



CALCIUM TRIAL ON APPLES IN HAWKES BAY

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This trial compared a Biomin Calcium foliar programme against different grower standard Calcium inputs and revealed that Biomin Calcium was highly effective.

In addition, the Biomin treated trees showed visual improvements in both leaf condition and fruit colour development, with a larger proportion of fruit harvested in the first pick from the Biomin treated blocks.

METHOD

Five blocks of Braeburn apples were chosen for uniformity and with sufficient size to allow the growers to spray in a normal manner.

On the test section the growers were asked to apply Biomin® Calcium at 1.5 kg/Ha plus Mobilizer at 2 L/Ha at 80% petal fall, 14 days after the first application and then 21 days after the second application. A fourth application was to be made mid-season, in mid-January and the fifth and final application two weeks before harvest.

On the control section the growers were asked to follow their usual pattern and record the applications.

In the week to ten days before harvest, Richard Mills was to collect a sample from each of the five blocks and deliver to an accredited laboratory for calcium testing.

BACKGROUND

The Braeburn variety is a chance seedling that was found in the Nelson region of NZ. This variety has shown to be problematic with regards to calcium related disorders such as bitter pit and lenticel blotch. These problems are exasperated in low cropping, high vigour trees or in seasons where calcium uptake from the soil is limited due to soil or weather conditions.

In response the industry under NZAPMB and then ENZA initiated research work which resulted in recommendations of a minimum of 10 applications of calcium nitrate prills or calcium chloride flake. These recommendations are still accepted practice.

Minimum mineral levels needed to be obtained before the fruit can be exported and a higher standard attained before post harvest drenching is not required.

Table 1 - Export Category

EXPORT NO DRENCH	EXPORT WITH DRENCHING	NO EXPORT
2.5 mg Ca/100g FW	1.85 - 2.49 mg Ca/100g FW	LESS THAN 1.85 mg Ca/100g FW

Ideally the Ca:Mg ratio should be greater than 0.6 and the Ca*10: K ratio should be greater than 0.17.



BIOMIN CALCIUM PRODUCT DESCRIPTION

- 15% w/v calcium and 3.9% as Amino Acid nitrogen, in the form of a soluble powder.
- Biomin® are a patented process of chelation using Glycine, which has an extremely small particle size (molecular weight <200) and highly effective absorption rate into the plant. Claimed to be fully available and systemic therefore low rates of product are required.
- Since Biomins® are chelated using Glycine and other amino acids; they are recognised by the plant as a proteinaceous organic nutrient allowing movement via both the xylem and the phloem making Biomin Calcium a mobile element. This is why plant availability is said to be increased and what makes Biomins® different from all other forms of Calcium on the market. Because Biomins® are in a readily available form, there is no requirement for the plant to change the product for assimilation before it is able to be utilized and effective, as is required with synthetic chelates.
- Free of pollutants and toxins.
- Able to be applied at a very early stage of plant growth without causing phytotoxicity.
- Compatible with almost all fungicides and insecticides.

Information taken from various literatures as supplied by Roots, Shoots & Fruits Ltd.

GROWER APPLICATIONS

The applications of calcium are detailed in Table 3. The Biomin® Calcium was applied 4 or 5 times and the controls had between 9 and 18 applications depending on the grower's habit. The water rates varied between 500 L/Ha and 2000 L/Ha depending, again, on the grower's management practices.

Products used by the growers in the control included Pitstop, Stopit, Panda, Calcium Nitrate prills and Calcium Chloride Flake. Details of these products are in Appendix 2.

RESULTS

Table 2 - Calcium levels (in mg/100g FW)

ORCHARD NUMBER	1	2	3	4	5
CROP LOAD	MODERATE	LIGHT	MOD-HEAVY	HEAVY	MOD-HEAVY
CONTROL	2.25	1.6	2.18	2.08	2.25
BIOMIN CALCIUM	1.98	1.7	2.25	2.08	2.16

All blocks exceed the Ca:Mg and Ca*10: K ration guidelines.

Two blocks had superior calcium levels from the use of Biomin® Calcium, two were worse and one was unchanged. None of the blocks were moved up or down an export category, as detailed above, by the use of Biomin® Calcium. Blocks 1 and 2 received four rather than the suggested five applications. The application proposed for mid-January was missed; this decrease of 20% in applied product may be significant!

In general there is no apparent difference in the results from any of the orchards with the exception of orchard 1, which had only 4 applications of Biomin® Ca instead of 5.

Orchard 2, despite also having only 4 applications of Biomin Calcium still reached a higher Calcium value than the grower standard.

Appendix 1

MONTH	WEEK	BLOCK 1 BIOMIN Ca	CONTROL	BLOCK 2 BIOMIN Ca	CONTROL	BLOCK 3 BIOMIN Ca	CONTROL	BLOCK 3 BIOMIN Ca	CONTROL	BLOCK 5
OCT	2							BIOMIN		
OCT	3	BIOMIN		BIOMIN		BIOMIN	STOPIT			
OCT	4						STOPIT			
NOV	1		PANDA		PANDA	BIOMIN	STOPIT (3)	BIOMIN	STOPIT	
NOV	2	BIOMIN	PANDA	BIOMIN	PANDA		STOPIT		STOPIT	
NOV	3					BIOMIN	STOPIT		STOPIT	
NOV	4	BIOMIN		BIOMIN			STOPIT(2)	BIOMIN	STOPIT	
DEC	1		PANDA		PANDA		STOPIT			
DEC	2						STOPIT		STOPIT	
DEC	3		PANDA		PANDA		STOPIT			
DEC	4		PANDA		PANDA		CaCI FLAKE		STOPIT	
JAN	1						CaCI FLAKE			
JAN	2						CaCI FLAKE		CaCI FLAKE	
JAN	3							BIOMIN		
JAN	4		PITSTOP		PITSTOP				CaCI FLAKE	
FEB	1		PITSTOP		PITSTOP	BIOMIN	CaNO3			
FEB	2									
FEB	3		PITSTOP		PITSTOP		CaNO3	BIOMIN	CaCI FLAKE	
FEB	4									
MAR	1	BIOMIN	PITSTOP	BIOMIN	PITSTOP					
MAR	2					BIOMIN	CaCI FLAKE		CaCI FLAKE	
MAR	3								CaCI FLAKE	
MAR	4								CaCI FLAKE	
TOTAL APPLICATIONS		4	9	4	9	5	18	5	2	
TOTAL Ca kg/ha		0.90	12.64	0.90	12.64	1.13	40.64	1.13	37.80	
TOTAL N kg/ha		0.00	3.50	0.00	3.50	0.00	7.44	0.00	0.00	

note: records for block 5 have been destroyed

Orchards 1 & 2 applied 14 times more calcium in the growers standard compared to the Biomin® applications; orchard 3 used 36 times more elemental calcium and orchard 4, 34 times more to gain very similar calcium results.

Fruit Weight (average fruit weight in grams)

ORCHARD NUMBER	1	2	3	4	5
CROP LOAD	MODERATE	LIGHT	MOD-HEAVY	HEAVY	MOD-HEAVY
CONTROL	178	169	159	175	153
BIOMIN CALCIUM	177	186	167	173	183

Two of the orchards had very similar average fruit weights and three had slightly heavier fruit in the Biomin® treated trees compared to the growers' standard applications.

DISCUSSION

The season in question has been difficult from the calcium viewpoint in that the last part of November and the majority of December was cooler and cloudier than normal. This part of the growing cycle is critical to achieving good fruit calcium levels, and the trees were not transpiring at a rate sufficient to extract maximum calcium from the soil. Additionally crop loads were, in general, not overly heavy as a result of the spring frost two years ago.

Of all the Braeburn samples submitted to the Gribbles laboratory 29.6% were under the export threshold, 60.1% needed drenching and were then exportable and 10.3% did not need drenching before exporting.

From the tested samples in this trial 20% were under the threshold for export and the remaining 80% needed drenching before exporting.

OTHER BENEFITS

This trial was not designed to measure any changes in leaf condition or fruit colour development and no measurements were made. No fruit samples were put aside for later inspection for calcium related disorders and at the time of writing no market outturn reports had been received.

The researcher noted visual improvement in leaf condition in Biomin® treated trees over control blocks and improved visual fruit colour development in two of the blocks that were revisited before harvest. The grower of block 4 was impressed with the improved colour, commenting that a larger proportion of the fruit was harvested in the first pick from the Biomin® treated block. It is interesting to note that the enhanced colour was in comparison to trees that had had Calcium chloride flake applied.

Again the trial was not designed to measure any differences in fruit size but it is interesting to note that three of the five orchards using Biomins® had larger fruit and the other two were virtually identical.

For growers who apply a number of calcium sprays there are savings that can be made due to less passes through the orchard, less labour and fuel costs. These are detailed in Appendix 3.

Appendix 2

PRODUCT	CA %	N %3	COMPOSITION	FORMULATION
CALCIUM CHLORIDE	74		CaCl	FLAKE
CALCIUM NITRATE	19	31	CaCl	PRILLS
STOPIT	16		BUFFERED CaCl	LIQUID
PITSTOP	17		BUFFERED CaCl	LIQUID
PANDA	23	10	BUFFERED CaNO	LIQUID
BIOMIN Ca	15	4	AMINO ACID CHELATE	SOLUBLE POWDER

Appendix 3

ORCHARD	BIOMIN + MOBILIZER	RUNS COST BIOMIN	BIOMIN TOTAL	STANDARD PROGRAMME	RUNS COST STANDARD	STANDARD TOTAL	DIFFERENCE
1	302	240	542	176	600	776	-234
2	302	240	542	176	600	776	-234
3	378	300	678	250	1080	1330	-652
4	378	300	678	117	720	837	-159



Control Block - note colour all the way down the rows.



Biomin Calcium Block - note the colour of the apples all the way down the rows.

[Click here](#) to read the full trial paper.

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