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MAKING USE OF FOLIAR NUTRIENT APPLICATIONS

Should a farmer regularly use, sometimes use, or hardly ever use foliar nutrient applications? This is a question that has become quite common in the Northern Great Plains of North America.

The use of foliar applications to supplement those nutrients available to crop roots from the soil itself, or applied as other fertilizers and manures, is not new. In most cases, if soil fertility is being managed well there is little need for supplemental foliar applications. However, it is wise to not use the word **"Never"** when discussing whether or not a farmer might consider a foliar application.

Historically, foliar application of supplemental nutrients was used effectively as early as the mid 1800s. For example, the use of low rates of soluble iron (Fe) salts to treat pale-green colored grape leaves and successfully improve them to a healthy green color is cited in 1844 (Price, 1968). This is a useful example of how a specific soil condition such as high soil pH can make the micronutrient Fe less available. Since only a small amount of Fe is needed by the plant, a low foliar application rate successfully corrected the deficiency by having sufficient Fe directly absorbed by the grape plant leaves. Research into foliar nutrient applications has advanced since such early uses. Understanding has also increased on how to use soil sampling to predict crop deficiencies, diagnose nutrient deficiencies visually and by plant tissue testing, and determine effective forms of foliar nutrient supplements.

As a general guide, applying supplemental nutrients to crops is most effectively done using soil applications for macronutrients required in relatively great amounts. Foliar applications are considered **First** when an unexpected nutrient deficiency is confirmed by crop sample analysis early in the growing season. A supplemental nutrient application, in a single or multi-nutrient formulation might be effective in improving the nutrient status of the crop and resulting in improved crop growth and yield.

The following images of canola provide an example of successful use of a foliar application containing boron (B) applied when an unexpected deficiency was observed, and confirmed by plant analysis, at the two to three-leaf growth stage. The left image is a control area where no B was applied, the right image shows the effect of a low application rate (i.e., 0.25 lb B/A or 0.28 kg B/ha). The plants receiving supplemental foliar B have much healthier and fully expanded new leaves, compared to the small and stunted plants with new leaves mottled with chlorotic spots.

Secondly, there may be soil conditions present that make a nutrient less available from the soil. For example, alkaline soil pH (7.8 to 8.2) soils causes Fe and manganese (Mn) to become less available.

Third, excess levels of other nutrient ionic forms in a soil can interfere with

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"Foliar applications are considered first when an unexpected nutrient deficiency is confirmed by crop sample analysis early in the growing season."

Courtesy: J. Bogdan, Saskatoon, SK.

Boron-deficient canola (left) versus canola treated with foliarly applied B (right).

another nutrient's uptake. An example is high levels of available phosphorus (P) can interfere with zinc (Zn) availability.

In all of these examples, a low rate foliar application may be the most practical course of action to improve crop growth. A well documented example is poorly drained and high pH (7.8 to 8.2) soils where soybeans susceptible to Fe deficiency are grown. Under these conditions, soil-applied Fe fertilizers are rarely effective, compared to a low rate foliar application.

So, to answer the beginning question ***"Should a farmer regularly use, sometimes use, or hardly ever use foliar nutrient applications?"***, it is best to conclude that sometimes foliar applications are effective both agronomically and economically. However, there should be confirmation of a suspected deficiency, and an understanding of why soil conditions may make specific nutrients less available.

References

Price, C.A. 1968. Annual Rev. of Plant Physiol. 19:239-248.

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