

HOW ROOT GROWTH DRIVES YIELD AND CROP OUTCOMES

Understanding the Engine Room of the Plant

by Richard Stone, Field Operations Manager NSW, Australia

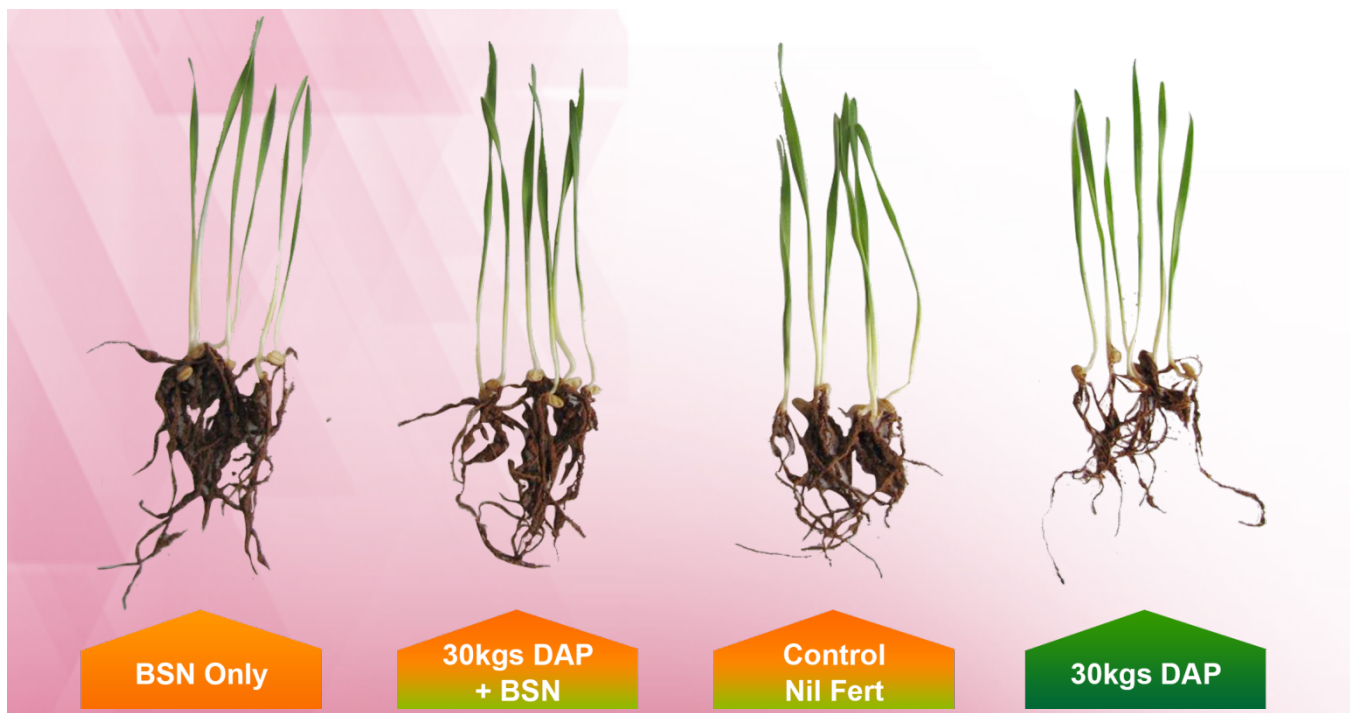


This IN discusses the successful crop outcomes achieved in both quantity and quality when the benefits of a fertiliser regime that better supports root growth and the development of greater organic root mass are fully understood and implemented by farmers and growers.

Campaign Background

In March 2015 Richard Stone, RLF's Field Operations Manager in New South Wales initiated a campaign within his client group to get this important message across. His campaign flyer contained a heading saying **'there is more to plant growth than just applying fertiliser to the soil !'**

The following photograph was taken at the Nyngan fertiliser trial held in 2008 and demonstrates the message that Richard is keen to share.



What the key observations show (from right to left of the image) is that :

1. **30kg DAP** shows that antagonism between phosphorous and zinc causes zinc deficiency. It has sparse root and spindly coleoptile.
2. **Control, nil fertiliser** shows increased root system and thicker coleoptile and no antagonism between phosphorous and zinc.
3. **30kg DAP + BSN** gives increased root and rhizosphere activity as the seed was primed with phosphorous and zinc.
4. **BSN only** gives denser root, greater rhizosphere activity and improved top growth. It is not influenced by phosphorous and zinc antagonism.

What is the Rhizosphere and why is it Important ?

Essentially it is the zone of soil immediately surrounding the root of the plant in which the chemistry and microbiology is influenced by root growth, respiration and nutrient exchange. It is characterised by enhanced microbial activity and by changes in the ratios of organisms when compared with the surrounding soil.

The Plant's Engine Room

So what exactly is happening in the engine room of the plant when a strengthened fertiliser program is followed ?

Once again, images taken from the same Nyngan Trial in 2008 demonstrate the effects that this has.

How 'turbocharged' Root and Rhizosphere activity supports better outcomes

Healthy rhizosphere stimulates microbial activity.

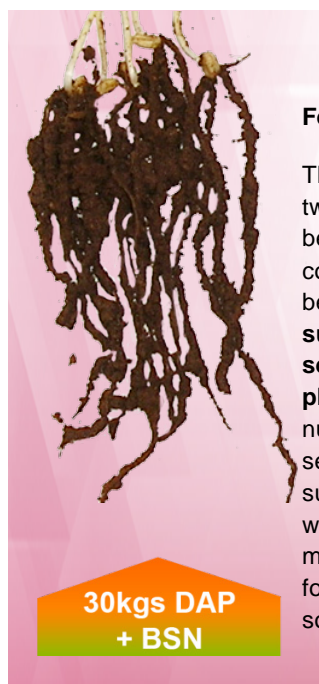
Using BSN Seed Primer on the seed reliably results in the development of a large root mass.

BSN root mass has a substantial increase in the number of fine root hairs and this gives an exponentially larger root surface area. As a result, BSN roots typically have a rich, bulky and healthy rhizosphere, all created by the larger root surface area generating a higher amount of plant exudate.

The plant exudate then provides the host for stimulated microbial activity, turning a BSN root mass into an efficient bulk of microbial activity where the conversion of soil based organic matter into inorganic 'plant available' nutrient occurs.

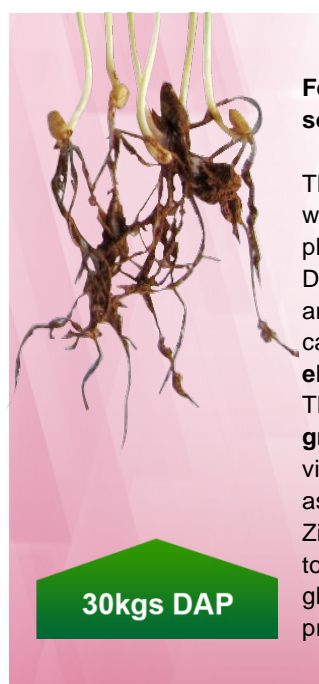
Several beneficial physical effects and outcomes are achieved by 'turbocharging' the root system. These 'cause and effect' benefits are :

1. increased early vigour
2. stronger plant growth with early tillers that are more viable
3. tolerance to drought and water logging
4. improves granular fertiliser performance
5. more nutrient from the soil and environmentally responsible
6. generates greater phosphorous activation and improves uptake from the soil
7. improves nitrogen efficiency in the plant
8. promotes better resistance to disease
9. provides the plant with greater tolerance to environmental impact or extremes
10. augments the plant's stress handling abilities
11. buffers pesticides and fungicides
12. improves plant metabolism



Fertiliser + BSN

The main difference between these two images is that this seed has been **primed with BSN** which counteracts any antagonism between Phosphorus and Zinc by **supplying zinc to the growing seedling and phosphorous to the plant from day one**. Seed priming nutrition encourages vigorous seedling growth and produces sugars that are passed on to the root which feed a growing population of microbes that mineralise nutrients for plant growth. Note the increased soil on roots from microbial activity.



Fertiliser applied to the soil only

The traditional method of fertilising wheat in Australia is to apply phosphorous in the form of MAP or DAP at sowing. However chemical antagonism of phosphorous can cause **reduced uptake of trace elements** such as zinc to the plant. The root/rhizosphere **lacks the growth and biological activity** visible in the root system alongside as a result of reduced uptake of Zinc. There is also less soil sticking to the roots from production of glomalin, a sticky substance produced by micro-organisms.

BSN Tested and Trialled for over 15-years

BSN has been independently tested in trials in Australia for over 15 years.

RLF's results stand up to the highest level of scientific scrutiny and can be viewed in much greater detail at www.ruralliquidfertilisers.com.

The summary of results that follow, (except for one large field trial), are of independent replicated trials. The figures represent a very high statistical relevance and some trial results show 95% or higher level of confidence. Achieving a range of statistically significant results from a Seed Priming fertiliser that has low costs per acre is exceptional, and the significance of this should not be underestimated.



Whilst independent replicated trial results confirm BSN's high level of effectiveness, what counts for the grower is the *10 : 1 financial return on investment BSN can provide.

An average yield increase of 12.5%.

And all because the benefits of a fertiliser regime that better supports root growth and the development of greater organic root mass are fully understood and then implemented by the farmer and grower.

*Australian demonstrated BSN cost v return based on average yield increase of 5% and 2012 cost data



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