Independent Trial

UK Apple Trial 2011

Boxford, Suffolk UK	**2012 – 2013**
Location	Year
Thomson & Joseph Ltd	**Apples**
Conducted by	Crop
Small plot replicated	
Trial Type	

Aim

To evaluate soil nutrient levels when applying BioAg liquid biostimulant *Soil & Seed* to fertiliser regimes.

Introduction

BioAg *Soil & Seed* is a biological liquid culture which delivers essential nutrients and metabolites directly to crops, as well as stimulating microbial activity in the soil. This fermented microbial culture contains a rich source of vitamins, minerals, proteins, enzymes, amino acids, carbohydrates and dormant beneficial organisms.

Soil & Seed is formulated to improve soil microbial activity which is a key component of soil fertility and the ability of soil to supply available nutrients to plants. Its principal features are:

- Balanced food supply for soil microbes
- Stimulates soil microbial population and diversity
- Accelerates conversion of crop residues into humus
- Improves soil moisture and nutrient utilisation

It is this latter claim of improving nutrient utilisation from soil reserves that was the basis of this independent trial.

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Method

Trial Design

Four orchard blocks of apples at the Boxford Fruit Farm—Beeston, Plough Lane, Old Barnfield (OBF) and Topcroft were each divided into a Control block (no *Soil & Seed* treatment) and a Treated block (*Soil & Seed* treatment). All orchard blocks were supplied with fertiliser nutrients through a fertigation system. The only difference between the Control and Treated blocks was the supply of *Soil & Seed*.

Treatment

Soil & Seed was applied via the fertigation system with the liquid fertiliser (8-3-5) over an 18 week period from May to end September 2012 in the treated blocks. The total *Soil & Seed* application rates are shown below.

Table 1: Soil & Seed Application Rates

Orchard block	*Soil & Seed* application rate (L/ha)
Beeston	12
Plough Lane	10
Old Barnfield (OBF)	12
Topcroft	14

Results

A representative soil sample from Control and Treated orchard blocks were analysed in November 2012 (Beeston) and March 2013 (Plough Lane, OBF and Topcroft) using the ADAS Standard Soil Analysis procedures. Soils were analysed for extractable (available) levels of Phosphorus, Potassium, Magnesium and Calcium and the results are presented in the Appendices. A summary of the soil analyses are shown below.

Table 2: Soil Available Levels

Nutrient	Control	Treated	Difference (%)
Phosphorus (mg/l)	32 (3)*	56(4)*	+75
Potassium (mg/l)	127 (-2)*	141(2)*	+11
Magnesium (mg/l)	59 (2)*	103(3)*	+75
Calcium (mg/l)	1107	1464	+32

**Indices are in parenthesis*

Mean soil available levels were 75% higher for Phosphorus and Magnesium, 32% higher for Calcium and 11% higher for Potassium on the *Soil & Seed* treatment compared to Control. In the case of Phosphorus and Magnesium this was equivalent to increasing the Soil Index by 1.

Soil Structure

Apart from the substantial increase in available soil nutrients a visual effect was observed in soil structure between Control and Treated orchard blocks. The following photographs are taken from a Control and *Soil & Seed* treated block from Beeston.

Beeston Control soil

Beeston Treated soil

It was clearly apparent when soil samples were taken from Control and Treated blocks that a marked difference in soil structure and compaction was apparent. Control soils tended to be solid and compacted whilst treated soils had a distinct structure and 'crumbly' appearance. All soils on this farm are 'heavy clay' in nature and this was borne out by the difficulty in putting a spade into the ground in Control blocks, whereas this exercise was much easier to carry out with less energy exerted on Treated blocks.

Conclusion

This farm evaluation of BioAg *Soil & Seed* has demonstrated the effectiveness of this microbial liquid culture to substantially improve the level of soil available nutrients, particularly Phosphorus, Magnesium and Calcium, and to a lesser extent Potassium.

It is well recognised that biological activity is important to facilitate the release of Phosphorus from soil reserves. Phosphorus is an essential nutrient for energy utilisation in crops to drive vegetative growth and fruiting. Of all the major nutrients Potassium supply from soil reserves into the soil solution is the least sensitive to microbial action. It is interesting to note that *Soil & Seed* was less effective in increasing the available level of Potassium than for the other nutrients.

In terms of soil structure biological activity is important to the development of stable aggregates. Soil fungi, with their thread like mycelia, help to bind soil particles together. Bacteria secrete a polysaccharide glue which holds soil particles thereby improving soil structure. Air penetration to soils and drainage is very dependent on the establishment of a stable soil structure which enables soil life to flourish and soil fertility to build.

This farm evaluation has demonstrated the benefits of *Soil & Seed* to improving soil available nutrient levels and soil structure. Future work will focus on the effect of *Soil & Seed* on crop health and production, as mediated through the positive improvements in soil fertility reported here.

Additional Background – About BioAg

BioAg is an Australian manufacturer of liquid biostimulants and natural phosphate fertilisers. BioAg's liquid biostimulant are a range of proprietary microbial cultures, specifically formulated to support different plant growth stages by improving plant and soil performance.

Each culture / product contains a:

- Balanced food supply of carbohydrates, amino acids, enzymes, vitamins, essential nutrients and growth promoters, that feed both plants and beneficial micro-organisms
- Large and diverse population of beneficial micro-organisms, including fungi, bacteria, yeast and protozoa.

Each product has been developed to:

- Stimulate soil biology and plant processes
- Feed soil biology to ensure it is active and able to interact with the plant
- Improve the balance of beneficial microorganisms in soils, and
- Provides microbial food and microorganisms into soils that are low in microbial activity or diversity due to factors such as, stress (cold, heat or water logging), lack of plant activity (fallow) and/or due to a lack of plant diversity (monoculture).

Applying the appropriate product at the requisite growth stage will support and enhance:

- Structured vegetative growth and enhance root development
- Nutrient cycling and improved plant availability of nutrients
    - Chelation of nutrients, via amino bonds
    - Conversion of in-organic nutrients into a microbial form (becomes part of the biomass)
    - Helps to unlock nutrients previously bound in soil complexes
    - Improves the flow of nutrients through the plant
- Water retention and uptake, and
- Plant vigour and tolerance to abiotic stresses.

The benefits of biostimulants can be depleted with time. In addition, as plants develop reach their next growth stage the nutritional needs of the plant also change. Applying the appropriate biostimulant, soil inoculant or foliar application, at the right time is a key attribute of any program.

BioAg's three core biostimulant products are:

1. *Soil & Seed* is a broad-spectrum microbial inoculant that assists; nutrient accessibility, nutrient solubilisation, nutrient cycling, enhanced seed germination, root development, disease and drought resistance and residue breakdown.

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2. *Balance & Grow* is a broad-spectrum source of foods and stimulants for balanced plant functions, plant health, and vegetative growth including; calcium and phosphate, vitamins, minerals, proteins, enzymes, amino acids and carbohydrates.
3. *Fruit & Balance* is formulated to increase flowering, fruit set and soil microbial activity. It delivers a rich source of plant-available phosphate when the plant is under peak load, stimulating strong fruiting and enhancing yield potential. Fruit & Balance contains a rich source of vitamins, minerals, proteins, enzymes, amino acids, carbohydrates, and growth promoters.

Each product is also available as an organic variant.

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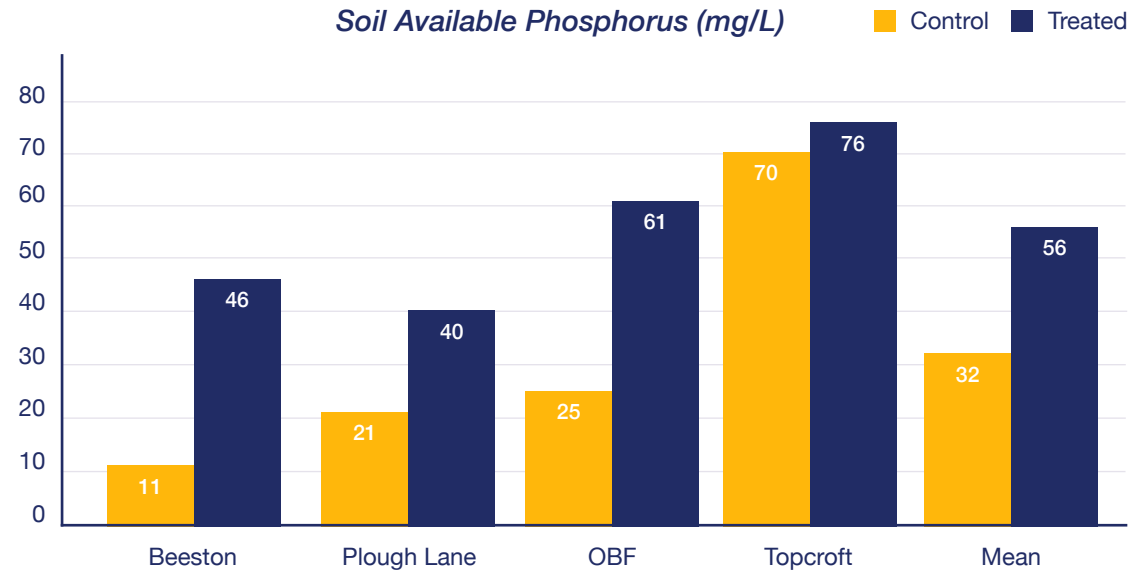
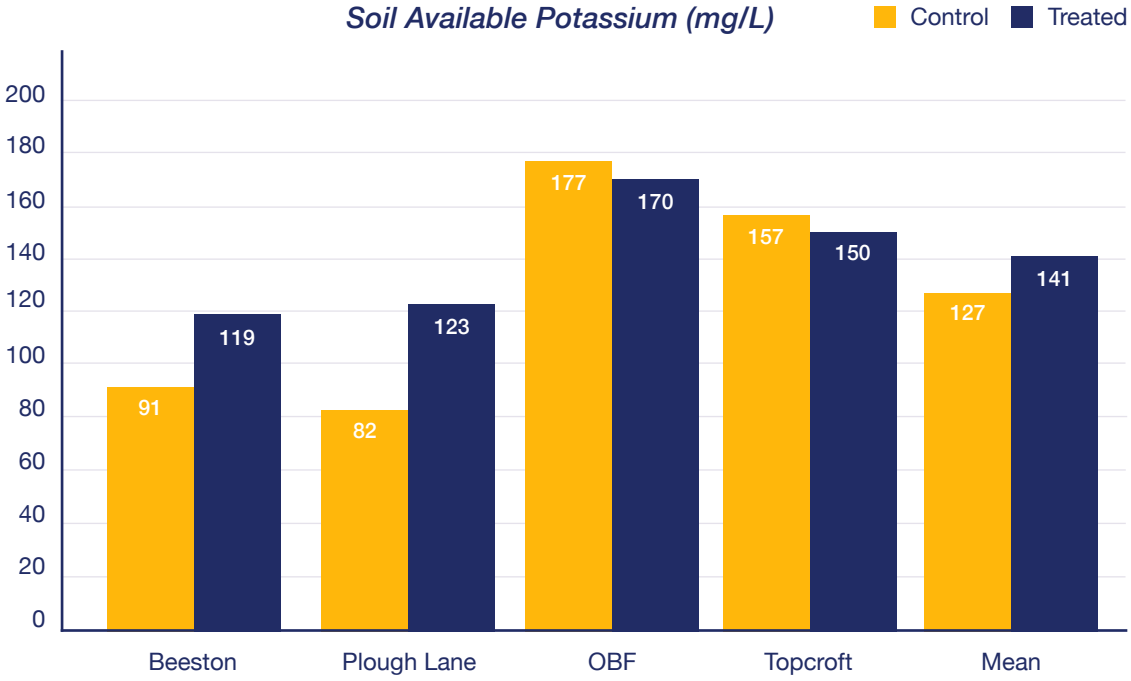
Appendices


Soil Available Phosphorus (mg/L)
Control
Treated
80
70
60
50
40
30
20
10
0
11
46
21
40
25
61
70
76
32
56
Beeston
Plough Lane
OBF
Topcroft
Mean


Soil Available Potassium (mg/L)
Control
Treated
200
180
160
140
120
100
80
60
40
20
0
91
119
82
123
177
170
157
150
127
141
Beeston
Plough Lane
OBF
Topcroft
Mean

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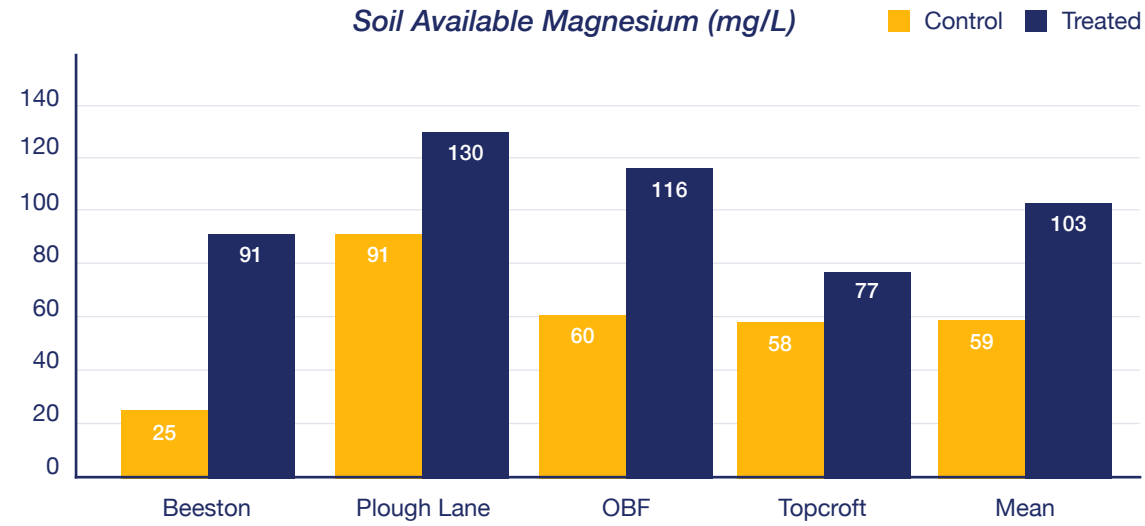

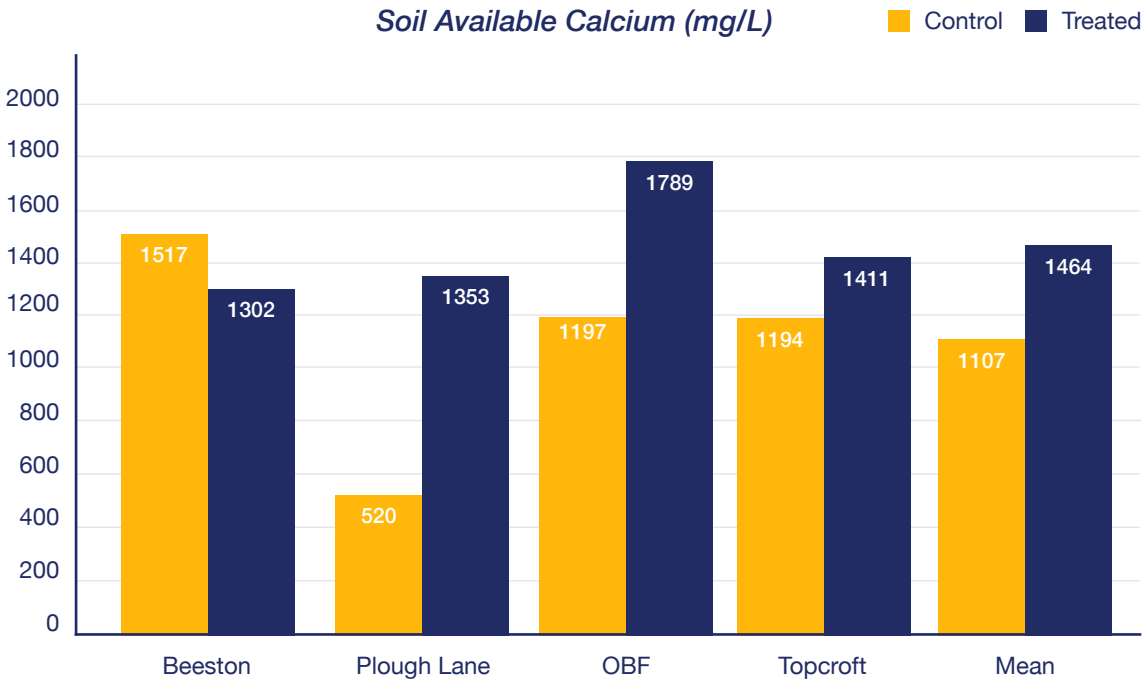

Raw Data

The trial data is available from the website **www.bioag.com.au.** For any questions or enquiries please contact your local BioAg Sales Representative.

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