



February 25, 2011

SOYBEAN INOCULANTS HAVE IMPROVED

Inoculating soybeans with products containing the bacterium *Bradyrhizobia japonicum* is a common practice and considered an inexpensive insurance against soybean yield loss. At the pesticide applicator meetings in Gage, Jefferson and Saline County this winter, about half the hands would raise that producers in our area are routinely inoculating soybeans even in a corn-soybean rotation.

The bacterium forms a symbiotic or beneficial relationship with soybean roots in which nitrogen-producing nodules are formed, allowing for nitrogen fixation to occur. Without it, soybeans would require 4 lbs of nitrogen per bushel yield.

As producers strive to find a "silver bullet" to significantly enhance soybean yields with the current projected price, they may look to one of the new soybean inoculants or combined inoculant and growth promoter products that are new to the market. These products are said to contain more aggressive strains of *Bradyrhizobia japonicum*, fix more nitrogen, and increase yields over previous inoculant products.

Nodules develop on soybean roots following a form of "communication" between the host root and bacteria. The process begins in the root with the production and release of compounds (isoflavonoids) which are recognized by the bacteria. The *Bradyrhizobia japonicum* respond by expressing "nod factors" (lipochitooligosaccharides or LCO for short) which eventually lead to root hair modification allowing the *Bradyrhizobia japonicum* to enter. After the bacteria have invaded the root hair, they multiply rapidly. Nodules, which individually house thousands of *Bradyrhizobia japonicum* cells, can be visible within one week after the time of infection.

In good conditions, a well nodulated soybean plant should have five to seven nodules on the tap root two weeks after emergence or twelve nodules per inch of tap root at flowering (R1). Temperature and other factors also play a role. For example, researchers have found that soil held at 60°F did not begin fixing nitrogen until 31 days after a soil at 77°F had started.

With LCO technology, soybean plant root growth is enhanced and soybean roots nodulate sooner regardless of soybean temperature. A single replicated UNL on-farm research trial near Waverly indicated a significant difference or increase in nodes and pods compared to the check plot, but yield was not statistically different. More information is needed on what conditions the LCO technology can increase yield.

In the mean time, if your field has not produced soybeans in the past four to five years or has never produced soybeans, make sure and add a new inoculant. In CRP or pasture ground, inoculate twice with the seed and seed box treatment. If your soil Ph is getting lower, a field has sandy spots or a creek bottom has flooded for several days, make sure and add a new inoculant strain. In these cases, a yield response may be possible or likely due to inoculation.

Going into the 2011 planting season, there are going to be considerably more seed treatments on



the market than ever before, some for application onto seed by retail seed treaters and by seed companies to treat seed. The new inoculants strains combined with growth promoters such as LCO deserve merit and further on-farm research consideration.

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