



Improving Foliar Feeding

By Robert Smith, Agronomist, Ultra Gro

Foliar feeding has been documented as early as 1844, as a remedy for “chlorosis sickness.” Foliar feeding has been widely used and accepted as an essential part of crop production. Early studies concluded that foliar applied nutrients were 8-10 times more effective in supplying the required nutrients than soil applied nutrients. The purpose of foliar feeding is not to replace soil fertilization. Foliar application has proven to be an excellent method of supplying plant requirements for secondary nutrients and micronutrients.

Foliar feeding can be an effective management tool to favorably influence pre-reproductive growth stages by compensating for environmentally induced stresses of adverse growing conditions and/ or poor nutrient availability. Early foliar applications can make an already good crop better, either by stimulating more vigorous growth or maximizing the yield potential growth stage period. The advantages of foliar feeding in accomplishing the desired crop responses are two-fold:

1. It is a highly efficient and timely method of applying needed and/or critical plant nutrients.
2. It is a means of compensating for soil or environmentally induced nutrient deficiencies.

Foliar nutrients are absorbed through the leaves. Leaves have transcuticular pores (pores between cell structures) and stomata through which nutrient sprays can enter the plant. The transcuticular pores are on both the upper and lower surfaces of leaves and are open all the time. Stomata are present in far greater numbers on the underneath side of leaves, and if they are open and the spray is directed to the underneath side, this can be a good entry point for the nutrients. The uptake efficiency was 10 to 12 times better through the leaves than through the roots.

To achieve the benefits of foliar feeding, combining proper methods of application is essential.

Various factors affect the effectiveness of foliar feeding:

pH of the foliar spray solution – Nutrients must be in their soluble form for the plant to be able to absorb them. pH affects the solubility of nutrients and their interaction with other components in the water. Generally, acidic pH improves the penetration of nutrients through leaf surfaces.

In addition, pH affects foliar absorption of nutrients in three other ways:

pH affects the charge of the cuticle (a waxy layer covering the leaves) and therefore its selectivity to ions. The ionic form of nutrients is pH dependent, and therefore pH can affect the penetration rate.



Use of surfactants – Surfactants contribute to a more uniform coverage of the foliage. They increase the retention of the spray solution by reducing the surface tension of the droplets.

Time of the day – the best time to foliar feed is early morning or late evening, when the stomata are open. Foliar feeding is not recommended when temperature exceeds 92°F.

Droplet size – Smaller droplets cover a larger area and increase efficiency of foliar applications. However, when droplets are too small (less than 100 microns), a drift might occur.

Spray volume – Spray volume has a significant effect on the nutrient absorption efficiency. Spray volume must be such that it is sufficient to fully cover the plant canopy, but not too high so it does not run off the leaves.