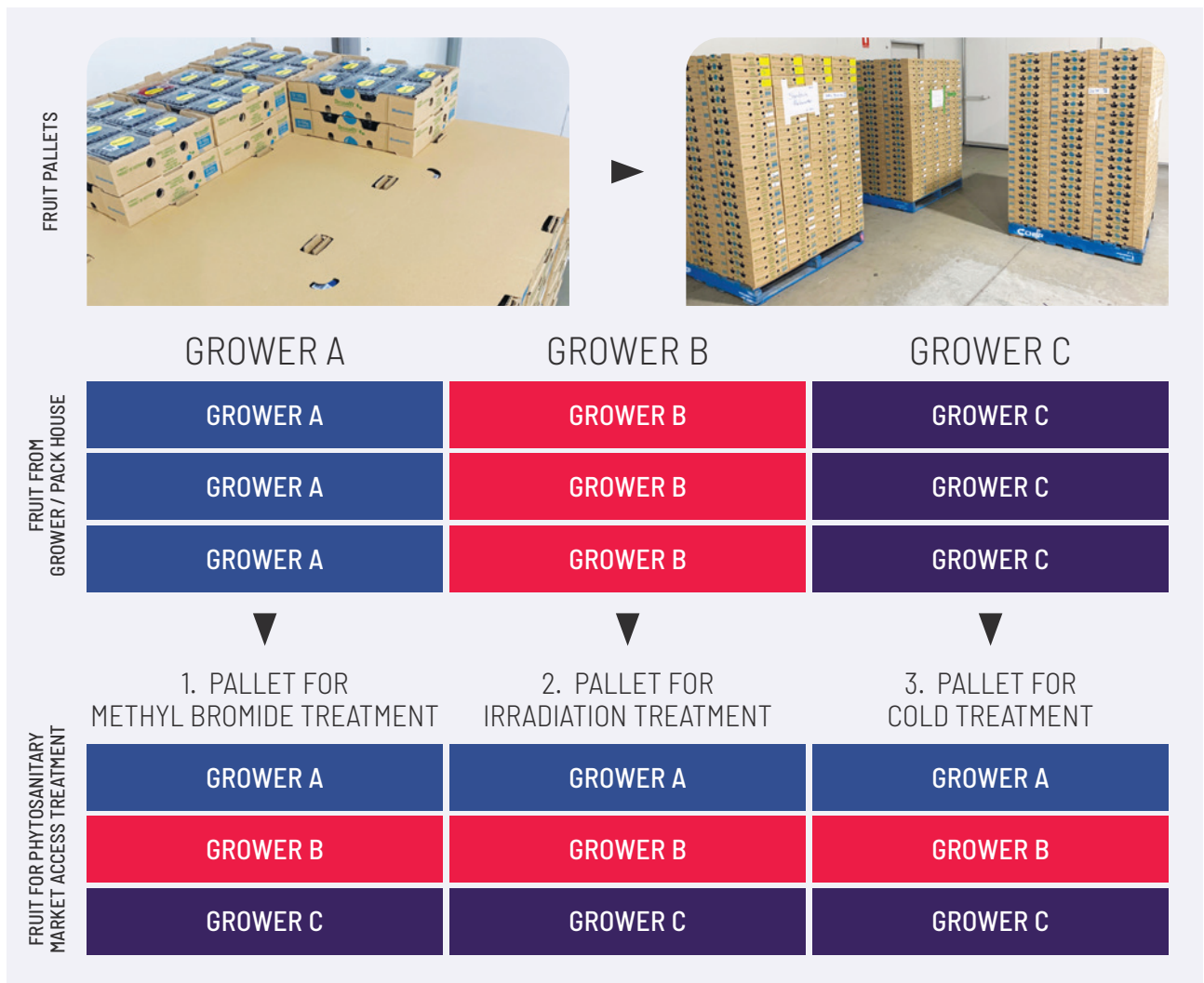


Figure 2. Fruit from three growers was spread evenly across the three treatment protocols.



MOONDARRA BLUEBERRIES

The results showed there were generally no differences in fruit quality between the different market access treatments across the different assessment times. The overall subjective quality of the fruit across the entire storage time was good throughout the trial. Cold treatment resulted in the best quality fruit during storage, but this treatment (3°C under modified atmosphere storage) took 14 days to complete and fruit would not be able to be sold during this time. The other market access treatments were similar in overall acceptability, but the differences changed with different assessment times.

The general appearance of all visual parameters (waxy bloom, fruit shrivel, and subjective fruit colour) were not affected by any market access treatment. There were some differences in firmness detected as measured by the FirmTech instrument (Figure 3a and b) where methyl bromide and irradiation treatment resulted in softer fruit averaged across the entire trial. However, the subjective assessment of firmness (i.e., just gently squeezing with your fingers) was not able to detect these differences.

The development of postharvest decay is a major problem for the marketing of blueberries. In this trial, postharvest rots did not develop in cold storage until after two weeks storage. Postharvest market access treatment had a significant effect on the development of rots, where both irradiation and methyl bromide treatment had higher rots across all assessment times, as compared to the cold treated fruit. For example, after 21 days storage at 5°C , the methyl bromide treated fruit had the highest levels of postharvest rots and the levels in the untreated and irradiation fruit were still high and unacceptable, but the levels of rots in the cold treated fruit were low.

It was interesting to note that there were some grower differences in the development of the postharvest rots. While all three growers had similar agronomic practices on the same cultivar, one grower had consistently lower levels of postharvest rots during storage. This observation is being followed up with the grower.

There was no effect of the different market access treatments on the fruit sugar levels as measured by the soluble solids content (SSC%) which remained high and consistent across the storage trial. In addition, there were no differences in fruit acidity (as measured by titratable acidity, TA) between the different market access treatments.

Blueberry Plants

COMMERCIAL GROWERS

NURSERIES

WHOLESALEERS

HOBBY FARMERS

HAVING SUPPLIED THE INDUSTRY WITH BLUEBERRY PLANTS FOR OVER THIRTY YEARS, WE CAN OFFER A LARGE NUMBER OF VARIETIES INCLUDING *Northern Highbush*, *Southern Highbush* AND *Rabbiteye* TYPES.

Talk to us today about how we can fulfill your requirements on plants@moonblue.com.au

moonblue.com.au



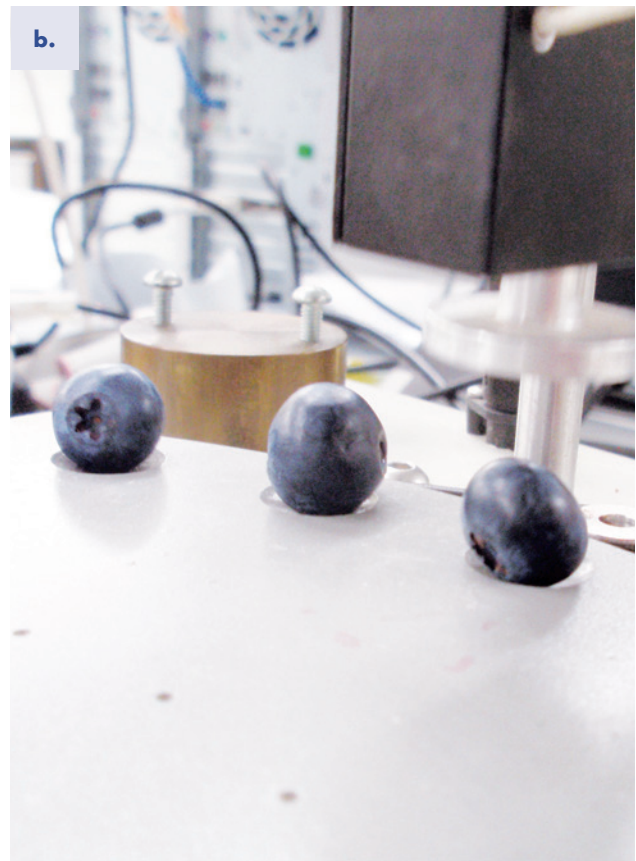


Figure 3a and b. Objective measurement of compression firmness of blueberry fruit using a FirmTech firmness tester at NSW Department of Primary Industries. Photo credit: John Golding.

Conclusions

These results show there were no consistent effects of the market access treatments on '1111' fruit quality in this trial. If air freight is required to meet export markets, both irradiation and methyl bromide treatment had similar effects on fruit quality.

While cold treatment often resulted in higher quality fruit (i.e., less postharvest rots), cold treated fruit must be continuously treated for 14 days and it is not possible to market the fruit before this time. This limits the flexibility of cold treatment for air freight markets, but it allows for marketing after treatment as fruit quality is superior with less rots.

The observation of grower differences in some quality attributes such as postharvest decay development requires more investigation to understand and manage these differences to minimise postharvest decay and optimise quality.

It is also recommended to repeat this trial with different cultivars and growing seasons as fruit quality and fruit response to market access treatments have been known to change between different years and between different cultivars.



Acknowledgements: We sincerely thank the cooperation and collaboration of the local growers, agronomist and packinghouse with this trial. We also thank Melinda Simpson, Blueberry Development Officer, NSW Department of Primary Industries for co-ordinating the trial. This trial is a contribution from the Project: **'Supporting informed horticultural market access treatment decisions' (4-E8O64VH)** which was co-funded by Federal Government through Accessing Premium Markets - Cooperation Activities - Agricultural Trade and Market Access Cooperation (ATMAC) program and NSW Department of Primary Industries.