



CARBOTECH™

ON FARM DEMONSTRATION – 2011/12

BEARING CITRUS, BOSVELD SITRUS, FARM LEONORA, LETSITELE, SOUTH AFRICA

TRIAL AIM

CARBOTECH is a liquid carbon product derived from plant extracts. CARBOTECH is useful in improving the efficiency of plant nutrient uptake.

The CARBOTECH mechanisms of action are as follows:

1. CARBOTECH will bind with nutrients and protect it from lock-out in the soil or from leaching and volatilization.
 - a. Cat-Ions such as Ammonia, Potassium, Calcium and Magnesium binds with CARBOTECH to form larger molecules, aiding in reducing leaching through the soil.
 - b. Anions such as Phosphates binds with CARBOTECH in 'n proses called organic Phosphate clustering protecting it from Calcium / Phosphate lockout.
2. CARBOTECH will improve root growth by stimulating cell division and growth as well as having a positive effect on phosphate availability and mobility
3. The beneficial carbonaceous bacterial food source available in CARBOTECH promotes the bio-life in the soil to thrive and assist in the promotion of nutrient uptake, root development and root health to give natural defence against attacks on plant health

On bearing citrus a strategy of a reduction in the application of fertilizer elements resulting in a financial saving on the fertilizer program cost could theoretically be achieved.

The aim in this case therefore was to see if the addition of CARBOTECH could affect a saving in costs, whilst an investigation of the leaf analyses in the following year would establish if the reduction in nutrients have adversely affected the tree reserves in the following year or not. A saving in costs with leaf analyses staying within norm after the season would therefore constitute a win.

FIELD TRIAL SETUP

CARBOTECH was applied on the Leonora farm on four different blocks. In each case an untreated control block was left for comparison. In the cases where CARBOTECH were applied the reduction made in nutrients applied were as follows:

Table 1: Fertilizer Application: Kg Element / Ha / Season

Block	NITROGEN			PHOSPHATES			POTASSIUM		
	Standard Chemical Program	Reduced value – CFT Program	% Reduction	Standard Chemical Program	Reduced value – CFT Program	% Reduction	Std Chemical Program	Reduced value – CFT Program	% Reduction
L 12A Midnight	158	132	16.4%	5	1	75.0%	84	50	40.0%
L 12C Midnight	158	132	16.4%	5	1	75.0%	84	50	40.0%
L 13B Valencia	158	132	16.4%	5	1	75.0%	84	50	40.0%
L 20A Tomango	158	132	16.4%	9	2	75.0%	84	50	40.0%

In each case an **additional** 28Kg of N was taken out of the program and replaced with one application of TwinN nitrogen fixating bacteria which is commonly used in conjunction with CARBOTECH.

It should be noted that Carbotech is normally applied according to varying norms based on the actual kg of element for each of the nutrients being applied through the fertilizer program. In each case the Carbotech applied was calculated and applied at the following rates:



Table 2: Calculation and application of CARBOTECH

Block	L/Ha
Farm - Leonora Citrus - Block - L 12A Midnight	14.43
Farm - Leonora Citrus - Block - L 12C Midnight	23.8
Farm - Leonora Citrus - Block - L 13B Valencia	14.4
Farm - Leonora Citrus - Block - L 20A Tomango	14.84

Carbotech was applied each time fertilizers were applied.

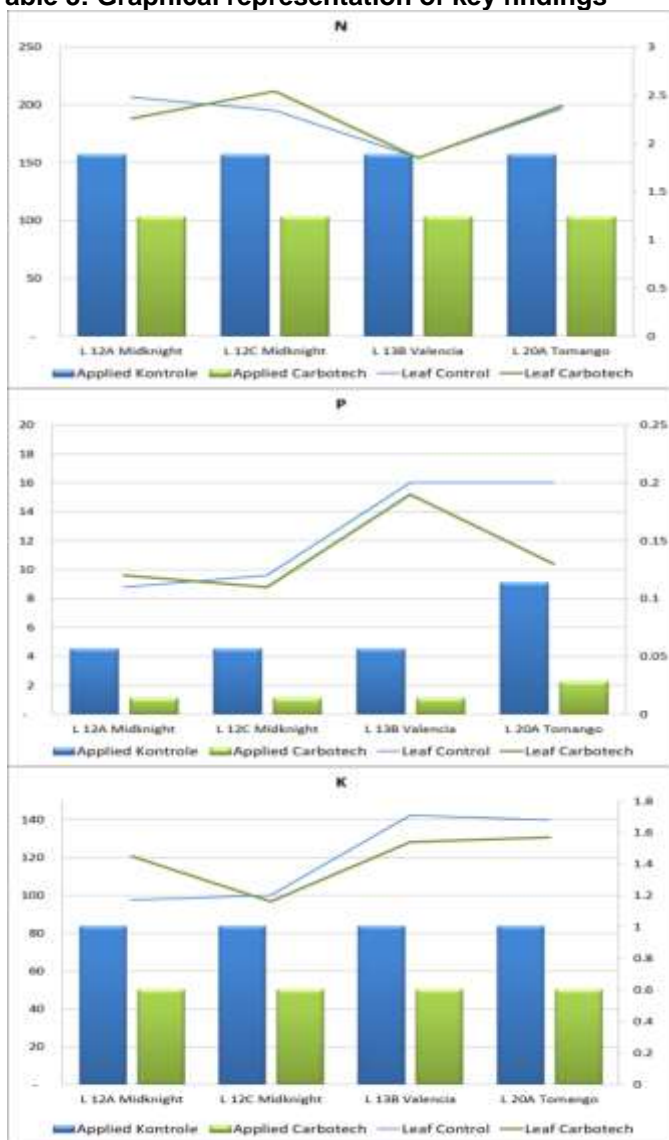
In 2012-13 the trial was continued on blocks L12C and L20A and yield and pack outs compared to control blocks L12D and L20B + L20C respectively

SUMMARY OF RESULTS

2011-2012

An overall fertilizer program cost saving of 5.5% was achieved across all four trial blocks and the leaf analyses were as follows:

Table 3: Graphical representation of key findings



On three of the four blocks Nitrogen leaf analysis was higher than the control blocks

On three of the four blocks Phosphates were within one point of each other either way and on one block the trial was 0.13 (within norm) and the control 0.20

Two of the K results were too high in relation to norm. In both cases the Carbotech results were slightly lower. For the two other results that were within norm the Carbotech result was similar or higher.



MEASUREMENTS

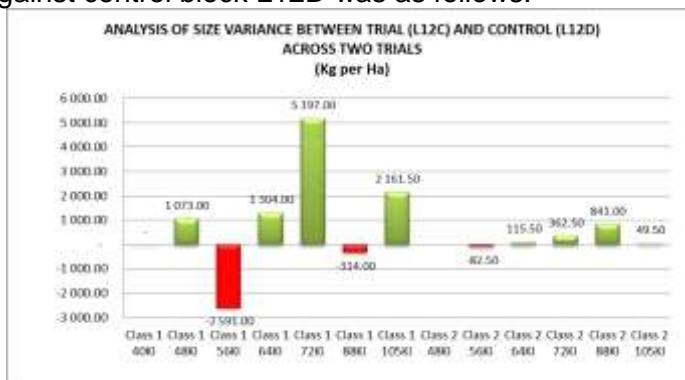
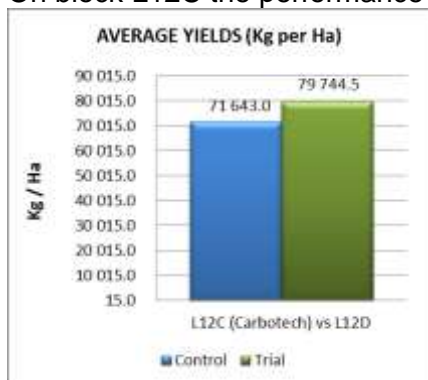
Table 4: Detail individual measurements:

Block	Detail	Year	Cultivar	N%	P%	K%	Ca%	Mg%
L12A	Carbotech (GBT)	2012	Midnights	2.26	0.12	1.45	4.13	0.36
L12B	Control	2012	Midnights	2.48	0.11	1.17	4.34	0.38
L12	GBT and Control	2011	Midnights	2.59	0.13	1.19	4.85	0.32
	Optimal Norm			2.4-2.6	0.12-0.15	0.9-1.5	3.5-6	0.35-0.5
L12C	Carbotech (GBT)	2012	Midnights	2.54	0.11	1.16	4.66	0.27
L12D	Control	2012	Midnights	2.34	0.12	1.20	4.48	0.40
L12	GBT and Control	2011	Midnights	2.59	0.13	1.19	4.85	0.32
	Optimal Norm			2.4-2.6	0.12-0.15	0.9-1.5	3.5-6	0.35-0.5
L13B	Carbotech (GBT)	2012	Valencia	1.85	0.19	1.54	4.78	0.42
L13A	Control	2012	Valencia	1.85	0.20	1.71	4.49	0.33
L13	GBT and Control	2011	Valencia	1.62	0.12	1.20	5.84	0.31
	Optimal Norm			2.3-2.6	0.12-0.15	0.9-1.5	3.5-6	0.35-0.5
L20A	Carbotech (GBT)	2012	Tomango	2.39	0.13	1.57	4.56	0.41
L20C	Control	2012	Tomango	2.36	0.20	1.68	4.22	0.38
L20	GBT and Control	2011	Tomango	1.98	0.14	1.68	5.08	0.46
	Optimal Norm			2.3-2.6	0.12-0.15	0.9-1.5	3.5-6	0.35-0.5



2012-2013

On block L12C the performance against control block L12D was as follows:



The yield and pack out had the following effect on the economics:

Actual financial implication

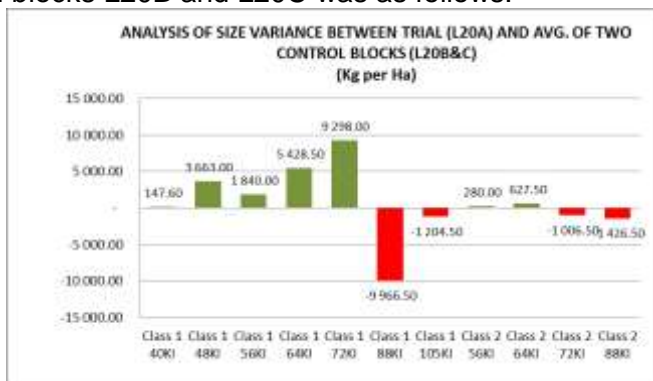
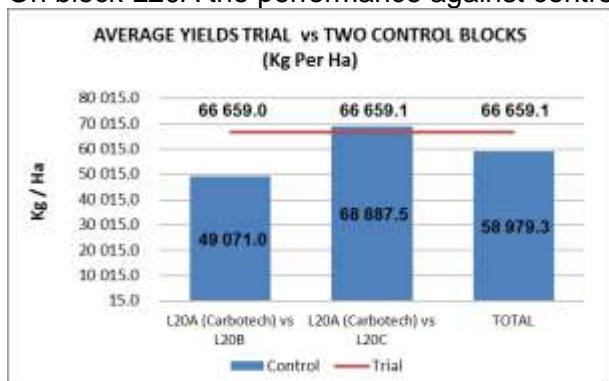
	R
Total revenue on trial block / Ht	317 581
Total revenue on control block / Ht	286 507
Financial advantage	31 074
Saving on fertilizer program	216
Net financial advantage / ha	31 290
	10.9%

Saving on fertilizer program

	R
Cost of Chemical Program	4472
Cost of Carbotech program	4256
Variance	216
	5%



On block L20A the performance against control blocks L20B and L20C was as follows:



The yield and pack out had the following effect on the economics:

**Actual financial implication
Trials vs Avg of Control Blocks**

	R
Control block L20B	190 329
Control block L20C	265 621
Avg revenue on control blocks	227 975
Total revenue on trial block / Ha	263 813
Financial advantage	35 838
Saving on fertilizer program	139
Net financial advantage / ha	35 977
	15.8%

**Actual financial implication
TRIAL vs L20B**

	R
Total revenue on control block	190 329
Total revenue on trial block / Ha	263 813
Financial advantage	73 484
Saving on fertilizer program	139
Net financial advantage / ha	73 623
	38.7%

**Actual financial implication
TRIAL vs L20C**

	R
Kontrolle L20B	265 621
Opbrengs op Proef	263 813
Voordeel verkry	-1 809
Saving on fertilizer program	139
Net financial advantage / ha	-1 670
	-0.6%

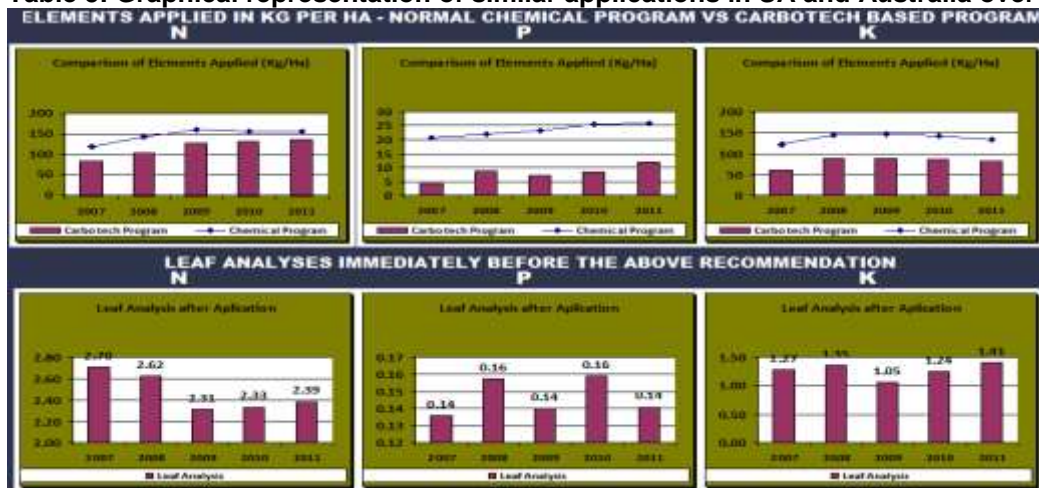
Saving on fertilizer program

	R
Cost of Chemical Program	3748
Cost of Carbotech program	3609
Variance	139
	4%

CONCLUSION

From the results obtained, it is apparent that CARBOTECH in conjunction with TwinN is useful for the reduction of fertilizer program costs in Citrus production, whilst not adversely affecting tree reserves or yield as evidenced by subsequent leaf and yield analyses. This result corroborates findings on various other farms country wide where similar results were found. The graphs below represent results over more than a 1000 Ha measured annually in various places in South Africa and Australia

Table 5: Graphical representation of similar applications in SA and Australia over 1088Ha Annually





ACKNOWLEDGEMENTS

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