



**Rural Liquid  
Fertilisers**



**Fertiliser for Seeds**



**Seed  
Delivery System**



**High-Analysis  
Broad Spectrum**



**High-Performance  
Formulations**



**World-Leading  
RLF Product**

**Trust. Grow. Yield.**

[www.ruralliquidfertilisers.com](http://www.ruralliquidfertilisers.com)

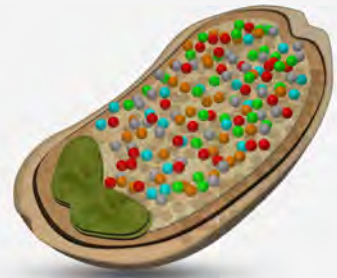
### What is SEED Priming?

Nutrient is imbibed into the Seed



### Primed Seed

Nutrients are on the inside of Seed



## You are Fertilising the SEED

BSN fertilises the seed by priming it with the optimum level of nutrients. BSN is engineered to safely deliver the nutrients into the seed embryo (called imbibing or imbibed). With optimum nutrient in the seed, germination, early growth and young plant formation is directly supported through the first 3-4 weeks of development.

This practice, called seed priming is proven to achieve growth, yield and many other environmental benefits because the plant is able to satisfy its nutrient requirements directly from seed. The seed is primed to achieve the best possible start available to it. In fact, through priming the seed, the embryo registers and establishes the maximum yield potential of the plant. As a result this allows the plant to develop superior root mass and vigorous and strong shoots, tillers and leaf.

BSN is unlike almost any other seed treatment product in the market today. Fertilising the seed by using RLF seed priming technology and BSN is fast becoming the next step in modern farming practice.

## BSN provides the Nutrients for the first 3-4 weeks of the Plant's growth period



Strong Early Growth + Vigor



Consistent + Higher Germination



Stronger with Bigger and Healthier Root Mass

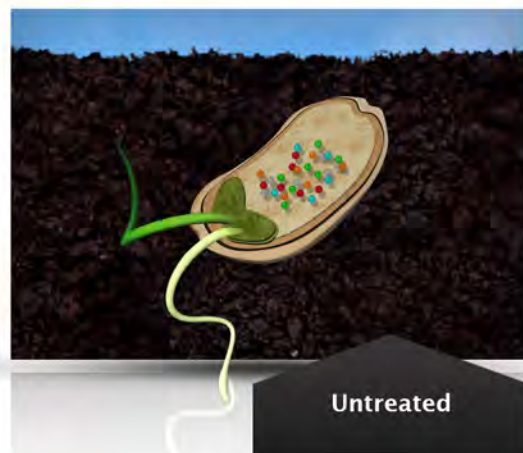
## Early Vigor + Strong Growth

## BSN is imbibed into the Seed increasing Nutrient Levels required for Growth



## Large increases in Seed internal Nutrient Concentrations are achieved with BSN

This table shows the nutrient analysis of untreated and BSN treated Seed in various crops. Following application of BSN the treated seed has been washed to remove any nutrient on the surface and then ground for analysis to demonstrate increases in Seed Nutrient Concentrations. Internal Nutrient levels are demonstrated to be raised significantly when treated with BSN.



Fertilising the Seed is the most efficient way of supplying Nutrients to the Plant

# BSN is not a Seed Coating

## BSN is imbibed INTO the seed not coated OUTSIDE the seed

The following graphics demonstrate the important principle of BSN's broad-spectrum nutrients being **IMBIBED** by the seed, as compared to seed dressing that **COATS** the seed with nutrient.



### 1 AFTER SEED PRIMING

During priming the BSN Superstrike™ nutrients are taken up (imbibed) by the seed.



### 1 AFTER SEED COATING

Seed coating binds fertiliser to seed coat.



### 2 AFTER SOWING

When seed is sown, the applied nutrients are within the seed. In early hours of germination, the growing embryo senses the elevated nutrient levels as nutrients are mobilised within the seed.



### 2 AFTER SOWING

When seed is sown, some of the coated particles separate from the seed and may sit inaccessible above the seed plane. In early hours of germination, the growing embryo does not sense any of the coated nutrients.



### 3 DURING GERMINATION

The root, emerging from germinating seed has already got its share of applied nutrients and is empowered for vigorous searching of soil and nutrients.



### 3 DURING GERMINATION

The root, emerging from germinating seed, searches for soil and coated nutrients in the surrounding soil.

## 1 SDS PROVIDES SAFE TRANSFER OF NUTRIENTS

Using BSN's built in Seed Delivery Systems (SDS) the nutrients are safely transported to be in close proximity to the seed embryo; ensuring nutrients have high availability to the young seedling. Importantly, BSN then triggers the seeds own nutrient sensing mechanisms to set the plant for maximum yield potential.



## 2 BSN INCREASES YIELD REGARDLESS OF FERTILISER RATE

It is very common in untreated seeds for nutrient levels to be suboptimal levels. It has been scientifically demonstrated that BSN improves the seeds internal nutrient concentrations.

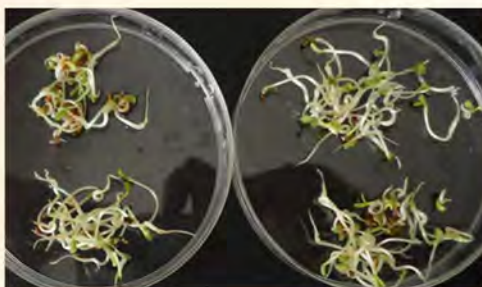
To ensure yield BSN adds "plant-available" Phosphorous which directly influences the yield potential regardless of fertiliser rates applied to the soil.

## 3 BSN IS EFFECTIVE IN ALL SOIL TYPES

BSN works effectively in all soil types regardless of the soil pH as the nutrient bypass the soil by being taken up from the seed.



## 4 FIX NUTRIENT VARIABILITY IN SEED LOTS



BSN corrects the nutrient variability that is naturally found in all seeds.

BSN is effectively and quickly imbibed by the seed. The resulting effect is that BSN primes the seed to the optimum range for essential nutrients including Phosphorus, Zinc, Copper, Manganese and Molybdenum; ensuring that all seeds are now in optimum nutrient condition.

## 5 GREATER ROOT MASS

BSN has the immediate effect of quickly growing a robust and larger root system.

This root system is bigger in overall mass, reach, and most importantly surface area. Typically this means an exponential increase in the number of fine root hairs which produce an increased amount of plant exudate and therefore stimulate greater microbial activity.



## 6 EARLY VIGOR AND STRONGER PLANT GROWTH

BSN when applied to the seed provides during the first 3-4 weeks of development the embryo, seedling and young plant with the nutrient required for healthy and strong growth.

BSN primed plants clearly show earlier, stronger and better plant growth as the basis for greater future yield potential.

## 7 HIGHER YIELDS, QUALITY + VALUE

BSN crops and fruits carry the benefits directly through to the farmer with higher yields, better quality and consistent crop and fruit produce.

These benefits all result in higher value, bigger margins and an overall greater financial outcome.



## 8 BSN IS GOOD BUSINESS FOR THE GROWER

BSN is good business for the grower who benefits directly from using BSN. The cost of using BSN is often a small percentage of the financial gains achieved through its application – a positive return for every dollar invested.



## SDS PROVIDES SAFE TRANSFER OF NUTRIENTS

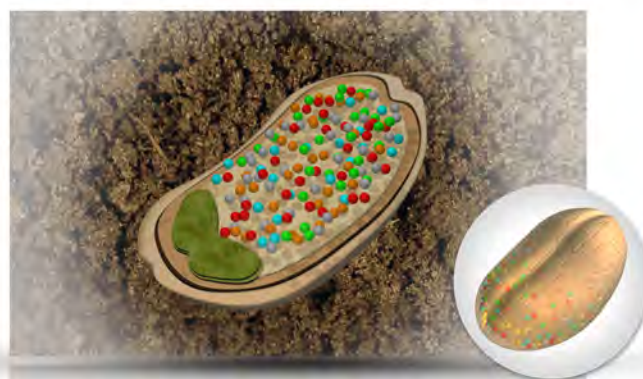
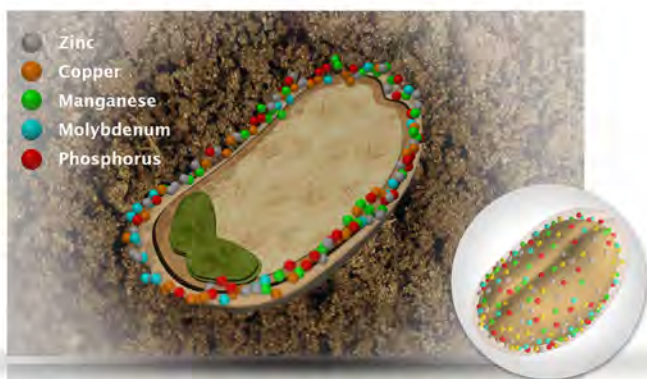
Using BSN's built in Seed Delivery System (SDS) the nutrient is safely transported to be positioned in close proximity to the seed embryo ensuring nutrients have high availability to the young seedling. Importantly, BSN then triggers the seed's own nutrient sensing mechanisms to recognise the elevated levels of available Phosphorus and Trace elements—this sets the plant for maximum yield from day one.

### 1 AFTER SEED PRIMING

During priming the BSN nutrients are taken up (imbibed) by the seed.

### 2 AFTER SOWING

When seed is sown, the applied nutrients are within the seed. In early hours of germination, the growing embryo senses the elevated nutrient levels as nutrients are mobilised within the seed.



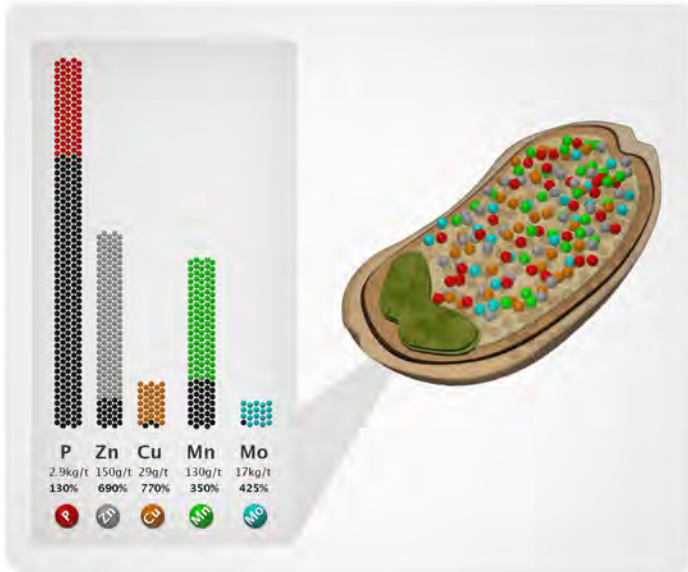
## Independent results prove BSN elevates Nutrients in the Seed

Element	WHEAT		CANOLA		LUPIN		RICE	
	Control (ppm)	BSN-10 seed dressed @ 5L + 3L water/T (ppm)	Control (ppm)	BSN-10 seed dressed @ 10L + 3L water/T (ppm)	Control (ppm)	BSN-10 seed dressed @ 5L + 1L water/T (ppm)	Control (ppm)	BSN-10R seed dressed @ 5L/tonne (ppm)
Manganese (Mn)	48	<b>189</b>	25	<b>500</b>	14.2	<b>163</b>	106	<b>310</b>
Copper (Cu)	4.3	<b>43</b>	2.1	<b>144</b>	3.3	<b>29</b>	2.5	<b>54</b>
Molybdenum (Mo)	<1.1	<b>2.1</b>	<1.0	<b>7.8</b>	3.5	<b>6.7</b>	<0.66	<b>4.4</b>
Zinc (Zn)	14.7	<b>126</b>	23	<b>410</b>	36	<b>164</b>	12	<b>175</b>
Magnesium (Mg)	1050	<b>1100</b>	3100	<b>3200</b>	2100	<b>2200</b>	1150	<b>1230</b>
Phosphorus (P)	1930	<b>2400</b>	5700	<b>7300</b>	3300	<b>3900</b>	2700	<b>3400</b>
Plant Available Phosphorus(P) Est.	193	<b>663</b>	570	<b>2170</b>	330	<b>930</b>	270	<b>970</b>
		<b>↑ 344%</b>		<b>↑ 380%</b>		<b>↑ 280%</b>		<b>↑ 360%</b>

(Batten, 1985) 10% of Total Seed Phosphorus is INORGANIC Plant Available Phosphorus

### Large increases in Seed internal Nutrient Concentrations are achieved with BSN

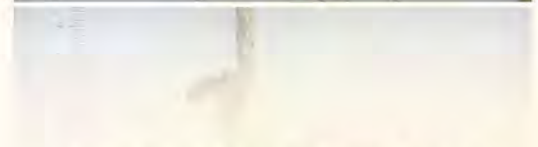
This table shows the nutrient analysis of untreated and BSN treated Seed in various crops. Following application of BSN the treated seed has been washed to remove any nutrient on the surface and then ground for analysis to demonstrate increases in Seed Nutrient Concentrations. Internal Nutrient levels are demonstrated to be raised significantly when treated with BSN.



### Available Phosphorus

The seed and plant can only use and metabolise inorganic phosphorus - called available phosphorus. In each seed, the available phosphorus is only about 10% of the total phosphorus (Batten, 1985), which means that the phosphorus available for seed germination and early growth is often too low.

BSN provides the seed with inorganic available phosphorus that the seed embryo and the plant can immediately use. The amount of available phosphorus that BSN renders, provides a 350% increase to the embryo and importantly makes it easily available for immediate use in germination and early growth. This early development then goes on to support greater phosphorus conversion, further providing available phosphorus to the plant for its continued growth.



### Available Phosphorus Table

	Wheat (ppm)	Rice (ppm)
Control Available P	193	270
BSN Available P	663	970
Increase Available P	↑ 344%	↑ 360%

### What does this mean

This means that by using BSN to provide the seed with available phosphorus you are making sure that the embryo and early plant has access to the key nutrient required for yield.

If phosphorus is too low then the opportunity to set high yield potential is lost, and that is why using BSN is essential in making available phosphorus levels in the seed high enough to set the maximum yield potential for the plant.

**BSN Increases Available P by ↑ 350%**





## BSN Increases Yield Regardless of Fertiliser Rate

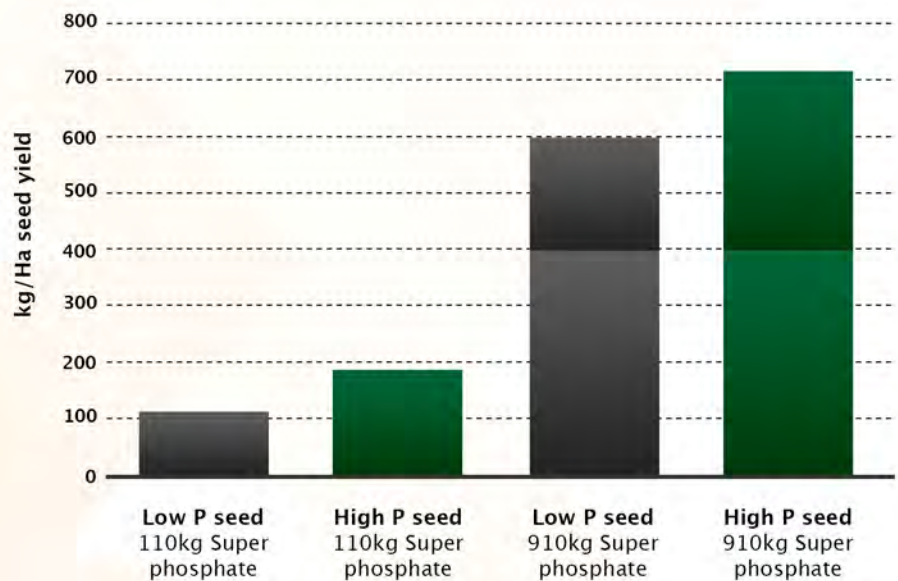
It is very common in untreated seed for nutrient levels to be at suboptimal levels, these levels are also negatively affected by annual climatic conditions including drought and flood, meaning that the seeds nutrient levels can change and be negatively impacted from one year to the next. It has been scientifically demonstrated by RLF and independent research scientists that BSN improves seed (internal) concentrations. Phosphorus and trace elements will directly influence yield potential regardless of fertiliser rate applied to the soil.



## Proof that higher Phosphorus in the seed gives higher Yield regardless of fertiliser rates

### Available Phosphorus

Work by Bolland and co-workers (2006), as shown in the graph to the right, shows higher yield of medic seed with high seed phosphorus regardless of the rate of super phosphate applied with seed at sowing.



Seed yield in medic having low (0.40%) and high (0.64%) phosphorus in the seed. Yield increase due to seed phosphorus was 27% and 23% higher at 110kg and 910kg Super phosphate respectively. (Adapted from Bolland et al 2006)

### What does this show

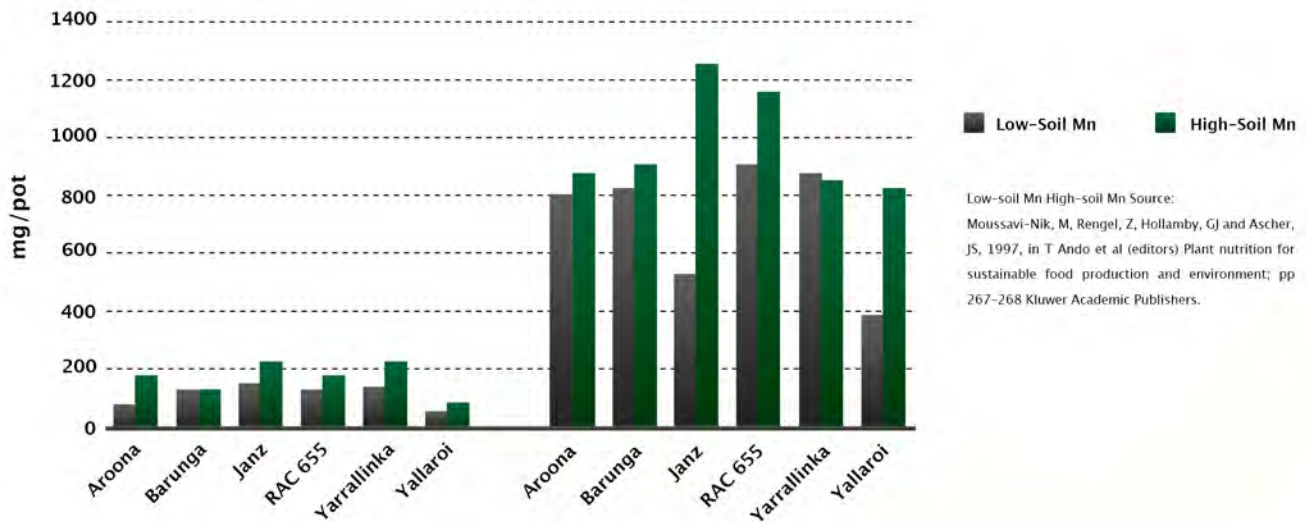
This shows how important the phosphorus levels in the seed are to future yield.

It doesn't matter how much fertiliser you use - if the phosphorus levels in the seed are higher, the yields are greater. This shows that by using BSN you can ensure that phosphorus levels in the seed are higher, and therefore the potential for yields will be greater, regardless of the rate of fertiliser used.



### Seed Manganese Response

This graph demonstrates that root growth is better with high manganese in seed regardless of soil manganese supplied. Similar responses to higher levels of Seed Zinc where Zinc is deficient in the soil.



### What does this show

This shows that the nutrient in the seed – in this case Manganese – has a better effect and result regardless of the availability of the element levels in the soil.

It confirms how important nutrient levels are in the seed compared to the nutrient level in the soil.

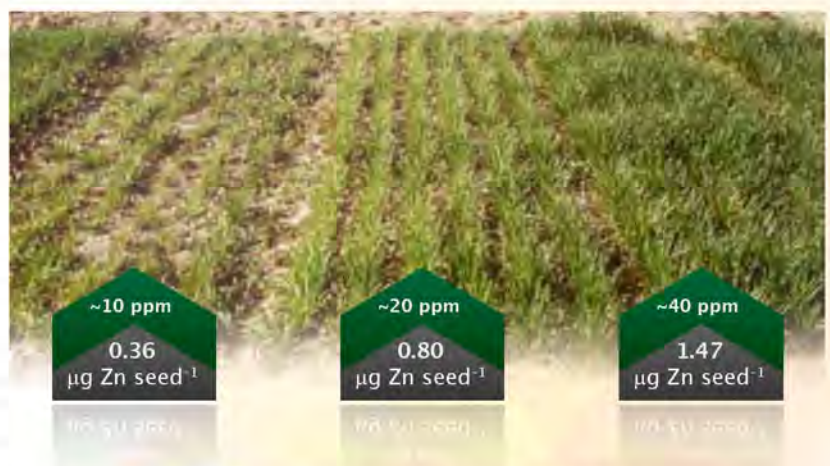
### Seed Zinc Response

Trial showing visual responses to increases in concentrations of Seed Zinc in Central Anatolia

### What does this show

Seed Zinc response shows us that the higher the seed nutrient level, the more response there is, regardless of levels in the soil.

This reinforces the importance of ensuring the seed has the optimum nutrient balance because the soil levels will have little direct result during germination and early growth.



Source: Yilmaz et al., J. Plant Nutr. 21: 2257-2264



## BSN is Effective in All Soil Types

BSN is effective and operates in all soil types and provides the optimum nutrient requirements directly into the seed.

The previous section confirmed that nutrient levels in the soil are not a compelling factor in germination and early growth - and BSN removes any dependence on the soil because it fertilises the seed directly. The surrounding soil conditions, and the soil types, have little influence over the availability of the seed embryo to use the nutrients provided by BSN.

## BSN Bypasses the Soil

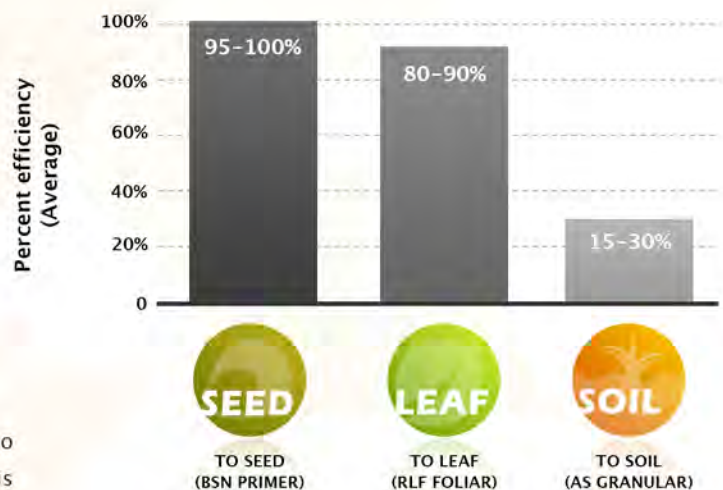
BSN fertilises the seed directly, and bypasses the soil and the soils requirement to provide nutrient for germination and early growth.

In the previous section the results of independent trials have shown that the soil types, fertiliser rates and conditions are not an influence when compared to the levels of nutrient in the seed itself. This is why BSN can bypass the soil conditions to provide the seed directly with the nutrient balance required during this growth period.

# Fertiliser Efficiency is Highest in the Seed

## Average Fertiliser Uptake

The seed can achieve between 95 - 100% fertiliser uptake efficiency when compared with 15 - 30% uptake for plants relying on fertiliser from the soil.



## What does this mean

This shows you that fertilising the seed by using BSN to imbibe a balanced nutrient package inside the seed, is the most effective and efficient method of providing nutrients directly to the plant.

It is logical - by using BSN technology - that it allows you to directly insert nutrient and fertiliser into the seed, to make this immediately available to the embryo and plant in the formats and amounts required for strong germination and vigorous growth.

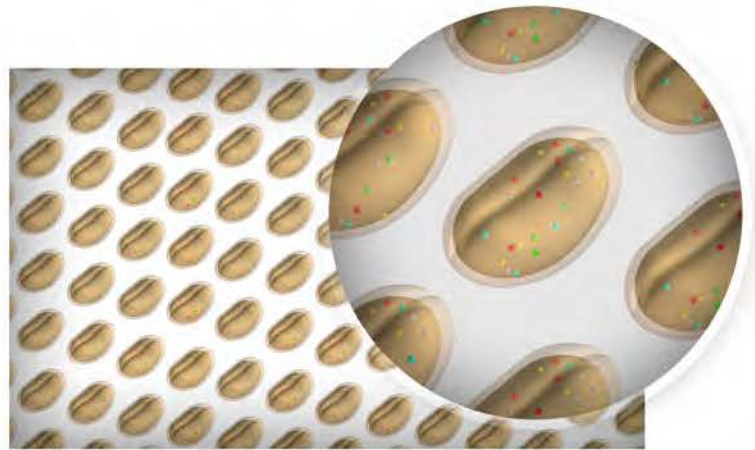
## Fix Nutrient Variability in Seed Lot with BSN Seed Primers

Utilising Broad Spectrum Technology, BSN corrects nutrient variability that is naturally found in all seeds as a result of external (e.g. drought) and internal (e.g. developmental) variability in the seed lot. BSN is efficiently and quickly imbibed by the seed. The resulting effect is that BSN primes the seed to the optimum range for essential nutrients including Phosphorus, Zinc, Copper, Manganese and Molybdenum. Each of these elements plays a critical role in the development and early vigour of the young seedling.

### 1 Every seed has different nutrient levels

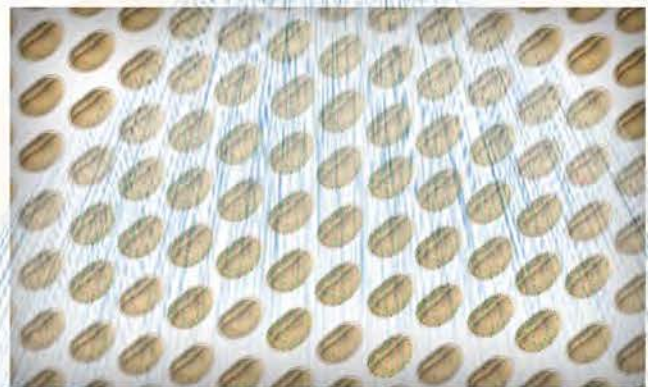
Every seed lot contains seeds that vary in nutrient levels and quality because of extremes and development variation during their growth.

No seeds are the same.



### 2 Treat with BSN

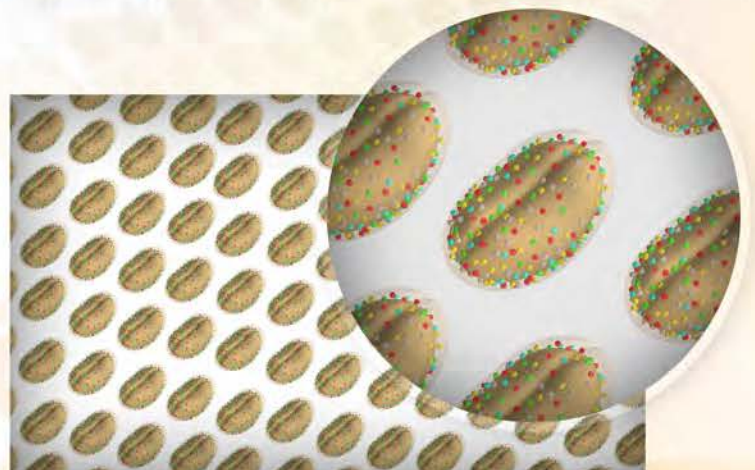
By treating with BSN every seed has the BSN nutrient imbibed into it and ready to play a critical role in the development and early vigor of the young plant.



### 3 BSN Fixes nutrient variability

Treating the seed with BSN primes every seed to the optimum nutrient level effectively fixing nutrient variability in seed lots.

Now the seeds are the same.



## Greater Root Mass

The root growth and rhizosphere activity (organic matter build up) in trials with different rates of phosphorus fertiliser shows that the better root activity is related to the BSN and is independent of fertiliser regime.

This proves that the movement of phosphorus from the seed influences the root growth of seedlings more than the soil-applied phosphorus during the early stages of seedling establishment.

## Independent Tests Prove BSN Effect on Root Mass





## Healthy Rhizosphere Stimulate Microbial Activity

Using BSN 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.





# Early Vigour and Stronger Plant Growth BSN generates growth advantages that have many EXTRA Benefits

## BSN Creates Many Added Benefits

BSN seed priming has a number of physical effects and outcomes that create benefits as a direct result. 12 of these 'cause and effect' benefits are listed below.



### IMPROVES GRANULAR FERTILISER PERFORMANCE

Importantly BSN is proven to work regardless of granular fertiliser rate or soil pH. Reduces the toxic effects of fertiliser in the furrow.



### MORE NUTRIENT FROM THE SOIL AND ENVIRONMENTALLY RESPONSIBLE

BSN increases uptake of granular fertiliser providing higher availability of soil applied NPK fertilisers whilst reducing leaching of expensive and environmentally damaging nutrients from NPK fertilisers into the stream and water table. BSN has a moderating effect on loss of nitrogen and phosphate from topsoil since it creates more root interception with these nutrients in soil.



### GENERATES GREATER PHOSPHORUS ACTIVATION AND IMPROVES UP-TAKE FROM THE SOIL

The BSN stimulated root mass causes two direct activities. Firstly, because it is physically larger and has more surface area, the plant has greater and more effective physical access to soil phosphorus. Secondly, this larger mass stimulates more microbial activity, resulting in phosphorus activation or the conversion of soil phosphorus into plant available phosphorus that the plant can then use.



### STRONGER PLANT GROWTH WITH EARLY TILLERS THAT ARE MORE VIABLE

BSN imbibed seed nutrients power stronger early plant growth from the point of germination - resulting in the earlier appearance of tillers that are thicker and stronger. More viable and stronger tiller formation is the precursor to better future yields.



### INCREASE EARLY VIGOUR

BSN assists in uniform and speedy seedling establishment. Vigorous root growth enhances growth of useful bacteria in root rhizosphere antagonising pathogenic bacteria.



### TOLERANCE TO DROUGHT AND WATER LOGGING

BSN increases tolerance to drought and also water logging for higher rainfall areas, since it forms more organic matter in rhizosphere of the root.





# Early Vigour and Stronger Plant Growth BSN generates growth advantages that have many EXTRA Benefits

## BSN Creates Many Added Benefits

BSN provides for the development of better root structures with bigger root mass and surface area.

When BSN creates such a solid root foundation it means that the crop has more strength and resilience in its future growth and development to handle many of the farming issues it may face in its time.

### 7 IMPROVES NITROGEN EFFICIENCY IN THE PLANT

The uptake efficiency of nitrogen from the soil is improved, using less energy in the transfer to the plant metabolism.

### 8 PROMOTES BETTER RESISTANCE TO DISEASE

BSN promotes an improvement in the general performance of the plant's resistance to disease and improves the plant's ability to robustly handle disease attack from its position of greater health.

### 9 PROVIDES THE PLANT WITH GREATER TOLERANCE TO ENVIRONMENTAL EXTREMES OR IMPACT

BSN is shown to give the plant the ability to deal with the extremes of environmental impacts such as drought, frost and water logging.

A BSN primed plant has more tolerance to extremes, giving greater assurance against uncontrolled environmental impacts.

### 10 AUGMENTS THE PLANT'S STRESS-HANDLING ABILITIES

BSN has been shown to provide the plant with the ability to handle plant related stresses. A larger root structure provides the plant with the ability to harness more strength during these times - which improves the overall outcome.

### 11 BUFFERS FUNGICIDES AND PESTICIDES

The harsh effects of pesticides and fungicides applied to the plant are shown to be easier to handle for a BSN grown plant, as it is buffered by the stronger and healthier conditions BSN achieves.

### 12 IMPROVES PLANT METABOLISM

Overall plant metabolism is improved in a BSN applied plant, as it has been established for maximum growth potential from the point the seed embryo was set during the seed priming.





## INDEPENDENT TRIAL RESULTS

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

This has made BSN one of the most trialled and tested seed priming products, and has results in support of BSN for many crops and many environments. Some of the many replicated programs are shown below.



## Summary of Results in Australia

**1** The results outlined, except for one large field trial, are of independent Replicated Trials. As independent replicated trials the figures represent a very high statistical relevance and some trials result show 95% or higher level of confidence. Achieving a range of Statistically Significant Results from a fertiliser that only costs a few dollars per hectare is exceptional and the significance of this should not be underestimated. The positive effect of BSN on yield was only obscured by paddock variability in 1 case out of 12 independent replicated trials as shown in the graph.

**2** RLF has many more positive field evaluation trials available for BSN however as they are not independent we have chosen not to include them in this document. The results provided can stand up to the highest level of scientific scrutiny.

**3** Whilst independent replicated trial results confirm BSN's high level of effectiveness, what counts for the grower is the 10:1 Financial Return on the Investment BSN provides.

Change in yield resulting from BSN treatment in replicated independent trials, only EP\* 2003 trial is independent large-scale trial. Median yield increase is 6.1% and average yield increase is 12.5%

**12.5% INCREASE**



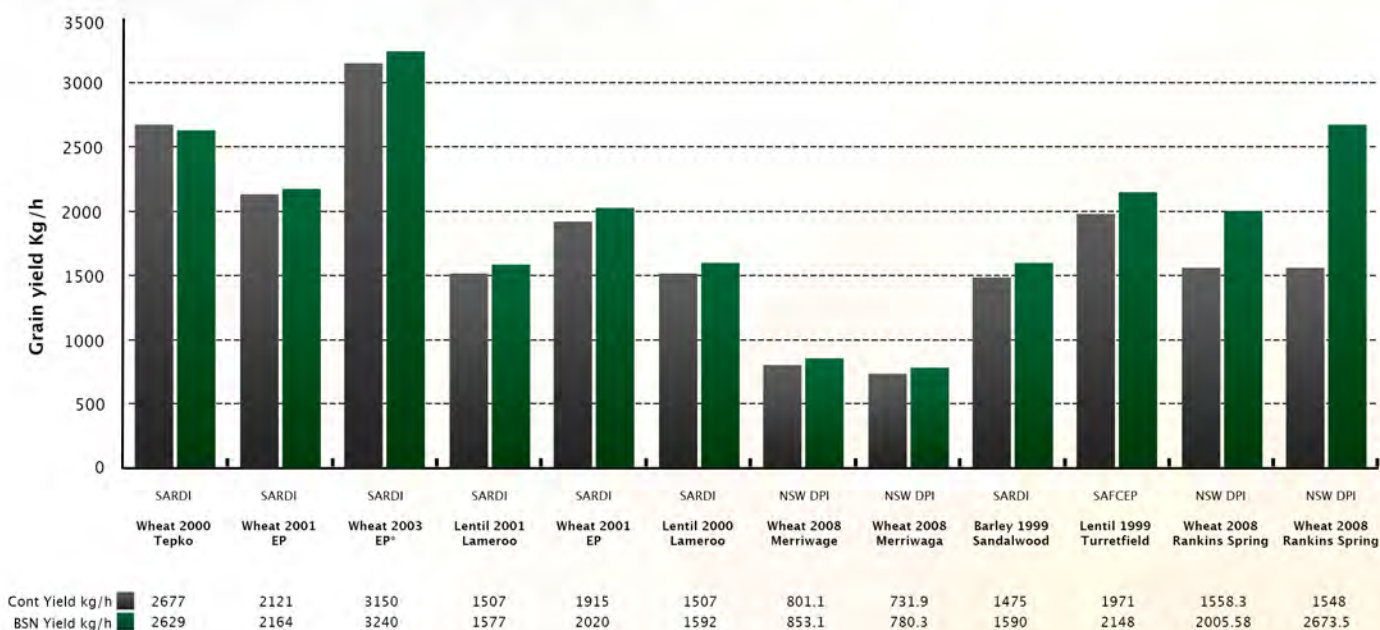


# Independent Trial Results for China BSN is working EVEN BETTER in Southern Hemisphere



**RESULTS ARE BETTER**

Yield change resulting from BSN treatment of various grains in independent replicated trials, only EP\* 2003 trial is independent large scale trial.



## Over 3 million farmer customers worldwide

BSN is used worldwide by over 3 million farmer customers.

It is this trust in BSN that has made it the worlds #1 seed primer. Our success is linked directly to the success of our farmer customers. We use modern plant physiology to support our demonstrated commitment to agriculture and the business of our farmer customers.

You can rest assured, comfortable in the knowledge that BSN is working for farmers all over the world today. BSN has become a valuable and reliable part of modern farming practice.

# 3,000,000+



**Real on-farm results give our farmer customers great confidence that BSN is a permanent part of any modern farming program**

RLF farmer customers using BSN achieve real results year after year.

These results can be seen both in the field, and in the balance sheet (financially) at the end of the season. BSN results assure our farmer customers and give them the confidence to include BSN as a permanent part of every crop - year after year.

- 1 BSN improves the nutrient status and general quality and margins from this new product category. Every kilogram of seed on the farm can be treated with BSN for benefit to the grower.
- 2 Distribution channels can achieve improved sales and margins from this new product category. Every kilogram of seed on the farm can be treated with BSN for benefit to the grower.
- 3 BSN provides opportunity for both Business to Customer and Business to Business Sales. Easy to use and handle the farmer can simply apply BSN on farm or alternatively BSN can be applied in line at large scale seed treatment and grading facilities.
- 4 BSN can be safely applied in combination with a number of common fungicides, reducing overall handling and application costs.
- 5 BSN is Step One in RLF's Integrated Fertiliser Management System and provides an excellent lead product to integrate RLF's range of Broad Spectrum High Analysis Compound Foliars to Growers Fertiliser Programs for Maximum Performance.



"BSN nutrient seed dressing is an absolute must in any season. We use foliar fertilisers to enhance crop performance according to seasonal conditions and plant requirements."

- Geoff Chase  
Tottenham, Central West NSW

**Input  
BSN Investment**

**Output/Production Improvement  
BSN Yield Return**

**Total extra grain  
from your Crop**

**20L drum of BSN**  
treats approx 80ha



Produces an extra  
x6 bulk bags of wheat **~6 tonnes**



Just one 1,000L shuttle of BSN produces an extra 300 bulk bags of wheat or 6 roadtrain loads based on a 5% yield increase on a 1.5T/ha crop.

2% yield increase on a 1.5T/ha crop  
= 300 bulk bags of wheat  
= 6 roadtrain loads

**200L drum of BSN**  
treats 40t of seed approx 800ha



Produces an extra  
x60 bulk bags of wheat **~60 tonnes**



32x20L drums  
**640L pallet of BSN**  
treats 128t of seed approx 2,560ha



Produces an extra  
x192 bulk bags of wheat (4 road trains) **~200 tonnes**



**1,000L shuttle of BSN**  
treats 200t of seed approx 4,000ha



Produces an extra  
x300 bulk bags of wheat (6 road trains) **~300 tonnes**

