

USING BIOLOGICALS TO SUSTAINABLY MAXIMISE YIELD AND INCREASE RETURNS FOR GROWERS

The rising costs of labour, fuel, power and fertiliser, coupled with a desire to embrace more sustainable practices, are driving the uptake of new biological and biostimulant products among potato farmers.

An agricultural biological is a broad term used to describe naturally occurring materials derived from microorganisms, plant extracts and other organic matter. They have the potential to reduce fertiliser and pesticide requirements, reducing the environmental impact of conventional agriculture.

Functioning both as natural pesticides and biostimulants, biological products can help control disease, enhance growth, improve soil health, improve plant nutrient uptake, and enhance the tolerance of crops to environmental stresses including temperature extremes and drought.

Understanding which biologicals will work in different situations, and the optimum rates needed, is critical to optimising both economic and environmental outcomes.

Julie Finnigan, Technical Agronomist at Serve-Ag / EE Muir and Sons, has been investigating use of biologicals in a range of horticultural crops, including potatoes, on trial sites in Tasmania.

Over the past two seasons, Julie has worked with some unique enzyme products that work to condition the

soil around the root systems of plants. This increases the availability and uptake of nutrients that are otherwise unavailable or difficult for plants to access.

One of her trials investigated the effectiveness of *Nucleon* on potato yields. *Nucleon* is a liquid enzyme additive from Agreva Sustainable Agriculture that contains lipase and mannanase to enhance nutrient uptake in horticultural crops.

Lipase works in the soil, assisting the conversion of lipids contained in soil organic matter into nutrients readily taken up by the roots. Mannanase works in the root zone, helping to break down root exudates around the outer layer (rhizosphere) of root tips. Collectively, these two enzymes help to improve soil conditions, improving plant root growth and nutrient uptake.

Based on the success of international trials, and the expected benefits in Australian conditions, Julie conducted several trials with both fresh market and processing potato varieties. These examined whether improved plant health, tuber growth and premium yields could be gained in Australian conditions.



Over two seasons, *Nucleon* was trialled at different rates using different methods, but primarily applied in-furrow at the time of planting. This mode of application ensured there are no extra passes or application costs for growers. The addition of only 24 to 75mL/ha of *Nucleon* in a tank-mix with soil-directed fungicides is very straight-forward.

According to Julie "The addition of such a small quantity of liquid to improve plant performance and yield was something of a "must see to believe" type of exercise!"

While early results were variable, more recent results at new rates were more consistent and demonstrate the promising potential of *Nucleon* for



Figure 1. Early root development in c.v Nicola treated with 24mL/ha *Nucleon* at planting (left) or left untreated (right).

- Photo by J. Finnigan.



Figure 2. Yield and tuber size of mature c.v. Russett Burbank treated with 50ml/ha *Nucleon* split between two applications (left) compared to untreated controls (right). - Photo by J. Finnigan.

the potato industry. "In the 2020/2021 potato season, *Nucleon* was trialled at the very low rate of 24mL/ha in processing potatoes along the Northwest Coast of Tasmania, along with fresh market potatoes in the southeast of the state" explained Julie. "For all trial sites, early root development and tuber set was excellent, with healthy fibrous root systems, and noticeably more around the stolons (Figure 1). This is a really advantageous start for good tuber development."

Yield estimates conducted prior to commercial harvest for the trial sites were variable, ranging from -3 T/ha through to +20t/ha compared to

the untreated controls. Site variability and on-site management conditions had a significant impact on these results, including high weed pressure, irrigation breakdowns, early and late harvests, and soil type and potato variety.

Removing the extreme values revealed an average increase in yield in the treated areas (Figure 2). According to Julie "While the gains were variable, *Nucleon* still provided a return on investment for growers. Additionally, there were underlying benefits.

Tuber sizes were consistently larger in the treated areas than the control plots, typically putting them into the premium size range."

More recent trials conducted in the 21/22 season trialled *Nucleon* at a rate of 75mL/ha, or 100mL/ha applied over two applications. These trials, conducted in processing potato varieties also along the northeast coast of Tasmania, provided yield increases ranging from 1.6T/ha to 4.1T/ha of premium sized potatoes.

These results are consistent with international potato trials using *Nucleon*, which have also yielded positive responses. "The product therefore seems to show great promise for the industry, environment and – most importantly - growers back pockets" concludes Julie.

For the coming season, *Magno*, a dry enzyme product containing the enzymes mannanase and phosphatase, will also be trialled in potatoes. *Magno* is designed to both improve uptake of phosphate applied in fertiliser, as well as releasing phosphate typically bound in soils.

The results from *Magno* trials in other crops ranging from lettuces to tree crops have been outstanding. Combined with the same ease of use and application as experienced with *Nucleon*, this could be expected to provide sustainable positive outcomes for the potato industry.

FOR MORE INFORMATION, CONTACT JULIE FINNIGAN AT SERVE-AG.