

Balancing the Bacteria on Your Seed

Inoculating pulses: Part of effective management systems

Trudy Kelly Forsythe



Nodules on the root system of an inoculated soybean plant.

Sometimes the smallest factors involved in the seeding process can be the ones that bring the biggest gains in pulse crops. Such is the case with the nitrogen-fixing bacterium *Rhizobium* – which is a key factor in growing high quality pulse crops. *Rhizobia* fix nitrogen gas held in soil pores into a form that is able to be taken up and utilized by the plant. This helps feed the plants to produce higher-yielding crops. In return, the bacteria receive energy from the plant.

Even though *rhizobia* can occur naturally in the soil, researchers have discovered that inoculating seeds with efficient nitrogen-fixing *rhizobial* inoculants enhances nitrogen availability in commercial pulse production.

“By inoculating seed, we assure that the plants have access to the *rhizobia* they need to grow nodules and fix nitrogen,” says Mike Verhoef, Seed

Company Manager at BASF, explaining that specific strains of *rhizobia* put in the furrow and on the seeds are more efficient than the ones native in the soil.

Researchers are always working to find more efficient inoculants, but it is not an easy feat. It can often take decades to find a new, and improved strain, and even when the possibility of a new strain is found, it can be years to develop and bring it to market.

over the existing strain we were currently using, and applying it to seed, producers saw a seven to 11 per cent yield increase,” Verhoef says. “We released that two seasons ago and we are still getting traction. It has been proven in the field by growers.”

Dr. Fran Walley, a professor with the Department of Soil Science, College of Agriculture and Bioresources at the University of Saskatchewan, says the

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More recently a new strain of *rhizobia* specific for peas and lentils was developed, which BASF released in its Nodulator XL product two years ago. “Just by finding that new strain

challenge is finding strains that are effective nitrogen fixers but are also suited to commercial production. The *rhizobia* must have stable nitrogen-fixing characteristics and be able to be

grown in sufficient quantities to create inoculants that enhance growth.

"This is a living organism so it is important to get the right strain, and then get it delivered to the grower so



as possible. Putting it in one hour after application is better than getting it in at hour 72."

"There are all sorts of innovations coming out with inoculants," says Walley. "Manufacturers are adding other bacteria or organisms and even other biochemical components. These new products may represent exciting advances. There is no question there are all sorts of organisms that can enhance plant growth."

Producers can now find products with added benefits as well, such as BASF's biostacked products which aim to deliver multiple beneficial biologicals to enhance performance, and fungicides to provide root disease suppression.

Monsanto BioAg has TagTeam which is a dual-action product that combines the nitrogen-fixation ability of rhizobia with *Penicillium bilaiae*, a soil-borne fungus that helps make

phosphate available to the plant. They also have TagTeam LCO which combines the dual-action system in TagTeam with LCO - a patented signal molecule that is required for the nodulation symbiosis to occur.

"We are continuously looking for advancements that will drive value to the grower," says Bret Gygi, Technical Development Lead - North America, with Monsanto BioAg. "A good example of this is the recent combination of rhizobia, LCO and *Penicillium bilaiae* in TagTeam LCO. We continue to evaluate strains and media, striving to truly optimize our products and reduce application volumes, while increasing return for growers."

The cost of inoculant makes sense for producers. "I think applying inoculants is part of the production system and good to do each year," says Walley.



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they can use it," says Michael Schaad, Marketing Manager of Functional Crop Care, Crop Protection with BASF. To this end, BASF has developed a unique bladder technology to package the product and keep a higher rhizobia count alive.

Once delivered, whether in liquid, granular, and/or peat-based form, inoculants should be stored in a dry, cool environment so they do not get wet or dry out, and are not exposed to extremes in temperatures. And, while the product comes with a recommended timeframe between application and planting time, the sooner this happens, the more effective the inoculants will be.

"Getting seed in the ground soon after application is important," says Walley. "From the moment the microorganism is put on the seed the population starts to decline, so you need to get it in the ground as quickly



An inoculated soybean crop.