



## Clare Wheat Trial 2011

Clare, South Australia	2011
Location	Year
Agrisearch Services Pty Ltd	Wheat
Conducted by	Crop
Small plot replicated	
Trial Type	

### Aim

To evaluate the impact on crop growth and yield in wheat when applying BioAg liquid biostimulants to fertiliser regimes.

### Summary

In its 2011 trial program, BioAg commissioned Agrisearch Services Pty Ltd to conduct a small plot trial on wheat at Clare in South Australia. The purpose of the trial was the 'evaluation of BioAg biostimulants for improving crop growth and yield in wheat'.

Agrisearch concluded that: 'All treatments applied except BIOAG 2730652900 appeared to slightly increase the numbers of tillers per metre of row; however the increase observed was not statistically significant when compared to the standard conventional control treatment'.

All treatments applied appeared to provide greater grain yield than the untreated control. The effects observed were not significant, however the greatest increase in yield was observed in the treatments where BioAg *Balance & Grow* was applied by foliar application at the mid-tillering growth stage

"The additional late application of BioAg *Fruit & Balance* applied by foliar application at the 2nd internode elongation growth stage did not result in any additional grain yield above that observed where the BioAg *Balance & Grow* was applied."

In considering this conclusion, it should be noted that the reason for the lack of statistical significance is the wide coefficient of variation between the sampling sites brought about by waterlogging in areas of the plot.

Notwithstanding the significance issue, there is a similar trend to that occurring in the Balaklava wheat trial conducted at the same time. The *Soil & Seed* application produced an increase in mean grain yield of 7.4%, and that of the *Soil & Seed* plus *Balance & Grow* an increase of 18.3%. As was the case in the Balaklava trial, the later application of *Fruit & Balance* produced no noticeable increase in yield for the same reasons.

By the time *Fruit & Balance* application occurred in late September, the plants were under significant moisture stress and could not or translocate nutrients effectively. Had this not been a trial with a program pre-set in Autumn, the correct agronomic decision at the 2nd inter-node elongation stage would have been not to apply *Fruit & Balance* in this situation, as there would be little or no expectation of economic gain from the application.

## Introduction

One small plot replicated field trial was conducted from June to December 2011 to evaluate various BioAg bio-stimulants for improving crop growth and yield in wheat. The trial was conducted near Clare in South Australia, Australia.

This report contains the experimental methods used and presents the results obtained. The trial was conducted under Agrisearch project BIOAG/11/02.

## Method

**Table 1: Site Details**

Co-operator	Ben Coles
Location	RM Williams Way, Clare, South Australia
Crop	Wheat
Variety	Espada
Soil type	Heavy grey clay
Site history	Barley 2010
Sowing date	21 June 2011
Sowing rate	100kg/ha
Crop management	1L ROUNDUP CT + 800mL TREFLAN pre-sow
Seasonal conditions	The winter cropping season started off wet shortly after emergence causing some water logging in the surrounding area. The spring was relatively dry though did not cause a reduction in growth.
Daily rainfall (mm)	Daily rainfall data as recorded at Clare by the Bureau of Meteorology is given in table 12 of the appendices.

**Table 2: Treatment List**

Treatment	Application Timing and Method	Rate/Ha
Standard conventional*	At sowing	-
BioAg <i>Soil &amp; Seed</i> *	Pre-sowing ground application	3L
BioAg 2730652900*	Pre-sowing ground application	2L
BioAg <i>Soil &amp; Seed</i> + BioAg <i>Balance &amp; Grow</i> *	Pre-sowing ground application + Foliar applied at mid-tillering	3L + 2L
BioAg <i>Soil &amp; Seed</i> + BioAg <i>Balance &amp; Grow</i> + BioAg <i>Fruit &amp; Balance</i> *	Pre-sowing ground application + Foliar applied at mid-tillering + Foliar at 2nd inter-node elongation	3L + 2L + 2L

\* The standard conventional treatment of 100kg MAP per ha was applied to all treatments.

### Formulations

Standard Conventional – a commercial fertiliser program consisting of 100kg MAP per hectare.

BioAg *Balance & Grow* – a fermented liquid formulation for plant and root development containing organic and non organic products as supplied by BioAg.

BioAg *Fruit & Balance* – a fermented liquid formulation for fruit development containing organic and non organic products as supplied by BioAg.

BioAg *Soil & Seed* – a fermented liquid formulation for soil microbial balance containing organic and non organic products as supplied by BioAg.

BioAg 2730652900 – a fermented liquid formulation for soil microbial balance containing organic and non organic products as supplied by BioAg.

**Table 3: Treatment Method**

Equipment	Gas operated back pack sprayer and hand boom
Method	Low volume broadcast
Walking speed	1.5m/sec
Nozzles	11001 air mix, medium spray quality
Nozzle spacing	50cm
Pressure	280kPa
Water volume	100L/ha
Boom height	50cm above target

**Table 4: Sowing Method**

Planting date	21 June 2011
Equipment	Cone seeder
Sowing rate	100kg/ha
Soil surface at planting	Direct drilled into burnt barley stubble

**Table 5: Application Details**

Date	Time of Day	Temperature (°C)	Relative Humidity (%)	Cloud Cover (%)	Wind (kph)	Crop Growth Stage
21-Jun-11	0930	15	49	20	0	Pre-sow
09-Sep-11	0900	13	58	0	0	Mid tillering
28-Sep-11	1000	14	63	40	2-4 S	2nd inter-node elongation

**Table 6: Trial Design**

Design	Randomised complete block
Replicates	4
Plot size	1.5m x 10m
Buffers	0.5m

**Table 7: Assessments**

Date	Timing	Assessment
21-Jun-11	Pre-sowing	Soil test pre-sowing
21-Sep-11	Late tillering	Plant samples (results not available at time of report writing – results will be supplied separate to this report once available)
01-Nov-11	Flowering	Tiller counts
13-Dec-11	Harvest	Yield
Not yet received	Post-harvest	Grain quality (results not available at time of report writing – results will be supplied separate to this report once available)

### Soil Sample

Prior to sowing at the pre-sowing application timing, soil samples were collected from across the trial site. Samples were collected at 0-15cm depth and sent to BioAg for analysis.

### Plant Samples

At late tillering/early jointing plant samples were cut from each plot. Samples collected were oven dried and despatched to BioAg for analysis. Data were not available at the time of report preparation and will be supplied separate to this report when available to BioAg.

### Tiller Counts

At flowering, the number of tillers per metre of row was determined by counting three randomly selected one lineal metres of row for each replicate. Data were presented as the mean number of tillers per metre of row.

## Yield

Grain yield was assessed by harvesting from each plot using a KEW small plot harvest. Data are presented as mean grain yield in tonnes per hectare.

## Grain Quality

Sub-samples were collected from each plot for grain quality testing. Parameters tested were screenings, test weight, protein and moisture. Samples were supplied to Agrisearch Services Wagga Wagga for analysis. Data were not available at the time of report preparation and will be supplied separate to this report when available to BioAg.

## Statistical Analysis

Statistical analyses were conducted using GenStat Release 11.1 (PC/Windows 2008 – Lawes Agricultural Trust, Rothamsted Experimental Station). The model includes all treatment effects. Analysis of variance and least significant difference (LSD) procedures were used.

## Results

Results are summarised in Tables 8-9 and are given fully in the appendices.

**Table 8: Results – Mean Number of Tillers per Metre of Row**

Treatment	Application Timing and Method	Rate/Ha	133 DAP 01-Nov-11
Standard conventional*	At sowing	-	62.1
BioAg <i>Soil &amp; Seed</i> *	Pre-sowing ground application	3L	62.7
BioAg 2730652900*	Pre-sowing ground application	2L	61.5
BioAg <i>Soil &amp; Seed</i> + BioAg <i>Balance &amp; Grow</i> *	Pre-sowing ground application + Foliar applied at mid-tillering	3L + 2L	77.4
BioAg <i>Soil &amp; Seed</i> + BioAg <i>Balance &amp; Grow</i> + BioAg <i>Fruit &amp; Balance</i> *	Pre-sowing ground application + Foliar applied at mid-tillering + Foliar at 2nd inter-node elongation	3L + 2L + 2L	76.2
F probability			0.593
Least Standard Difference (LSD) 5%			ns

\* The standard conventional treatment of 100 kg MAP per ha was applied to all treatments.

ns = not significant

**Table 9: Results – Mean Grain Yield (t/ha)**

Treatment	Application Timing and Method	Rate/Ha	175 DAP 13-Dec-11
Standard conventional*	At sowing	-	2.84
BioAg <i>Soil &amp; Seed</i> *	Pre-sowing ground application	3L	2.87
BioAg 2730652900*	Pre-sowing ground application	2L	3.05
BioAg <i>Soil &amp; Seed</i> + BioAg <i>Balance &amp; Grow</i> *	Pre-sowing ground application + Foliar applied at mid-tillering	3L + 2L	3.36
BioAg <i>Soil &amp; Seed</i> + BioAg <i>Balance &amp; Grow</i> + BioAg <i>Fruit &amp; Balance</i> *	Pre-sowing ground application + Foliar applied at mid-tillering + Foliar at 2nd inter-node elongation	3L + 2L + 2L	3.33
F probability			0.129
Least Standard Difference (LSD) 5%			ns

\* The standard conventional treatment of 100 kg MAP per ha was applied to all treatments.

ns = not significant

## Conclusion

All treatments applied except BioAg 2730652900 appeared to slightly increase the numbers of tillers per metre of row; however the increase observed was not statistically significant when compared to the standard conventional control treatment.

All treatments applied appeared to provide greater grain yield than the untreated control. The effects observed were not significant, however the greatest increase in yield was observed in the treatments where BioAg *Balance & Grow* were applied by foliar application at the mid tillering growth stage.

The additional late application of BioAg *Fruit & Balance* applied by foliar application at the 2nd internode elongation growth stage did not result in any additional grain yield above that observed where the BioAg *Balance & Grow* treatment was applied.

## 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.
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.**



## Appendices

**Table 10: Full Results – Number of Tillers per Metre of Row**

Treatment	Application Timing and Method	Rate/Ha	Rep	133 DAP 01-Nov-11
Standard conventional*	At sowing	-	1	54.0
			2	64.8
			3	72.0
			4	57.6
			mean	62.1
BioAg Soil & Seed*	Pre-sowing ground application	3L	1	60.0
			2	68.4
			3	64.8
			4	57.6
			mean	62.7
BioAg 2730652900*	Pre-sowing ground application	2L	1	56.3
			2	58.0
			3	50.4
			4	81.2
			mean	61.5
BioAg Soil & Seed + BioAg Balance & Grow*	Pre-sowing ground application + Foliar applied at mid-tillering	3L + 2L	1	79.8
			2	78.6
			3	82.8
			4	68.4
			mean	77.4
BioAg Soil & Seed + BioAg Balance & Grow + BioAg Fruit & Balance*	Pre-sowing ground application + Foliar applied at mid-tillering + Foliar at 2nd inter-node elongation	3L + 2L + 2L	1	80.1
			2	68.4
			3	72.0
			4	84.3
			mean	76.2

\* The standard conventional treatment of 100 kg MAP per ha was applied to all treatments.





Table 11: Full Results – Grain Yield (t/ha)

Treatment	Application Timing and Method	Rate/Ha	Rep	175 DAP 13-Dec-11
Standard conventional*	At sowing	-	1	2.7
			2	3.4
			3	2.9
			4	2.4
			mean	2.8
BioAg Soil & Seed*	Pre-sowing ground application	3L	1	2.8
			2	3.1
			3	3.4
			4	2.2
			mean	2.9
BioAg 2730652900*	Pre-sowing ground application	2L	1	2.9
			2	3.2
			3	2.9
			4	3.1
			mean	3.0
BioAg Soil & Seed + BioAg Balance & Grow*	Pre-sowing ground application + Foliar applied at mid-tillering	3L + 2L	1	2.9
			2	3.2
			3	3.8
			4	3.5
			mean	3.4
BioAg Soil & Seed + BioAg Balance & Grow + BioAg Fruit & Balance*	Pre-sowing ground application + Foliar applied at mid-tillering + Foliar at 2nd inter-node elongation	3L + 2L + 2L	1	3.0
			2	3.7
			3	3.3
			4	3.2
			mean	3.3

\* The standard conventional treatment of 100 kg MAP per ha was applied to all treatments.



## Rainfall Data

Rainfall data observations for Clare, South Australia recorded by Bureau of Meteorology station approximately 8 km from the trial site.

*Table 12: Rainfall Data*

Month Day	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11
1	0	0	1.6	0	0	25.8	0
2	0.6	0	2	0	0	0.4	0
3	0.2	0	15	0	0	0	0
4	0	11.8	2.8	2	0	0	0
5	0	0	1.4	7.6	0	10.6	0
6	0.2	3.6	5	1.4	0	0.6	3.8
7	0	0	17.4	12.8	0.6	3.4	0.2
8	0	0	0.2	7	0	0.6	5.8
9	0	0.2	4.4	0.8	0.8	0	0
10	0	0	7.2	2.6	0.8	0.2	17.4
11	4.2	0	6.4	6.2	3	0.2	0.2
12	4.8	0	0	0	0.4	0.2	0
13	5.2	0	0.4	0	0.2	0	0
14	0	0	0	0.2	0	0.6	0
15	0	0	0	0	0	6.8	0
16	0	0.2	0	1.6	0	0.2	0
17	0	1.8	0.4	33.4	0	0	0
18	0	7.4	7	3.6	0	0	0
19	0	0.2	0.4	8.6	0	0	1.6
20	0	0.2	0	0	0.8	0	3.8
21	0	20	0	0.2	0.6	7.4	0
22	9.2	3.4	0.2	0	0	0	0
23	15.2	10.6	0	0	0	0	0
24	6.4	0.4	0.2	0	0	0.6	0
25	0	0	1.2	0	0	2.6	9.4
26	0	0	0	0	0	0	
27	2.2	0	0	0.2	0	0	0
28	0	0	0	0	1	0	0.2
29	0	0	0	0	17	2.8	0
30	0	2.2	1.6	0	4.2	0	0
31	0.2		0	0		0	