Optimization of RLOS protocol for superficial scald prevention on 'Packham's Triumph' pears

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Introduction

- What non-chemical technologies are currently available to the South African pear industry:
  - DCA-CF (dynamic controlled atmosphere-chlorophyll fluorescence)
  - DCA-CF + 1-MCP (before packaging)
  - ILOS (initial low oxygen stress) + CA

What is RLOS

- RLOS – repeated cycles of low oxygen stress with ethanol monitoring
- LOS followed by ULO phase
- Ethanol measured after each stress period
- Stress applied every 21 days

RLOS

Stress periods according to RLOS protocol

	FUJI	RED DELICIOUS	GRANNY	GALA	P.LADY / MODI'	MORGEN / R.BEAUTY	CONF/ ABATE	PT
O_2%	CO_2%							
0.9-1.1	0.7-0.9							
0.5-0.7		0.8-0.9						
0.5-0.7			0.8-0.9					
0.6-0.8				0.9-1.0				
0.5-0.7					0.6-0.7			
0.5-0.6								0.6-0.8
0.5-0.7							0.4-0.7	

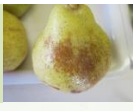
FCE: Swinglos protocol

RLOS

Maximum level of ethanol suggested in apples and pears during stress periods

CULTIVAR	ETHANOL (mg/L juice)
Braeburn	200-250
Fuji	70-100
Gala	50-70
Golden Delicious	70-100
Granny Smith	70-100
Jonagold	50-70
Morgenduft	70-100
Pink Lady	50-70
Red Delicious	300-400
Packham's Triumph	**100-150**

Objectives



- Repeated low oxygen stress (RLOS) can prevent superficial scald on PT during long term storage (10 months)
- Certain seasons the alcohol build-up during stress periods is higher than prescribed maximum of 100-150ppm – off tastes
- Aim
  - to optimize the RLOS protocol to control superficial scald on PT

Materials and Methods

- Optimum harvested PT from Grabouw (2017)
- Treatments
  - RLOS + ULO (0.9% O_2 + 0.8% CO_2)
  - RLOS + CA (1.5% O_2 + 2.5% CO_2)
  - RA
- Storage temperature: -0.5°C
- Storage time:
  - 2 months (min stress period: 1, max stress period: 2)
  - 4 months (min stress period: 1, max stress period: 4)
  - 6 months (min stress period: 1, max stress period: 6)
  - 8 months (min stress period: 1, max stress period: 8)
  - 10 months (min stress period: 1, max stress period: 9)
- 6wk shipping and handling period plus 7 days at 20°C

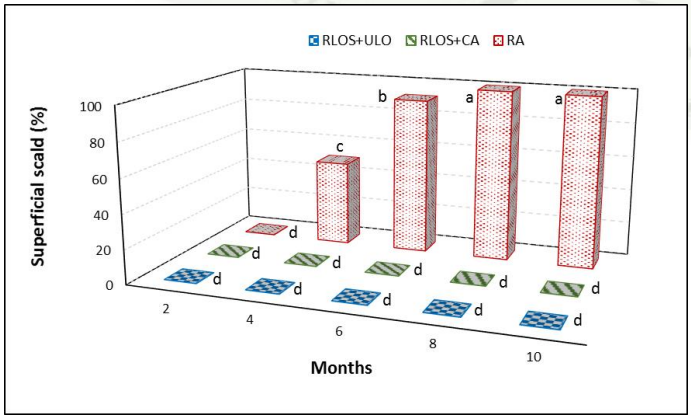
Results and Discussion

Alcohol concentration (ppm) measured with an alcoholmeter after stress periods

Treatment	Stress 1	Stress 2	Stress 3	Stress 4	Stress 5	Stress 6	Stress 7	Stress 8	Stress 9
RLOS + ULO	195	225	243	403	90	119	99	783	205
RLOS + CA	72	102	97	37	30	30	37	106	124
RA	7	10	7	14	6	28	44	27	90

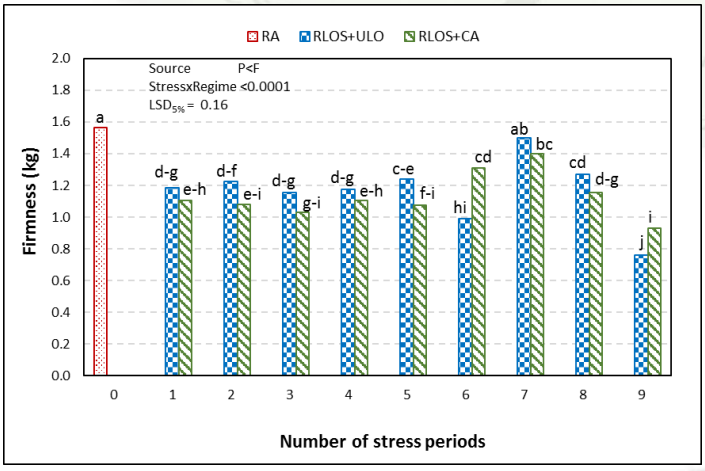
Results and Discussion

Superficial scald development after shelf-life



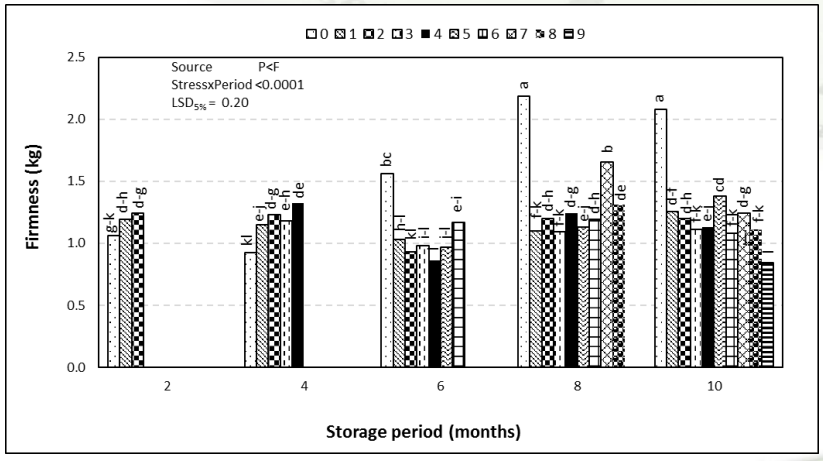
Results and Discussion

Firmness after shelf-life



Results and Discussion

Firmness after shelf-life

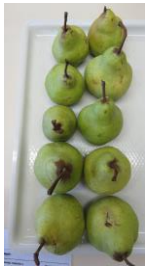


RLOS + ULO


Stress 1


Stress 3


Stress 5


Stress 7


Stress 9

RLOS + CA

Conclusions

- One stress period of 10 days (0.5-0.6% O_2) was effective to prevent superficial scald over long term storage (10 months)
- High alcohol concentrations after RLOS+ULO did not result in off-tastes
- Alternative if no DCA-CF of DCA-RQ facilities are available

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