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Cold chestnuts

Optimising storage conditions for quality and cost

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Applied Horticultural Research

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Introduction & Method

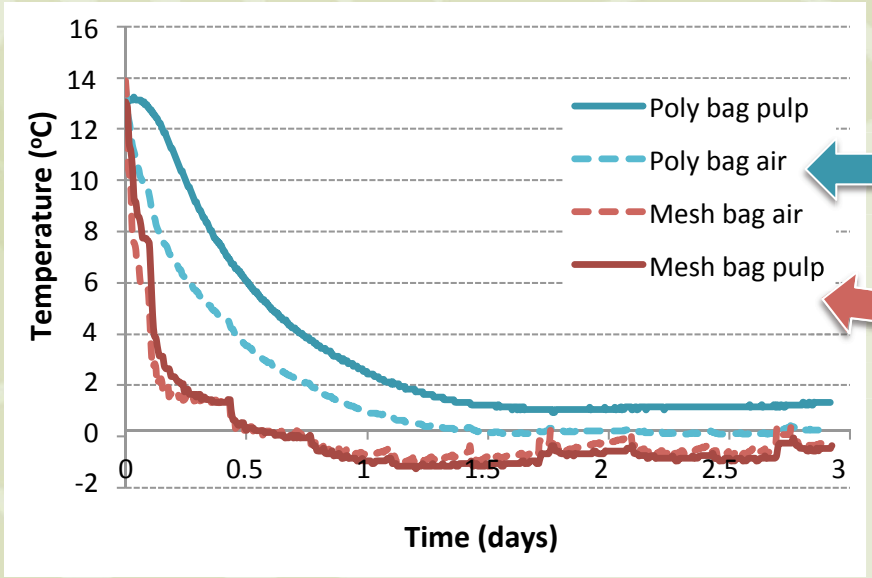
- Australian chestnuts are usually harvested into half tonne plastic or wooden bins. On arrival at the packinghouse chestnuts may be cleaned, sorted and/or dipped in sanitiser before storage for up to 3 months. Many growers simply place bins in coldrooms to cool.
- Bin liners are commonly used to maintain quality while coldrooms are set as low as -3°C.
- In this study we measured cooling rates + quality of chestnuts at small, medium and large operations using;
  - ★ Room cooling
  - ★ Room cooling with ventilation pipes
  - ★ Room cooling in lined bins
  - ★ Hydrocooling
  - ★ Forced air cooling
  - ★ Cooling in packed sacks

Cooling Rates

Small Grower

- Harvested fruit were packed directly into woven polypropylene (PPE) or mesh bags, then placed in the cold room. Air and pulp temperature were monitored inside the bags.

- Air flow through mesh bags was rapid and fruit chilled quickly.
- PPE bags reduced air flow, so fruit cooled more slowly.

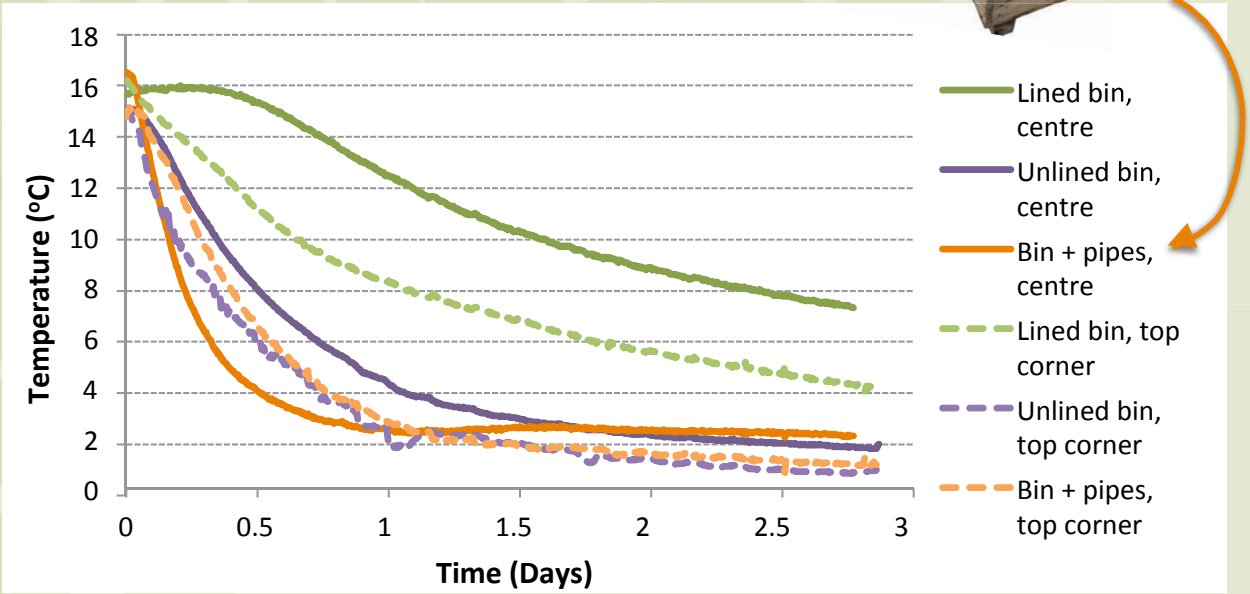


Cooling Rates

Medium Grower

- Harvested fruit were room cooled in a lined wooden bin, an unlined bin and a bin with pipes added for ventilation. Pulp temperature of fruit in the centre of each bin and in a top corner was monitored.

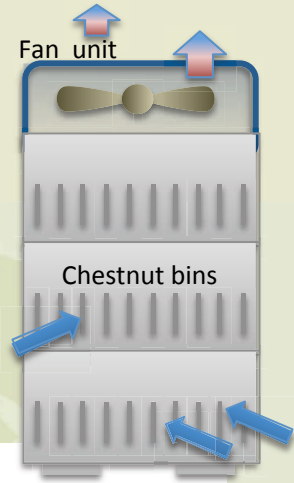
- All fruit in the lined bin cooled extremely slowly.
- Fruit on the top of the unlined bins with/ without pipes cooled at a similar rates
- The pipes greatly improved cooling the centre of the bin.



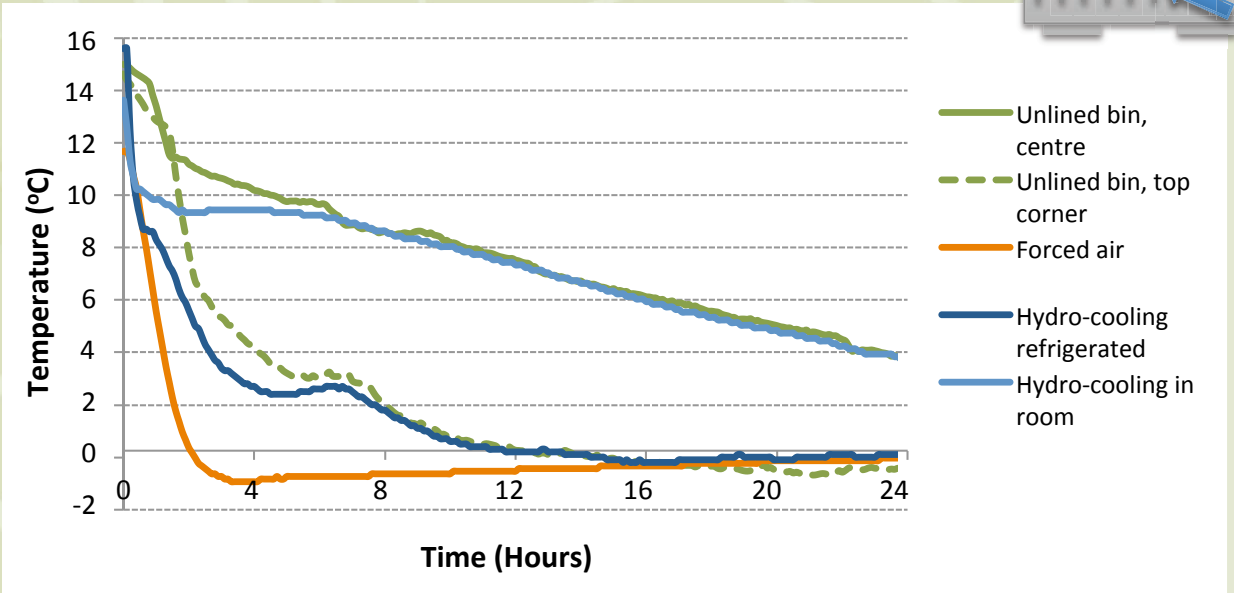
Cooling Rates

Large Grower

- Harvested fruit were; room cooled in a plastic bin; forced air cooled in a stack of 3 bins; hydrocooled in a refrigerated system or hydrocooled using a tank of water in the cold room.
- Hydrocooling was for 30 minutes only, fruit then drained and placed in the cold room. After removal fruit cooled at the same rate as in an unlined bin.
- Forced air cooling (3 hours) followed by static room storage provided rapid cooling.



Forced air cooling system



Summary & Conclusion

Farm	Cooling method	Time to ¾ cool (hours)	Weight loss (avg %)
Small	Packed in PPE bag	20	0.2
	Packed in mesh bag	3.3	1.5
Medium	Lined bin	**139**	0.4
	Unlined wooden bin (centre)	24	0.6
	Unlined wooden bin with ventilation pipes	12	0.7
Large	Unlined plastic bin (centre)	28	1.3
	Hydrocooled in the cold room	35	-0.8 (gain)
	Hydrocooled in refrigerated system	3.5	-1.1 (gain)
	Forced air top bin	**1.7**	0.3
	Forced air middle bin	**1.5**	0.3
	Forced air bottom bin	**1**	0.3

worst

best

Acknowledgements

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