

## **Foliar Feeding of Plant Nutrients**

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At the SE Strawberry Expo at Greenville, NC and the Carolina Farm Stewardship Association Conference at Boone, NC this past November, many growers expressed interest in nutritional plant health products new to this region. I am excited about such unique supplemental plant health products. Some, for soil application, contain enzymes that will cause a great increase in soil's natural population of bacteria to improve soil structure, water and air permeability and help unlock bound-up currently unavailable soil nutrients. Some, for drip irrigation to roots, improve plants without applying more nitrogen. Some, formulated for foliar application, provide fastest plant response. All are designed to supplement your soil improving fertility program. Several are OMRI certified for organic growers, some now are formulated with food-grade nutrients for sustainable, non-toxic use. With improvements in plant absorption technology, use of food-grade nutrients prevents plant absorption of heavy metals or other impurities that may be contained in non-food grade nutrients, and/or toxins that could become part of the fruits or vegetables that we would consume. Look for this information on the product labels!

For many years, horticulturists and agronomists have largely subscribed to the belief that foliar feeding of plant nutrients is an idea of dubious merit. A commonly held opinion is that foliar nutrients feeding is best employed only where a specific minor element deficiency may exist as determined by tissue test of plant foliage or leaf petioles.

Dramatic and fast correction of such nutrient deficiencies are generally always seen from such foliar applications.

Dr. H.B. Tukey, renowned plant researcher and Head of Michigan State University's Department of Horticulture back in the 1950's, working with research colleague S.H. Wittwer at MSU, first proved conclusively that foliar feeding of plant nutrients really works. Researching possible peaceful uses of atomic energy in agriculture, they used radio-active phosphorous and radio-potassium to spray plants, then measured with a Geiger counter, the absorption, movement and utilization of these and many other nutrients within plants. They found plant nutrients moved at the rate of about one foot per hour to all parts of the plants. **Comparing efficiency of plant use of foliar-fed nutrients versus soil-applied nutrients near roots, they found foliar feeding provided about 95 percent efficiency of use compared to about 10 percent of use from soil applications!** Likewise, speed of absorption and use by foliar applications was immediate, whereas from soil applications absorption and plant use both were very slow, thus providing a major benefit of foliar feeding where a specific plant nutrient deficiency may exist, be it major or minor plant nutrient.

You'll note from references of these researchers' work cited at the end of this article, that

this very important finding was published, but only in research journals and symposia proceedings. These findings rarely found their way into the ranks of Extension educators or their grower-focused publications and other teaching materials or programs.

I am living proof of that, nor was this information taught in my academic class's way back in the late 1950's and early 1960's. Now, a half-century later, I believe it is important to bring these science-based findings to light and publicize this work to benefit growers and their crops.

Armed with this knowledge they dug out of the research journals, commercial agricultural chemists began developing foliar feeding formulations. Their continuous product improvement research has resulted in products containing not only specific plant nutrients, but also natural plant sugars that aid rapid entry and movement into and through plants, plus cytokinins: natural plant growth hormones extracted from seaweed, now stabilized for several years of shelf life. Together with nutrients, they aid natural plant defense mechanisms to resist many plant diseases and insect pests. We know that healthier plants, like humans, are better able to resist many pests compared to those in stressed, poor condition. Also, growers know and observe that the weakest plants are the ones most often attacked by many insect, disease and mite pests. I believe such products can help improve your soil and your plants' health for higher yields with lower pest control inputs and plant nutrients costs, based on my tests over the past year and ongoing at our farm. Remember, a relatively small amount of plant nutrients, foliar-applied, can replace a much greater amount that is soil-applied, and is immediately available to plants.

The development of a low-cost, natural soybean oil-based adjuvant for use with such foliar-applied nutrients and crop protectants further improves leaf and stem coverage and retention for about \$2.50/acre per application. An example, combined with foliar (or even to twigs and stems after leaf drop) potassium to benefit berry, grape and tree fruits plants in late fall/early winter, or during winter in milder areas when applied anytime temperatures are above freezing: To toughen/harden plant cells, apply one gallon per acre of foliar-formulated potassium. In two weeks apply a second spray of two gallons of foliar K per acre. Add 1 pint/acre of the soybean oil adjuvant first to the tank, then a small amount of water while agitator is running, then add the potassium product and fill tank with water with agitator running, then spray. 1 gallon of the potassium per acre plus 1 pint of adjuvant oil per acre costs about \$18.50 per acre per application for materials, is rain-fast in 15 minutes and is great insurance at very low cost for high-value horticultural crops. Note: Use only 50 mesh screens at the spray tips so the cytokinins will pass through to your plants. With clean spray water, I also can remove my tip screens and can also use larger spray tips to insure no clogging.

For smaller areas foliar applications for 4 gallon back pack sprayer, use 1 ounce of the spray oil in 1 quart of water, stir, then add 16 oz. of the foliar potassium, stir, then fill tank with water while stirring. Shake tank from side to side while applying to maintain agitation to prevent settling. Do NOT apply this program through drip irrigation systems, as this

product is formulated for foliar use only. Seaweed extracts may clog some drip irrigation filters. A clear potassium solution is available for drip irrigation, and also supplies no plant-tenderizing nitrogen in the fall or winter.

References cited for further reading:

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2. Tukey, H.B., Wittwer, S.H., Teubner, F.G., and Long, W.G., 1956. Utilization of radioactive isotopes in resolving the effectiveness of foliar absorption of plant nutrients. *International Conference on the Peaceful Uses of Atomic Energy, Vol. 12: 138-148*. United Nations, N.Y.
3. Witter, S.H., Teubner, F.G. and McCall, W.W. 1956. Comparative absorption and utilization by beans and tomatoes of phosphorus applied to the soil and foliage. *Proceedings, American Society for Horticultural Science*. (needs vol and pp numbers from Barden).