Future Orchards Trial: Interim Report

Project title:	Impact of Summer NAA on return bloom in Red Fuji
Region:	Batlow
Contact:	Kevin Dodds NSW DPI
Projective Objective:	To evaluate / demonstrate the use of Summer NAA applications as a method to increase return bloom in biennial red fuji

Outline/method/ (what you did):

Establishment

October 2015 – A suitable block of Red Fuji going into an ON crop was identified at MT View Ehmnsens Orchard. In addition and second block of the same variety was selected by the grower for a duplication of the demo block.

This block was conveniently divided into three sections by two double rows of Braeburn apples. These three sections formed the treatment blocks.

Treatments Applied

Two treatments were applied and a control maintained for comparison as indicated in Table 1.

Table 1. Treatments applied as part of this demonstration trial

Section	Date	Treatment	Water Volume (L/Ha)
1	2/12/2015	6ppm NAA + Pomade (125ml/100L)	2400
	11/12/2015	6ppm NAA + Pomade (125ml/100L)	2400
2	2/12/2015	5ppm NAA + Pomade (125ml/100L)	2400
	11/12/2015	6ppm NAA + Pomade (125ml/100L)	2400
Control	-	No Treatment	Nil

The original trial plan was for three applications of NAA at 10 day intervals commencing in the first week of December. However, as a result of some leaf yellowing that occurred following the second spray of NAA, the third

	application was withheld. See results summary for more details and photos of the leaf yellowing. Trees and fruit in the treated and control sections were inspected following the first applications of NAA (6ppm and 5pmm) on 2nd December 2015. No detrimental effects were observed at that time. A second inspection was conducted on 18th December 2015 following the second round of NAA treatments. Leaf yellowing was very prominent with the estimated percentage of leaves turning yellow put at between 5 and 15% of total leaves. Details of sprays applied (including other crop protection sprays) and weather conditions were collected and tabulated for further investigation of the leaf yellowing. **Pre-Harvest Fruit Size Assessment** Measurement of a representative sample of fruit from each of the treatment sections just prior to harvest (March 2016) **Return Bloom Assessment** A visual assessment of return bloom across the three treatment sections will be conducted (Oct 2016) **Final Report to APAL (Nov 2016)**

Results Summary (measurements and observations, photos, photos of control area if applicable)

Figure 1. MT View Ehmsens Block 4 Fuji map showing Fuji (Netted) and double rows of Braeburn separating the treatment blocks

Figure 2. This block was selected because it is strongly biennial and was coming into an ON crop as can be seen form the strong flowering.

Figure 3. Ian Robson standing with some of the Red Fuji in Block 4 at Full Bloom.

Figure 4. Fruit showed no negative visual impacts following the two NAA sprays in each section.

Figure 5. An example of the leaf yellowing observed in both of the NAA treatment sections following the 2nd spray application (18.12.2015)

Figure 6. An example of one of the worst effected trees in the 6ppm NAA treated section.

Leaf yellowing and reduction in number of treatments applied

Following the second application of NAA, a significant level of leaf yellowing and premature drop was reported by the grower. At this time it was decided that the planned third set of NAA treatments would not proceed. In attempt to shed some light on the possible cause(s) of the leaf yellowing, spray application data and climatic data for the period covering the first two treatnments was collated and is presented in table 1.

Table 1. NAA treatment details and climatic conditions surrounding the treatments.

Date	Blocks	Sprays Applied	Rate 1 / 100L	Rate 2	Spray Vol / Ha	Max	Min	Rainfall	Max HUM
26/11/2015						20.7	3.4	0	72.8
27/11/2015						20	0.6	0	89.7
28/11/2015						26.5	3.8	0	98.1
29/11/2015						27.6	9.7	0	99.2
30/11/2015						27.7	5.7	0	98.7
1/12/2015						31.4	9.9	0.2	81.1
2/12/2015	H & E Fuji	NAA + Pomade	30ml + 125ml	25ml + 125ml	2400	20.5	7.4	0	82.8
3/12/2015						27.8	4	0.2	91.5
4/12/2015						30.2	8.2	0	96.4
5/12/2015						31.4	10.9	0	86.8
6/12/2015						33	12.7	0	74.6
7/12/2015						31.1	16.2	0	67.8
8/12/2015						23.3	15.4	8.2	96.6
9/12/2015		Captan / Altacor				29.6	12.6	2	99
10/12/2015						29.9	9.2	0	93.4
11/12/2015	H & E Fuji	NAA + Pomade	30ml + 125ml	25ml + 125ml	2400	25.2	9.4	0.6	75.7
12/12/2015						24.3	1.3	0	93.5
13/12/2015						26.7	5.4	0	92
14/12/2015						31.2	6.8	0	76.2
15/12/2015						30.4	12.9	0	64.2

This information was shared with the AgFirst consultants and several other parties seeking input and comment as to the possible cause of the leaf yellowing. Although no definitive answers were given, the following points were proposed as possible factors leading to the leaf yellowing response;

1. Very High spray water volume used. From the NZ experience with the use of summer NAA, it was believed that the water volume used to apply the product in this instance was excessive and would have resulted in too much NAA being applied per hectare.
2. Temperatures and humidity around the time of the applications and in the days following were considered high which could have contributed to excessive uptake of NAA by the trees.
3. Pre-existing crop load stress may also have been a contributing factor. Following the heavy bloom and a relatively light blossom thinning, flower and fruit numbers remaining on the tree may have led to some level of crop load induced stress which when coupled with the stress of the NAA treatments resulted in premature leaf senescence.

Pre-harvest fruit size measurements

Within one week of intended harvest, a random sample of 100 fruit per treatment block were measured for diameter. The results of these measurements are summarised in table 2 below.

Table 2. Pre-harvest fruit size measurement results summary.

	NAA 6PPM	NAA 5PPM	CONTROL
Mean Fruit Diameter (mm)	66.68	64.13	65.41
Standard Deviation	6.64	6.56	4.68
Sample Variance	44.07	43.05	21.87
Range	33.12	28.00	21.77
Minimum	48.67	50.29	56.85
Maximum	81.78	78.29	78.62

The pre-harvest size measurements showed no particular trend between blocks for fruit size. However, the treated blocks showed a greater level of size variance and sample range when compared to the control. This suggests that the NAA treatments had some impact on fruit size range across both the 5ppm and 6ppm treatment areas. The reason for this greater range and variance is not clear, but may be linked to the additional tree stress resulting from the NAA.

What's next ?

A visual assessment for return bloom impacts is planned for Spring 2016 (Oct), the results of which will be reported in the Final report for this trial due November 2016.

Implications (What did we learn? How will this impact on the business? What will we change? What are the road blocks/obstacles to change?)

Observations as a result of the leaf yellowing occurrence will help to inform the future application and use of Summer NAA in Fuji apples at Batlow. Consideration will be given to lower spray volumes for future applications and avoidance of hot weather and other forms of crop stress.

Fruit size measurements suggest there may be size impacts resulting from the use of Summer NAA in some circumstances. Observations will need to be ongoing to determine is such size impacts exist when treatments are applied under more favourable crop load, spraying and weather conditions.