

Winter 2017

In this edition

- Winter cropping - Adding to Bottom-Line Growth
- Growing More Winter Feed
- Horticulture - Tomato Update
- Maximising the return on Dual-Purpose Wheat
- BioAg is pleased to have recently released a corporate video

BioAg COUNTRY

WINTER CROPPING - Adding to Bottom-Line Growth

**“For the grain farmer, the essentials of growing wheat or canola are the same”
Australian Oilseeds Federation, 2009.**

BioAg was here

While being very different crops to grow, both wheat and canola pose similar challenges in trying to maximise yield and quality.

Before harvest, wheat plants need to achieve biomass growth focused on promotion of tillering, stem production, head elongation, sustained flowering, enhanced grain fill, and higher protein content.

Prior to grain fill and oil production in canola, the plant undergoes biomass accumulation through the vegetative stage and into the cabbaging-stage. This needs to occur before branching and flowering in order to produce and sustain pods in the reproductive phase.

By weeks 4 to 6 after sowing, cereal and canola crop yield potential is already starting to be influenced.

For *both* cereals and canola, initial root growth is driven by nutrient absorption from within soil solution.

In cereals, the extent of secondary root growth determines the plant's ability to deliver yield and finish grains post-tillering.

In comparison Canola plants achieve maximum biomass during the cabbaging-stage, and following this starts to elongate and branch.

Vegetative growth provides the “solar panels” for photosynthesis (leaves).

In turn, this aids the production of energy (in the form of carbohydrates) that the plant requires to combat stress and drive growth.

Environmental stresses occurring from mid May onwards (like water logging, cold weather, lack of sunlight and frosts) slow plant processes and photosynthesis.

Less vegetative growth occurs, less energy is captured, and therefore fewer carbohydrates are produced in the plant. This reduces the future potential yield.

Supporting plant growth early on is important to delivering improved final yields.

Minimising the negative effects of the colder months

Over the colder winter months, the biological systems in both the soil and the plant are exposed to the same environmental conditions.

While photosynthesis is occurring above the soil, the living organisms in the soil are working to drive nutrient cycles and utilise carbon, oxygen, nitrogen and root exudates.

Winter stresses slow these biological systems until either the conditions improve **or they are fed additional nutrients.**

Continued on page 2

Growing MORE Winter Feed

2016 Pasture Trial Summary

- Trials conducted in 2016 across four Australian states
- **Balance & Grow + GA + N** produced the greatest dry matter yield (+22kgDM/day)
- **Balance & Grow + GA** produced the greatest return on investment (+20kgDM/day)

In the winter of 2016, the BioAg agronomy team ran a series of trials investigating the optimisation of winter pasture growth and developing a winter-feed wedge.

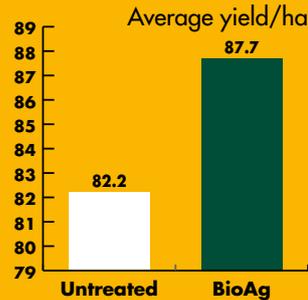
The trials were conducted in Tasmania, Victoria, South Australia, and New South Wales over predominantly improved pastures (mainly ryegrass and phalaris base).

Combinations of Balance & Grow (B&G), Gibberellic Acid (GA) and Nitrogen (N) were tested against a nil treatment.

These products were applied separately, as well as in various combinations, with the idea of evaluating what combination provided the most value in terms of dry matter production and overall feed test.

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Horticulture – Tomato Update



• +5.4 t/ha yield increase

Kagome Australia commenced tomato production near Echuca (Vic) in 1996, and has since grown to become Australia's largest tomato producer.

For the past three years, Kagome has conducted trials using BioAg products to measure their effect on tomato yields.

2016-17 Kagome Tomato Trial Summary

As has been the case in previous trials, the BioAg regime continues to provide yield increases.

For the 2016 trial, harvested on 1 April 2017, the yield increase was +5.4 t/ha.

Soil Fertility

During the season, tests were performed on the trial plot soils by Microbial Laboratories Australia (MLA) to determine what affect the BioAg regime was having on soil fertility.

The graph below illustrates the results of this test.

When compared to the control plots, the BioAg regime has increased soil health and functions in all areas and often to large degrees.

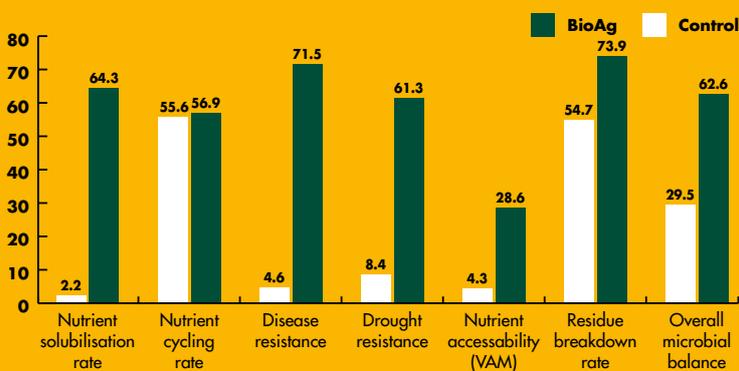
By improving the processes that occur in the soil, the BioAg products balance the nutrient supply to plants and soil-borne microbial populations, as well as stimulate and add diversity to these populations, which in turn promotes crop health and yield.

BioAg Products used in the trial

The BioAg plots received 25 l/ha of BioAg liquids applied at stages throughout the growing season, from planting to week 15:

- Soil & Seed 16 l/ha via fertigation
- Balance & Grow 5 l/ha via foliar application
- Fruit & Balance 4 l/ha via foliar application

Each of these products have been designed to stimulate and improve soil and/or plant health and processes throughout the key stages of a crops life-cycle (at planting, through vegetative growth, and at flowering or fruit-setting).



Your Soil

The ability of your farms' soil to hold and supply nutrients is critical to feeding the biological processes described above, in particular the harnessing of energy to produce carbohydrates.

"Soil conditioning" is the activation of the living component of farm soils. It occurs structurally and chemically around cation sites, improving water infiltration, which in turn supports improved root depth and the crop's water use efficiency.

Waiting too long into the season to activate or condition your soil can have negative effects on crop establishment.

Working from soil tests taken before sowing, BioAg consultants recommend those products required (be it BioAgPhos, lime, gypsum or others) to build long-term improvements in soil condition for both winter and summer crops.

Once the crop is sown and the weather turns cold, the improved soil condition can then support improved plant growth.

Supporting your Crop

Obviously, offsetting the negative impacts and stresses of winter in cereal and canola crops in the juvenile stage, will support plant growth and eventual yields.

As discussed, in the colder months soil biological processes will slow. This can lead to instances where the soil does not deliver the plants total nutrient requirements.

In these circumstances, we would consider feeding the biological processes in the soil and/or encouraging foliar uptake of nutrients.

BioAg's Balance & Grow provides both the plant and the soil with the appropriate nutrients to stimulate and support the biological systems that deliver growth including calcium, phosphate, a range of enzymes, and microbial food.

When applied as a foliar application in conjunction with a nitrogen product (such as UAN or calcium nitrate) the plant has improved access to the nutrients it requires, delivering improved growth and helping to fight stresses that may reduce yield.

Delivering yield

Supporting your crops early growth during the stresses of winter is an important factor in delivering improved yields.

Soil condition plays an important early role, while nutrient supply and sustaining the biological systems in both the plant and soil will improve winter growth and the plants ability to combat stresses.

Improved vegetative growth through winter will set your cereal or canola crop up for improved yields at harvest.

BioAg has products available for most farming enterprises including organic systems.

Contact BioAg's representatives to discuss your questions and needs. To read more about the results of BioAg's clients and trials go to our website:

Trials and Case Studies: www.bioag.com.au/trials-case-studies

Sample Programs: www.bioag.com.au/fertiliser-programs

For Organic Growers: www.bioag.com.au/bioag-products/organic

Maximising the return on Dual-Purpose Wheat



• 8.3 t/ha yield achieved after stock grazed on the crop in August

• +17% yield increase above the control

Successful farmers make the most out of every resource available to them. For some farmers, dual-purpose wheat is proving to be one of those resources.

Dual-purpose wheat is a viable option for high rainfall zones and irrigation areas, where farmers are adopting and successfully integrating it into their farming systems.

If managed correctly it can be grazed through the winter months.

This allows farmers to capitalise on the strong commodity pricing for both beef and sheep, while still harvesting a crop at the end of the season.

To maximise the return on investment for a dual-purpose cereal, it is important to have:

1. Healthy plants (above and below ground),
2. A good tiller number per square metre, and
3. A soil system that can deliver the required nutrients to a rapidly growing crop, post grazing.

The timing of the removal of stock from grazing, growing season rainfall, and the cereal variety all influence the quantity of dry matter produced and grain harvested.

How nutrients are delivered, and how plants access these nutrients plays a key role in the overall productivity of the system.

Dual-purpose wheat under trial

To evaluate the effect of a BioAg fertiliser program on dual-purpose wheat, a randomised, replicated plot trial was conducted in Campbelltown (Tasmania).

The standard practice for this region was used as the control, and the list of inputs and timings are shown in the table below.

Timing	Product	BioAg Treatment	Control (Standard)
Pre sowing	Lime	2.5 t/ha	2.5 t/ha
	BioAgPhos ⁽¹⁾	250 kg/ha	-
	Soil & Seed ⁽²⁾	3.0 l/ha	-
	Urea	-	100 kg/ha
At planting	DAP	75 kg/ha	125 kg/ha
	Seed (Revenue)	80 kg/ha	80 kg/ha
Prior to grazing	Tissue Test	Completed	Completed
Post grazing	Balance & Grow ⁽³⁾	3.0 l/ha	-
	Calcium Nitrate	15 kg/ha	-
	Urea	-	200 kg/ha
Flag leaf emergence	Fruit & Balance ⁽⁴⁾	2.0 l/ha	-
	Total solid inputs (kg/ha)	2920	3005 (+85 kg/ha)
	Total liquid inputs (l/ha)	8	0 (-8 l/ha)

1. BioAgPhos – A biologically inoculated reactive phosphate rock

2. Soil & Seed – A microbial inoculant, containing a diverse range of micro-organisms and a complexed food source

3. Balance & Grow – A fermented liquid culture designed to supply the plant metabolites required for vegetative growth

4. Fruit & Balance – A fermented liquid culture formulated to enhance the plants natural ability to shift its reserves from vegetative to reproductive

Planting of all plots occurred on the 16th of May 2016. They were allowed to grow, without any grazing pressure until mid August.

Once introduced, stock were allowed to graze up until the 30th of August, which was the growth stage GS30.

The plots were harvested on the 21st of January 2017, with both a yield and grain quality assessment completed.

The BioAg plots increased yield by 17% over the control (1.2 t/ha).

The strategy behind the BioAg treatment was to encourage a healthy and exploratory root system early, and to enhance tiller numbers per plant.

When this is achieved, plants have a greater capacity to respond following grazing with new vegetative growth, and the increased tiller numbers translates to increased grain heads per square meter, and thus yield.

The trial data highlights that the BioAg treatment produced a statistically significant yield response over the control.

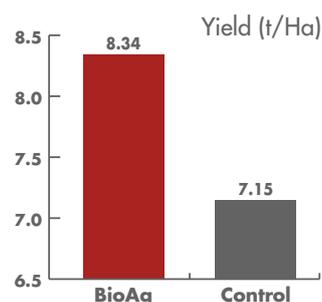
This was achieved from improved tillering and recovery post grazing, which can be seen in the grain head count per square metre.

It is also evident that the increased yield and lower late season nitrogen application of the BioAg treated plot has restricted the protein accumulation in the treated area, compared to the control.

The use of BioAg biostimulants and sustained release phosphorous will be evaluated again next season.

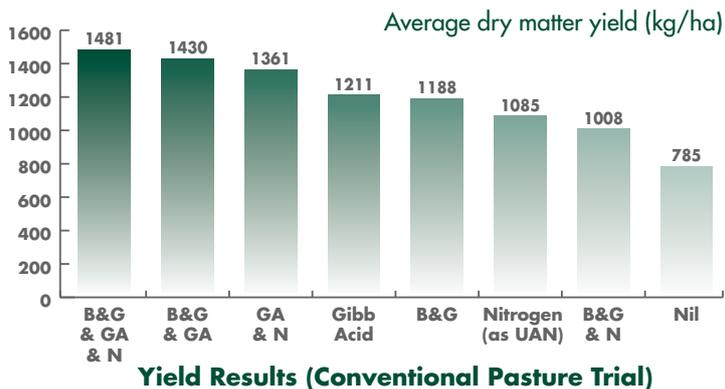
The new trials will include an increase in post grazing nitrogen application with the objective of improving protein in a higher yielding crop.

BioAg products have previously been trialled on wheat, with yield increases from those trials averaging 23%. Full reports for these and all other BioAg trials are available at www.bioag.com.au/trials-case-studies.

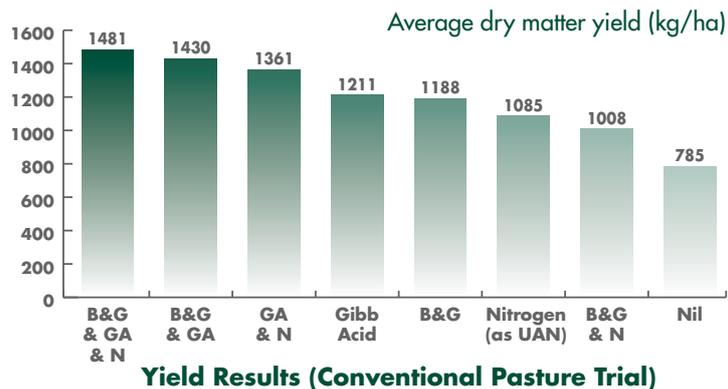


	Plants/m ²	Yield (t/ha)	Head Counts/m ²	Test Weight (kg/HI)	Screenings (%)	Protein (%)	Moisture (%)
BioAg Treatment	181.3	8.34 ^a	689	60.6 ^b	2.76 ^b	12.53 ^b	11.87 ^a
Control	196.0	7.15 ^b	675	64.57 ^a	0.65 ^a	13.57 ^a	11.67 ^b

Note: The results followed by a different letter indicate a statistical significance between the treatments



Yield Results (Conventional Pasture Trial)



Yield Results (Conventional Pasture Trial)

Results

Dry Matter

Comparing the results from each trial site, the most effective combination for producing more dry matter was **Balance & Grow with GA and N**.

This gave an extra 22kg DM growth per day over the treatment period (average of 32 days over the June/July months).

The best individual treatment (over all plots in all states) was a B&G with GA treatment in Northern NSW, which grew 2 tonnes/ha of extra dry matter over that of the nil treatment.

Both these combinations (B&G/GA/N and B&G/GA) produced statistically significant growth compared to the nil treatment. All treatments gave a positive result over the nil treatment.

Cost per Hectare

The 3-way mix of B&G, GA and N gave the greater yield, but was also the most costly on a per hectare basis (\$42.50) for 22kgDM per day of growth.

The B&G/GA treatment only cost \$24.50 per ha to give a very similar result (an additional 20kgDM per day over the period of the trial).

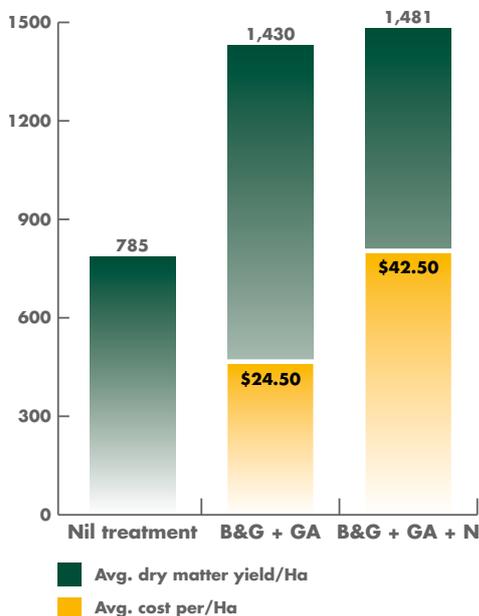


Chart comparing the two most effective treatments in the trial, and their cost per hectare.

2017

The trials will be repeated again this year to gather more information on the best ways of developing a winter-feed wedge.

For the Organic Growers

There is currently significant interest in organic pastures systems, particularly dairy.

One of the perceived limitations with organic pasture systems is providing enough pasture growth through the winter months.

The alternative is generally supplementary feeding using more expensive organically certified grain or hay.

Another component of this trial was to test similar strategies in organically certified combinations.

This part of the trial tested:

- Balance & Grow (Organic) (B&G Organic)
- Gibberellic acid (GA), and
- Fish meal (as an organic source of nitrogen, replacing UAN)

The results of the organic pasture trial mirrored the conventional pasture trial,

where the combination of the three products provided not only the most dry matter production over the control, but also the greater level of protein, digestible carbohydrates and metabolisable energy.

Whilst the cost of the three products applied as a foliar is more expensive than the conventional alternative (because of the fish meal), it is still a far cheaper option than buying organically certified grain or hay.



Photo showing the typical response to Gibberellic Acid applications (bleaching of leaf) but also the extra growth over that of an untreated plot (back).

BioAg is pleased to have recently released a corporate video

The video aims to provide an overview of BioAg, its capabilities, its innovation in product development, and its innovation in agricultural programs. While many view BioAg's products as its main innovation, these are really tools used to deliver the real outcomes of BioAg programs, which is increasing the health and fertility of farms and soils, while sustaining intensive agriculture.

If you are interested in viewing the video, there are a couple of ways to see it. **BioAg Home page:** Visit our home page www.bioag.com.au and scroll down until you see the video. **BioAg YouTube channel:** Visit www.youtube.com and search for BioAg Australia. On our channel you will find the corporate video, along with some past videos that may be of interest. Enjoy!



Better soils. Better crops. Better stock.™

For more information, phone 02 6958 9911 or visit www.bioag.com.au