Fruit Quality: The Impact of Storage Temperature and Maturity

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Avocado Industry Council Ltd
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Introduction

- Harvest from August until March
- Increasing fruit maturity
- Sensitivity to chilling injury thought to decrease over the harvest season (Toerien, 1986)
- Low temperatures and long storage duartion increases rots and chilling injury (Hopkirk et al, 1994)

Aim

Over the export harvest season:

- To define the chilling injury response to temperature and time in storage
- To characterise the response of fruit quality parameters to temperature

Materials and Methods

Trial	Storage temperature	Fruit age
Harvest	Early, Mid, Late Sept, Nov, Feb	Early, Mid, Late Sept, Nov, Jan
Temperature (°C)	2-7.5, 20	4, 20
Duration (days)	0 and 28	0, 7, 14, 21, 28, 35, 42
	Ripened at 20°C, 60% RH	

Materials and Methods

- Three orchards in the Bay of Plenty
- Dry matter average of a 20 fruit sample
- Fruit assessment to AIC manual

Disorders:

Green Fruit	Ripe fruit (cut surface, inside skin)
Discrete patches	Stem end rot
	Diffuse flesh discolouration
	Body rot

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Results and Discussion

Non-Stored Fruit

Orchard	Harvest	Dry Matter %	Time to ripen days	Stem end rot Inc[a] %	Body rots Inc %
1	Sept	23.3	16.5	6.0	16.0
	Nov	27.7	16.8	2.0	19.0
	Feb	32.7	10.0	5.0	26.0
2	Sept	25.0	15.0	11.0	17.0
	Nov	30.3	12.0	3.0	34.0
	Feb	36.2	8.0	0.0	25.0
3	Sept	24.2	17.0	10.0	16.0
	Nov	27.1	15.0	9.0	42.0
	Feb	34.0	8.7	1.0	43.0

Results and Discussion

Cool-Stored Fruit

Temperature	Harvest	Time to ripen	Stem end rot	Body rot
°C		days	Inc[a]	Inc
2	Sept	8.9	19.1	22.1
	Nov	7.7	8.7	21.7
	Feb	4.9	6.3	42.7
3	Sept	10.4	26.3	20.3
4	Nov	6.6	8.0	16.0
	Feb	3.9	5.3	39.0
5	Sept	8.8	12.3	7.3
	Nov	4.9	9.0	16.0
	Feb	3.1	5.0	45.0
7.5	Sept	4.3	5.7	10.0
	Nov	3.1	2.0	5.7
	Feb	1.2	7.0	47.3

Results and Discussion

Cool-Stored Fruit

Rot expression in relation to ripening time changed with harvest and increasing dry matter

September harvest	slow ripening most stem end rot least body rot
February harvest	fast ripening least stem end rot most body rot

Results and Discussion

Cool-Stored Fruit

Different expression of stem end rot and body rot at low temperatures may be related to:

fungal spore survival

fungal growth rates

(Everett, 1998)

Results and Discussion

An inconsistent relationship between ripening time and rot expression suggests that fruit maturity factors can override the influence of ripening time.

Results and Discussion

Chilling Injury

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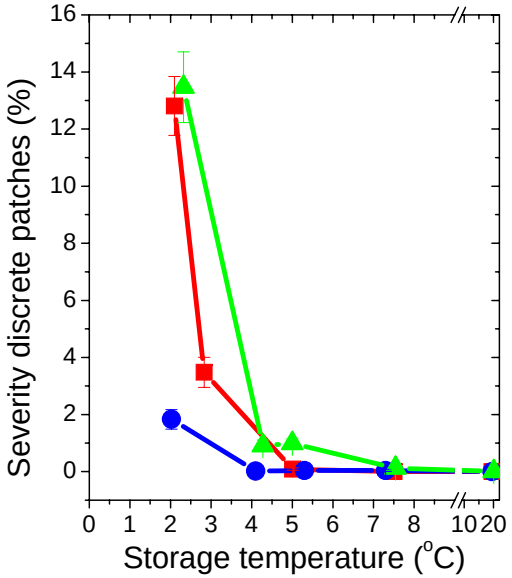

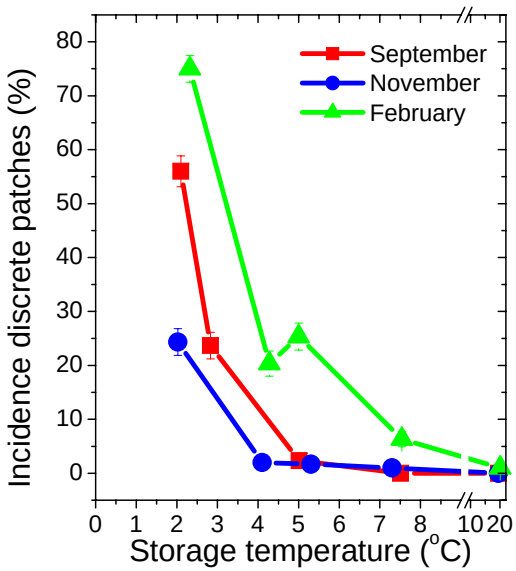

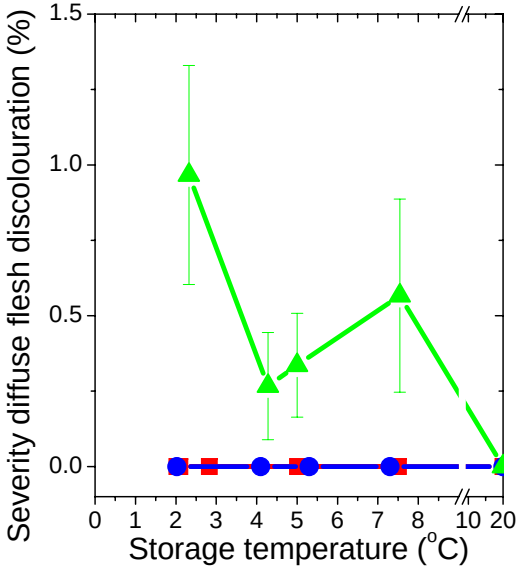

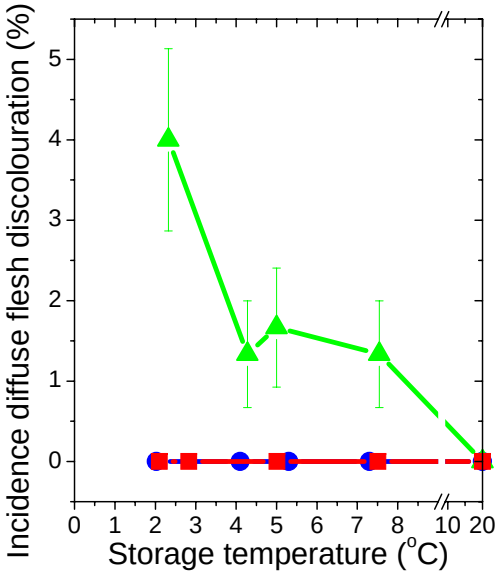

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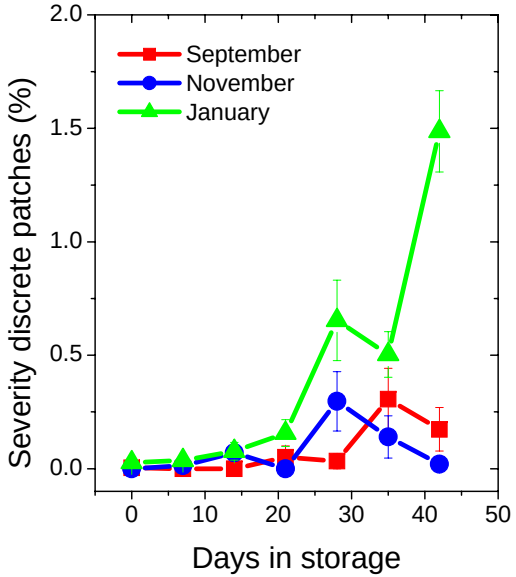

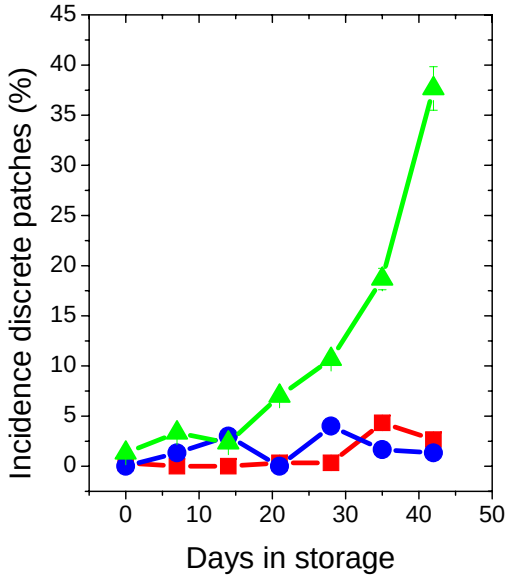

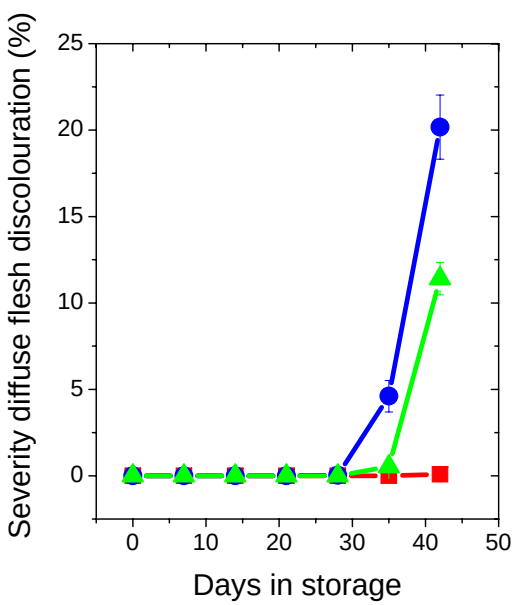

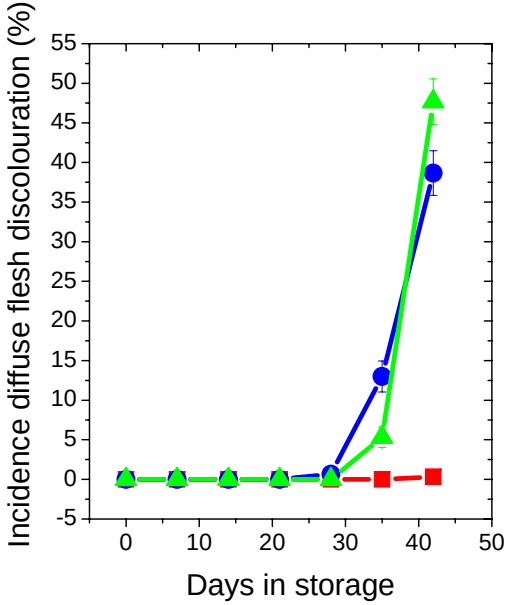

Results and Discussion

Chilling injury

These results contrast decreased chilling injury at later harvests in South Africa (Toerien, 1986)

For NZ Hass avocados storage temperature and duration could be adjusted in relation to harvest maturity over the export harvest season for optimal fruit quality

Conclusions

- Chilling injury sensitivity and rot expression changes with harvest
- Differential effect with harvest of ripening time on rot expression
- Storage duration should not exceed 28 days
- To isolate ripening factors, such as maturity, from ripening time the relationship between rot development and ripening time needs to be further defined

Conclusions

For optimum quality storage temperature could be adjusted for harvest time

For example:

Time in harvest season	Storage Temperature
Early (September)	5°C
Mid (November)	4°C
Late (January, February)	7°C

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