

JumpStart®

Enhancing phosphate fertility

For years the common practice to ensure that a corn crop was not deficient in phosphorous (P) was to simply apply more P fertilizer. However, with the significant increase in the price of P fertilizer, this strategy is getting more expensive.

Mike Lipetsky, Agronomist, from Allied Agronomy in Kensal, ND puts it this way: "With the high price of fertilizer these days, we see the value of using the P that's in the soil more efficiently, instead of having to put down extra."

A biofertility product called JumpStart® is an inoculant that delivers better access to soil and fertilizer P to maximize your P fertilizer investment.

"The more you understand how phosphorous behaves in the soil and in the crop, the better you are able to understand whether JumpStart is a good agronomic fit for your operation," says Garry Hnatowich, Senior Research Agronomist with Novozymes Biologicals. "Over the last few years, growers in North Dakota, South Dakota, Minnesota and Nebraska have increased their corn yields by an average six percent and winter wheat yields by eight percent by adding JumpStart to their P fertility program."



Challenges with the P cycle

Phosphate quickly becomes tied-up in the soil and is highly immobile.

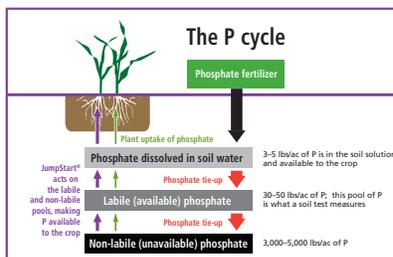
Fertilizer P is easily and quickly tied-up by other minerals in the soil. Once P is bound it is unavailable to the crop. As a result, only 10-30% of the P fertilizer applied in a given year is used by the crop, and 30-50% of the P fertilizer applied may never be recovered for use by crops in subsequent years.

Phosphate availability for a crop is highest within a soil-pH range of 5.5 to 7.0. Optimum availability is achieved at a pH of 6.5 to 6.8. In high-pH soils (i.e. greater than 7.0) the calcium in the soil will be the primary P binding factor. At low-pH values (i.e. less than 6.5), the availability of P decreases largely as a result of the P being bound by aluminum and iron compounds.

The soil solution typically contains only two to four days of P supply for a crop. Therefore, to achieve maximum P fertility, there must be a continual movement of P from the low solubility forms to the soil solution throughout the growing season.

Soil type, temperature, and moisture conditions also affect P availability. In general, lower soil temperature and lower soil moisture means lower P availability, while soils with high silt and clay content bind more P.

Phosphate is very immobile in the soil, moving less than a quarter of an inch. As a result, a crop's root system must grow to the P, the P does not move to the root.



JumpStart's role in P fertility efficiency

The active ingredient in JumpStart is the naturally occurring fungus, *Penicillium bilaii*.

JumpStart increases the efficiency of a P fertility program in two ways: (1) it slows down the binding of the P applied as fertilizer that year; and (2) it solubilizes P applied in previous years that has been strongly tied-up by insoluble compounds such as calcium P.

The close association between plant roots and the fungus is important because of the immobility of P in the soil. As the fungus colonizes the root, it produces organic acids. The organic acids break the bonds that hold P in a form that the crop cannot access – the result is an enhanced rate of P solubilization (release) from both the labile (temporarily bound) and the non-labile (unavailable) pools of P. The fungus' ability to solubilize P from the non-labile pool gives a crop access to the very large pool of P that is typically not utilized.

Maximizing the JumpStart benefit

Phosphate availability is an obvious key indicator of performance. In low available P soils, as measured by a soil test, the impact from JumpStart will be greatest. "What is considered

Maximizing phosphate efficiency in corn



low or high is dependent on the soil test method used," says Garry Hnatowich.

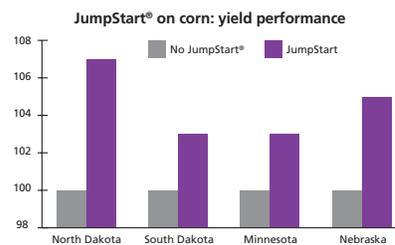
The table provides a guideline of where to expect the maximum benefit from JumpStart based on the soil test method. The other key predictor of JumpStart performance is soil pH.

At higher pH levels, calcium is the primary cause for binding P, and the organic acids produced by JumpStart are particularly adept at breaking calcium P bonds.

Soil test method	Measured P availability (ppm) 0 – 6 inches	
	Maximum JumpStart® benefit	Limited JumpStart benefit
Olsen	<11 ppm	>11 ppm
Bray P-1	<15 ppm	>15 ppm
Mehlich 1	<9 ppm	>9 ppm
Mehlich 2 or 3	<15 ppm	>15 ppm

JumpStart is a fertility management tool, and as a part of an overall fertility program JumpStart delivers a three-to-one return on investment from higher yields.

Novozymes Biologicals currently has sales representatives in North Dakota, South Dakota, Minnesota, Nebraska, Kansas, the Pacific Northwest, and California, and are expanding their geographic presence every year. "We are always looking for new growers interested in conducting side-by-side trials," says Garry Hnatowich, "as the best way for a grower to appreciate the value that JumpStart creates is for them to try it on their own farm."



Source: Retail and farmer-conducted split-field trials (2003 to 2007)

If you are interested in conducting a trial, contact Novozymes Biologicals at 1-888-744-5662.

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