Future Orchards Trial: Interim Report August 2019

Project title:	Lenswood Young Tree Growth trial
Region:	Adelaide Hills
Contact:	Paul James
Projective Objective:	To observe and monitor the performance of young Aztec Fuji trees trained 6 different ways and how these methods influence the growth of the trees in an orchard set up for netting.

Outline/method/ (what you did):	Four replicates of 6 different tree training methods were used to establish Aztec Fuji trees on M.26 rootstocks. All trees were planted on the same day and have been trained according to the principles of each training system.

The trees were planted at 3.5 x 1m (2857 trees/ha) in 2014 and the initial tree training work has focussed on growing the trees to maximise tree height which is essential to maximise commercial performance in a netted orchard.

Tree training was carried out on a regular basis and most aspects of tree growth have been measured and recorded.

The 6 treatments were

- *(Pink)* - planted as provided by nursery – no initial limb removal or adjustment
- *(Blue)* - planted and all side limbs removed (whipped) no heading
- *(Yellow)* - planted and all side limbs removed (whipped) no heading, whipped again in the second year
- *(Orange)* - planted and all side limbs removed – headed @ 900 mm
- *(Red)* - planted and all side limbs removed – headed @ 900 mm – branches stubbed at end of first growing season.
- *(White)* - planted and all side limbs removed – headed @ 900 mm – grower own system – no limbs left below heading point.

The trees in each treatment have been pruned and trained each year with the objective of maximising their tree height and branching structure to optimise cropping capabilities.

The trial has run for 5 years and at this stage is progressing according to expectations. 2019 was expected to be the final harvest of fruit and tree measurements of the trial but will be continued for another season.

Since the first fruit crop in 2017 the orchard has been netted for protection from hail and birds. |

Results

Extensive yield and tree growth characteristics have been routinely measured during the trial but not necessarily reported. They have been used to monitor tree growth and adjust pruning requirements as necessary

The measurements in table 1 have been undertaken to describe some of the commercial differences observed in the trials. The non-headed trees (Blue, Yellow and Pink) tend to have more branches and less small growth (sprigs and spurs) than the headed treatments (Red, Orange and White) which has resulted in better commercially structured trees. The Pink (control) treatment has the lowest number of total growth points which reflects the influence of the dominant lower limbs in the tree which resulted from the non-pruning at planting.

Table 1.   Winter Pre Pruning Measurements 2018.

	Butt Circ		Tree		**Pre Pruning**	
	15cm agu (cm)	TCSA	height (m)	**Branches** >15 cm	**Sprigs**	**Spurs** <5 cm
Blue	15.86	20.09	3.38	21.9	9.6	13.4
Red	14.66	17.18	3.42	21.2	9.9	15.8
Orange	14.08	15.91	3.39	21.9	9.9	16.8
White	13.31	14.18	3.53	22.9	9.9	13.4
Pink	14.84	17.78	3.28	21.0	8.6	12.2
Yellow	14.51	16.87	3.45	22.9	9.6	10.8

Branches are considered > 15 cm long, Sprigs are 5-15 cm long and spurs are <5cm. All these measurements are of growth off the main leader and do not include secondary branches.

Table 2 shows the annual yields for each treatment and demonstrates the annual increase (general) in overall yields per tree.

Table 2.   Cumulative Yields of Trial 2017 -2019 (kg per tree)

	Yield **2016**	Yield **2017**	Yield **2018**	Yield **2019**	Cumulative Yield **Kg / tree**	Calculated t/ha
Blue	0.00	9.00	6.28	23.0	**38.3**	**109.28**
Red	0.00	7.18	7.56	20.5	**35.3**	**100.74**
Orange	0.00	5.04	12.87	14.1	**32.0**	**91.37**
White	0.00	5.17	15.43	14.5	**35.1**	**100.24**
Pink	0.00	8.08	7.60	19.1	**34.8**	**99.50**
Yellow	0.00	5.32	16.44	14.0	**35.7**	**102.07**

To date there does not appear to be any distinctive differences in cumulative yields when the yields per tree are considered in terms of Kg per tree. When these figures are calculated into tonnes per hectare the commercial differences to a grower become more evident. Overall the difference of 17.9 tonne per hectare between the best yielding and lowest yielding treatments represents a significant commercial difference in the cashflow development of a new orchard.
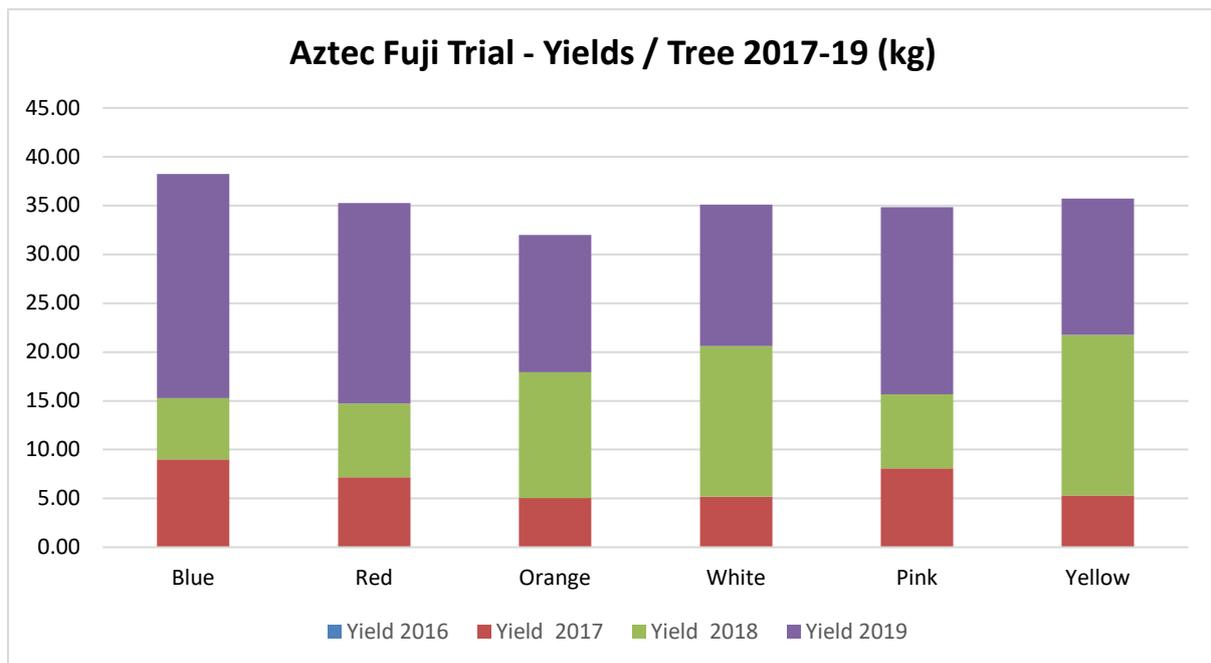
After 5 years of tree development the differences between different tree development strategies are closer than initially expected (in terms of yield) and may reflect the impact of tree development/pruning strategies after the first growth season.

Photo 1   **Photo of tree growth and crop load March 2019**

Note the difference in tree vigour and crop load of different treatments along the row

Graph 1.   Cumulative Yields – kg /tree

Aztec Fuji Trial - Yields / Tree 2017-19 (kg)

Legend: ■ Yield 2016 ■ Yield 2017 ■ Yield 2018 ■ Yield 2019

Graph 1 shows the annual yields of each treatment by each season. The first crop is the lowest bar heights, 2nd year crops the middle bar and the 3rd year crop is shown by the top bar. The different bars clearly show different yields per treatment in each season which is an indicator of early fruit production but also of the biennial cropping attributes of Fuji trees.

Because of this biennial bearing aspect to the trial it is being extended by another season to provide 4 years of crop yields. This will allow for 2 "on" and 2 "off" crops and allow for a more consistent evaluation of the trees cropping development.

Implications of trial results

The trial will continue for another year to enable for consistent yield information to be collected. At this stage of the trial the differences between each initial tree treatment appear to be getting less distinct each season. This raises the question – **"*Is the impact of grower tree pruning and training management more important than what actual tree establishment technique is used?*"** The final tree yields, and tree measurements may provide a clearer answer to this question.

Photo 2   Tree height and cropping of trial trees - 2019