

Focus Orchard and Trial Update - Southern Victoria & Tasmania

April 2020

Principal author: Craig Hornblow (Agfirst), trial information provided by Sophie Folder (Tasmanian FLA) and Camilla Humphries (Southern Victoria FLA)

Over the previous 19 months we have had a focus on fruit quality. Some of the best field walks I have been on have included interactive tasting of a range of fruit, questioning and debating differing aspects of the eating experience and ultimately identification of what influences fruit quality.

We have selected orchard walk guests to share their expertise, putting into an Australian context, the aspects that will help us understand and achieve improved fruit quality.

Our FLA's and COG's have also been asked to build on the theme with their observational field trials. The following is a summary of a few from Tasmania and Southern Victoria. Please note that these trials are designed to be observational. The budgets do not allow them to be scientifically statistical.

Southern Victoria Focus Orchard Update

Heat mitigation

A trial in Harcourt this season set out to evaluate sunscreen and bio stimulants for their efficacy of mitigating against heat stress, minimising sunburn damage, improving packout and improving skin quality. Products tested were:

Surround® Crop Protectant – Calcined Kaolin clay – forms a barrier film to minimise the impact of sunburn.

Deccoshield® (Decco Iberica) – a calcium carbonate liquid formulation

Megafof® (Valagro®) – A bio-stimulant product containing vitamins, amino acids and proteins, betaines and growth factors

Many previous trials have shown evaporative cooling to be very effective in reducing sunburn and heat damage. As water security is a problem, this trial evaluated selected heat and sunburn protection products as an option for those growers who cannot install overhead sprinkling systems.

For sunburn damage to be avoided, apple fruit surface temperature (FST) should remain below 46 °C, (S.R. Green, Plant and Food Research, NZ and I. Goodwin, D.Cornwall DPI Tatura, Vic, 2014). Fruit surface temperatures in the trial were measured using thermocouples and an infra-red thermometer was used to measure leaf temperature, comparing the effects of heat and sunburn protection products, on fruit quality.

Table 1: Treatments

	Product rate per application	Applied Water rate (L per ha)	Dates Applied
1. Control			
2. Deccoshield	20L/ha	400	15/11/19, 5/12/19 and 6/1/20
3. Deccoshield + Megafol	20L/ha + 3L/ha	400	
4. Surround	5kg/100L	400	

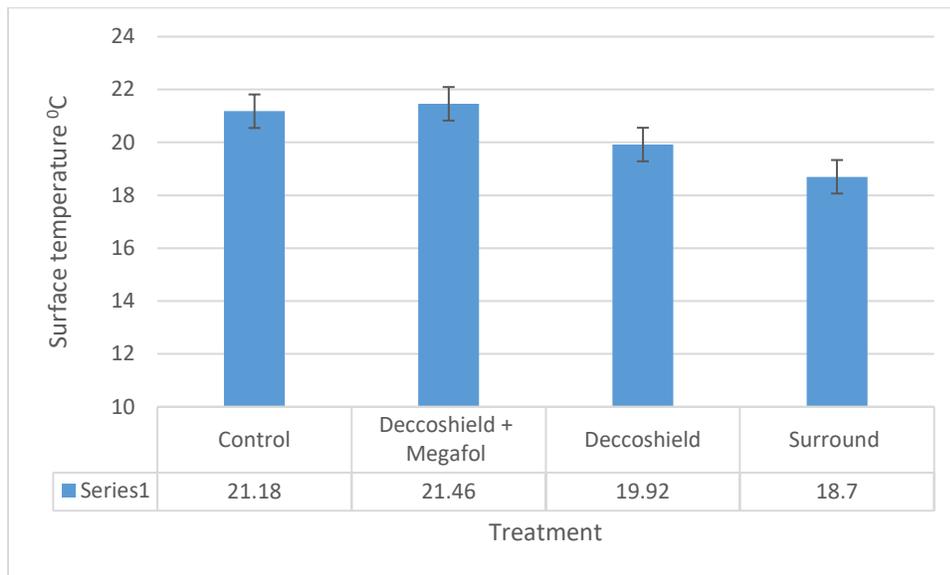
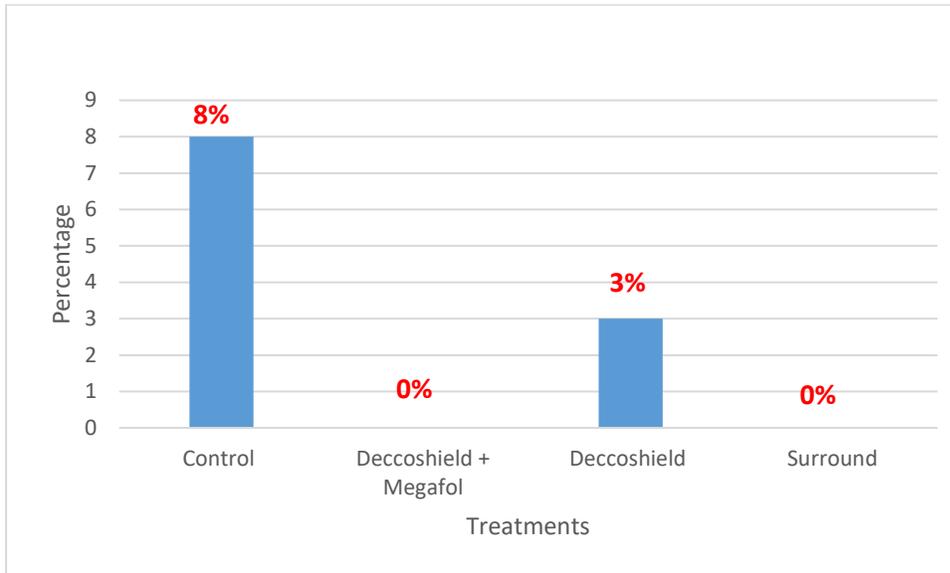


Figure 1: Leaf Surface Temperature

Leaf surface temperature was lowest for the Surround treatment, 12 % lower than the untreated control and 6% lower than the fruit treated with Deccoshield.

Figure 2: Percentage of sunburnt fruit



Orchard Temperatures were above 40 °C on several occasions this year. All treatments provided a greater level of sun-burn protection compared to the untreated control fruit. No sunburn damage was recorded on fruit treated with Deccoshield and Surround .

Impacts on maturity and fruit foreground colour will be reviewed shortly and reported through the APAL website.

With the initial review of data, the results look promising and growers could have an greater range of options to improve fruit quality while combating heat.

Further reading: [Particle film application and influences apples leaf physiology, fruit yield, and fruit quality. J.Amer.Soc.Hort.Sci.126:175-181. Glenn, D.M., G.J. Puterka, S.R Drake, T.R Unruh, A.L. Knight,P.Baherle,E.Prado,and T.A Baugher. 2001](#)

Harvest Management with Retain® (AVG).

Management of the harvest has a major impact on outturn fruit quality and anything that can help at this challenging time needs to be considered.

ReTain® is a plant growth regulator which contains the active ingredient aminoethoxyvinylglycine (AVG), a naturally occurring fermentation product that blocks ethylene biosynthesis in plants (Boller et al. 1979). Suppression of ethylene production in plant tissues helps prevent pre-harvest fruit abscission and increases fruit quality such as firmness when applied as a pre-harvest spray. ReTain® used in this way allows for greater flexibility of harvest management as well as enabling fruit to continue to increase in size while maintaining fruit quality. A negative effect of ReTain® in some situations is a suppression of foreground colour.

ReTain® was trialled in Victoria on Royal Gala to evaluate its effect on fruit drop and fruit quality.

Table 2: Treatments

	Timing
Untreated	
ReTain	7 days before harvest (DBH)
ReTain	28 days before to harvest
ReTain	28 and 7 days before to harvest

ReTain® was applied at label rates with an organosilicon spreader at 1000L of water per hectare.



Figure 3: Retain® was applied to apple trees cv. Royal Gala to evaluate the effects on fruit drop and fruit quality.

Maturity

ReTain® treatments at 26 DBH and 26 +7 DBH lowered starch pattern levels, indicating that fruit maturity was delayed. ReTain® applied at 7 DBH showed the opposite trend. This could be due the later application not holding advanced fruit and resulting in significant variation in the harvest sample.

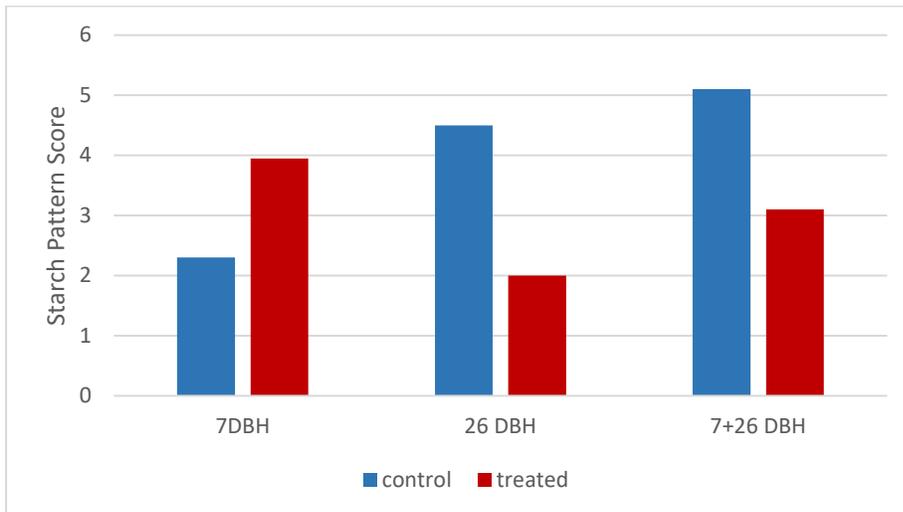


Figure 4: Effect of timing of application of AVG on starch as an indicator of maturity in Royal Gala apples.

Fruit Drop

Only a marginal (11%) reduction in fruit drop was observed when ReTain® was applied 28 DBH.

A 43% reduction in fruit drop was measured for the ReTain® treated fruit which was applied 7 DBH.

From these results it can be suggested that an application of ReTain® 7 DBH will reduce fruit drop, and an earlier application of ReTain at 26 DBH will delay fruit maturity as at this earlier stage, ethylene biosynthesis is suppressed.



Figure 5: Typical fruit drop comparison – more fruit can be seen on the untreated control (L) compared with the image on the right where trees were treated with Retain® 7 days before harvest.

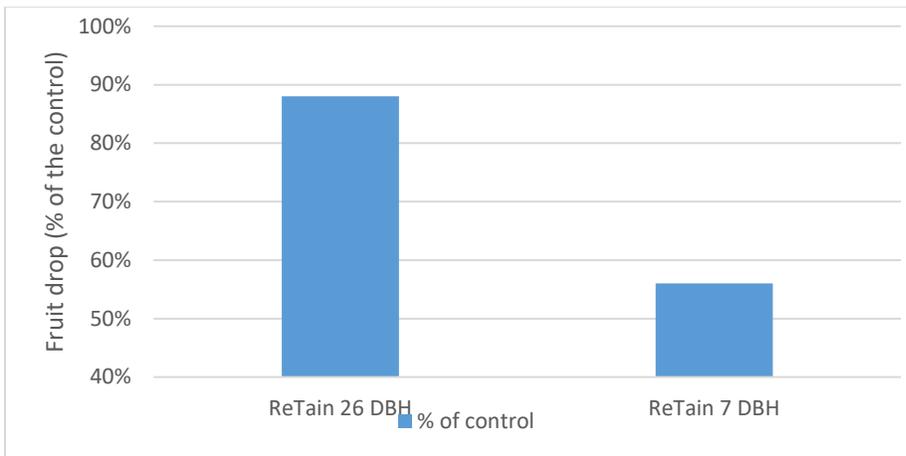


Figure 6: Fruit drop as a % of the control

Different varieties have a wide range of susceptibility to fruit drop. Climatic conditions can also influence the significance of fruit drop. While Retain® has been shown to be very effective in reducing fruit drop (increasing marketable yield) it's use needs to be well thought through to balance the other impacts on maturity and colour depending on application timing.

Tasmanian Trial Update

The effect of managing crop load on eating quality of Envy was reported last year. Since then, fruit dry matter has also been measured. .

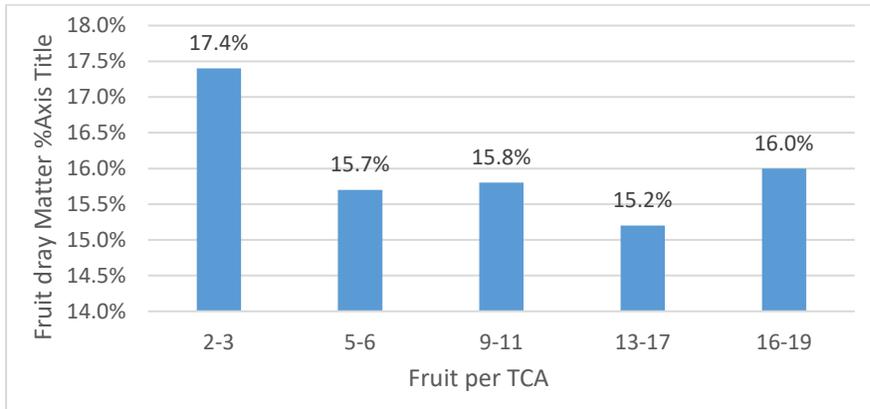


Figure 7: Effect of crop load on fruit dry matter of Envy apples, 3 weeks pre harvest (1/04/2019)

Dry matter can be influenced by a range of management and environmental factors. With this trial I would have expected a strong negative relationship with yield. There is a

crop load effect but only at an extremely low crop load suggesting other factors are influencing fruit dry matter. The higher crop loads of 13-17 and 19-19 fruit per TCA are quite broad and could have effected the true relationship of high Dry Matter and crop load. In the last decade, fruit dry matter has been one of my biggest learnings and is now a key metric to measure fruit quality. As well as a quantitative measure of fruit quality potential fruit dry matter gives an improved interpretation of starch pattern progression and fruit maturity. To understand how dry matter can be used as an excellent indicator of quality, the following article by John Palmer and colleagues is a great summary.

Further reading

Fruit dry matter concentration: A new quality metric for apples. Journal of the science of food and agriculture. 90. 2586-94. 10.1002/jsfa.4125. Palmer John, Harker, F Tustin, D & Johnston Jason. (2010).

Benefits of harvest stem clipping

Continuing the fruit quality theme, Sophie Folder will be conducting a trial in the 2020 harvest on the cost and benefits of stem clipping. There is limited experience of decreasing picker productivity (approximately 30% lower bins picked per day), so the question is, will the benefits exceed this additional cost? The trial will be reported in mid 2020 after storage evaluations. For further information contact, Sophie Folder, Tasmanian FLA.