



## “To fertilise or not?” That is the question.

### *And the answer – you will wish you had when it rains.*

There is no doubt that making the decision about buying and applying fertiliser is difficult right now. El Niño has officially been declared, signalling hot dry conditions ahead...again. Farm input costs are up, and livestock prices are down. But as history has shown, the rains will return, and market prices will rebound.

When times are tough, how you manage through is as important as how you make the most of opportunities when they occur. For any pasture operation, this means getting the most and best quality feed growth from every rain event.

‘Every drop counts’ as does ‘every blade of grass’ in challenging times. The value of hay, silage and farm produce only seems to go up when it is dry. To get the most from any rain event, fertile soils are required. Turning every millimetre of rainfall into plant growth is multiplied when soils are fertile.

### How fertile are your soils

You may assume your soils are okay as you have prepared them the same as previous years, or only missed one season. However one good growing season can extract a lot of nutrients from soil, depleting fertility. Some regions have had 3 good-to-wet seasons resulting in visibly ‘tired’ paddocks due to good crops, significant grazing, and leaching and runoff losses.

The most accurate way to determine any living thing’s health level, including your own or your soil, is to test. Most of us have blood tests to measure our health, so too analysing your soil via a comprehensive annual soil test is just as important. Accurate soil analysis means you will only apply what the soil needs, rather than wasting money or risking further soil imbalances by applying nutrients the soil does not require.

### Smart fertilisers

History has shown that after long dry periods, major rain events that follow can cause significant damage and loss of soil fertility due to binding (tie-up in acidic soils), leaching or runoff. So if you are going to put the work and investment into soil fertility, choose wisely and use fertilisers that are less susceptible to those types of losses.

BioAg’s *BioAgPhos*<sup>®</sup> is a high-grade reactive phosphate rock, composted with a proprietary phosphate digester. By replacing water solubility with microbial digestion, nutrient lock-up and leaching losses are negated. *BioAgPhos* can be spread at any time of the year, not just before a predicted rain event. It is ideal for both an immediate and long-term phosphorus (P) source, designed to work over 2 years with little to no loss pathways. *BioAgPhos* has 30% immediate plant-available P, while the remainder is released over the next 1 to 2 years. It will also help build background levels of P in the soil and contribute to neutralising, due to the calcium content and natural alkalinity.

### Plan to be ready

Soils are an ecosystem, alive with living organisms including worms, fungi, insects, bacteria, as well as minerals and organic matter. Nutrients in soil need to be in balance if the soil is to be fertile, ready to support plant growth.

Check your soil fertility to establish a benchmark analysis, build fertility and rebalance nutrients if required so that your soil is ready to support and maximise plant growth when it rains, making the most of every millimetre of rainfall. *(continued on pg 2)*



# “To fertilise or not?” That is the question.

## Biennial benefits

If *BioAgPhos* is on the ground, you know it will start working and be available for any rain event, and you get more P for your money as 100% of the P becomes available over time. The P is also not degraded by small rain events, unlike for synthetic fertilisers where even a small amount of rain can see all the P locked-up in an antagonistic soil. For *BioAgPhos*, the crop or pasture will only use the P it needs to support growth across multiple smaller rain events. Whether it takes 2 or 4 years for significant rains, *BioAgPhos* will be on the ground ready to supply plants with the P they require.

Given the sustained release nature of P, *BioAgPhos* can be efficiently applied every second year, and we have many customers doing just that. It can be blended with other soil nutrient additions your soil may require, providing significant savings on spreading costs and your time.

Beef producers, Jamie and Virginia Bond near Tooma NSW have traditionally applied *BioAgPhos* to half of their farm each year, rotating application annually over each half of the farm. This has allowed high production levels to be maintained without depleting their soil reserves; improved soil health and carrying capacity; and significantly increasing the organic matter over the past 20 years which is critical in improving soil water holding capacity.

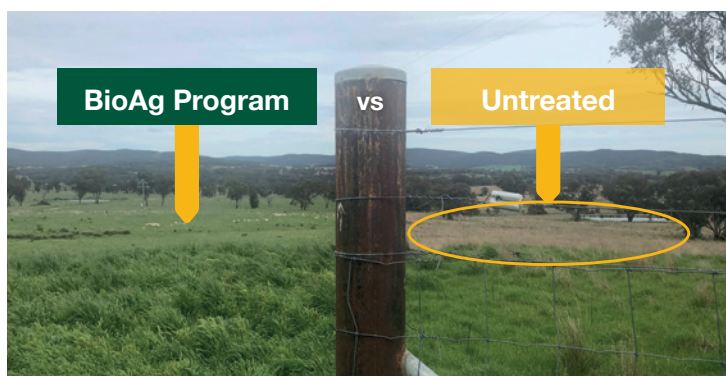
Consistent biennial *BioAgPhos* application over the years, has also improved the base levels of Phosphorous and Calcium allowing them to look at other nutrients to further aid in soil balance and fertility. In recent times, lime and gypsum have been mixed in with *BioAgPhos* to increase nutrients and help reduce acidity. Trace elements like Boron and Molybdenum are also starting to be added to the Bond's bespoke blended applications.

Scan for the Bond's Case Study on our website



It is a big call in current conditions as to what to do about fertiliser application, but maintaining soil fertility will be key to taking advantage of any future rain event – unpredicted or forecasted.

**By being smart with your fertiliser choice, you can balance-up the risk and concern of spending money during tough conditions, with the knowledge that your soil is ready to take advantage of any rainfall when it occurs.**



To make the most of any rain - soil fertility is key.

# #Gippsland – a place of all kinds of wonder

The Gippsland region in southeastern Victoria stretches from outer Melbourne, along the south-east coast of Australia to the NSW border.

It is considered the powerhouse of Victoria's natural resources and commodities economy with the location of key sectors including agriculture, power generation, dairy, forestry, fishing, tourism... the list goes on. The region is also rich in natural attractions such as unspoilt beaches, rainforests, snowfields and trails.

This year, BioAg's area managers Slobodan Vujovic and Peter Emerson, exhibited at two of the region's large agricultural events: the East Gippsland Field days in Bairnsdale, and South Gippsland Dairy Expo in Korumburra.

Around one third of the Victorian dairy industry and approximately 20% of the beef industry, are based in the Gippsland region. With a combined industry value of almost \$2B and employing over 6,000 people, BioAg recognises the significance of this key food bowl region.



“The level of enquiries from farmers looking to replace chemical fertiliser has doubled in the past 5 years. I am seeing rising consumer driven demand for products that use natural fertilisers,” commented Russel Dryden, agronomist with Godman Seeds in Bairnsdale.

With increasing demand from consumers for more natural products and less chemical inputs, the Gippsland region will certainly benefit from BioAg's proven natural highly-reactive phosphate rock fertilisers and biostimulants.

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# Liquid Boosts for Permanent Plantings

**There are certain times within the growing cycle of a crop that can do with a boost to help nature's processes along.**

Restoration of soil biological, chemical, and physical properties particularly after harvest, is crucial to sustaining future yields and quality, building soil fertility and maintaining high performing soils ready for the next crop.

## Post-summer harvest and winter cropping period

Nutrient supply to plants is heavily determined by soil characteristics. Mineral shortages or cation imbalance, heavy and waterlogged soils or low oxygen levels in soils will have a negative impact on crop nutrient supply and uptake, notably at establishment.

Winter crops emerging require proximity to nutrients for initial uptake. The plant then establishes soil microbial associations and root mass to access additional nutrients. Many common farming practices deplete the level of beneficial organisms in the soil.

For permanent plantings, post-harvest is a critical period for crop recovery and how well a crop recovers is aligned to next seasons harvest.

Post-harvest in permanent planting and sowing for winter crops is the time to consider a broad-spectrum balanced food supply of carbohydrates, amino acids, enzymes, vitamins, essential nutrients and growth promoters, that feeds both plants and beneficial soil micro-organisms. A strong soil microbiome provides the best opportunity for supply of nutrients to crops even in poorer soils.

BioAg's *Soil & Seed*<sup>®</sup> biostimulant improves soil structure, thereby increasing nutrient and moisture retention in the soil and greatly reducing the amount of nutrient lost through leaching. It encourages rapid germination and early root development and helps buffer the crop against stresses such as pests, heat, frosts, drought, and disease.

*Soil & Seed* is an excellent soil microbiome builder, feeding and expanding the volume and diversity of beneficial soil micro-organisms. In turn improving nutrient solubilisation, cycling and uptake and improving soil properties mitigating heavy clay, and issues associated with high magnesium levels.

*Soil & Seed* increases plant establishment rates for row and broad-acre cropping, acts as a plant growth stimulator due to the available complex organo-chemical composition that includes macro- and microminerals, free L-amino acids, carbohydrates, humic compounds, and vitamins.

Versatile in application, *Soil & Seed* can be applied using fertigation, soil applied, seed-applied, or foliar boom spray. It can be mixed in with other common tank blends including calcium nitrate, UAN, dissolved urea, micro-nutrients and other foliar applied products.

**Treated Crop** – Sulsa with BioAg's *Soil & Seed*<sup>®</sup> Biostimulant liquid injected at 4L/ha at sowing (no flutriafol)



- larger root network with more secondary roots; improving access to soil nutrients and moisture, enhancing the crops inherent resilience

**Untreated Control** – Sulsa + Flutriafol liquid injected at sowing



- typical conventional system root growth

## Fruit fill and maturation

Nutrient requirements vary depending on the crop growth stage. Close to maturation tree crops and vines are accumulating sugars and building yield characteristics such as sugar to acid ratio and colouring.

BioAg's *Fruit & Balance*<sup>®</sup> is a fermented microbial culture that contains a rich source of vitamins, minerals, enzymes, amino acids, carbohydrates that supports fruiting and are beneficial for fruit quality improvement and increases resilience to abiotic stresses such as heat, salinity and water stresses. It is a natural bio-chelator of water-soluble nutrients and trace element salts. It also delivers a readily available source of phosphorus at a time when permanent plantings and crops have a peak demand.

*Fruit & Balance* also enhances the nutritional value and quality of fruit by supporting plant functions that increase sugar levels, improve fruit firmness and storage quality and reduce fruit splitting.

Both are recommended as foliar applications in a tank mix with any required nutrients for management of deficiencies or uptake issues; due to factors such as pH or high cation antagonism\*.

Scan codes for  
more information  
on Nutrient  
Use Efficiency



\* Interaction among plant nutrients can yield antagonistic or synergistic outcomes that influence nutrient use efficiency. High cation antagonism refers to when the yield response of two nutrients when combined is less than expected from the individual nutrient responses.

# What Rock Phosphate really Rocks? BioAgPhos® vs other Rock Phosphates

**Phosphorus (P) is one of the important nutrients for plant growth. It is vital for seedlings and young plants as it is a component of plant cells, essential for cell division and development of the growing tip of the plant.**

But not all rock phosphate is equal.

Phosphate rock is a natural mineral and variations can occur from deposit to deposit and within single deposits. There is no standard in Australia that phosphate rock must meet to be classified as an effective fertiliser.

In the 1990's the CSIRO performed a detailed evaluation of the effectiveness of phosphate rocks as a fertiliser, comparing and classifying several phosphate rocks from across the world.

*Table 1 – The table below provides a summary*

Rock	Source	Total P (%)	Reactivity*	Solubility in 2% citric acid (1st extraction)	Solubility in 2% formic acid (1st extraction)	Solubility in neutral ammonium citrate (2nd extraction)
Sechura	Peru	12.9	High	40	70	9
North Carolina	USA	12.7	Mod High	36	74	8
Egyptian	Egypt	12.7	Mod	31	49	8
Khouribja	Morocco	14.2	Low Mod	28	56	7
Duchess	Queensland	10.5	Low	30	45	5

*Table 1 – The use of citric and formic solubility is common when evaluating phosphate rocks for use as a direct application fertiliser. This table provides a guideline on reactivity, but also a comparison to alternative phosphate rocks.*

*\* Reactivity is based on a subjective grouping based on the solubility results achieved.*

BioAg's natural solid fertiliser range is manufactured using Algerian rock phosphate. Algerian phosphate rock is known as a highly reactive rock that is suitable for use as a fertiliser in the right soil and climates. It has been analysed by independent laboratories and contains between 12.7% to 12.9% P of which 35% is extractable in dilute citric acid, 70% is extractable in dilute formic acid and approximately 6% is soluble in neutral ammonium citrate (2nd extraction).

In comparison to the phosphate rocks evaluated by CSIRO, the Algerian Rock would be considered in the range of moderately high to high reactivity. As a comparison, Duchess Rock from Queensland (tailings from the beneficiation process are sold in the market as Soft Rock or Colloidal Rock), has around 10.5% P and was rated as being of low reactivity. Therefore Algerian Rock has greater value on two fronts: 1) higher in P content; and 2) higher reactivity. A higher-grade reactive phosphate rock naturally produces a high-value phosphate fertiliser, making the BioAgPhos® range of natural solid fertilisers excellent value and highly effective.

Although phosphate rock is natural, it is used to produce synthetic P fertilisers. Solubility of P in industrial chemical P fertilisers is enhanced with the application of inorganic acids, such as sulphuric acid.



BioAg however maintains the natural nature of phosphate rock by inoculating and composting it with a proprietary phosphate digesting culture. The culture contains microbial food sources, enzymes, metabolites, and phosphate solubilising micro-organisms. It is these soil micro-organisms that play a key role in transforming organic forms of soil P into plant available forms.

The release of P from *BioAgPhos* occurs as plant acids decompose its mineral structure and the organic (composted) matter within *BioAgPhos*, into plant-available forms. 100% of the P in *BioAgPhos* is bio-available, with around one-third available immediately, and the balance released over the long-term based on soil conditions, length of growing season, and size of the root zone. Losses and lock-up are a hidden cost of P fertilisers but can be combatted through your choice of fertiliser. Even in the most productive soils, with high organic matter, losses of P are experienced. These losses can be due to runoff from the topsoil, leaching through the root-zone, or lock-up by soil antagonists. The sustained release of P from BioAg's phosphate fertiliser range reduces lock up or leaching.

A comment from Mark, one of our long-time users of the *BioAgPhos* range in Tasmania:

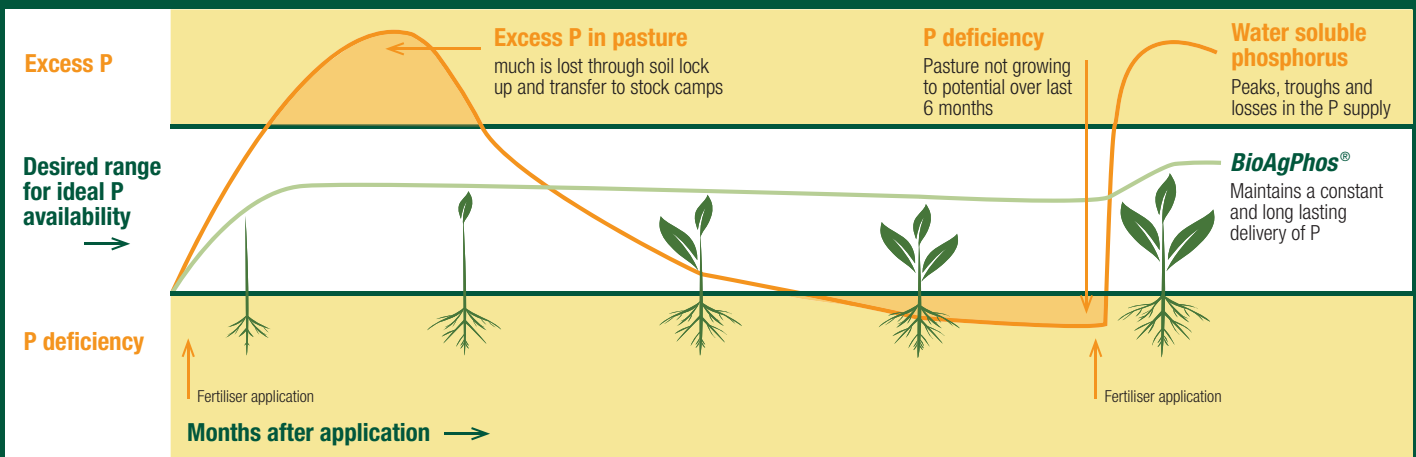


With a third of P, S and Ca immediately available and the other two-thirds sustainably and steadily released over a 2-3 year period, we've only needed to apply **BioAg Superb®** every other year, which has saved us a lot in input, storage and application costs, and importantly time.



A clear conclusion then – it's the *BioAgPhos* range that really rocks out of all the phosphate rocks!

## Phosphorus Availability | Water soluble phosphate vs. *BioAgPhos*®



## Distributor Spotlight – Ag Warehouse Bega

BioAg products have been well supported on the south coast of NSW for many years. Ag Warehouse recently purchased Bega Agricultural Services to become Ag Warehouse Bega.

Agronomist David Croxford finds that BioAg's solid natural fertiliser *S10*® (P 11.4%, S 10.0%, Ca 32.0%) works particularly well in the typical high rainfall environment of the NSW south coast. By replacing water soluble fertiliser with *BioAgPhos S10* containing elemental Sulfur, nutrients are not lost through runoff or leaching. Sustained release of nutrients is also a benefit, with one third of nutrients immediately available, and the remainder released over 1 to 2 years. The prolonged release characteristic allows for effective and cost-efficient biennial spreading or rotational spreading across a large property.

The use of *BioAgPhos* based fertilisers in this area also meets the principles of the Clean Coastal Catchments project to reduce fertiliser run off into waterways and environmental impact.



Speak to David or the team at Ag Warehouse Bega about your soil needs today. [agwarehouse.com.au](http://agwarehouse.com.au)

# Just a Trace – *Micro in nature, but MIGHTY in impact.*

**The name ‘Trace Elements’ does little to highlight the importance of these powerhouse ‘micronutrients’ to crops, pastures and stock health. ‘Trace’ referring to ‘only present or only required in minute quantities.’**

Grass tetany for example, is a highly fatal disease associated with low levels of magnesium in the blood of livestock, particularly lactating cows. It can impact and devastate a herd quickly and must be acted upon immediately. Prevention is of course better and cheaper than dealing with an outbreak. Other trace element deficiencies are less visible than grass tetany, but equally highly impacting on grower returns.

## Limiting factors – Liebig’s Law

Typically when budgets are tight, it is micronutrients that are reduced or deleted altogether from a soil fertility program. Yet these micro-workhorses may in fact be the ‘limiting factor’ on crop growth, yield, quality or stock health. In BioAg’s Winter/Spring 23 newsletter, we explained Liebig’s Law – one of the key soil analysis principles. Liebig’s Law of the Minimum states that if one of the essential plant nutrients is deficient, plant growth (which flows onto stock health) will be poor, even when all other essential nutrients (macro and micro) are abundant.

Trace elements when in deficit or excess, will influence crop yields and stock production, therefore balance is required for a positive results and returns.

**So is cutting back on trace elements really the right decision? In short, no.**

Three key micronutrients to consider are Boron, Zinc and Copper.

**Boron** plays an essential role in cell wall development, crop pollination, fruit development and translocation of sugars. As Boron is relatively immobile in plants, a constant supply is needed during the growing cycle. The difference between adequate, deficient, or toxic levels of Boron is small, so understanding the dynamics of release, soil pH and availability are important.

A deficiency can be observed in several ways, but its largest impact will be on seed or fruit yield and quality. Most soils carry reserves of Boron in soil organic matter. Boron is released as organic matter decomposes; however it does not bind with soil colloids and therefore is easily leached. A healthy soil with robust levels of soil organic matter and sustained release Boron fertilisers are key practices to ensure Boron is continually supplied to crops or pasture through soils. Alternatively low frequent foliar applications can be applied.

**Zinc** is one of the most common deficiencies in crops across Australia. It plays a key role in plant, stock, and human health. Soil pH, organic matter, and VAM (vesicular arbuscular mycorrhiza) all have a major impact on the availability of Zinc in soils. Importantly, chelating agents in soil organic matter will increase solubilisation and uptake by plants.

Deficiencies are typically observed as chlorosis in sections of leaves or as chlorotic bands in cereals and grasses. Zinc deficiencies can be rectified through application of Zinc in fertilisers or in foliar sprays, though understanding the impacts of soil pH, soil organic matter, enhanced root growth and VAM and the interaction of soil phosphate and calcium levels on Zinc availability and plant availability should be considered.

**Copper** is an essential micronutrient for healthy plants and stock. It plays an important role in metabolic processes, such as chlorophyll production, photosynthesis, plant metabolism, nitrogen fixing and is essential for wheat pollination. While deficiencies of Copper are not as common as Zinc, the importance of Copper to yields and quality means it needs to be monitored. Copper is used in small quantities by plants but cannot be translocated and therefore a continual supply is needed. It also has a narrow band between deficient and toxic levels. Copper, Iron and Zinc ions are similar in size and charge and can inhibit each other.

Deficiencies are commonly observed as chlorosis in the growing tips of plants or die back in shots and sprouts. As a common element in fungicides careful monitoring and testing is important.

A range of products can be used to supply Copper, but with consideration of factors such as soil pH and levels of zinc and iron.

## Micro’s matter

The importance of micronutrients cannot be underestimated. Providing these through your soil, through fertilisation or accessing unavailable reserves through microbial activity, is typically the most cost-effective method. Use of foliar applications is also a solution; especially for key or peak demand periods or to counter an unexpected deficiency. Foliar applications of micronutrient salts with natural chelators such as BioAg’s *Balance & Grow*® provide a cost-effective foliar solution that can be applied with other nutrients or chemicals.

Ensuring key micronutrients are available will ensure you get the most from your investment in macronutrients such as Phosphorus, Nitrogen and Potassium.

BioAg offers a full range of trace elements for blending with our range of solid fertilisers, as well as a proprietary range of specialised products with unique characteristics and benefits.



Zinc deficiency in citrus crop

Scan for all elements  
essential to plant growth

# Impactful results even in challenging seasons

## Organic Wine Grapes

In BioAg's Winter/Spring Newsletter 2022, we wrote about a leading Australian wine producer seeking ways to improve the yield and quality of their organically grown grape crop. BioAg readily accepted this opportunity/challenge and has been working with the producer in their Riverina vineyards over the last 3 years. We are now pleased to provide the results and analysis undertaken on the Demonstration site.

A 12ha demonstration block of organic Shiraz vines was allocated for the Demonstration project, undertaken from May 2021 until March 2023 (harvest seasons 2022 and 2023). Soil tests were performed at the end of each harvest season to determine benchmarks for the seasons ahead.

BioAg designed a nutrition program based on soil tests results; the producer's objectives to improve quality and yield; and consideration of historical issues at the site.

## Bespoke program

The objective at the start of the program was to maintain adequate to good levels of Phosphorus (P), Calcium (Ca) and Sulphur (S) levels, and to decrease Magnesium (Mg) and Sodium (Na) levels. The nutrition program utilised our natural solid fertiliser *BioAgPhos*<sup>®</sup> with an ameliorant (gypsum) to improve soil macronutrient levels and soil physical properties. *BioAgPhos* has P 12.3%, Ca 35% and S 1% and releases around one-third of those nutrients immediately, with the remainder released over 1 to 2 years.

In addition, soil testing identified key trace elements Manganese (Mn), Zinc (Zn), and Boron (B) as being moderate to low and were these were incorporated into – the nutrition program.

Micronutrients were applied in combination with BioAg biostimulants at key growth stages. These biostimulants provide important nutrients and metabolites specific to the stage of growth and are natural chelators of highly affordable micronutrient salts, aiding their adsorption and reducing losses to antagonists.

Soil inoculants and run-off from foliar applications also feed soil biology; increasing the numbers and diversity of beneficial soil micro-organisms; improving key properties related to soil biology (*Soil & Seed*<sup>®</sup> and *HydraHume*<sup>®</sup>); stimulating early vine vegetative growth (*Balance & Grow*<sup>®</sup>) and improving fruit set and development (*Fruit & Balance*<sup>®</sup>). Early season improvement in soil biology stimulates root growth and improves nutrient cycling and availability by creating organic complexes that aid nutrient absorption.



Scan to view full program,  
soil analysis and results



## Grape Yield and Quality

Year	Variety	Baume	Colour	Yield T/ha
Before 2021	Shiraz	13.6	1.1	9.6
Demo 2022	Shiraz	13.1	1.3	8.9
Demo 2023	Shiraz	14.4	1.2	11.1

## Results

The 2021 to 2023 seasons were colder and wetter than normal/ average seasons, hindering growth across all the producer's operations (conventional and organic). While the nutrition program ensured vines had access to all critical nutrients, the climatic conditions impacted both the yield and quality of the grapes.

Yields of around 10T/ha in organic production are considered 'good'. The impact of weather conditions was also evident in the yield results at a conventional block of the same Shiraz variety which were below 10T/ha in 2022 (target yield for conventional systems is in the range of 18 to 22T/ha).

Despite the wet and cool conditions, the producer noticed a significant improvement in crop growth throughout the season compared to prior years. There was clear benefit from the post-harvest solid fertiliser applications which supported vine recovery and nutrient uptake prior to dormancy. This in turn supported early season vigour, with important growth stages supported with foliar applications.

The weather conditions induced a higher risk and increased occurrence of Downy Mildew and Botrytis across the entire vineyard. However, the BioAg demonstration block suffered fewer incidents of disease compared to all other blocks, including the chemically treated conventional blocks. This was achieved by supporting early growth and key growth stages, ensuring the vines were stronger and healthier and therefore better able to combat disease and stress themselves, without the need for additional chemical treatments.

The demonstration has shown the Vineyard Manager the benefit of balanced nutrition programs and the use of biostimulants to support crop physiology and nutrient cycling and uptake, and how biostimulants aid in the use of lower cost inputs. The outcome is they are now incorporating the program into several conventional blocks.

# BioAg in the field



A recent field visit by some of the BioAg team to a canola Demonstration crop in Southern NSW that is utilising a bespoke BioAg soil health program - it's looking the goods, given heads and shoulders only in view.

## Christmas Break

The BioAg team including our Narrandera head office and plant and the Geelong Quarry site, will be taking a break over Christmas and the New Year.

We will be closed Monday 25 December, reopening Tuesday 2 January 2024.

Please contact 0418 367 326 for emergencies or urgent product collections during this time.

We thank you for your continued support during 2023. We wish you and your families a safe and happy festive season and look forward to our continued association in the New 2024 Year.



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