IPNI Plant Nutrition TODAY
Better Crops, Better Environment...through Science

From Scientific Staff of the
International Plant Nutrition Institute (IPNI)
3500 Parkway Lane, Suite 550
Peachtree Corners, Georgia 30092-2844 USA
Phone: 770-447-0335 Fax: 770-448-0439
E-mail: info@ipni.net Website: www.ipni.net

Summer 2015, No. 2

COMPARING FOLIAR AND IN-SOIL METHODS OF APPLYING PLANT NUTRIENTS

Field crops normally absorb the majority of nutrients from the soil through root absorption, but above ground plant structures, especially leaves, are capable of absorbing limited amounts of some nutrients. Because of this, most supplemental nutrients supplied to crops as fertilizer are applied to the soil, and soluble nutrients in the soil contact root hair surfaces, where they are absorbed into the roots and transferred to other parts of the growing plant for metabolic use. However as noted, leaves and also to a lesser degree stems, and flowering plant tissues, can absorb limited amounts of nutrients. It is important to understand which nutrients can practically be supplied by foliar applications, if the soil supply is inadequate for optimum crop growth.

There are a couple of situations where nutrient supplementation using a foliar application may be considered more effective than an in-crop topdressing application:

Situation one. Only a small amount of a specific nutrient is required, and due to low soil mobility of the nutrient it is actually more efficient to supply the small amount of needed nutrient as a foliar application. This can be the case for both macronutrients and micronutrients. There can also be soil conditions that cause a nutrient to be less available to crop roots. One example is cool excessively wet conditions on an alkaline soil (e.g., pH >8.0) where iron is less available to certain crops (e.g., iron chlorosis of soybean), even if supplemental iron fertilizer has been applied to the soil before or at planting.

Situation two. The crop is late in its life cycle and there may not be sufficient time or rainfall to move a soil mobile nutrient into the soil to be absorbed by the roots, and transferred from the roots to the growing points where it is needed. Again, this can be the case for both macronutrients and micronutrients. An example of this can be foliar nitrogen (N) applied as a liquid urea solution to high protein bread wheat in the early heading growth stage. The added N as urea solution at a lower rate, e.g., 10 lb N/A, is sufficient to moderately increase grain protein, e.g. up to 1 percent. A broadcast granular urea application even at three times the rate (i.e., 30 lb N/A) may not be available to the crop in time to have the desired grain protein enhancement, especially if little or no rainfall is received after broadcasting the urea as a late in-crop application.

There are other situations where foliar applications are less efficient or not practical logistically or economically compared to a pre-plant, or in-crop side-dressing, or broadcast application to the soil for root uptake.

One situation is when large amounts of a nutrient are needed and the amount that can be effectively applied and utilized by the crop as a foliar application is inadequate. An example of this is side-dressing of half the N requirement for a corn crop as the in-crop split application that was preceded by half of required N applied as a pre-plant application.

Another situation is when a foliar application is relatively effective, but not enough of the needed nutrient can be supplied in one application, so multiple applications would be needed, spaced out sufficiently in time (e.g., once a week). Multiple applications in field crops can be expensive due to fuel, equipment, and labor costs, and there may not be sufficient time to apply sufficient amount of the needed nutrient. An example of this could be a severe phosphorus (P) deficiency where there is not time to apply sufficient applications of low rates of foliar P and the application costs to do this are excessive. In this situation it may be better to realize there is not much that can be done for this seasons P deficient crop. The preferred course of action is to apply sufficient P fertilizer to the soil prior to the planting of subsequent crops to correct the P deficiency.

Foliar applications of nutrients can be effective, but there are many factors to consider before making a decision including both mobility of the nutrient in the crop foliage and mobility in the soil, the amount of required nutrient to improve crop growth, and the economic cost of both the form of fertilizer and its application.

– TLJ –

For more information, contact Dr. Thomas L. Jensen, IPNI Director, North American Program, Phone: (306) 652-3535. E-mail: tjensen@ipni.net.

Note: ***Plant Nutrition TODAY*** articles are available online at the IPNI website: www.ipni.net/pnt