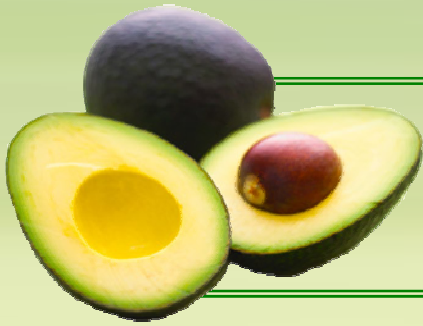


Addressing the Postharvest Vascular Staining Disorder of the 'Maluma' Avocado Fruit Cultivar

S.D. Mhlophe, D. Lemmer and F.J. Kruger

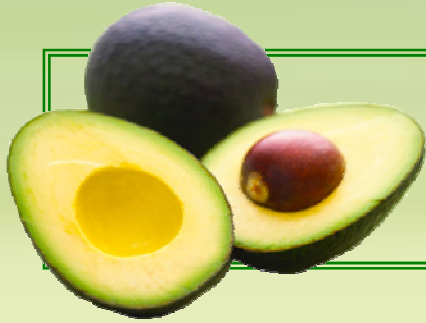
Agricultural Research Council-
Institute for Tropical and Sub-tropical Crops





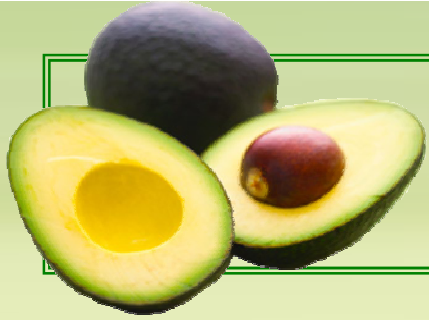
BACKGROUND

- ‘Maluma’: Early ‘Hass’-like cv. from Limpopo province
- Compact trees & large fruit compared to ‘Hass’ avocado fruit
- Released with full export cv status in SA from Allesbeste nursery
- Ha planted & exports since 2006



BACKGROUND....

- Problems: Soft landings, grey pulp & red vascular staining
- Mid 2010: ARC requested by SAAGA to investigate 'Maluma' problems
- Preliminary investigations indicated VS as most important
- Soft landings & Grey pulp addressed by good postharvest practices

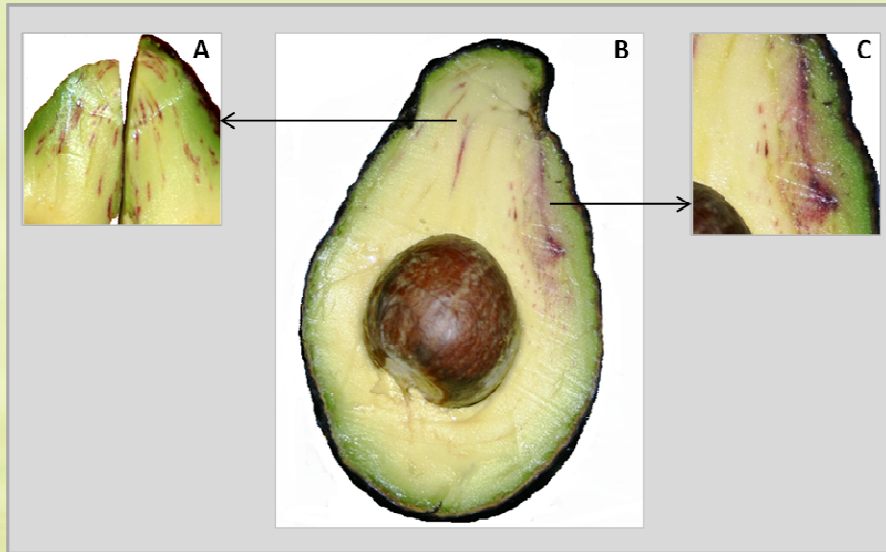


BACKGROUND....

- VS is confined to the 'Maluma' cv. (rarely in 'Hass')
- This presentation only addresses the VS disorder in SA focusing on 'Maluma'



BACKGROUND.....



- VS appears as dark red speckles/streaks inside the vascular tissue

- Prominent in the outer ring & less obvious in the inner ring of vascular bundles



BACKGROUND.....

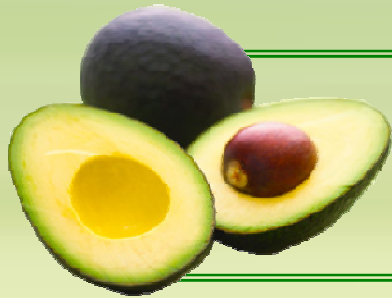
- VS in stored soft 'Maluma' fruit is amplified
- Reason: red pigment turns dark when fruit is stored
- Pigment may diffuse into pulp





BACKGROUND.....

- 2011 season, trials were performed in the Nelspruit area
- The project was designed to establish the causes & to formulate appropriate remedial recommendations.



BACKGROUND.....

- The study consisted of 2 experiments

Experiment 1: Longitudinal survey in 3 locations in the Nelspruit region

Experiment 2: SmartFresh TM(SF), Storage temperature, Controlled atmosphere (CA) & Regular atmosphere (RA)

EXPERIMENT 1

Orchard susceptibility

AIMS

1. Establish whether certain orchards are more/less susceptible to VS disorder
2. Establish the minimum/maximum maturity cut-off point for harvesting 'Maluma'

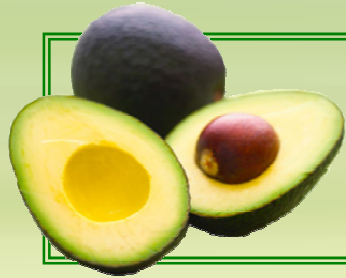


MATERIAL AND METHODS

Experiment 1

Sample collection

- **Location:** 3 'Maluma' orchards: **Avocado Valley, Bergendal & Schagen (Mickey farm)** (3-5 yrs)
- **Sampling:** 30 fruit (count 20) from 2 sample plots on 2 weeks basis from March-June 2011
- **Transportation:** ARC-ITSC postharvest lab



MATERIAL AND METHODS.....

Evaluations:

- Included maturity, ripeness, VS incidence & intensity

Maturity - 10 fruits (oven-drying method), % Moisture/Dry mass content

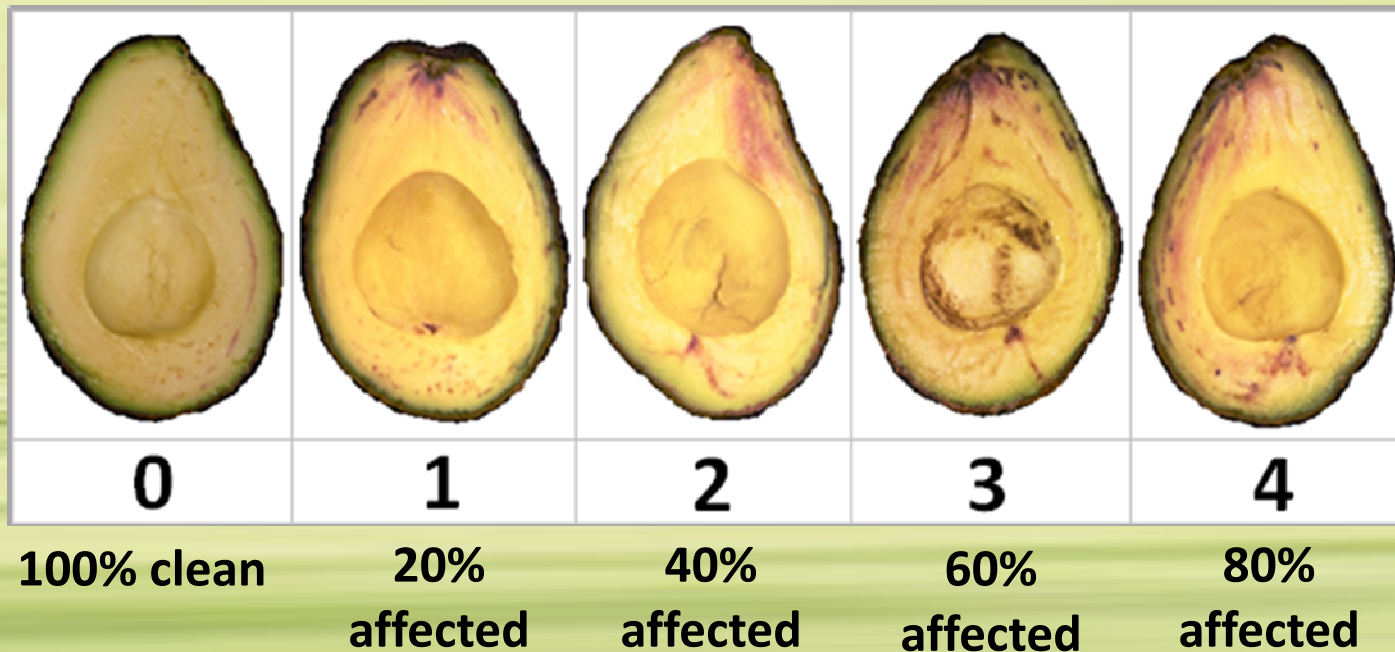
Ripeness - gentle hand squeeze assess firmness on a scale of 1-5. A value of 4 corresponded with our definition of fully ripe

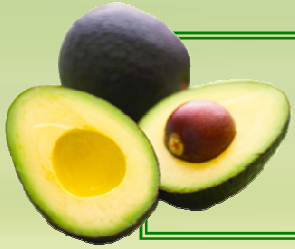
MATERIAL AND METHODS.....

VS incidence & intensity

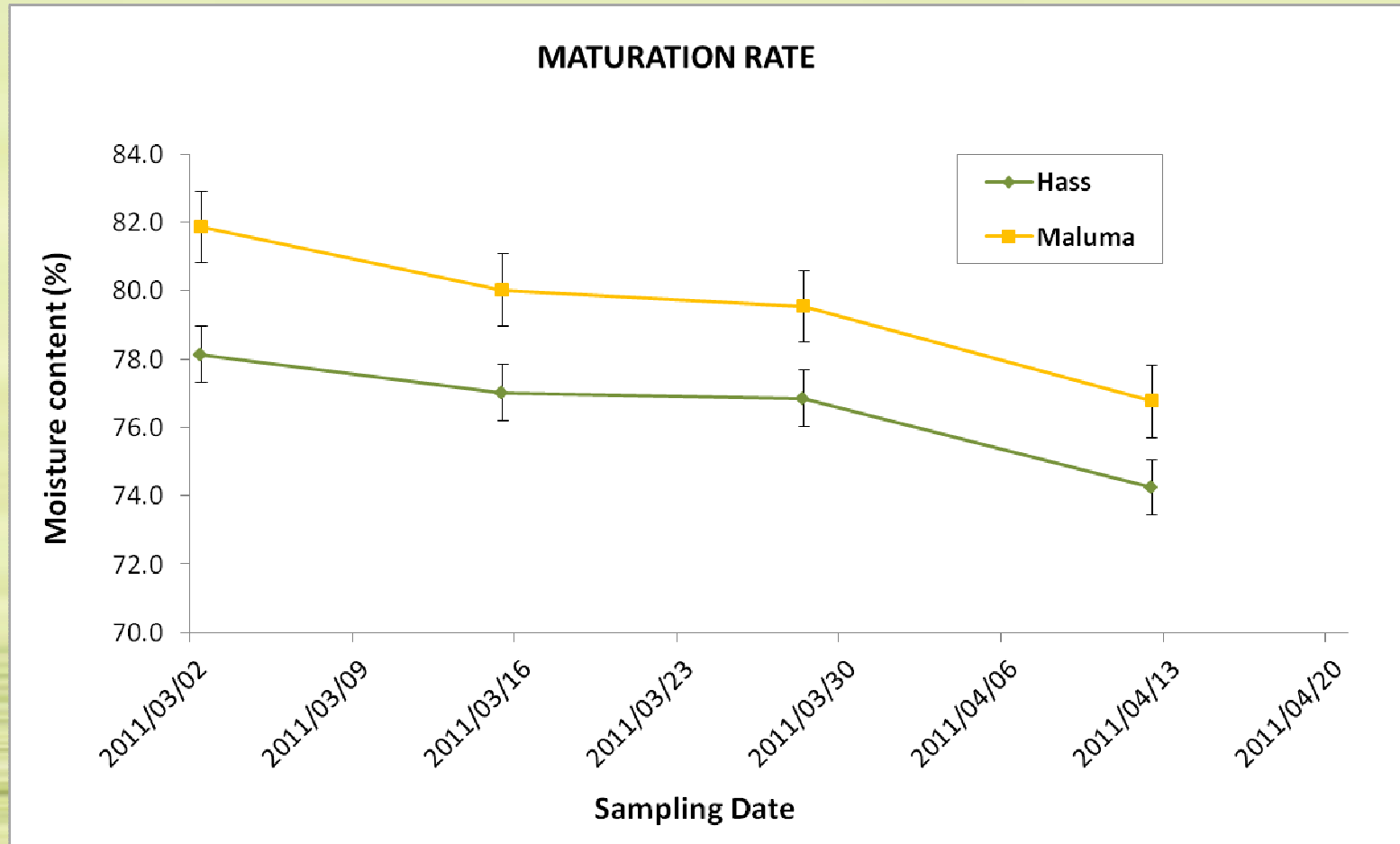
VS incidence - % Fruit with VS was recorded

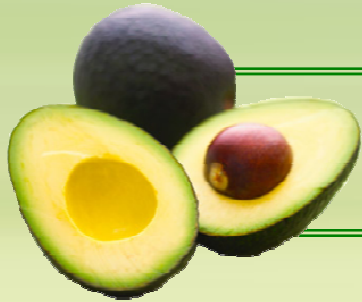
VS intensity - rated on a scale of 0-5 (0: 100%,
5:100% affected)



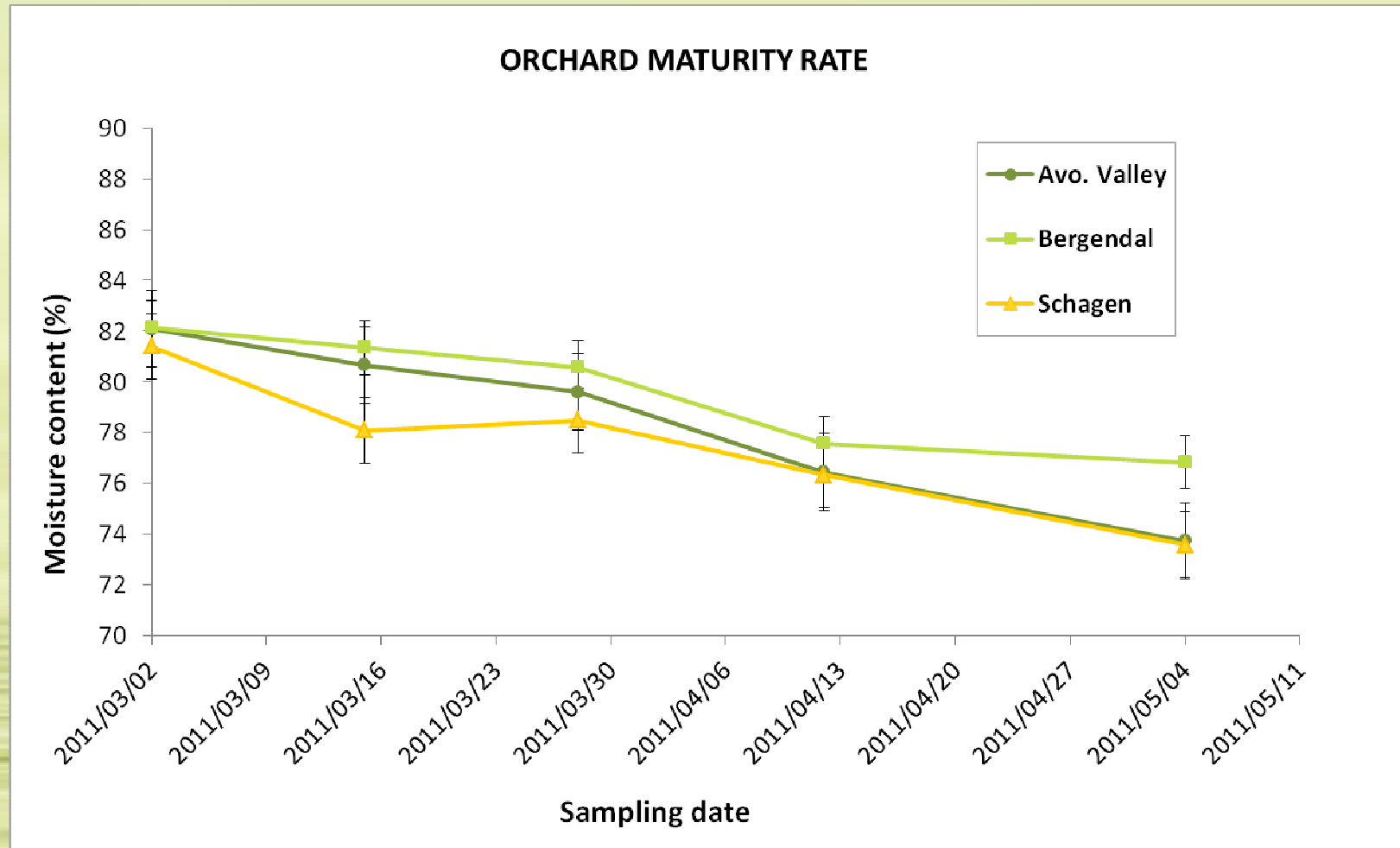


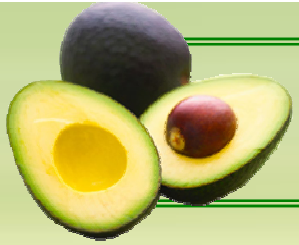
RESULTS: Maturity rate ...



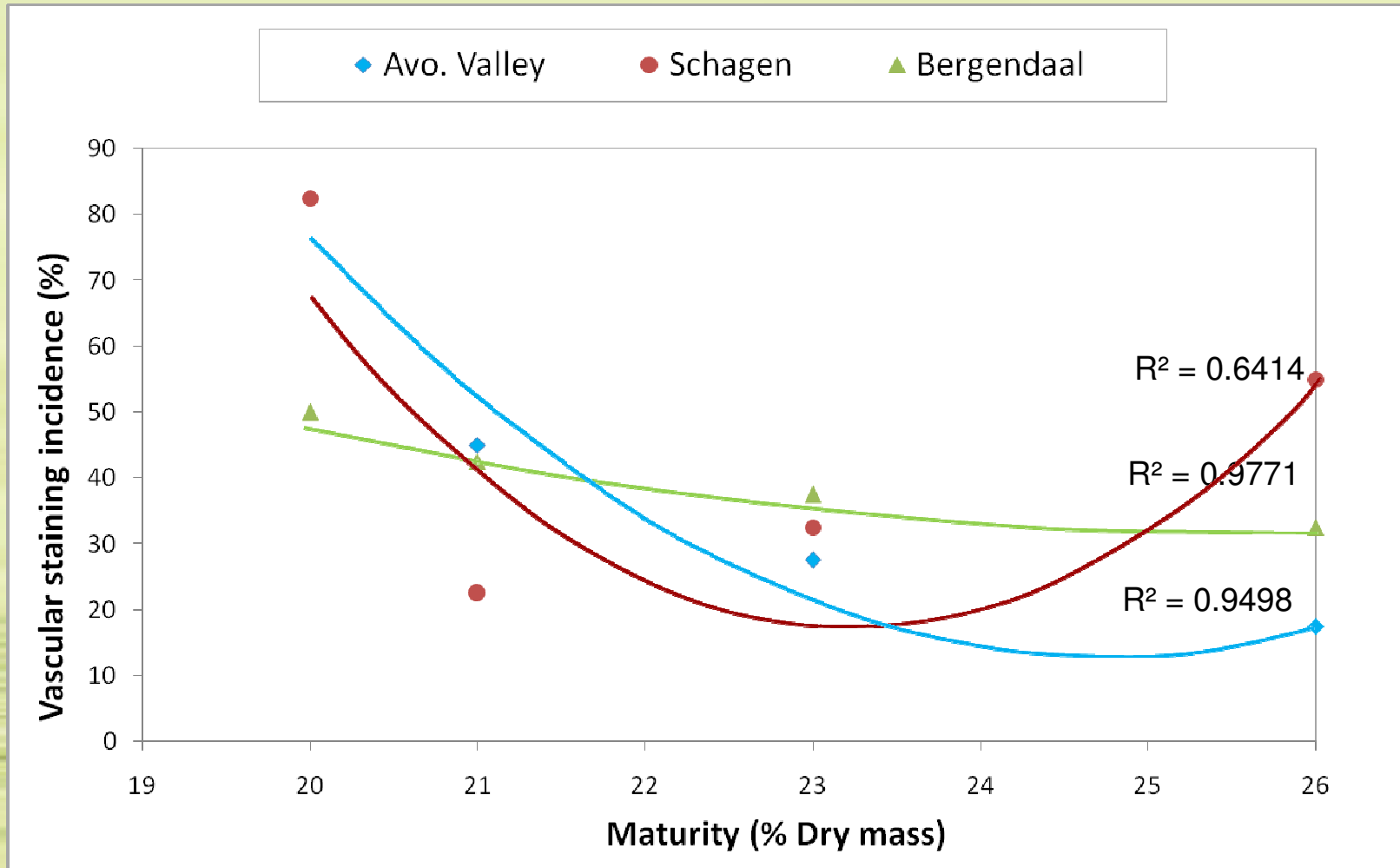


RESULTS: Maturity rate

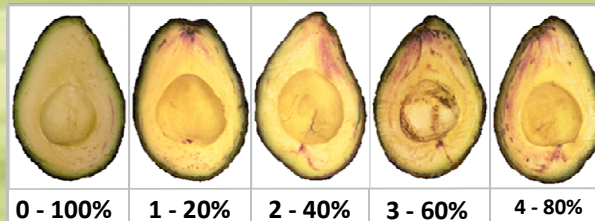
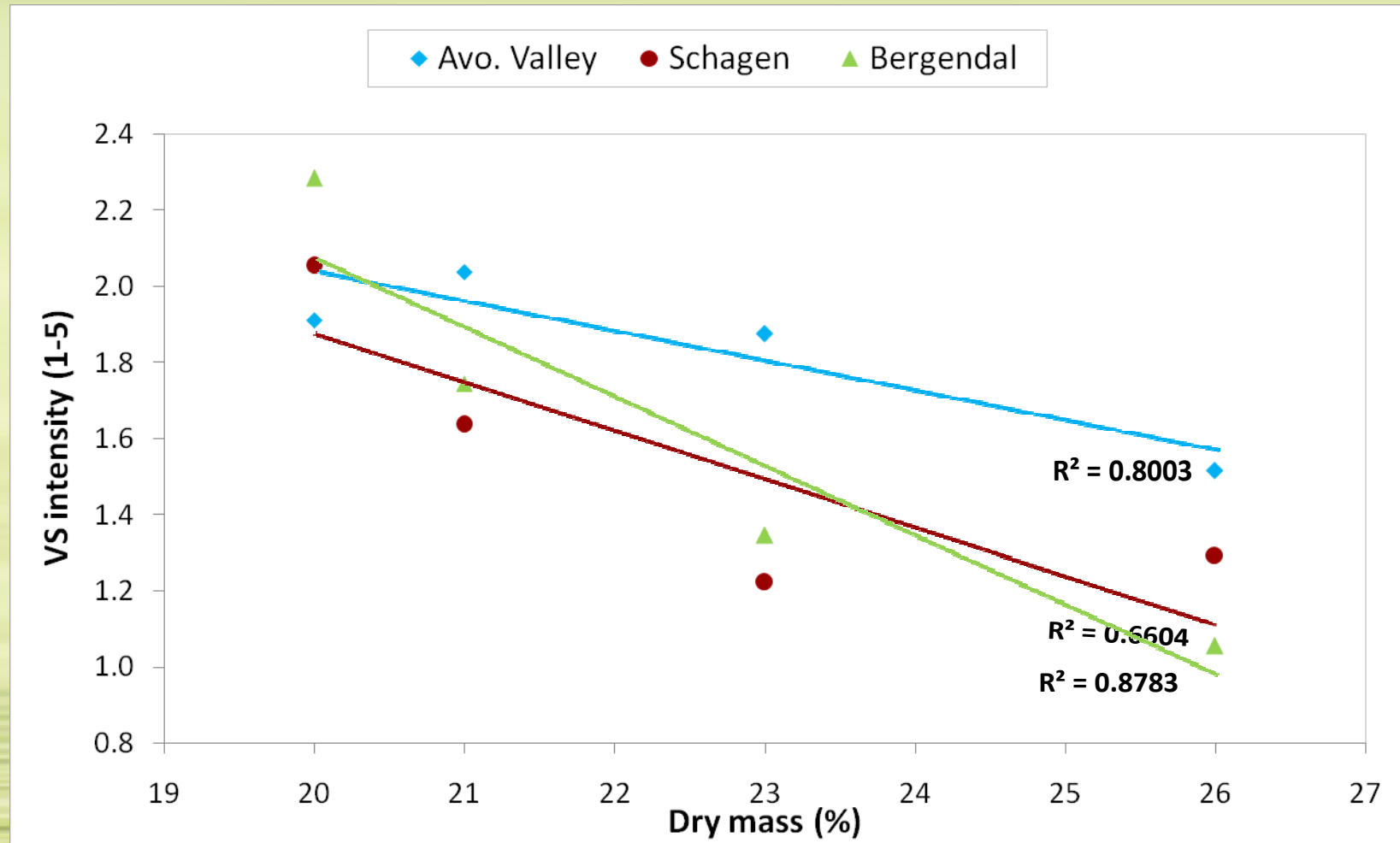




RESULTS: VS Incidence



RESULTS: VS Intensity Positives only



SUMMARY: Experiment 1

- Correlation between VS & maturity
- VS incidence & intensity decreased as fruit matured
- VS was low at maturity levels between 23-26% DMC (74-77% MC)
- Problem addressed by minimum maturity cut-off point



EXPERIMENT 2

SF application & CA storage

AIM

Determine the effect of SF & CA on VS incidence and intensity of 'Maluma' fruit stored under cold temperatures

MATERIAL AND METHODS

Experiment 2

- **Samples:** Pack-house in the Nelspruit region
- **Treatments:** 4 box reps (count 18), SF (300 ppb), 16 hrs at 6 °C, CA, RA
- **Storage:** 4, 6 & 8 °C for 30 days
- **Ripening:** After storage at 21 °C
- **Evaluation:** VS incidence & intensity



RESULTS: VS incidence & intensity

Treatment	Storage temperature (%)	Incidence (%)	Intensity all (1-5)	Intensity positives (1-5)
RA	4	65.3 a ^(x)	1.3 a	2.0 ab
CA	4	34.7 b	0.5 ab	1.4 abc
SF	4	23.6 c	0.3 b	1.1 c
RA	6	58.3 a	1.1 a	1.8 ab
CA	6	33.3 b	0.5 ab	1.4 abc
SF	6	22.2 c	0.2 b	1.0 c
RA	8	69.4 a	1.5 a	2.2 a
CA	8	43.1 b	0.8 ab	1.8 abc
SF	8	30.6 c	0.4 b	1.2 bc

(X) Means in columns followed by the same letters are not significantly different at 5% level of significance.



SUMMARY: Experiment 2

- Storage under CA reduced the VS disorder
- Pre-storage treatments with the ethylene inhibitor (SF: 300 ppb) substantially reduced VS incidence & intensity
- Storage temperature had no influence on the reduction of the VS disorder



CONCLUSIONS

Experiment 1

Aim 1: Determine whether certain orchards are more/less susceptible to the VS disorder

- VS incidence & intensity decreased with maturity and differed in each orchard

Aim 2: Determine the min/max maturity cut-off point for harvesting 'Maluma'

- Recommended min/max harvest maturity is between 23% and 26 % DMC (74-77% MC)



CONCLUSIONS

Experiment 2

Aim: Determine the effect of SF & CA on VS disorder of 'Maluma' avocado fruit

- CA significantly reduced the VS incidence & intensity (~40%)
- SF (300 ppb) effectively reduced VS incidence & intensity (~60%)
- Storage temperature did not play a role in reducing the VS incidence and intensity



THANK YOU!!!!

ACKNOWLEDGEMENTS

- ARC & SAAGA – Funding
- Maluma' Growers Forum - contributions
- Nelpruit producers - participation

1. Avocado Valley

2. Bergendal

3. Mickey Farm (Schagen)

- Mr Jan M. Ntandane – Technical assistance



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- **Arpaia, M.L. 2006.** Avocado postharvest quality. Continuing Project: year 7. Proc. Cal. Avo. Research Sym, University of Cal, Riverside 4 Nov. 143-155.
- **Ernst, A.A. 2011.** Interaction of storage, ethylene and ethylene inhibitors on post-harvest quality of 'Maluma. Proc VII World Avo Congress, Cairns, Au. 5-9 Sept.

