Evaluation of alternative spray programs for the control of Pre- and Post-harvest diseases on Fuerte and Hass in South Africa

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Introduction

- Avocados are mostly grown in sub-tropical areas of South Africa
  - High summer rainfall (800-1300mm p/a)
- Climate favours development of various pre and post harvest diseases:
    - *Pseudocercospora purpurea* (Cercospora spot)
    - *Colletotrichum gloeosporioides* (Pepper spot &Anthracnose)
    - *Botryosphaeriacea* sp (Stem end rot)
- Both Hass and Fuerte (green skin) are affected by these diseases (Fuerte> Hass)

Introduction

- High volumes of copper-based fungicides are sprayed during the wet season (Oct to Feb)
- Concern over the sustainability of continuous use of copper fungicides
- Export focused market with 65-70% of our fruit going to EU and UK:
  - From 1 January 2019, total application of maximum 28 kg of copper per hectare over a period of 7 years (2019-2025) = 4 kg per hectare per year (REGULATION (EU) 2018/1981)
  - Azoxystrobin was registered but EU MRLs was decreased from 0.5 to 0.01mg/kg in 2015, lead to the product being withdrawn for use on Avocado.

Spray programmes in SA

- Timing and number of sprays depend on cultivar & disease pressure (Fuerte x 4; Hass x 2)
- Volume applied is calculated to suit orchards:
  - size of trees, planting density & disease pressure
- Most used fungicide : Copper oxychloride WP (50% Cu)







Methods

- Trials were conducted on Westfalia Estate on both Hass and Fuerte. Treatments were randomised and applied with mist-blowers / handguns.
- Fruit were evaluated for diseases and disorders at Harvest and after 28 days of cold storage (5,5°C) using a 0 to 3 severity rating scale

Aim

- Reduce the amount of copper applied to our orchards by evaluating alternative products for control of pre- and post –harvest diseases


DEFENDER 250 EC

Reg. No.: L 8471 Act /Wet No. 36 of/van 1947

An emulsifiable concentrate, systemic fungicide for the control of the diseases mentioned on crops as listed.

'n Emulgeerbare konsentraat, sistemiese swamdoder vir die beheer van genoemde siektes op gewasse soos aangedui.

FRAC FUNGICIDE GROUP CODE:	3	FRAC SWAMDODERGROEP KODE:

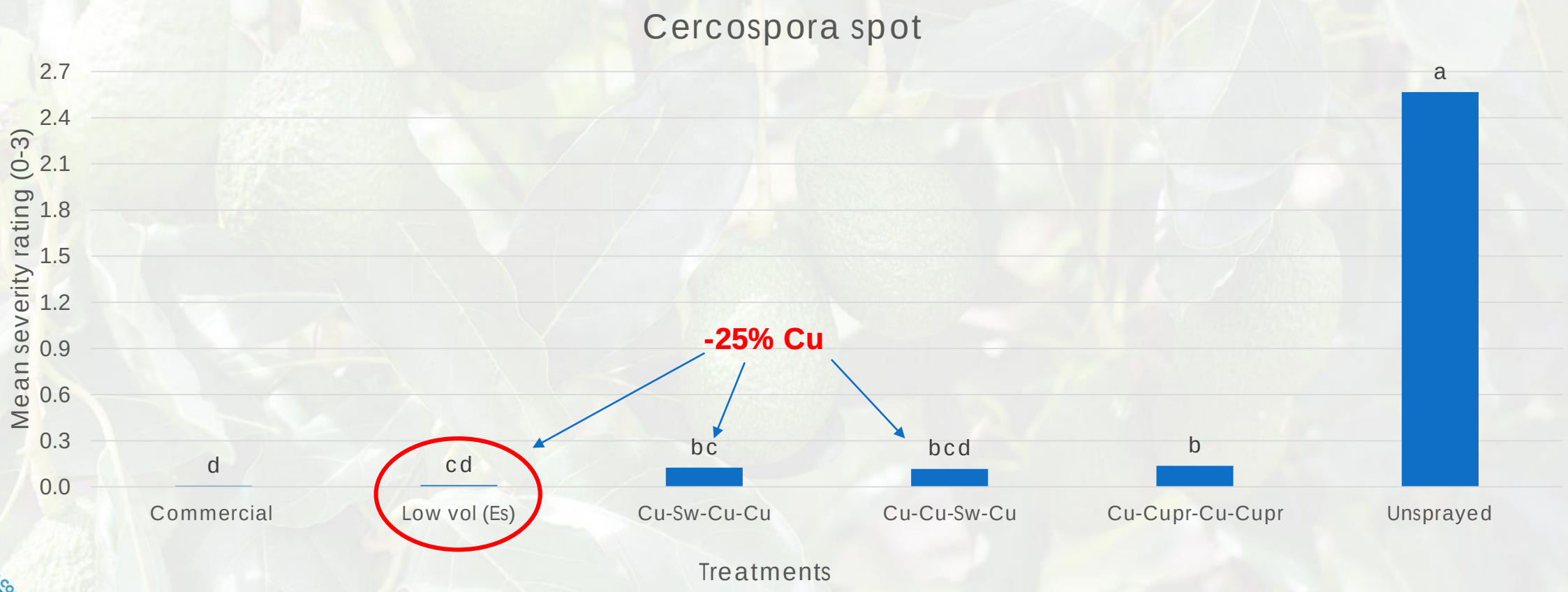
ACTIVE INGREDIENT/AKTIEWE BESTANDDEEL:
Difenoconazole (triazole) / Difenokonasool (triasool) ..... 250 g/l

2020-2021 season

- Trial 1: Fuerte mist-blowers (4500L/ha)

Treatment		Active ingredient / rate	Dates	Cu kg/ ha / yr
1	Commercial control, Coprox	Copper oxychloride @ 3g/L	Oct, Nov, Dec, Jan	**27kg**
2	Low volume Electrostatic, Coprox Super	Copper oxychloride @ 10g/L	Oct, Nov, Dec, Jan	**20kg**
3	Coprox, Switch 2nd spray, Cu-Sw-Cu-Cu	Copper oxychloride @ 3g/L Cyprodinil, fludioxonil @ 0,2g/L	Oct, Nov, Dec, Jan	**20,3kg**
4	Coprox, Switch 3rd spray Cu-Cu-Sw-Cu	Copper oxychloride @ 3g/L Cyprodinil, fludioxonil @ 0,2g/L	Oct, Nov, Dec, Jan	**20,3kg**
5	Coprox x2, Cuperdem x2 Cu-Cupr-Cu-Cupr	Copper oxychloride @ 3g/L Copper heptagluconate @ 3ml/L	Oct, Nov, Dec, Jan	**15,1kg**
6	Untreated	none	-	-

Trial 1: Fuerte Results



Trial 1: Fuerte Results

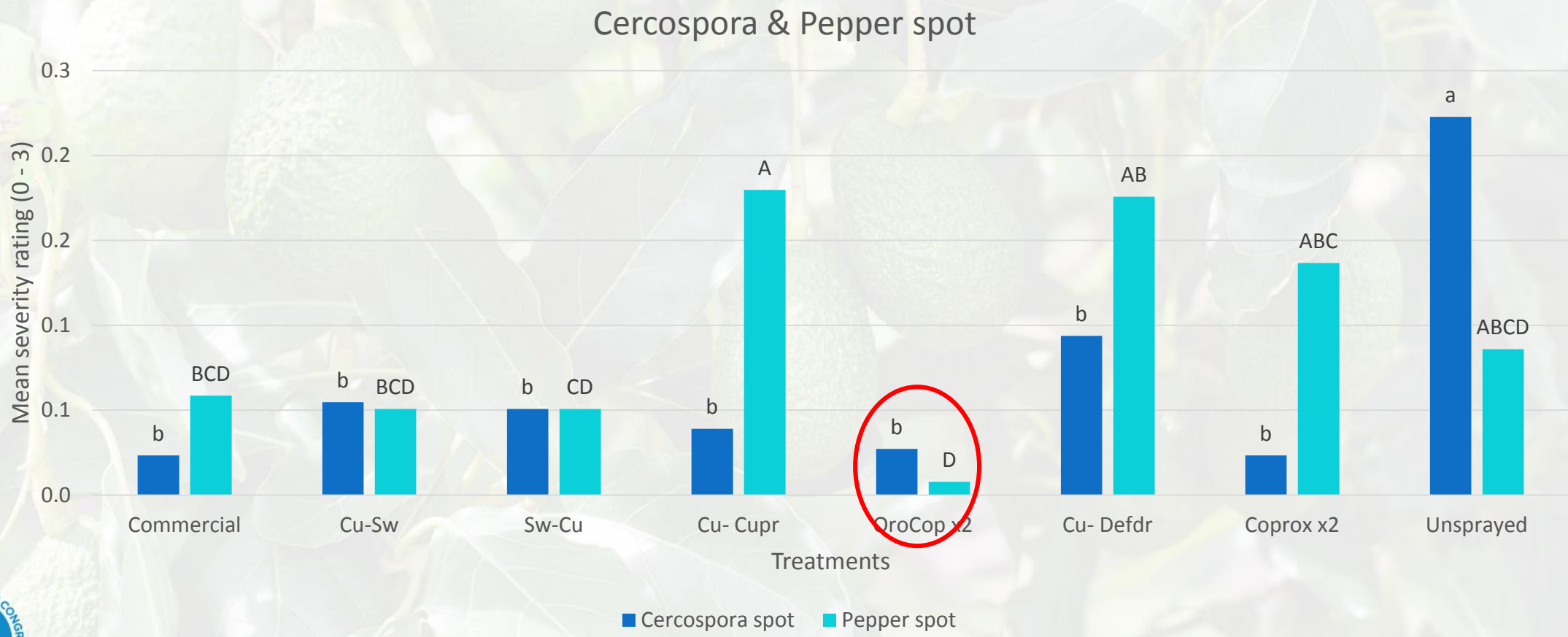
- All treatments reduced Cercospora spot, with no significant differences between Electrostatic mist-blower & conventional
- Both Switch and Cuperdem have potential when used in a programme with Coprox and reduced amount of copper applied by 25% and 45%
- Very low incidence of post harvest disease during the 2021 season
  - No significant differences were detected between treatments

2020-2021season

- Trial 2: Hass ES mist-blower (1000L/ha)

Treatment		Active ingredient / rate	Dates	Cu kg/ ha / yr
1	Commercial control, Nordox - Coprox	Cuprous oxide @ 1g/L Copper oxychloride @ 3g/L	Dec, Jan	**2,25kg**
2	Coprox – Switch Cu-Sw	Copper oxychloride @ 3g/L	Dec, Jan	**1,5kg**
3	Switch - Coprox Sw-Cu	Copper oxychloride @ 3g/L Cyprodinil, fludioxonil @ 0,2g/L	Dec, Jan	**1,5kg**
4	Coprox, Cuperdem Cu-Cupr	Copper oxychloride @ 3g/L Copper heptagluconate @ 3ml/L	Dec, Jan	**1,68kg**
5	Orocop Duo™ x 2	Copper oxychloride (SC) @ 4ml/L	Dec, Jan	**1,36kg**
6	Coprox - Defender	Copper oxychloride @ 3g/L Difenoconazole @ 0,5ml/L	Dec, Jan	**1,5kg**
7	Coprox x 2	Copper oxychloride @ 3g/L	Dec, Jan	**3,0kg**
8	Untreated	none	-	**-**

Trial 2: Hass Results



Trial 2: Hass results

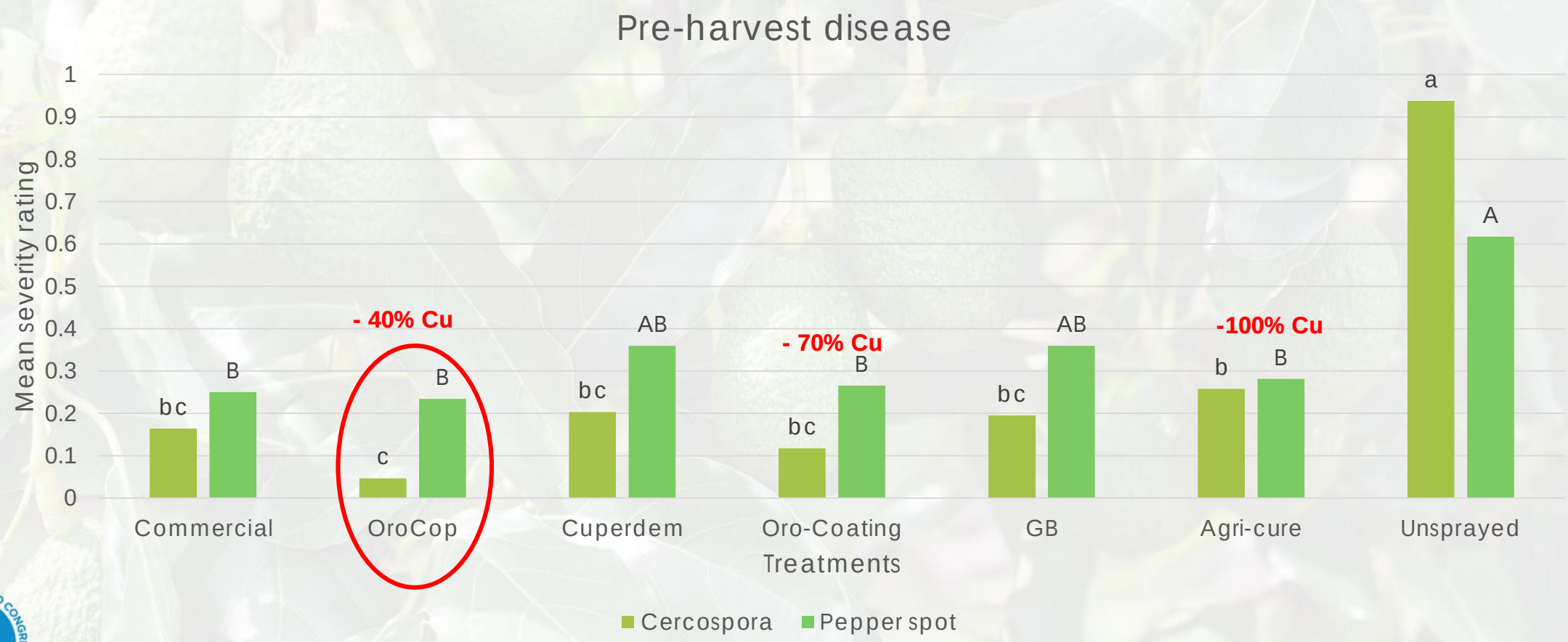
- No significant differences between commercial & other treatments for Cercospora spot control
- Best control of Pepper spot was with Orocop Duo™ followed by Switch/Coprox combinations
- Very low incidence of post harvest disease during the 2021 season
  - No significant differences were detected between treatments

2021-2022 season

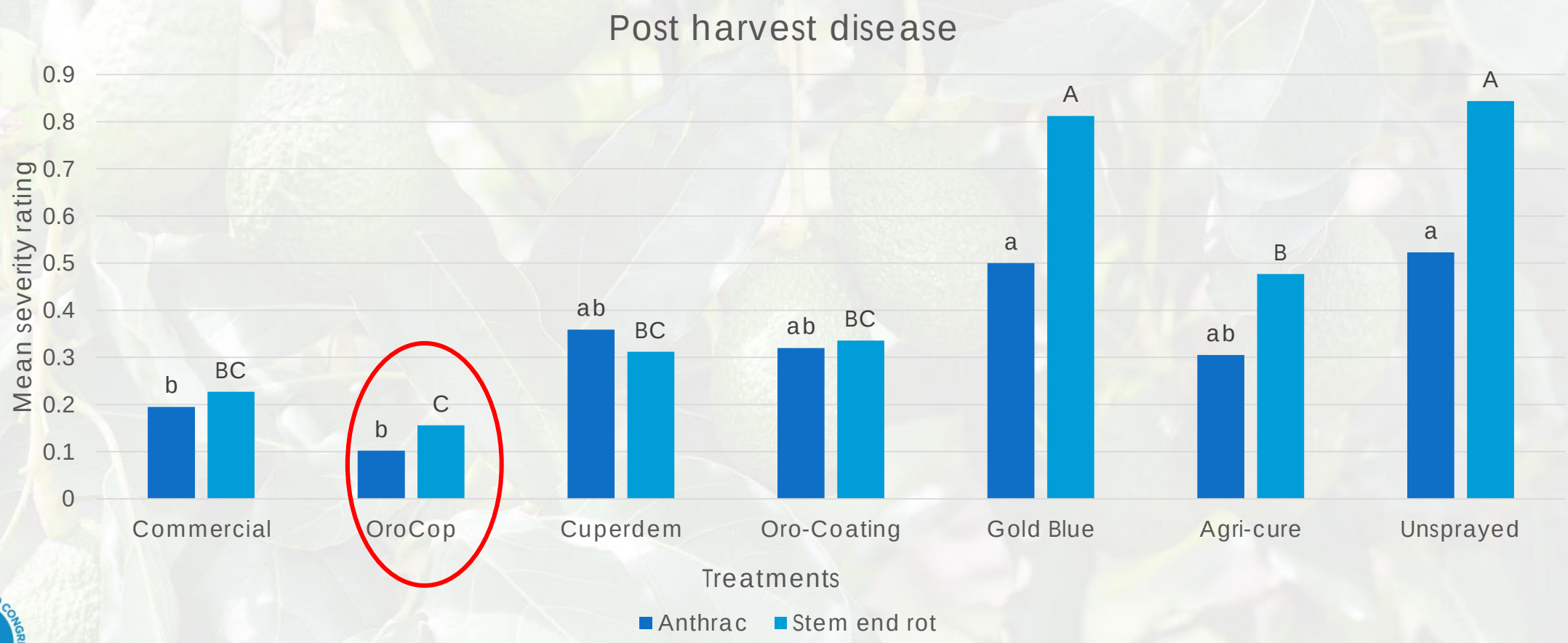
- Trial 3: Hass ES mist-blower (1000L/ha)

	Treatments	Active ingredient / rates	Dates	Cu kg / ha / yr
1	Commercial control, Nordox - Coprox	Cuprous oxide @ 1g/L Copper oxychloride @ 3g/L	Dec, Jan	**2,25kg**
2	Orocop Duo ™ x 2	Copper oxychloride (SC) @ 4ml/L	Dec, Jan	**1,36kg**
3	Cuperdem x 2	Copper heptagluconate @ 3ml/L	Dec, Jan	**0,36kg**
4	Orocop / Coating	Copper oxychloride (SC) @ 4ml/L Biodegradable coaing@15ml/L	Dec, Jan	**0,68kg**
5	GB x 2	Potassium hydroxide, copper sulphate @ 2ml/L	Dec, Jan	**0,04kg**
6	Agricure x 2	Potassium bicarbonate @ 3g/ L	Dec, Jan	**0**
7	Untreated	-	-	

Trial 3: Hass results



Trial 3:Hass results



Trial 3: Hass results

- All treatments were significantly better than untreated control for Cercospora spot and with Orocop Duo being slightly better than the rest
- Commercial, Orocop, Agricure and Coating/Orocop treatment were significantly better than untreated for Pepper spot control,
  - while reducing copper by 40%, 100% and 70% respectively
- Best control of post harvest disease was achieved with Orocop Duo™, but not significantly different to commercial control

Conclusions

- Potential to drastically reduce the amount of copper applied by using alternative products alone or in a program with Coprox or Orocop Duo™
- We will continue to evaluate alternatives to confirm our results and find a sustainable solution that will result in excellent control and less copper being used.

Acknowledgements

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