CARBOTECH™

LONG TERM FARM DEMONSTRATION: 2007 – 2015

BEARING CITRUS, J.S. BRUWER, ROBERTSON, 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

A CARBOTECH fertilizer program was followed from the beginning on a number of blocks of Afourer Mandarins. The first planting was in 2006. Reductions in the application of nutrients were made and the resulting leaf and soil analysis monitored year on year. The graphs below reflect the results on a 40Ha block since planting

In the last six years a further cut on Nitrogen was made. This additional reduction was substituted with TwinN nitrogen fixating bacteria, and was not shown as a cut in nitrogen on the graphs below as the nitrogen was substituted with a biological source.

The fertilizer program cost, fertilizer volumes and yield per Ha was also logged.

SUMMARY OF RESULTS

Substantial reductions on nutrients were made on all elements except Nitrogen over the years, resulting in an average cost saving against a standard chemical program of greater than 10% over 8 years.

The leaf analyses were generally maintained within norm and the soil analyses generally improved, indicating that no mining of nutrients took place. In fact in all cases (macro nutrients), the soil is now richer in nutrients than in the beginning.

The total volume of fertilizer that needed to be applied was reduced by 30% on average, alleviating logistical issues associated with fertilizer application

MEASUREMENTS

Table 1: Percentage of nutrients applied in relation to the standard chemical fertilizer program. (i.e. 70% means only 70% of the standard chemical recommendation was applied)

YEAR	N	P	K	Ca	Mg
2008	71%	17%	49%	18%	23%
2009	70%	25%	60%	30%	0%
2010	80%	25%	60%	30%	30%
2011	95%	25%	60%	30%	0%
2012	100%	30%	70%	50%	0%
2014	100%	30%	75%	70%	0%
2015	100%	50%	75%	70%	0%
2016	100%	50%	75%	70%	0%

Illustration 1: Nitrogen Application and effect on leaf analyses

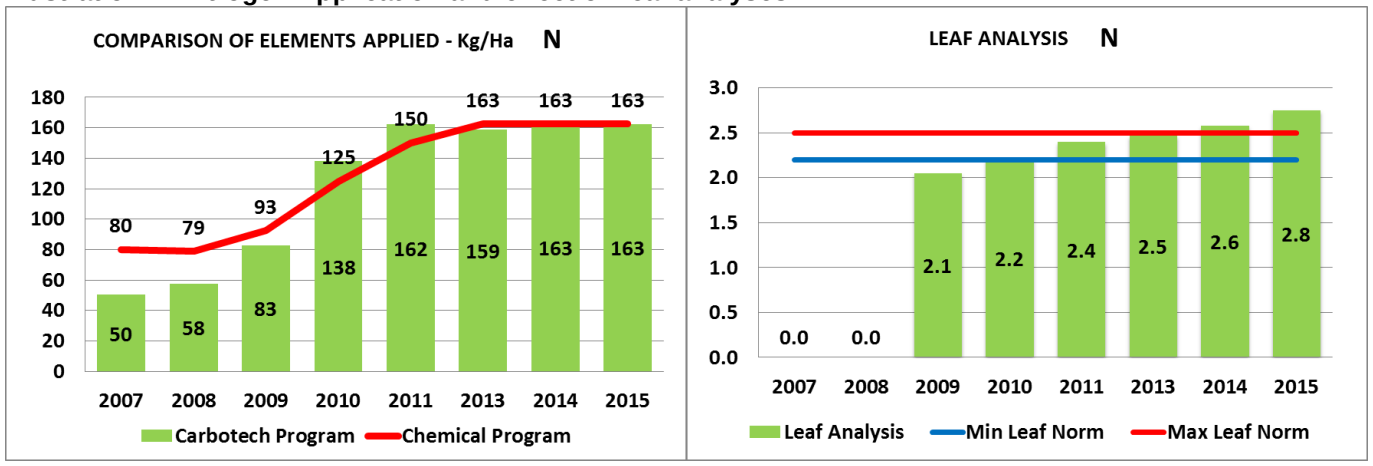
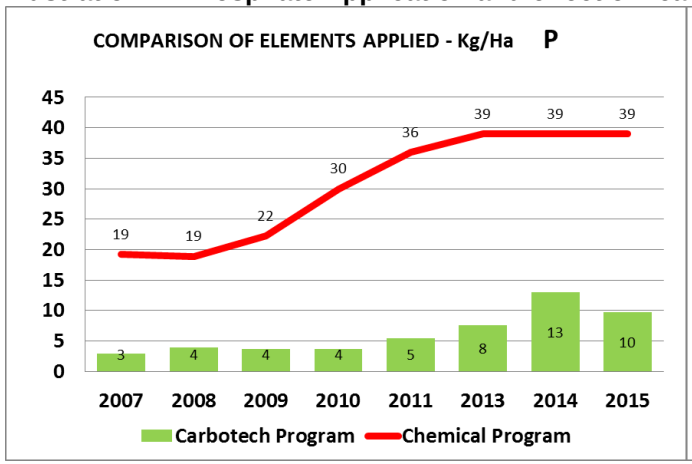
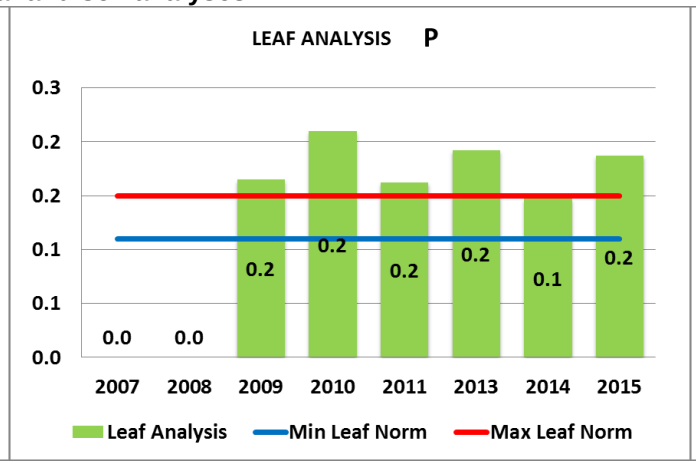


Illustration 2: Phosphate Application and effect on leaf and soil analyses





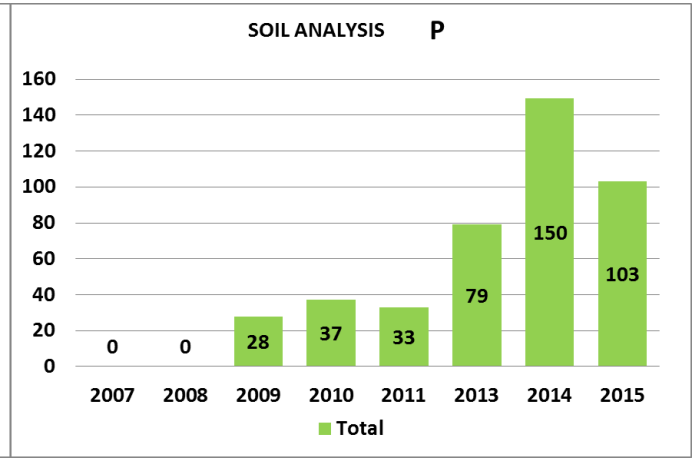
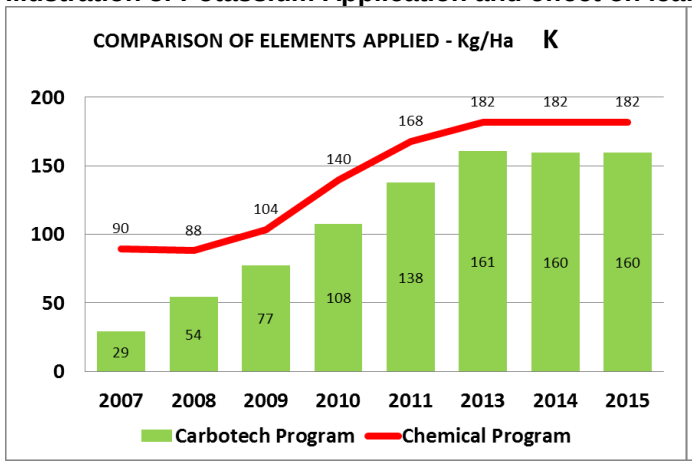
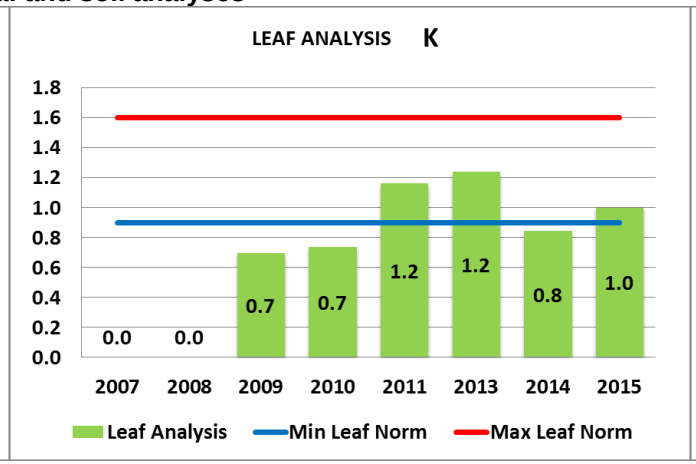


Illustration 3: Potassium Application and effect on leaf and soil analyses





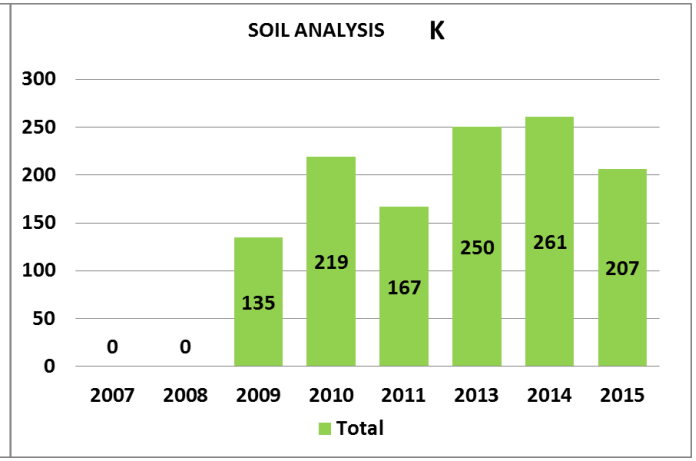
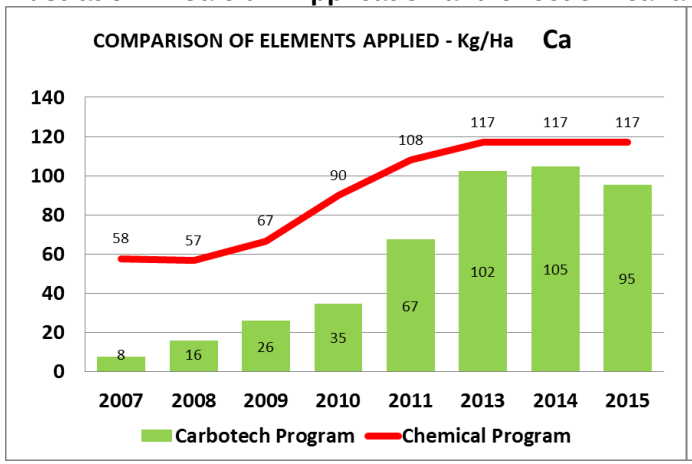
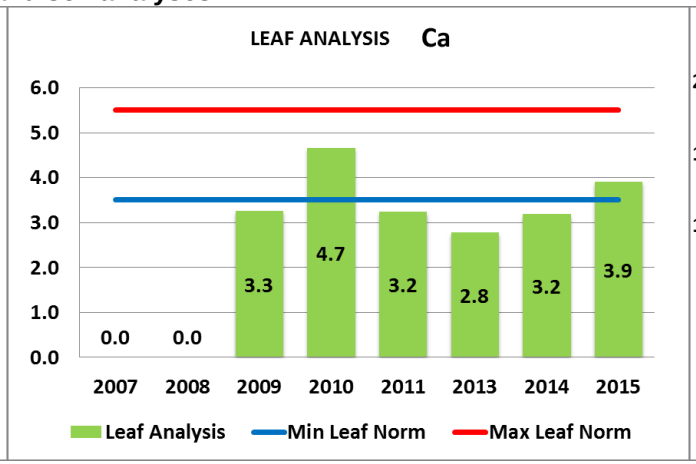


Illustration 4: Calcium Application and effect on leaf and soil analyses





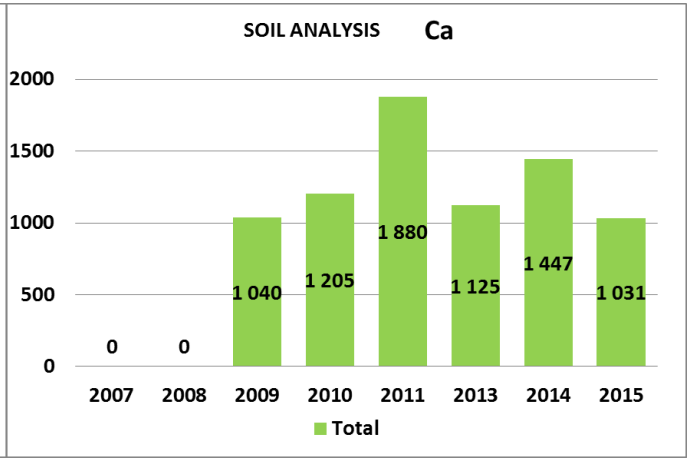
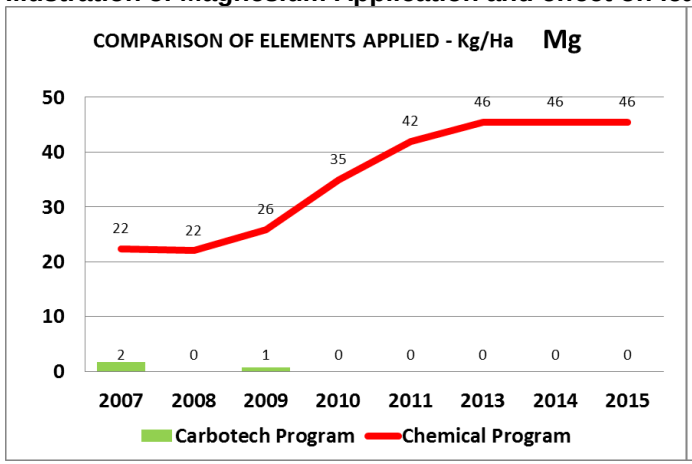
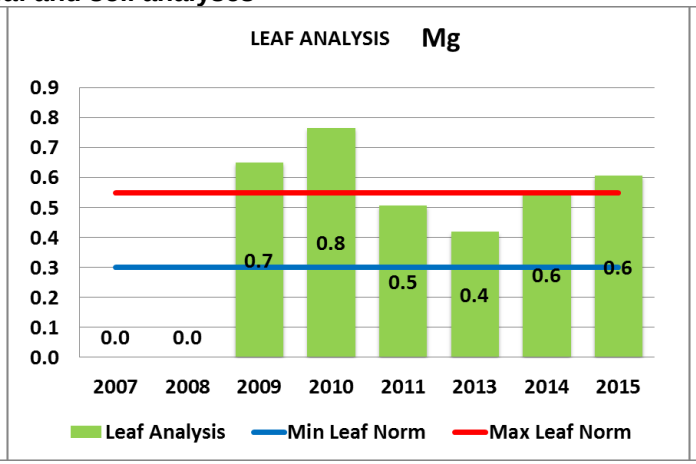


Illustration 5: Magnesium Application and effect on leaf and soil analyses





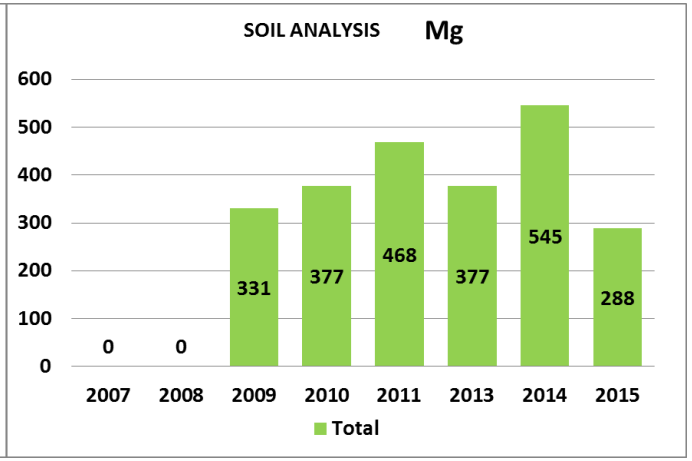


Illustration 6: Fertilizer program cost comparison and Fertilizer volume comparison

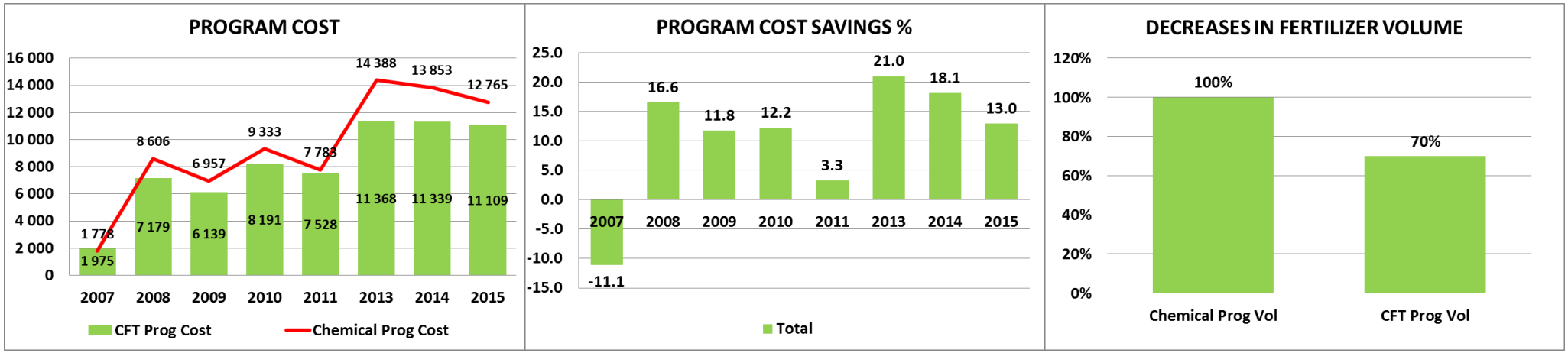
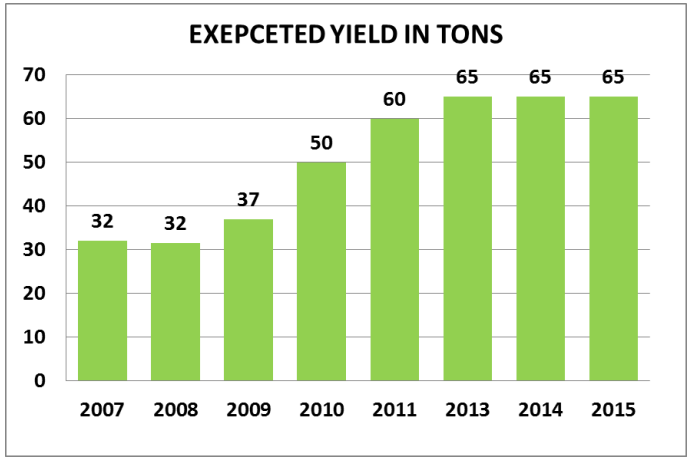


Illustration 7: Yield trends. (Planting date 2006)



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 as evidenced by subsequent leaf and soil analyses. This result corroborates findings on various other farms country wide where similar results were found.

ACKNOWLEDGEMENTS

We would like thank Mr. J Bruwer for affording us the opportunity to do these applications on his farm and Mr. Mr Herman Van Zyl for the meticulous measurements and control that allowed for the recording of these results.