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Rethink Tomorrow

Myth busters

The truth about phosphate fertility

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In order to make the most of an investment in phosphate fertilizer you need to understand how it reacts in the soil. The following statements reveal the truth of phosphate-plant nutrition and some of the misconceptions behind some products.

The statement:

Orthophosphate is better than polyphosphate because it is in the plant available form.

Busted

The explanation:

In the soil, polyphosphate ions are readily converted to orthophosphate ions in the presence of soil moisture. This conversion can be completed in days with normal soil temperatures.

The effect of orthophosphate and polyphosphate fertilizers on crop production was evaluated at 15, 30, and 45 lb/ac of applied P_2O_5. Resulting yields at the three levels of applied fertilizer were the same for both poly- and orthophosphate, clearly showing that a pound of P is a pound of P.

Note: 11-52-0 is 100% orthophosphate.

G. Rehm et. al; *Understanding phosphorus fertilizers;* University of Minnesota. 2002

The statement:

Liquid phosphate is mobile in the soil.

Busted

The explanation:

Phosphate will only move 1 mm in the soil regardless of fertilizer form (liquid or granular).

H. Marschner; *Mineral Nutrition in Higher Plants*, 2nd Edition. 1995

The statement:

Liquid phosphate is available throughout the entire growing season.

Busted

The explanation:

Phosphate fertilizer in any form gets tied up in the soil quickly with only 10 to 30% of the applied phosphate fertilizer being available for that season's crop to utilize. However, no matter what form is applied, seed placed P fertilizer is more efficiently available compared to broadcast.

P.E. Fixen; *Agronomic evaluations of MAP and DAP.* In Proc. North Central Ext. Ind. Soil Fert. Conf. 1989

The statement:

Liquid phosphate can be foliar applied.

True

The explanation:

You can apply liquid P to the foliage but it is not an efficient means of application. There are chelation technologies used to aid in nutrient availability (including phosphate); however, these technologies have limited success, as uptake quantity is usually restricted to maintenance levels at the very best. The application placement is irrelevant, as all phosphate has to be in an available form for the plant to utilize. There are more soil components that aid in nutrient availability than on the leaf surface, thus the plant's primary nutrient uptake (including phosphate) is in the soil through the roots.

H. Koontz and O. Biddulph; *Factors Affecting Adsorption and Translocation of Foliar Applied Phosphorus*; University of Washington. 1957

T. Bruulsema; IPNI Agribriefs; *Foliar Phosphorus and Potassium of Soybeans.* 1998

The statement:

Seed-coated phosphate fertilizer is immediately available to the plant.

Somewhat

The explanation:

It may be immediately available to the plant, but in a quantity insufficient to meet the crop's demand, especially in early development. A seed coating of phosphate cannot capture an adequate quantity of a plant's phosphate needs for a growing season. The application method does not matter, as all phosphate is still transformed to a high ratio of plant-unavailable to plant-available. If you put these two factors together, the quantity does not add up to an efficient delivery method.

J. Scott, C. Hill, and R. Jessop; *Growth chamber study of phosphorus drilled granules or as seed coatings to wheat sown in soils differing in P-sorption capacity.* 1991

A.M. Johnston, S.S. Malhi, J.J. Schoenau, and S.W. Exner; *Nutrient and biomass accumulation of major crops.* Res. Rept. Canadian Fert. Inst., Ottawa, ON. 1999

The statement:

Phosphate delivers a yield response every time.

Busted

The explanation:

Phosphate is the least efficient macronutrient used in agricultural production. The addition of P fertilizer will produce a yield response approximately 50% of the time. Factors affecting yield response from P fertilizer include: level of available P, soil temperature, soil moisture, and fertilizer placement.

J.P. Ross; *Effect of Phosphate fertilization on yield of mycorrhizal and nonmycorrhizal soybeans.* 1971

The statement:

Elemental sulfur acidifies the soil and frees up phosphate for the plant.

Unlikely

The explanation:

The acidification that elemental sulfur can provide in the seed row is minimal due to the buffering capacity of the soil. Elemental sulfur can locally acidify the soil when applied at high rates (hundreds of kg/ha), which could result in localized acid formation. But, this has not proven to be an effective tool for improved phosphate availability in agricultural systems.

R. Mullen, E.Lentz, and M. Watson; *Soil acidification: how to lower soil pH.* Ohio State University. 2007

The statement:

JumpStart® is not effective in low pH (acidic) soils.

Busted

The explanation:

JumpStart is active in a pH range of 5.0 to 9.0. The key to whether JumpStart will produce an agronomic effect is not dependent on the pH, but rather on the level of available phosphate, environmental conditions, and plant responses to phosphate. Field trials illustrate that lower plant available phosphate levels result in a JumpStart response.

The statement:

Repeated manure applications can mean the use of P fertilizer and JumpStart® are not required.

Probable

The explanation:

Manure is a combination of organic and inorganic phosphate forms. Heavily manured fields tend to have levels of available phosphate too high to support cropping systems, and thus do not respond to phosphate fertilizer applications and probably not JumpStart.

G. Rehm et. al; *The nature of phosphorus in soils*; University of Minnesota. 2002

The statement:

An all-in-one fertilizer can be used to acidify the soil.

Busted

The explanation:

Fertilizer applications are one of the most impacting inputs in agriculture production systems. Crops require nutrients to achieve genetic potentials. Excessive fertilizer applications to decrease the alkalinity of a soil are ineffective, and an inefficient use of inputs for the return.

R. Mullen, E.Lentz, and M. Watson; *Soil acidification: how to lower soil pH.* Ohio State University. 2007

The statement:

Using JumpStart will mine your land of phosphate.

Busted

The explanation:

As much as 90% of the P fertilizer applied in one year is retained in an insoluble form that is not available to the plant. Most soils contain substantial reserves of total P but less than 10% of soil P is normally available for plant use since the remainder is fixed.

JumpStart colonizes (grows along) plant roots, releasing organic compounds that in turn release the "fixed" mineral forms of less available soil and fertilizer phosphate, making more of it immediately available for the crop to use. JumpStart does not eliminate the need for P fertilizer it merely improves the efficiency of phosphate.

R. Kucey, H. Jenzen, and M. Leggett; *Microbially mediated increases in plant-available phosphorus.* 1989

To find out more call our toll-free line at **1-888-744-5662** or visit **www.bioag.novozymes.com**.

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