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Managing heat when harvesting ?

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Harvesting Hass during high temperatures

Alec McCarthy

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HAL
Know-how for Horticulture™

The harvesting scenario – in Western Australia

- Current recommendation to not harvest above 30 ℃
- Temperature commonly exceeding 30 ℃ during harvest

- Production increasing – tighter time demands
- Growers ignore recommendation

- WA fruit has a good fruit quality image
- Potential threat to fruit quality and image

The temperature issue on quality

- Perceived or real?
- Impact of high temperature on fruit quality – before, during, after harvest
- Impact of delays in removal of field heat / holding conditions after harvest before cooling

Related issues affecting quality

- Length of storage impact
- Disease pressure
- Dehydration

The investigation

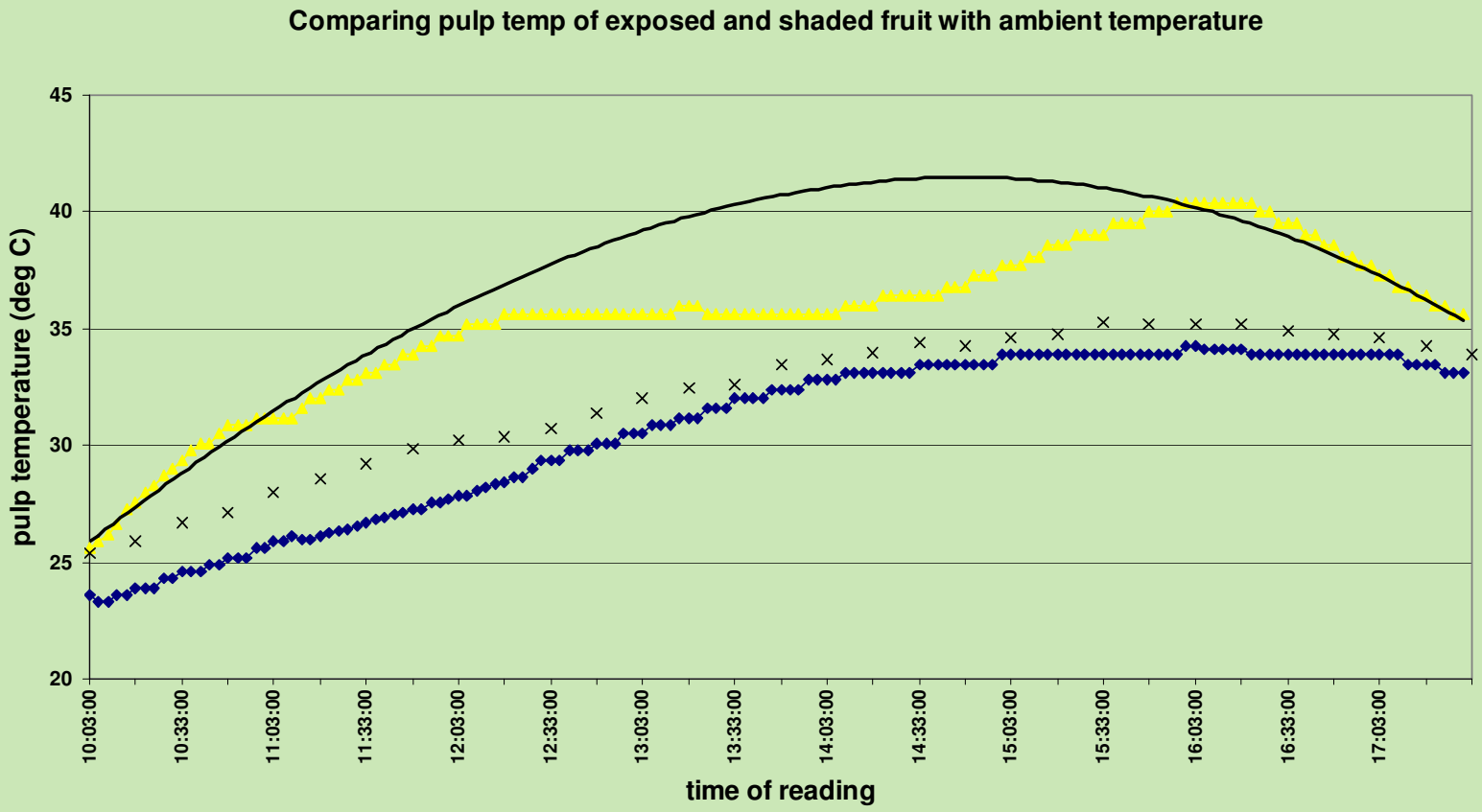
- To determine the impact of harvesting during high temperatures on the post harvest quality of Hass avocados grown under cool Mediterranean conditions in the south west of Western Australia.
- Harvest temperature range 28 – 37 ℃
- Cooling delay of up to 24 hours
- Storage for 14 and 28 days

- 2 years of controlled field trials
- 1 year of commercial verification

- Fruit quality assessed using the 'AvoCare' assessment manual (Woolf et al.)

Temperature logging in the tree

Change in pulp temperature during the day



Exposed fruit (yellow triangles – received some shading during the middle of the day), predicted exposed reading with no shade (solid line), shaded fruit (blue diamonds), ambient (blue cross)

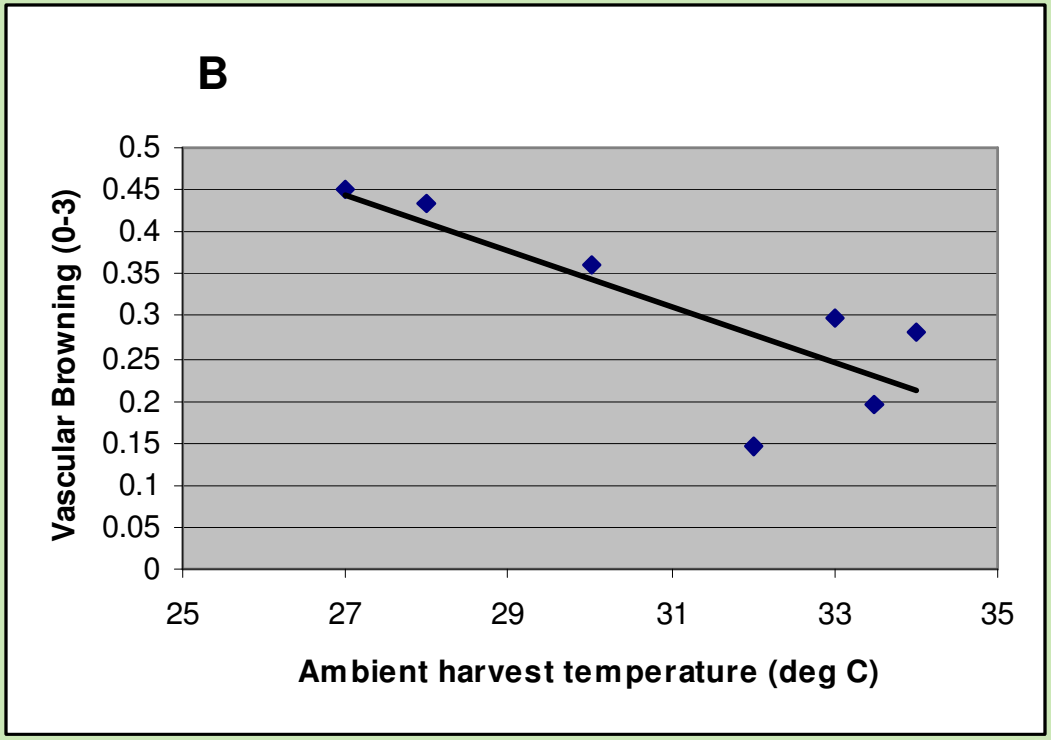
Fresh sunburn, one day of exposure

Effect of heat/direct sun on fruit on the tree - summarised

- Sun exposed fruit's pulp temperature increases well above the 'ambient' temperature, by 5 to 8℃, similar to findings by Woolf et al and Ferguson et al
- Shading will arrest further increase in pulp temperature when fruit is still attached to the tree
- Shaded fruit essentially mirrors the ambient temperature
- Sun exposed fruit's pulp temperature can get over 30℃ by 10:30 am on a hot day, > 35℃, Shaded fruit by 12:30
- Newly exposed fruit is very sensitive to exposure to direct sunlight on hot, dry days

Year 1 results

- A significant linear affect of harvest temperature could not be seen for body rot, skin colour or fruit softness
- A significant favourable linear affect of harvest temperature was displayed for vascular browning



Year 1 results (cont.)

- There was no significant linear impact of the increasing delay into cool storage on the key quality parameters of body rots, vascular browning or stem end rot.

- The storage length did have a significant impact on all the quality parameters

2004 Fruit quality results – storage length

Measurement	Storage period	Mean rating	significance
softness	14 days	5.089	0.027
	28 days	5.636	
Skin colour	14	4.162	<0.001
	28	5.241	
Body rot	14	0.670	0.048
	28	1.104	
Vascular browning	14	0.145	<0.001
	28	1.941	
Diffuse discolouration	14	0.121	<0.001
	28	1.514	
Stem end rot	14	0.016	<0.001
	28	0.355	

Year 2 results

- Several significant impacts were detected for both increasing harvest temperature and the delay into cool storage
- All but one were of a very minor nature that would be hard to pick without statistics, ie, less than a 0.5 shift

- One significant quality deterioration occurred, increasing harvest temperature increased the level of body rot by 0.17 for every 1°C, when subjected to a two hour delay. The 24 hr delay produced body rot levels similar to the highest temperature with a 2 hr delay.

Conclusions

- Other parameters than harvest temperature likely having a greater impact on fruit quality

- Harvesting at temperatures above 30°C is acceptable with minimal impact on fruit quality, provided fruit is:

  - Protected from the elements (direct sun and wind)
  - Field heat removed within 24 hours of harvest
  - Fruit stored at the appropriate temperature for the chosen period of storage

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