

Induct[®] SOYBEAN

Bacterial Soybean Inoculant



Induct[®] HC SOYBEAN

Highly Concentrated Liquid Soybean Inoculant

Induct[®] EXO SOYBEAN

Bacterial Inoculant with EXO Technology

NEW TECHNOLOGY ADVANCEMENTS IN NITROGEN FIXATION SOYBEAN INOCULANT

Manufactured, Distributed, and Guaranteed by:
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EXO SIGNALING TECHNOLOGY CHANGING THE PRACTICAL WORLD OF FARMING

MBFi has researched and discovered a technology that significantly assists the symbiotic relationship between plant and organism; they activate nodulation genes which lead to the production of Nod factors. These Nod factors attract rhizobia which attach to the plants root and leads to increased nodule numbers and nodule dry weight per plant as well as and increase effective nitrogen fixation.

EXO signaling mechanisms play an important role in agriculture by delivering immediate communication between plant and rhizobia cells. This is particularly important in stressful conditions which are ever-present in the practical world of farming.

Not only does EXO Technology improve nodulation, it also activates plant defense responses and improves drought tolerance thereby increasing plant growth and development. The technology delivers by activating defense related genes and pathways which lead to the production of secondary metabolites such as volatile organic compounds, protease inhibitors and phytoalexins that deter pests. The diverse functions of the EXO technology ultimately improve plant performance and crop yields.

HOW DOES IT WORK?

1. IT PROTECTS BACTERIA AGAINST BIOTIC AND ABIOTIC STRESS

The EXO forms a protective barrier around the bacterial cells and improves microbial habitability and survivability.

2. SUPPRESSION OF PLANT DEFENCE RESPONSES

EXO results in the suppression of host defense responses and can therefore increase nodulation infection.

3. ENHANCED INTERACTION BETWEEN RHIZOBIA AND PLANT

Recognition of EXO by the host plant accelerates host bacteria communication, thereby increasing the attachment process.

4. ACT AS A NUTRIENT TRAP

EXO can act as a carbon reserve and accumulate other nutrients and molecules. The EXO matrix traps compounds from the soil water phase and permits their use as nutrient and energy sources.

5. PHYTOALEXIN PRODUCTION IN THE HOST

EXO stimulates the accumulation of phytoalexins in leguminous plants and thereby increases plant defenses.

6. IMPROVES SWARMING CAPABILITY

Swarming is a multicellular movement towards/over the surface. A higher EXO concentration improves the swarming capabilities of rhizobia toward the root system.



IMPROVED SURVIVAL OF RIZOBIUM WITH THICKENING OF THE CELL WALL

MBFi has developed a technology that plays an important role in the survival of Rhizobium and the symbiosis with soybeans. The technology allows cells to maintain osmotic balance by accumulating osmolytes in cytoplasm, this prevents water inside the cell from moving to the environment where solute concentrations are higher; assisting with protection from damage due to drought and salinity.

The cell wall of the Rhizobium thickens in the presence of osmolytes. Benefits of the improved structural integrity of the cell wall include, the Rhizobium being able to withstand harsh environmental conditions, improved nutrient acquisition and the thickened cell wall also acts as a physical barrier against several antimicrobial compounds. Overall, survival and persistence of Rhizobium in the rhizosphere increases and improves with the presence of osmolytes, this allows for the symbiotic relationship between soybeans and Rhizobium to persist in turn increasing crops yields.

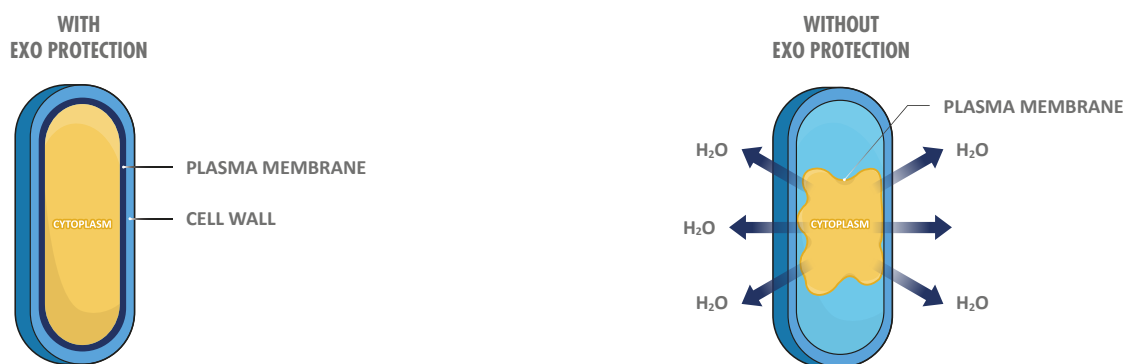
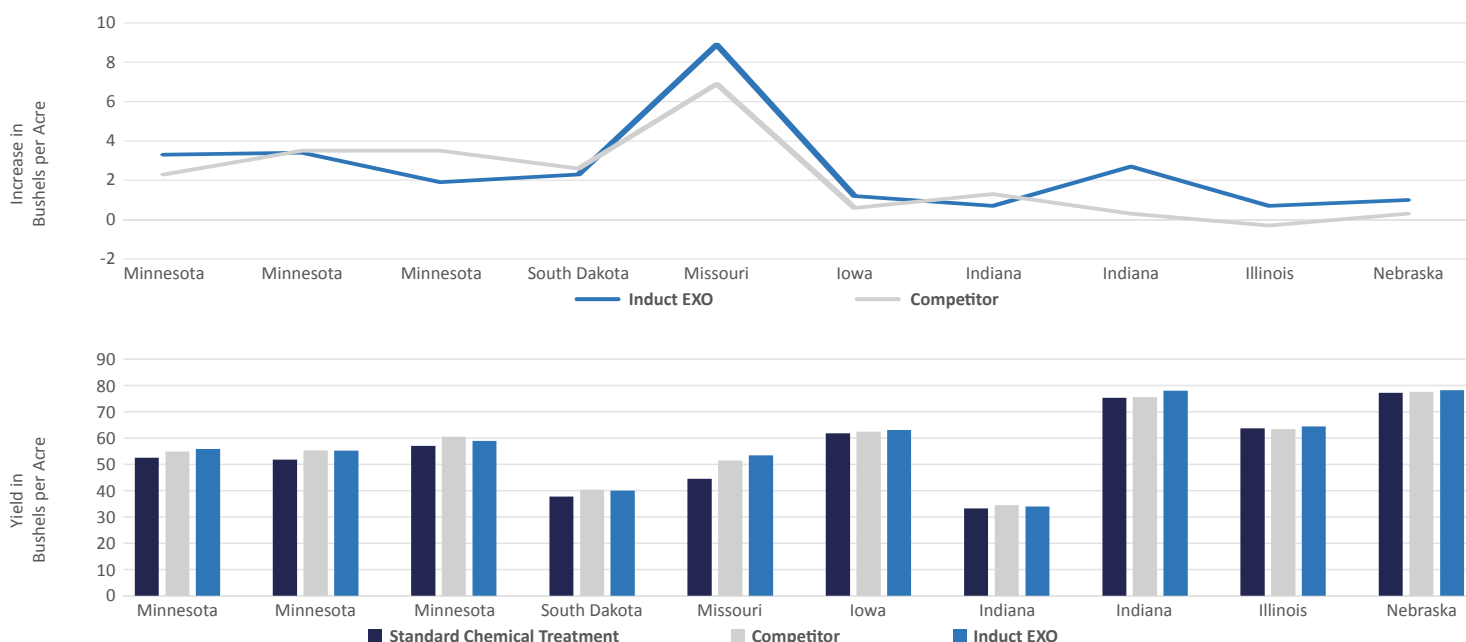


Figure above illustrating the rhizobia cell wall has been thickened and reinforced to enhance better moisture retention in the cell. This EXO technology makes the bacteria more tough and resilient to harsh environmental conditions.

RESULTS FROM THE FIELD

60 Trial sites from 7 states to prove Induct EXO Soybean effectiveness against various commercial inoculants



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EXO

Activation

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SCIENTIFICALLY DEVELOPED RANGE OF HIGH-QUALITY LIQUID RHIZOBIUM INOCULANTS WITH EXO ACTIVATION TECHNOLOGY

Nitrogen is an essential element required in large quantities by leguminous plants for growth. Although nitrogen is available in the atmosphere it occurs in an unusable form and is unavailable to plants. For this reason, farmers have been known to use synthetic fertilizers to meet the nitrogen demands of their leguminous crops. However, long term use of these fertilizers negatively affects the soil environment and in turn financially impacts farmers. To escape the use of synthetic fertilizers, farmers can now rely on Biological Nitrogen Fixation (BNF). MBFi has scientifically developed a range of Premium Rhizobium Inoculants with EXO Activation Technology for legume crops which allows for consistent and reliable BNF.

PRODUCT	CFU/ml	SHELF LIFE	UNITS TREATABLE	DAYS ON SEED
	5 x 10 ⁹	18 months	50 & 200	0
	1 x 10 ¹⁰	12 months	50 & 500	60
	1 x 10 ¹⁰	12 months	50 & 250	120

WHAT IS BNF?

BNF is a process in which certain microorganisms (such as rhizobia) convert atmospheric nitrogen into a form that plants can absorb and utilize for growth. In turn the plants provide the microorganisms with a sheltered environment to live and access to carbon and nutrients. This symbiotic relationship between nitrogen-fixing bacteria and plants plays a crucial role in maintaining soil fertility and promotes better plant growth and productivity.

Recognition and Signal Exchange are the first steps of nodulation formation. The plant roots secrete compounds called flavonoids which trigger the rhizobia in the soil to produce Nod factors. The Nod factors attract rhizobia towards the root which then attach to the root hairs. This binding causes an influx of calcium and the root hair begins to curl around the rhizobia which induces the formation of infection threads. These threads grow through the root hair cells and into the root cortex. As the infection threads advance, the rhizobia multiply and spread within the root cortex. This triggers the plant to form specialized structures called nodules. Inside the nodules, the rhizobia convert atmospheric nitrogen into ammonia through nitrogen fixation. This ammonia is then used by the plant to produce amino acids and other nitrogen-containing compounds essential for growth.

