

## **The Foliar Feeding of Phosphorous in Cropping Systems.**

Before we discuss the foliar feeding of “P” in cropping systems, we need to understand a bit about how a plant uptakes Phosphorous, it’s need for Phosphorous, and at what time during it’s lifecycle. This will of course depend upon the plant type we are discussing. For the sake of discussion we will address field corn and soybeans, with some additional thoughts on cereal crops at the end.

**First we will discuss corn:** Soon after planting, the corn plant will have a high need of Phosphorous. Initial amounts are provided by the seed. Oftentimes, this early need exceeds the supply of Phosphorous provided by the seed. This is why we in many parts of the country provide “starter” amounts at planting. And it explains why most starter fertilizers should contain a large supply of Phosphorous.

Since Phosphorous is the main component of DNA, and RNA (the genetic makeup), we don’t want to short the supply at an early stage of development. In fact it is the amount of Phosphorous in the corn plant by the 5<sup>th</sup> leaf stage that sets the genetic yield potential. If phosphorous is short at this point in the plant, adding more later in the plants life will never make up for the loss in yield potential at this stage.

This is the reason for starter fertilizers. Most starters are placed beside the row in corn production. However, the need to assure the supply of early phosphorous to the plant is why a good case can be made for the seed placing of safe amounts of high quality nutrients. Seed-placement assures quick uptake upon germination, and a very high percentage uptake of those nutrients prior to the soil fixing (tying up) those nutrients. If the nutrient is in the plant the soil cannot tie it up and make it unavailable.

So, we supply this early need for Phosphorous with starter fertilizers. We don’t need particularly large amounts of Phosphorous to accomplish this “starter effect”, because as the soils begin to warm in the spring, they release a fairly good supply of Phosphorous to the growing plant from the supply of Phosphorous in the soil. Provided of course, you have provided a good fertility program within your farming operation.

There are several things that influence the availability of that phosphorous to a growing plant, such as: overall levels of nutrients, drainage, tillage method, current temperature, soil pH, and others. After the soils warm, with reasonable growing conditions, and practices, phosphorous isn’t usually an issue to plant growth until later in the growing season. If

levels are adequate, you will usually produce a corn crop that is mature sooner, with drier corn, than if the supply of phosphorous was short. Usually there is a good demand for phosphorous right at the end of the growing season. Depending on the root systems, disease pressure, insect damage, and overall plant health, how well that need is met. If for instance, the roots cannot take up enough phosphorous to meet that need at the end, the health of the plant may suffer, or at least you may limit the final yield.

**With soybeans:** Up to this point soybeans somewhat follow the description from above for corn, except for the large early need for Phosphorous. The root systems on soybeans definitely influence the ability of those beans to take in nutrients of any kind toward the end of the plants lifecycle. It can be difficult to meet the demands for nutrients at this stage. And that is the rationalization for the foliar feeding of soybeans. Actually the impaired uptake of nutrients by root systems is most of the rationalization behind foliar feeding.

**To Foliar Feed, or Not!** Again **we will address corn** first. Anything that impairs the root system could be a good candidate for foliar feeding. Phosphorous (genetics DNA, RNA) helps encourage the growth of the root system. If thru chemical damage, drought, flood, or even mechanical damage, you have stunted the plant, foliar feeding may jumpstart the plant to new growth by encouraging the plant to put out new root growth.

In most situations we don't foliar field corn, nor do we see a paying response to doing so. With sweet corn, if the early market pays a premium, then foliar feeding may very well pay. We often see the advancing of maturity with sweet corn of up to a week, to a week and a half with foliar feeding.

It is possible with the smaller root systems on seed corn, and popcorn that we could see a paying response with them. One of the biggest problems with foliar feeding (while foliar feeding is an excellent way to get nutrients into a plant quickly) is the ability to get large quantities absorbed by a plant using this method. Therefore, repeated trips are often necessary to get a good response.

**With soybeans,** foliar feeding with Phosphorous at an early stage to encourage additional root growth is probably a good idea, particularly if the early growing season has been less than ideal. That is where we get some of the biggest responses. Again, if you have damaged the plant (chemical, weather, or otherwise) this is often a quick way to help a plant to recover.

Later in the soybean plant's lifecycle the root system just isn't big enough to drag in enough nutrients to finish the plant to its fullest. At this point a small dose of phosphorous to encourage additional root growth, accompanied by some liquid potash may finish that plant out nicely compared to no additional nutrients.

After many years of foliar soybean plots this is my take: Foliar feeding is more likely to pay in a stressful growing season than in an excellent growing season. The first application of key nutrients at an earlier stage tend to give better results than do those same nutrients applied later. Sometimes, a second application may be warranted.

The root theory may hold more merit than we have often given credit to. I plant sample between all of my treatments, with a "no treatment" check. Where we treat the soybeans, we often have nutrients show up that we did not foliar apply; yet the untreated check will still show a shortage of that particular nutrient.

Early in the growing season on a well fertilized soil: soybeans often show a shortage of Molybdenum, and Boron. On RoundUp Ready soybeans, I will typically use a small amount of P&K, with Manganese, Molybdenum, and Boron. Manganese and Molybdenum are important components of the soybean plant's ability to fix nitrogen. Since RoundUp tends to inhibit the uptake of Manganese we could slow nitrogen production in the plant. Therefore, I foliar with Manganese, and with Molybdenum.

Later in a soybean plants lifecycle, it isn't unusual for that plant to become deficient in Potassium (potash). If I foliar feed a second time, Nitrogen and Potash are major components, with a bit of Phosphorous, and Manganese with Boron.

I am becoming of the opinion that Boron should be going on earlier than we have usually thought. Many fertilizer people are scared to death by Boron, and it is a "hot" product. Instead of ignoring it like most "row crop" fertilizer people, they should study it carefully.

**Additional Crops:** Cereal crops like winter wheat, and similar crops, tend to use most of their phosphorous upfront. It is for this reason that not much attention is paid to Phosphorous in later stages. If it didn't get on at planting, we used to tell our customers to not waste their money with Phosphorous at top-dress time. Phosphorous is mainly thought of as a root promoter. Therefore, if you didn't get it on as a starter we told them to forget it.

However, if we accept the idea of Phosphorous as a root stimulator to get more root growth, then we could make a good case for the use of phosphorous with our topdressing. Sort of a “Break the Dormancy” at the end of the winter (for winter wheat). For instance, blending a small amount of 10-34-0 with 28% nitrogen for an early topdressing, even after having used a starter fertilizer. Beyond that I’m not sure one could justify the use of NPK on wheat as a foliar treatment.

**Summary:** These are justifications for foliar feeding of row crops. It should be noted that on row crops, while justified, IT DOES NOT USUALLY PAY. The higher value crops where we can make more trips show a positive return, tend to be where I would spend my money at this time.