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Arapaho HLB Foliar Nutritional Program

Basis for Program

Dr. Robert Rouse initiated a field plot at the Southwest Florida Research and Education Center to test the components of Maury Boyd's foliar program alone and in combination. For example, if Maury's program included potassium nitrate and sulfates of micro elements, Dr. Rouse applied only potassium nitrate to some trees, only sulfates of micros to other trees, and both to another group. The intention was to observe and measure the contribution each component of the program made to the effectiveness of the whole. All rates were per 250 gals of water.

The results showed that every treatment improved tree health over untreated controls. However, the most significant gain in tree health and productivity was from the micro elements Zinc, Manganese, Molybdenum, and Boron, along with the macro element magnesium. His source materials were all sulfates, so the sulfur component could be playing a role as well. The second most influential component came from the macro elements, Nitrogen, Phosphorous, and Potassium. In Dr. Rouse's study, these were supplied by potassium nitrate and a "phite" material. Dr. Rouse also feels that the addition of a phosphite type material results in slight increases in yield, although no discernible effect on tree health is evident.

The best looking treatment was "#2", which combined these elements. No other combination of treatments performed as well. The only additional observation was that salicylic acid apparently stimulates bud break, which accelerates vegetative growth – a potentially important consideration because all foliar nutritionals are more effective when applied to fully expanded leaves of a new flush that have not yet formed a thick wax cuticle. Salicylic acid doesn't appear to induce systemic acquired resistance (SAR), but could be a tool to improve the effectiveness and timing of foliar sprays.

Interpretation and Adaptation of the Program

Micro Elements -- The micro element mix of sulfates at these rates has proven itself in Maury Boyd's groves and Dr. Rouse's trials, so we basically just had shot bags made up to simplify handling. The success of this particular treatment may very well be based on the pounds of metal, so while other micro element formulations such as chelates, etc., contain materials that provide a source of the same metals, none of them provide the same pounds of metal at the rates recommended. At rates sufficient to provide the same pounds of metal, the cost would be much higher than the sulfates. So, our program involves mixing a shot bag in 250 gallons of water to achieve the same concentrations as Dr. Rouse's treatment, and applying that mix in sufficient volume to wet all the leaves on the trees.

Nitrogen – The nitrogen source in the Rouse/Boyd program is potassium nitrate. However, in field tests with potassium nitrate by Koo and Anderson in the 60's, leaf analysis showed that the uptake rate for

this material was low. On the other hand, work by Syvertson showed that of the potential nitrogen source materials for foliar sprays, triazone urea had the highest efficiency because it was a stabilized compound that persisted on the surface of the leaf long enough to allow a high percentage of uptake. So, while potassium nitrate treated trees show a positive response in the Rouse trials, research has shown that triazone urea, name brand NSure or Nitro 30 (least expensive) would provide a more reliable nitrogen source material, particularly if applied to older leaves.

Potassium – The Rouse Treatment #2 and Boyd programs derive most of the potassium from potassium nitrate (some is added by the "phite"). Referring back to Koo's work, one of the intentions of applying foliar potassium nitrate was to improve fruit size of grapefruit grown on neutral or high pH soils, but after multiple trials, this did not prove to be effective. On the other hand, Dr. Brian Boman showed that monopotassium phosphate (MKP) applied in the spring of the year did have a positive effect on grapefruit fruit size, so it is apparently a more effective source than potassium nitrate. MKP, however, has a higher salt index than dipotassium phosphate (DKP), so the latter is better for foliar sprays of grapefruit to avoid leaf and fruit burn. Therefore, DKP is a better source of K than potassium nitrate.

Lexxaphos – About 12 years ago, we began working with Foliar Nutrients, Inc. and their consultant, Dr. John Taylor Sr., on a new "phite" compound, which is now sold under the brand name of Lexxaphos. It is a patented product, only available legally from Foliar Nutrients and their sole licensee, Griffin Fertilizer. Lexxaphos is a proprietary combination of Dipotassium phosphate and potassium phosphonate, unique among the "phites". It is the only material of this type that carries a full EPA Pesticide Registration for Alternaria on citrus, and fungal diseases on other crops. After many years of spraying the material, we also clearly observed a systemic acquired resistance effect as well as direct toxicity to fungus diseases.

Dr. Taylor, who was also on the team that invented Ridomil, was adamant that if a material of this type is mixed with any heavy metals, the active portion of the molecule is inactivated and the SAR and fungicide value of the material is lost. At that point, the value of Lexxaphos, or any of the other "phites", is strictly as a nutritional product. Also, Dr. Taylor felt that the effectiveness of Lexxaphos was based on achieving a certain concentration of the material in the cells of the leaf. Therefore, he recommended that it always be applied as a 2% mixture – for example 2 gals of Lexxaphos in 100 gals of water (we applied it for years as 1 gallon in 50 gallons of water with good results). Finally, he also felt that if it was tank mixed with a nitrogen source, the effect of the nitrogen on cell division would dilute the Lexxaphos, so he recommended against that practice as well.

When we applied Lexxaphos to grapefruit, the product caused fruit burn. If we added adjuvants to improve uptake, the burn increased. Since this apparently does not occur when "phites" are tank mixed with nutritionals containing metals, it's kind of proof that Taylor was correct – the metals cause the degradation of the active portion of the molecule that, along with being active against phytophthora and other fungi, would be the cause of burn on grapefruit.

Lexxaphos should be applied by itself, or only with materials such as insect growth regulators, strobilurins, or other chemicals that wouldn't affect the activity of the Lexxaphos, and only to oranges and specialties. For the money, Lexxaphos provides more value than simply nutritional materials since it is also labeled for fungus disease control and has SAR activity. Therefore, the program is based on the use of a 2% mixture of Lexxaphos on varieties other than grapefruit, or dipotassium phosphate on grapefruit supplemented with ground applications of a phytophthora material, alternated with nitrogen and minor element sprays, instead of tank mixing everything together.