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Foliar Feeding Tips

Corn and soybeans are entering a time of extreme stress due to hot temperatures and moisture stress. Most plant nutrients are absorbed through a plant's roots. However, sometimes nutrients can become locked up in the soil with other elements, making them unavailable to the plant. There are many factors that can contribute to nutrients becoming soil immobile. If the fertilizer solution pH is too high or too low, nutrient deficient, or excessive; some nutrients might not be plant absorbed. Poorly managed soils, low soil organic matter, low microbial activity, damaged root systems, excessive water or a lack of water can all lead to lowered rates of plant nutrient absorption. When a nutrient cannot be easily absorbed through the soil, foliar feeding may be a possible solution.

The leaves, and sometimes even the stems, of many plants are equipped with tiny, pore-like structures called stomata, which means “mouth” in Greek. Stomata will open and close at certain times of the day. Stomata have two major functions. Stomata allow oxygen and water vapor to leave the plant which is called transpiration which cools the plant and allows for more water and nutrients to flow from the roots to the leaf cells called translocation. Stomata also absorb carbon dioxide for photosynthesis. Stomata can also be a plant opening for absorbing liquid plant nutrients, but timing is critical.

Stomata opening and closing is affected by environmental conditions. Stomata are generally open during periods of high light intensity which allows carbon dioxide in for photosynthesis. Stomata also open during times of high humidity, when water is plentiful and plants don't need to conserve water. However, stomata remain closed when conditions are exceedingly hot (above 80°F) or very dry, when a plant will keep its stomata closed to conserve water. For foliar feeding in hot summer months; spray in the morning or early evening and in sunlight when the weather is still relatively cool. Here are some foliar feeding tips

- The ideal nutrient spray pH is right around 7.0 or neutral.
- Agitation may be necessary to keep nutrients from precipitating to the bottom of the tank.
- Avoid foliar feeding when temperatures are above 80°F. In the summer it's best to spray either in the morning or early evening, when temperatures are lower (72°F is best). Spray between 7AM and 10AM or after 5PM for best results.
- Foliar feed when weather conditions are more humid.
- Nutrient solution mixes should use a more diluted rate than you would for root feeding.

- Finer and smaller nutrients enter stomata and leaf cuticle pores easier than large forms.
- For most micronutrients, the sulfate form tends to be water soluble and the easiest to get into solution.
- Use sprayer tips that create fine mists to get an even leaf spray pattern.
- Wetting agents, surfactants, and fulvic acid improve performance. High surface tension in water causes it to bead up and reduces water absorption when sprayed. A wetting agent or surfactant lowers water's surface tension, allowing for smaller water molecules to be absorbed. Fulvic acid aid micronutrients movement into a plant leaves, stems, and roots.
- Spray both the tops and bottoms of the leaf until they are completely covered, if possible.
- Do not apply foliar fertilizer so that droplets form on leaves. This may cause leaf burn.

Recent research (Minnesota, 2017) shows that nutrients may be taken in though the leaf cuticle. Leaf cuticles contain many micro-pores (< 1 nanometer) which are lined with negative charges that are attracted to positively charged elements. Calcium, magnesium, potassium and many micronutrients (iron, zinc, copper, manganese) are all positively charged. Negatively charged anions like phosphorus and sulfur are more difficult to move into the plant because they are repelled. Movement through the cuticle is dependent upon many factors including nutrient concentration, molecular size, nutrient form, etc. If you suspect a particular nutrient deficiency, cut a leaf and dip in a foliar nutrient solution. If the nutrient is needed, cut leaf color should improve. Generally, on a whole plant leaf, if successful; color changes and improved growth may occur within 24-48 hours.

Foliar feeding can be effective method to supply a plant with micronutrients and as a short-term solution to many different nutrient deficiencies. However, if fields nutrient deficiencies occur on a consistent basis, foliar feeding is not the answer. Foliar feeding is often a temporary fix instead of a permanent solution; labor intensive, and rather expensive on a large scale. Healthy plants come from healthy soils so properly fertilizing your soil and promoting healthy microbes should be your first step. Foliar feeding of nutrient deficiencies though can help boost plant growth during periods of extreme stress.