



PRODUCT **GUIDE**

# Grow Better: We Make It Possible

Innovation has always been our primary commitment. We have a clear mission to promote agriculture that is ecologically friendly and more sustainable.

It starts with innovative thinking: We plant ideas to harvest the bounty of a healthy planet.

Our drive for innovation has led us to create a wide variety of technological solutions to address the complexities of agriculture today. Our achievements today help us establish the standards of tomorrow.

In this catalog you will find a variety of solutions to help you produce more efficiently.

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# Inoculants

Some crops, such as soybeans, peas, beans, alfalfa, clover, and peanuts have the ability to create a symbiotic relationship with bacteria in order to capture atmospheric nitrogen. These bacteria, known as rhizobia, are important soil microorganisms. When legumes are incorporated into agricultural systems, it is important to make sure that a rhizobia strain is present that can associate with that specific legume.

We are experts in strain selection, propagation, and packaging under strict quality assurance standards are your best assurances of superior nitrogen fixation and increased crop yields.

In 1989, Rizobacter was the first company to develop liquid-based inoculants. This development proved to be a significant advance in seed treatment. Our inoculants contain strains that are scientifically selected for their specificity, infectivity, and effectiveness in biologically fixing nitrogen.

Inoculants are usually marketed as a single product or in packs that combine the inoculant with a seed care product and a bacterial protector for seed treatment. It is this combination which heightens efficiency in inoculation, improves pathogen and pest control, and optimizes seed nutrition.

## High Concentration (HC) Technology

**Rizobacter presents its new formulation of Higher Concentration (HC) inoculants based on specially selected bacterium that make the seed treatment process more efficient.**

This new generation of inoculants aims to reduce the application rate, improve the interaction with other technologies in the seed treatment, and maximize nodulation and Biological Nitrogen Fixation (BNF). Moreover, it is compatible with many common seed treatments, making application more convenient, and so prevents issues at planting time.



## Advantages:

- ✓ Greater concentration of bacteria and greater stability in the container.
- ✓ Lower application rate.
- ✓ Bacteria are more physiologically active compared to traditional production methods.
- ✓ Superior protection at the cell membrane level to reduce desiccation.
- ✓ Greater survival on the seed surface.
- ✓ Better adaptability to adverse environmental conditions such as moisture and chemical stress.
- ✓ Compatible with seed-applied chemicals. (Ask your ag-input supplier for specific recommendations.)
- ✓ Increased Biological Nitrogen Fixation.

# Inoculants

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## LLI Technology

With specially designed inoculant formulations and sophisticated application methods, seed companies are able to treat seed in direct combination with fungicides, insecticides, micronutrients, and polymers. Enhancing the inoculant with a long-life formulation achieves extended on-seed rhizobia survival time, providing growers with a high-quality, yet simple solution.

Long Life Inoculant (LLI) Technology in soybeans allows treatment for 220 days before seeding, even when mixed with fungicides and herbicides. The exact time frame is directly influenced by the chemicals combined and storage conditions of the treated seed. This cutting-edge technology becomes a powerful ally to the seed industry, allowing ready-to-use seeds with superior quality, in terms of product distribution, dust-off control, and flow.

### Main Benefits:

- ✓ Helps to achieve a more efficient and sustainable production system.
  - ✓ Saves substantial time and effort during planting operations.
  - ✓ Ensures the quality of the treatment.
  - ✓ Improves germination and emergence uniformity.
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## Osmo Protection Technology

Osmo Protection Technology (TOP) promotes high metabolic and physiological performance of the microorganisms that are part of the inoculant.

TOP improves the physiological state, survival rate, and concentration of bacteria both in the package and once the seed is treated. This technology also improves stress tolerance, especially when the inoculant is used with chemical seed treatments or under moisture-limited conditions.

This technology allows efficient nodulation and Biological Nitrogen Fixation, even under adverse conditions, such as high temperatures and drought, that may affect the survival of the microorganisms.

Climate change is increasing the frequency of stressful events during the early stages of the crop. In this context, a resilient inoculant becomes a valuable tool to optimize production levels.



### Main Benefits:

- ✓ Increased cellular protection.
- ✓ High and stable bacteria concentration.
- ✓ Insecticide and fungicide compatibility.
- ✓ Long shelf life – with improved germination and emergence uniformity.
- ✓ Improves crop resistance in abiotic stressful situations, especially low temperatures, water shortages, and soil acidity.

# Inoculants and Bio-inducers

## Bio-Induction Technology

Bio-inducers is a new and pioneering concept in the field of agricultural microbiology. They open a gateway to the world of chemical signaling between plants and microorganisms. Bio-inducers trigger molecular signaling early on in the metabolic processes between bacteria and plants, which allows early nodulation.

In other words, in the manufacturing process, bacteria have been prepared to recognize and respond immediately to specific chemical signals produced by the legumes. This state-of-the-art technology encourages the symbiotic partnering of plants and bacteria. It stimulates interaction with other beneficial soil microorganisms.

Bio-induction also promotes growth of legumes as a result of a greater activity in the rhizosphere and more effective nodulation.

### Advantages:

- ✓ Promotes a more effective and earlier nodulation: more nodules located on the main root, where they fix more nitrogen.
- ✓ Maximizes the Biological Nitrogen Fixation (BNF).
- ✓ Increases disease tolerance due to signal activation.
- ✓ Activates microbial and plant physiology.

### Signum<sup>®</sup> Soybean

**Technologies:** Osmo Protection and Bio-Induction  
**Packaging:** 1 x 400 fl oz (11.83 L) & 10 x 40 fl oz (1.18 L)  
**Application rate (imperial)** 2 fl oz per 100 lbs  
**Application rate (metric)** 1.3 mL/kg of seed

### Soybean Rizoliq<sup>®</sup> Top Osmo Protector

**Technology:** Osmo Protection  
**Packaging:** 1 x 400 fl oz (11.83 L) & 10 x 40 fl oz (1.18 L)  
**Application rate (imperial)** 1.5 fl oz per 100 lbs  
**Application rate (metric)** 0.975 mL/kg of seed

### Pea/Lentil Osmium<sup>®</sup> Osmo Protector

**Technologies:** Osmo Protection  
**Packaging:** 2 x 184 fl oz (5.45 L)  
**Application rate (imperial)** 3 fl oz per 100 lbs  
**Application rate (metric)** 2 mL/kg of seed

### Chickpea Osmium<sup>®</sup> Osmo Protector

**Technologies:** Osmo Protection  
**Packaging:** 2 x 184 fl oz (5.45 L)  
**Application rate (imperial)** 3 fl oz per 100 lbs  
**Application rate (metric)** 2 mL/kg of seed

### Rizoliq<sup>®</sup> Top Peanut Osmo Protector

**Technologies:** Osmo Protection  
**Packaging:** 4 x 140 fl oz (4.16 L)  
**Application rate (imperial)** 1 fl oz per 1.000 ft of row  
**Application rate (metric)** 10 mL/100 meters

## Launcher Liquid Soybean Inoculant

**Packaging:** 1 x 400 fl oz (11.8 L) & 10 x 40 fl oz (1.18 L)  
**Application rate - On-seed (imperial)** 2 fl oz per 100 lbs  
**Application rate - On-seed (metric)** 1.3 mL/kg of seed  
**Application rate - In-Furrow (imperial)** 0.25 fl oz per 1.000 ft  
**Application rate - In-Furrow (metric)** 2.5 mL/100 meters

## Launcher Granular Soybean

**Packaging:** 40 lb Bag (18.14 kg) & 560 lb Tote Bag (254 kg)  
**Application rate (imperial)** 3.8 lbs/acre (12 inches row spacing)  
**Application rate (metric)** 4.4 kg/ha (30.5 cm row spacing)

## Launcher Granular Peas and Lentils

**Packaging:** 40 lb Bag (18.14 kg) & 560 lb Tote Bag (254 kg)  
**Application rate (imperial)** 3.8 lbs/acre (12 inches row spacing)  
**Application rate (metric)** 4.4 kg/ha (30.5 cm row spacing)

# Inoculants

## Summary of Advantages:

- ✓ Biological Nitrogen Fixation (BNF).
- ✓ Increased yield potential.
- ✓ Compatible with many seed-applied chemicals.
- ✓ Allows a lower application rate.
- ✓ Bacteria have a more active physiological state than those produced with traditional methods.
- ✓ Ready-to-use seed.
- ✓ Accelerates communication between root and bacteria.
- ✓ Superior protection at the cell membrane level to reduce desiccation.
- ✓ Adaptability to stressful situations (moisture deficit, soil acidity and low temperatures).
- ✓ Better compatibility with fungicides and insecticides.
- ✓ Offers operational flexibility.





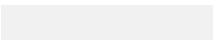







# How to check nodulation



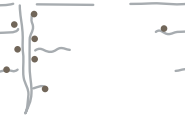









## Nodulation can be checked in two stages

- ✓ Carefully dig up with a shovel (do not pull) at least 3 plants from different areas in the field.
- ✓ Carefully remove soil attached to the roots by rinsing the root with water in a bucket.
- ✓ Evaluate the nodules, following the scale provided, according to their growth stage.

### EARLY NODULATION ASSESSMENT AT V2.

PARAMETER/SCORE	1	2	3	4
Total number of nodules	None	Scarce < 5	High ≤ 5	Very High ≥ 10
Nodule size	Very small < 2 mm	Small 2 mm	Medium ≤ 3 mm	Big ≤ 4 mm
Nodule position/ location	Secondary roots 	Mainly on secondary roots 	Equivalent distribution 	Mainly on primary roots 
Color				
Functionality	White	Pink	Mainly pink-red	Red
BNF estimated through observation of nodule color				
	Non-effective or null fixation			Effective fixation

### LATE NODULATION ASSESSMENT AT R3-R5

PARAMETER/SCORE	2	3	4	5	
Total number of nodules	None	Scarce < 5	Medium ≤ 10	High ≥ 10	Very High ≥ 20
Nodule size	Very small < 2 mm	Small 2 mm	Medium ≤ 4 mm	Large 5 mm	Very Large ≤ 6 mm
Nodule position/location	Secondary roots 	Mainly on secondary roots 	Equivalent distribution 	Mainly on primary roots 	All in primary roots 
Color					
Functionality	White	Pink	Mainly pink-red	Red	
BNF estimated through observation of nodule color					
	Non-effective or null fixation			Effective fixation	

\*Active nodules are red inside, indicating that bacteria are alive and active. Dead, inactive, and senescent nodules are usually grayish green or brown inside.

# Crop Protection

Rizobacter has developed a seed treatment product based on *Trichoderma harzanium*, a fungus recognized for being one of the most important bio-control agents of diseases caused by seed and soil pathogens, such as: *Fusarium* spp, *Bipolaris sorokiniana*, *Drechslera tritici repentis*, *Tilletia laevis*, *Ustilago tritici*, *Cercospora kikuchii*, and *Phomopsis* spp.

*Trichoderma harzanium* Bio-fungicide achieves equal or superior effectiveness when compared to chemically synthesized products. Due to its multiple modes of action and its low risk of generating resistance in pathogens, it is a very valuable tool in integrated pest management schemes.

These microorganisms have three different ways for fighting pathogenic fungi:

- 1. Competition:** The rapid growth rate offers an important advantage when competing for space and nutrients with pathogens. It also improves the root structure, enhancing the absorption of nutrients and providing a better tolerance to stressful conditions.
- 2. Mycoparasitism:** It grows around the pathogen and on its surface. Thanks to its lytic enzyme action (chitinase and  $\beta$ -L,3-glucanase), it can also degrade the pathogen's cellular wall, leading to its death.
- 3. Antibiosis:** *Trichoderma harzianum* also secretes a large amount of antibiotic metabolites that inhibit the pathogens' parasitic activity and prevent its development and reproduction.



## Advantages:

- ✓ 100% liquid product for direct on-seed application.
- ✓ Compatible with other biological and chemical products\*
- ✓ Provides PGPR effects
- ✓ Offers extended residual control.
- ✓ Promotes new, more efficient, and sustained defense mechanisms.

\*Ask Rizobacter's Technical Advisers for more information about compatibilities

## Rizoderma

**Packaging:** 3 Bladders of 67.62 fl oz (2 L)

### Application rate (imperial)

Soybean: 1.5 fl oz per 100 lb

Wheat: 3 fl oz per 100 lb

Rice: 14-20 fl oz per 100 lb

### Application rate (metric)

Soybean: 1mL/ kg of seed

Wheat: 2 mL/kg of seed

Rice: 400-600 mL/100 kg of seed





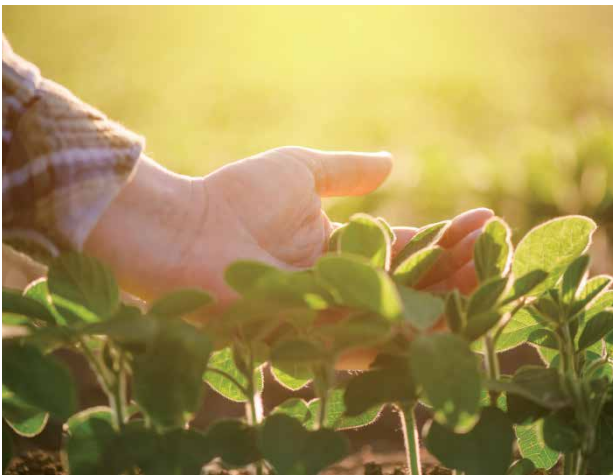
# Crop Nutrition

The technology of micro-granulated fertilizers facilitates rapid access to nutrients, which are essential for the emergence and development of the crop. This represents a qualitative jump towards efficiency and precision in the fertilizing process.

The correct nutrition of crops through the use of fertilizers is vital to generating good yields and maintaining the quality of production within a sustainable system.

Starting with micro-granules that are applied directly in the furrow, along with the seed, it is possible to achieve the maximum benefit of the nutrients – such as phosphorus, sulfur, zinc, and nitrogen – as the result of the early obtainability.

The chemical composition of the micro granulated fertilizers enables rapid desegregation and absorption. It does not cause damage to the sprouting plant. It helps achieve the correct equilibrium in the minerals so that the developing roots are truly efficient in the absorption of nutrients, even when it involves cold grounds and momentary droughts.



## Main Benefits:

- ✓ The proximity of the micro-granules with the seeds allows for the quick absorption of nutrients by the developing roots.
- ✓ Contributes to the development of a root system and the rapid establishment of a uniform crop.
- ✓ Even distribution of applied nutrients.
- ✓ Enhances the conditions for the correct nodulation and the Biological Fixation of Nitrogen in legumes.
- ✓ It is not phytotoxic in the recommended dosage.

## Crop Nutrition

### Rizostar® PZ

**Nutrients:** Nitrogen (N), Phosphorous (P), Sulfur (S) and Zinc (ZN)

**Packaging:** 44 lb Bags and 1322 lb

Big Bags (20 kg Bags and 600 kg Big Bags)

**Application rate (imperial)** 17.5 lbs/acre to 36 lbs/acre

**Application rate (metric)** 20 kg/ha to 40 kg/ha

### Rizostar® CMB

**Nutrients:** Phosphorus (P), Sulfur (S), Calcium (Ca), Nitrogen (N)

Zinc (Zn), Boron (B), Molybdenum (Mo) and Cobalt (Co)

**Packaging:** 44 lb Bags and 1322 lb

Big Bags (20 kg Bags and 600 kg Big Bags)

**Application rate (imperial)** 17.5 lbs/acre to 36 lbs/acre

**Application rate (metric)** 20 kg/ha to 40 kg/ha

## Biostimulants

A microbial biostimulant promotes plant growth and increases nutrient availability for better development.

The pure, liquid formulation of our products contains a high concentration of bacteria.

Biostimulants produce phytohormones (auxins, gibberellins, cytokinins) that act as growth factors, promoting root development.

### Advantages:

- ✓ Increases nutrient availability in the soil.
- ✓ Improves fertilizer use efficiency.
- ✓ Improves water use efficiency.
- ✓ Suitable for organic farming.

### Rizofos<sup>®</sup> Liq

**Packaging:** 2 Bladders of 68 fl oz (2 L)

**Application rate (imperial)** 1.5 fl oz per 100 lbs

**Application rate (metric)** 1 ml/ kg of seed

### Rizospirillum

**Packaging:** Bladder of 27 fl oz (800 mL)

**Application rate (imperial)**

Soybean & Corn: 1.5 fl oz /100 lbs

**Application rate (metric)**

Soybean & Corn: 1mL/kg of seed

## Adjuvants

Rizobacter offers a set of specifically designed solutions for spraying activities that includes surfactants, anti-evaporants, water conditioners, anti-drift products, and cleaning agents.

### Adjuvant Portfolio

**WATER CONDITIONER:** An efficient cation sequestering agent. It improves water quality by inactivating troublesome cations and decreasing hardness while also correcting pH levels.

**ANTI-EVAPORANT, PENETRANT, AND SPREADER:** This is an exclusive formulation with methylated vegetable oil and organosilicon components designed to protect droplets, enhance spreading, and speed-up penetration when applying during challenging weather conditions.

**EQUIPMENT CLEANING AGENTS:** The increasing complexity of spray formulations requires specially designed equipment cleaning products to descale and inactivate ingredients that may produce phytotoxicity on sensitive crops.

**DRIFT-REDUCER:** Damage to sensitive crops is one of the risks of spraying. With urban sprawl encroaching rural areas, precautions are needed to avoid any harm to local communities. Preventing spray drift is essential to minimize any risk to sensitive crops, people, and animals.

**ANTI-FOAM:** Whether part of a tank mix or included in product formulations, antifoam products are important to environmental protection and spray efficiency. By using a very low dosage, farmers can prevent foam creation.

### Main Benefits:

- ✓ Environmentally friendly and safe formulas.
- ✓ Enhance the active ingredient performance (herbicides, fungicides, insecticides, and foliar fertilizers) by reaching the targets and allowing uniform distribution.

### RIZOSPRAY Extremo

**Attributes:** Anti-evaporant, super penetrating & super wetting

**Packaging:** 1.1 gal (5 L)

**Application rate (imperial)**

2.7 fl oz/ acre for every 10 gal/ acre of broth

**Application rate (metric)**

200 mL/ha for less than 200 L of broth/ha

### RIZOSPRAY Integrum

**Attributes:** Anti-evaporant, micro emulsifier & super penetrating

**Packaging:** 1.1 gal (5 L)

**Application rate (imperial)**

2.7 fl oz/ acre for every 10 gal/ acre of broth

**Application rate (metric)**

200 mL/ha for less than 200 L of broth/ha



## Quality Has No Borders

We are always committed to excellence. That's why, in 1998, we began development of our Total Quality System.

Thanks to a process of continuous improvement, our company is one of the first to obtain Trinorm Certification comprising ISO 9001:2015 Quality Management System, ISO 14001:2015 Environmental Management System, and OSHAS 18001:2007 Safety and Occupational Health Management System.




This quality commitment reflects our compliance with the highest international standards and our determination to meet and exceed the requirements of the world's most demanding markets.

At present, Rizobacter is operating in USA, Brazil, India, Paraguay, Bolivia, Canada, Uruguay, Colombia, South Africa, Kenya, México, Romania, Serbia, Austria, Hungary, Belgium, France, Germany, Netherlands, Turkey, Ukraine, and Russia. Rizobacter is serving farmers in more than 40 countries and on 5 continents.





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