Independent Trial

Twizel, New Zealand Trial 2021- 2022

Twizel, New Zealand	2021 - 2022
Location	Year
AgScience Research	Pasture
Conducted by	Crop
Replicated Small Plot Trial	
Trial Type	

Evaluation of *BioAgPhos* and *Soil & Seed* when used on low rainfall rangelands with low fertility

Aim

Previous research and market perception is that Reactive Phosphate Rock (RPR) fertilisers are only effective in year one where rainfall is above 850mm, or by year 4 when rainfall is over 700mm.

In addition, there is a prevailing view that applying lime with RPR fertilisers will make the RPR ineffective as a fertiliser.

This trial is to evaluate the effectiveness of *BioAgPhos* (a RPR based fertiliser) in a low rainfall environment and when used with lime.

Introduction

The trial examines BioAg's Biologically Activated Rock Phosphate (*BioAgPhos* or *BAP*) and BioAg's fermented biostimulant *Soil & Seed* (*S&S*) and the response on dryland pastures.

BAP is a highly reactive Algerian phosphate rock which has been inoculated with microbial stimulants that increases plant nutrient availability. *BAP* contains 13% total phosphorus[1] with citric solubility of 37% and formic solubility of 70%. *S&S* is a fermented liquid culture containing microbial compounds, microbial food sources which increase the functional availability of nutrients and minerals.

1 Dry basis

New Zealand field trials evaluating BioAg fertilisers started in December 2016 at lowland sites in New Zealand's Southland and Canterbury regions.

Trials were extended to South Island high country soils at Glenbrook / Westside Station, near Twizel, in the Mackenzie basin in 2018. Initially poor lucerne germination and survival delayed fertiliser application until the 2021-2022 growing season. The trial was re-drilled and BioAg's biologically activated phosphate *BAP* was applied at an unfertilised dryland site on the 5th May 2021. *S&S* was applied in spring, on the 18th November 2021.

Method

Soils were thoroughly analysed prior to commencing the trials. Analysis showed that soil pH was in the range of 5.5 to 6.0.

The entire site, treated and untreated plots, were drilled with lucerne. Then treated plots were fertilised. To correct pH, lime was included in the fertiliser blend. 250kg of *BAP* was mixed with 500kg lime and 50kg of elemental sulphur, and applied at a rate of 800kg/ha on the 5th May 2021 to match commercial soil recommendations. It was hand applied together with a single rate of Actibor, supplying boron, at 1.5kg/ha to allow time for incorporation before spring application of *S&S*.

S&S was spray applied at four rates (0, 4, 8 and 12L/ha) in a factorial design on the 18th November 2021.

BAP and *S&S* were applied in a randomised block design with Actibor in four blocks, totalling 36 dryland plots. There was a 1m buffer strip between plots.

Figure 1 – Dryland fertiliser application plot 2x5m, Twizel NZ, May 2021

Pasture production was measured on the 12th January 2022 eight months after *BAP* application and 1.7 months after *S&S* application. Herbage was weighed after cutting with a rotary mower to 5-6cm height in a 5x2m plots (Figure 3). Subsamples were taken from every plot for dry matter determination.

A total of 516.5mm of rain was recorded in the district over the eight month period, which is typical for the area.

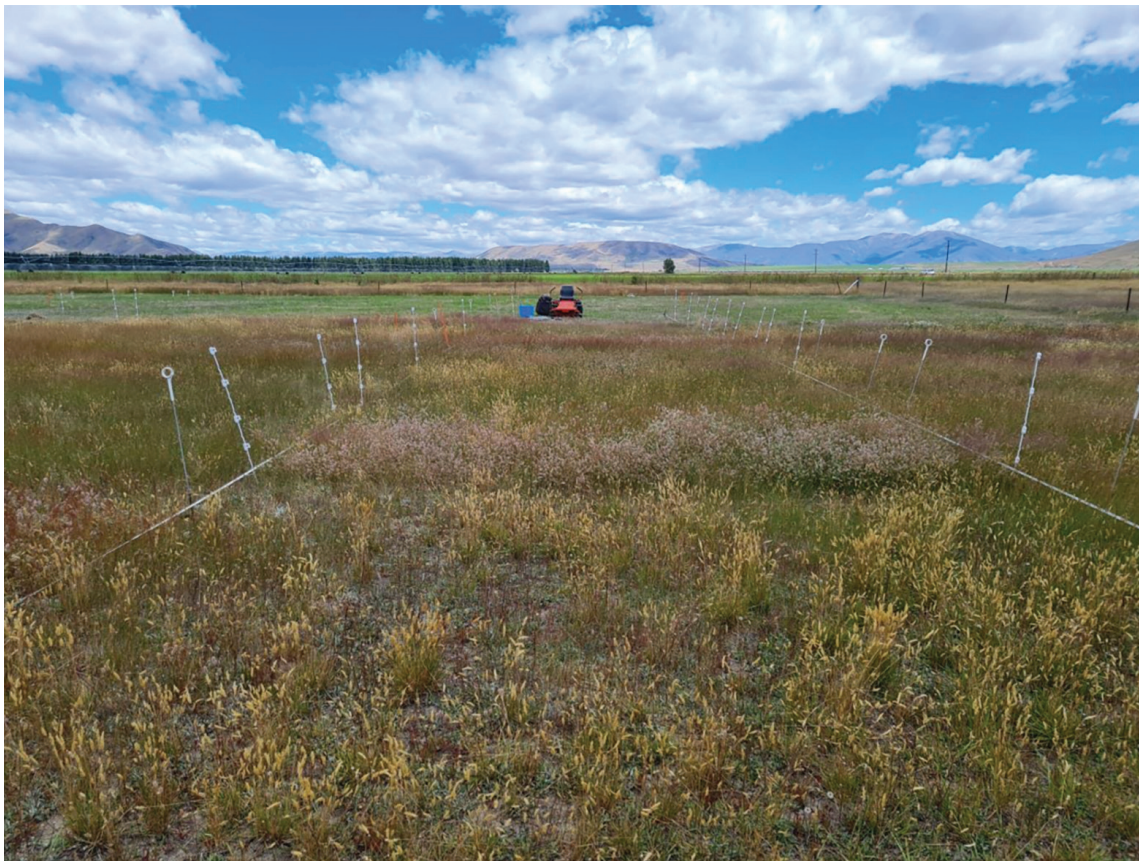
Table 1 – Rainfall (mm) - Twizel, NZ

Dec '20	Jan '21	Feb '21	Mar '21	Apr '21	May '21	Jun '21	Jul '21	Aug '21	Sep '21	Oct '21	Nov '21	Dec '21	Jan '22	Feb '22
45.2	140.7	17.3	13.5	18.0	65.0	24.0	98.0	51.0	46.5	41.0	88.0	85.5	17.5	128.5

The percentage cover of every grassland species present in each plot was also visually estimated before harvesting.

The number of sown lucerne plants was counted in each plot and the height of the three tallest plants, or tallest plants when there were fewer than three plants, was measured.

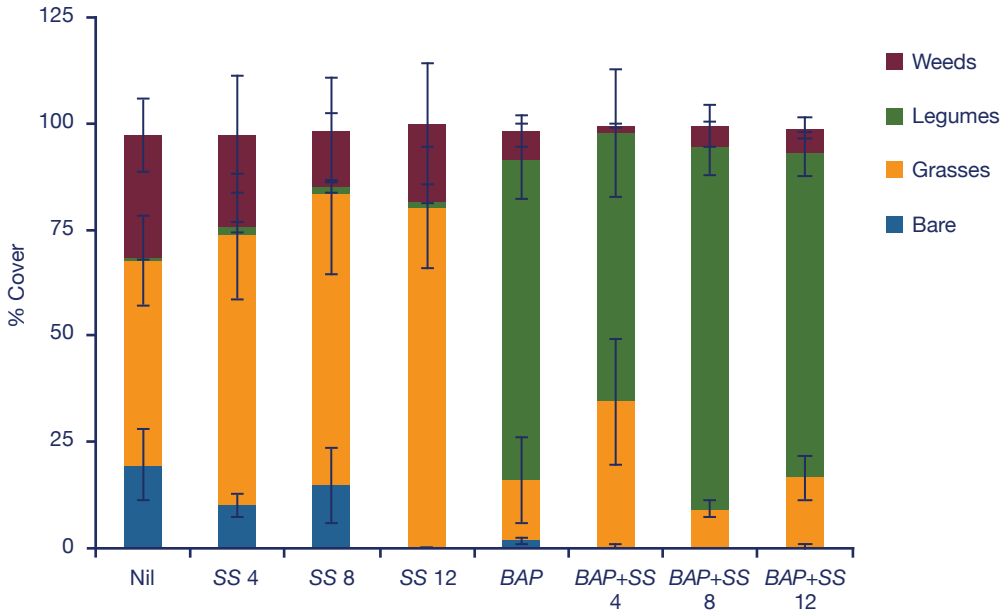
Figure 3 – Forage production assessment, dryland low fertility site



Results

The treatments significantly altered dryland pasture composition. (Figure 4; grass cover, P < 0.007; legume cover, P < 0.0001).

Figure 4 – Effect of BioAg applications on pasture composition *(+/- Standard Error of the mean (SEM))*



The sown lucerne responses almost exactly mirrored the resident dryland legumes. It strongly responded to *BAP* in both plant establishment (Figure 5; P < 0.001) and growth (Figure 6, P < 0. 0003). *S&S* had a small effect.

Figure 5 – Effect of BioAg applications on lucerne number *(+/- SEM)*

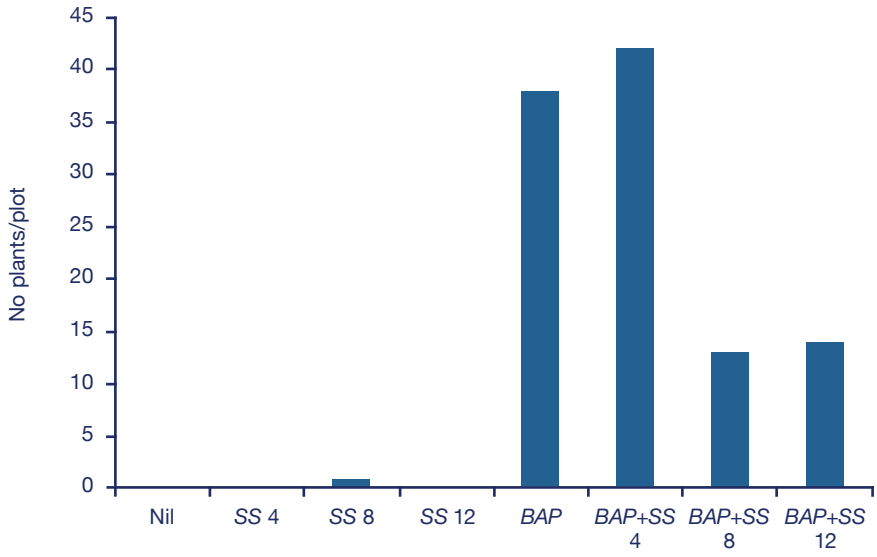
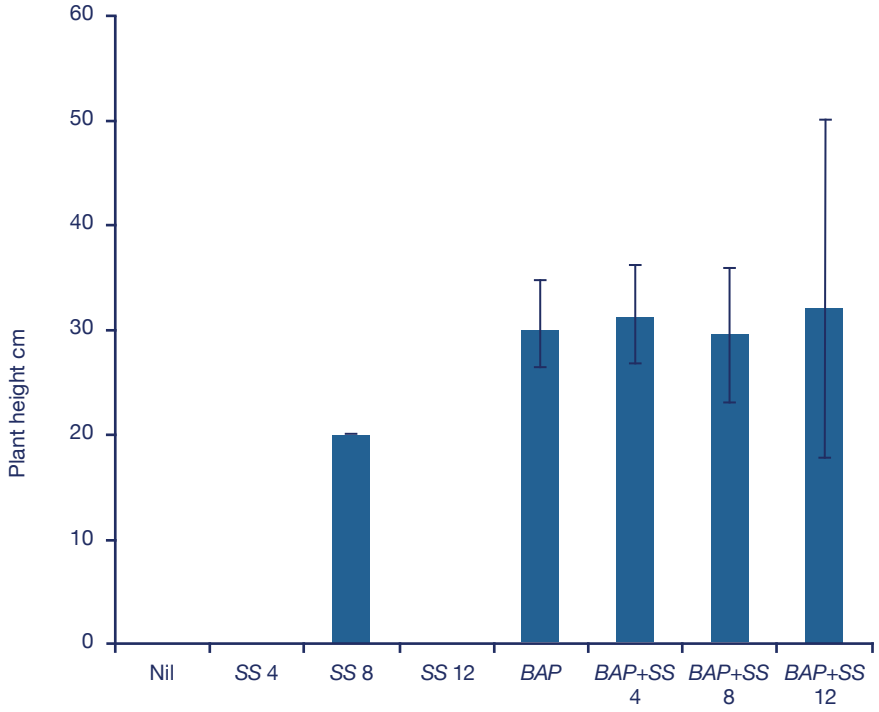


Figure 6 – Effect of BioAg applications on lucerne height (+/- SEM)



BioAg applications significantly increased dryland pasture production (Figure 7; $P < 0.008$). *S&S* applied alone progressively increased yield with application rate up to 17% above untreated grassland. *BAP* alone increased production by 60%. *S&S* addition further increased production: 4L/ha increased yield by 120% ($P < 0.018$) and *BAP* with 8L/ha gave an 110% increase ($P < 0.08$). *BAP* with 12l/ha gave a 75% increase but high experimental variability limits the precise comparison of rate effects (Figure 8).

Figure 7 – Effect of BioAg applications on low fertility dryland pasture production (+/- SEM)

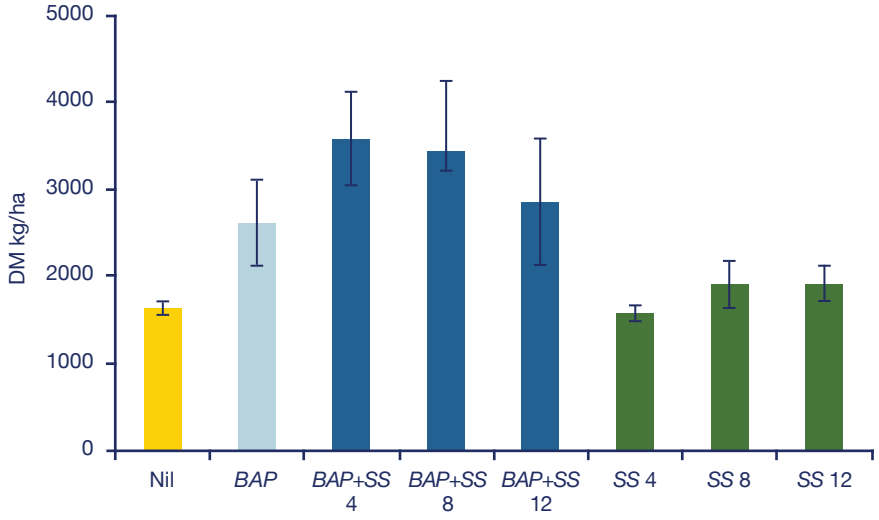
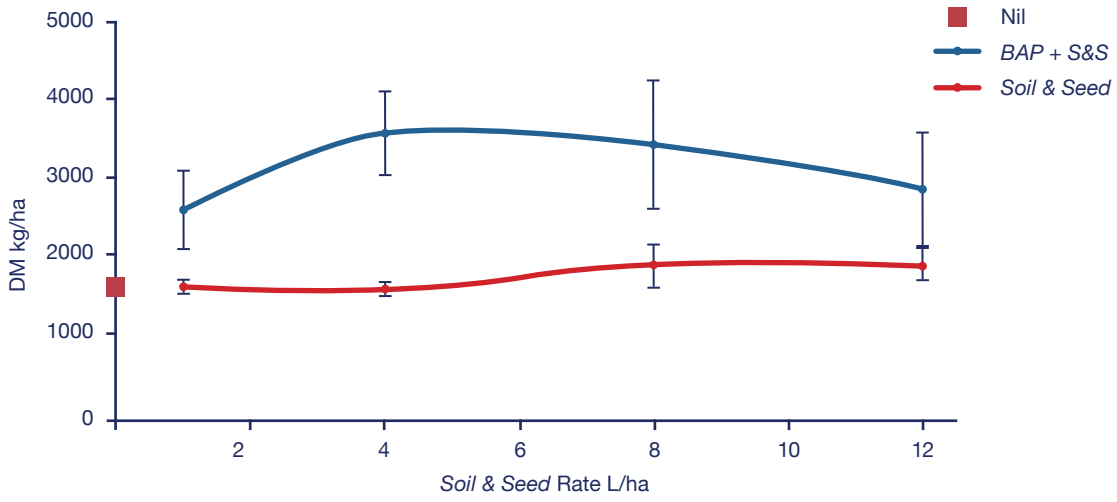


Figure 8 – Effect of Soil & Seed application rate on pasture production (+/- SEM)
Zero rates graphically offset for presentation clarity



Conclusion

The trial results provide statistically significant growth and yield response when applying *BAP* as a fertiliser.

In the trials, rainfall was below 520mm for the period, and lime was used in conjunction with *BAP*.

Current market perceptions that a phosphate rock fertiliser is not viable with less than 600mm of rain or in conjunction with lime, are countered through this trial.

BioAgPhos has shown to provide statistically significant growth and composition responses.

Addition of *Soil & Seed* over fertilised plots increased production compared to the untreated and non-fertilised plots.

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Additional Background – About BioAg

BioAg is an Australian manufacturer of liquid biostimulants and natural phosphate fertilisers since 1999. Our focus is on supporting growers to 'do it better' by incorporating the principals of biological farming into their conventional farming operations and providing the inputs to achieve their goals.

BioAg's solid fertiliser range is based on *BioAgPhos*, a high grade and highly reactive phosphate rock combined with BioAg's microbial digesting agent. The result – a phosphate rock based fertiliser range that is less reliant on rainfall to be plant available.

BioAg's liquid biostimulants 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.

Visit **bioag.com.au** for more information on BioAg's product, research and case studies.

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