

Availability of Phosphorus Fertilizer

A recent study of phosphorus (P) reaction to dry and wet soils offers insight about the fate and availability of phosphorus fertilizer when applied to dry soils!

It is well documented that P fertilizers can quickly transform from labile (plant-available) forms into non-labile forms that are tied up and unavailable for immediate uptake by plants. While P that is tied up will eventually become available to the plant again, the gradual process by which it does so can cause producers to wonder what happens to the nutrient during this downtime.

According to new research conducted in Australia, the level of moisture in the soil at the time of application has a significant effect on how much P is available to the plant during the season.

The Australian researchers studied the reaction of both liquid and granular P fertilizers in soil that was either dry or at field capacity. They measured the movement of P from the application site as well as the amount of P that was in labile and non-labile forms.

They found that when soils were dry, very little diffusion occurred away from the site of application and the P interactions with soil were negligible. This resulted in phosphorus remaining relatively unchanged and still in a labile form.

Another key finding was that granular sources resulted in higher amounts of labile P compared with liquid P sources (Figure 1). However, when soils were wet, both granular and liquid P fertilizer experienced significantly more diffusion away from the application site and much more interaction with the soil. Consequently, when applied in wet soils, neither source differed in labile P.

The study's results carry real-world relevance for producers who take great care to ensure maximization of fertilizer investments.

We now know there is little risk of losing efficiency if applying P fertilizer to dry soils well in advance of crop germination and growth. Fertilizers will not react with the soil, and this will help to maintain higher levels of labile P. In particular, granular P fertilizers were found to react the least and maintain high levels of labile phosphorus, ready and waiting to support plants when they need it.

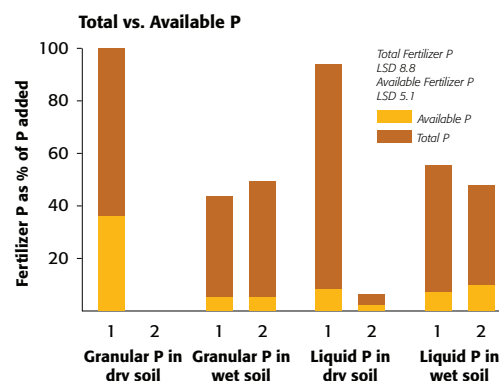


Figure 1.

Compares the total and labile amount of granular and liquid fertilizer P applied to wet and dry soils. Numbers on the bottom of the graph show the distance of the measurement from the application site (1 = 0 to 7.5mm; 2 = 7.5 to 13.5mm). The granular form of fertilizer resulted in higher labile P than the liquid form when applied to a dry soil. There was no difference when applied to a wet soil.

> FACTS

Phosphorus fertilizer applied in advance of crop germination and growth will remain available when applied in dry soils because the fertilizer will not react with the soil.

Granular phosphorus fertilizer is more available than liquid phosphorus fertilizer when applied to dry soils and equal when applied to wet soils.

¹McBeath et al., 2012. Soil Science Society of America Journal 76:1301-1310.