

- Spray at a time of day which is best suited for nutrient uptake, early morning or evening, our preference is late afternoon...
- A little goes a long way – we don't need to use a large amount of material to elicit a response in the crop...
- Better calcium levels = better foliar spray performance – calcium in the crop helps the cells signal nutrient movement
- Rule of 2% - keep the spray dilute – 2% is ~12 oz. per 4 gallons (512 oz.) – generally limit your added materials to 2%
 - Follow Label Directions if using Commercial Products
- “Phosphorous, Nitrogen, & Sugar are essential for any mixture” (Jon Frank – International Ag Labs)

Crew Talking Points

- Foliar Uptake of Nutrients (Penetration & Translocation) Beyond Stomata, Temperature Dependent
 - http://www.haifa-group.com/files/Other/partners_zone/Presentations/Haifa_U_Foliar.pdf
- Droplet size and “atomized” misters... & Surfactants, Stickers, & Avoiding Burn
- pH of the Sprays – we typically aim for ~6.0 range: also Vegetative vs. Fruiting Growth
- EC – Conductivity Monitoring

Spray Coverage: Just need to apply a fine mist, doesn't need to be dripping off the leaf. Coverage varies depending on crop and canopy size, walking speed, and intention – our lightest applications are 3 backpacks per acre, but more typical per 4 gallon backpack is 6-8 beds (~1,000 sq. ft. each) or ~1/6 of an acre. At the heaviest rate, 1 backpack might cover just 3 or 4 beds of full-size tomatoes sprayed from both sides – this would require 12 backpacks per acre.

Brix Bounty Farm 2016 Basic Recipe – Recipe is for a 4 Gallon Backpack, use clean water

- 2 – 4 oz. Molasses (sugar)
- 4 – 8 oz. Organic Gem N stabilized with P – don't spray leaf crops close to harvest...
- **or** 3-6 oz. AEA Sea-Shield (2-1-1) – also supplies calcium
 - In 2016 we'll be trialing On-Gaard as an Organic N source for foliar applications
- ½ - 1 oz. Liquid Kelp (for trace minerals, sugars, and growth stimulants)
- ½ - 2 oz. Sea-Crop (for trace minerals)
- Fulvic acid, soluble humate, or the like...
- BioLink Micronutrients and or traces (see below)
- Couple of drops of yucca (Therm x70) – 1 tsp. per backpack is plenty

Foliar Additions (as applicable):

- Apple Cider Vinegar
- Borregard (ligninsulfonate)
- Coral Calcium or Water Soluble Calcium (KNF)
- Compost Tea
- Equisetum (Horsetail) – DIY Silica Source
- Raw Milk
- Soft Rock Slurry Water (1#SRP in 1gallon distilled water – just the suspended colloids)
- Vitamin C (we also use this to complex chloramines if we are using town water)

Maintenance Trace Mineral Applications – ½ - 1 oz. BioLink Micronutrients (by volume) per backpack or... the below as needed

Boron - just a pinch of Solubor (5-10 grams per gallon = ~1/4 oz. by weight)

Copper - 1/8 – ¼ tsp Copper Sulfate per gallon

Iron - ¼ - ½ tsp Iron Sulfate per gallon

Manganese - ¼-1/2 tsp Manganese Sulfate per gallon

Zinc - ¼ - ½ tsp Zinc Sulfate per gallon

Cobalt – just a “very small” pinch of Cobalt Sulfate (2-3 grams per backpack)

Molybdenum – just a “very small” pinch of Sodium Molybdate (2 grams per backpack)

Remedy Mineral Applications – presuming 8 backpacks per acre (32 gallons - water) - a “heavy foliar” rate – don’t mix more than one of these per backpack or you will risk leaf burn – these are all concentrated amounts. **CAREFUL, ALWAYS BEST TO TEST FIRST.**

Sources of Calcium, Nitrogen, and Phosphorous not listed – farm specific

- BioLink Micronutrient Fertilizer - 4-8 oz. per backpack
- SEA-90 – 5 oz. per backpack (2.5# per acre)
- Boron – 1# Solubor (21% B) per acre > 2 oz. Solubor (21%B) per backpack – 4 gallons
- Calcium
- Copper – (.5% solution) ~2.5 oz. Copper Sulfate (25% Cu) per backpack – 4 gallons
- Iron – (1-2% solution) 5 oz. - 10 oz. of Iron Sulfate (20% Fe) per backpack – 4 gallons (~6 oz would be ~2% solution)
- Magnesium - 10-20 oz. Magnesium Sulfate per Backpack (5-10# per Acre)
 - Small Scale – 1 Tbsp Magnesium Sulfate per gallon
- Manganese (1-2% solution) – 5 oz. – 10 oz. Manganese Sulfate (32% Mn) per backpack – 4 gallons –
 - * This is a heavy application* be aware of its potential impact on leaf/vegetative crops... Mn is “reproductive”
 - up to 2# actual Manganese per acre (6# Mn Sulfate) – best to start with 3 pounds MnS per acre to check response...
- Nitrogen
- Phosphorous
- Potassium (1-2% solution) – 5 oz. -10 oz. Potassium Sulfate (52% K₂O) per backpack (2.5-5# Potassium Sulfate per acre)
- Zinc – (.5% solution) ~2 oz. Zinc Sulfate (36% Zn) per backpack – 4 gallons of water
 - This rate is ¼ - ½ # of actual Zinc (~1# Zinc Sulfate) per acre
 - Up to 1% solution recommended for potatoes
- Cobalt – 3 oz. (84 grams) Cobalt Sulfate (21% Co) per acre > 1/3 oz. (10.5 grams) per backpack
- Molybdenum – 2 oz. (56 grams) Sodium Molybdate (39% Mo) per acre > ¼ oz. (7 grams) per backpack
- Selenium – Sodium Selenate is preferred, but difficult to source...
- Silicon – One option is a (.25-1% Solution of Sil-Matrix) – 1 oz. – 5 oz. Sil-Matrix (29% Potassium Silicate)
 - Follow Label Instructions: http://www.certisusa.com/pdf-labels/Sil-Matrix_label.pdf
 - Now available through Fedco OGS (\$135 per 2.5 gallons – expensive, 7 Springs (VA) listed \$72 per 2.5 gal)

DIY “Bio Accumulators” to consider for use in ferments or teas: There is a wide selection of native and garden plants to consider...

- Comfrey – good K source
- Nettle – good Fe source (also K, Ca, Mn)

Mid-Season “Corrections” with Foliar Sprays – Soil & Nutrition Conference February 2016

Mid-Season “Corrections”: A Guide to Foliar Spray Selection & Application: Foliar sprays offer farmers the capacity to quickly address in season nutrient deficiencies and fine tune their crops to improve production. From supplementing nutrition to reducing insect pressure, foliar programs offer potential solutions for farms anywhere on the fertility continuum. After outlining the basics of utilizing foliar sprays, and introducing a framework for "in season fertility" decision making, we'll cover strategies and simple recipes to make the most of your investments.

Basic Decision Making Framework for Foliar Sprays

? What Level of Optimum Production is Your Goal ?

? What is the Problem You Are Trying to Solve ?

May Foliar Sprays Reduce a Need for Future Intervention (i.e. Pesticide or Fungicide Use) ?

What is the Financial Costs for Action or In-Action?

What are the Labor Costs and Opportunity Costs of Directing Labor Away from Other Activities?

At Brix Bounty we have found the only way to consistently implement a foliar spray program is to include time for it in our work week... this is relatively easy to come by before harvest season ramps up, but is more difficult once cucurbits and tomatoes come in (i.e. multiple fruiting crops requiring frequent harvests each week).

We typically set aside one or two periods per week (April into July) “reserved” for foliar sprays and then make a decision how best to use that time? i.e. Routine Enhancement of Growth, Addressing a Problem, Focusing on Non-Foliar Activities

By mid-July we might limit our foliar activities to 1x per week or every other week... depending on the growing season.

Reducing Nitrates – Nitrate Reductase Enzyme and Nutrient Mobility

- Base Spray -> omit Fish or SeaShield then add the following:
- Sodium Molybdate up to 2 oz. per acre rate – ¼ oz. per backpack
- Magnesium Sulfate – at 16 – 32 oz. per acre – 2-4 oz. per backpack
- Iron Sulfate – at 8-16 oz. per acre – 1-2 oz. per backpack
- Boron (Solubor) – at 8 oz. Solubor per acre rate – 1 oz. per backpack
- Copper Sulfate – at 8 oz. per acre rate – 1 oz. per backpack

Promoting Flower Set – Emphasize the following:

- Ammonium Forms of Nitrogen and Phosphorous ... Reproductive Energy
- Boron
- Copper
- Molybdenum
- Manganese
- Zinc
- Apple Cider Vinegar

Promoting Fruit Quality – Emphasize the following: For calcium to be effective it needs to be sprayed when fruit is small, before cell expansion!

- Calcium
- Boron
- Potassium

After Significant Flooding Event (anaerobic field conditions > shuts down nitrate conversion in the soil) – See U FL Resource “Practices to Minimize Flooding Damage to Commercial Vegetable Production <http://edis.ifas.ufl.edu/ss425>

- Suggestion to foliar apply NPK - 4# Nitrogen, 1# Phosphate, 1# Potassium per acre (plus traces as necessary)

Six Recommended Foliar Spray Resources

Note: Most companies who produce or market foliar/fertilizer products have extensive information online

For example see boron information at <http://www.borax.com/market/agriculture.aspx>

- *Chapter 6: Foliar Nutrition, The Farm as Ecosystem.* Jerry Brunetti. Acres USA. 2014.
- *Foliar Nutrition* by Midwest Laboratories – 81 pages
 - https://www.midwestlabs.com/wp-content/uploads/2012/09/foliar_nutrition.pdf
- *Foliar Fertilization* – ATTRA (2003) –
 - <https://attra.ncat.org/attra-pub/viewhtml.php?id=286>
- Jon Frank (International Ag Labs) – *Foliar Sprays Email Series* – Foliar Spray information building on Carey Reams
 - <http://foliarsprays.com/pdf-downloads/articles.html>
- *Foliar 10 FAQ* with Graeme Sait
 - <http://blog.nutri-tech.com.au/top-10-most-frequently-asked-foliar-fertilising-questions/>
- *The Growers Program and Foliar Nutrition* (Growers Minerals Solutions – not OG) Building on the work of Victor Tiedjens
 - <http://www.growersmineral.com/pdf/The%20GP%20-%20Foliar%20Nutrition.pdf>

The Myth of Foliar Feeding (Linda Chalker-Scott) - <http://puyallup.wsu.edu/wp-content/uploads/sites/403/2015/03/foliar-feeding.pdf>

Bandaid Approaches to “Micro-Nutrient” Deficiencies in Vegetable Production – Pre Mixed Liquids to Consider:

BioLink Micronutrients – \$27.99/gal (Jan 2016) Fe, Mn, Zn plus K, Mg, B, S, Mo

<http://www.groworganic.com/organic-biolink-micronutrients-gallon.html> Label - <https://www.groworganic.com/media/pdfs/fl869-b.pdf>

Safer Gro – “Amino Acid Encapsulated Minerals”: Biomin Boron, Biomin Calcium, Biomin Cal-Boro, Cal-Boro Light, Biomin Iron, Biomin Manganese, Biomin Zinc (they also have Biomin Magnesium – though Epsom salts are widely available)

Safer Gro – Biomin Copper is one that we’ve used in the past because of concerns regarding copper sulfate’s impact on soil biology – we’ll be trialing this added to our gh potting soil in 2016.

Safer Gro – This website contains full information of their product listing (including non-OMRI approved materials), it isn’t a retail website... <http://www.safergro.com/category/products/plant-care-nutrition/>

For purchase of Safer Gro products, consult your local fertilizer supplier or check Amazon or Unbeatable Sales (through Amazon), JH Biotech (the makers of Safer Gro) referred me to these suppliers in a 2015 conversation.

Spreader/Sticker – we currently use: Therm X70 – Yucca Extract - \$21.99/ pint, \$34.99/quart, \$119/gallon (Jan 2016)

<http://www.groworganic.com/therm-x70-yucca-extract-1-pint.html>

From Peaceful Valley Website: “Our best spreader sticker! Totally natural irrigation and emitter cleaner contains: 70% concentrated yucca extract, makes sprays stick to crop foliage. Use 2-3 oz/acre or 0.25 tsp/gal per foliar application when Therm X70 is applied alone or in combination with other foliar materials. Product foams heavily and should be added last when being mixed in high agitation systems. Can also be sprayed on the soil as a soil penetrant. Use at 16 oz per acre or 1 tsp/5 gallons of water; once a year on good ground, twice a year on alkaline soil. For preventing buildup in drip lines, apply 2 oz/acre weekly. Active ingredients are steroid saponins-complex sugar structures which help plants assimilate nutrients.”

For those so inclined, you can make your own foliars using raw ingredients, look for soluble grade materials

- Fulvic Acids are recommended for foliars
 - <http://guarding-our-earth.com/organic-fertilizer/organic-fertilizer/fulvic-acid-humic-acid-chelation/>
- Amino Acid Chelates are worth researching... Citric acid is often used with amino acids –
 - <http://jhbiotech.com/docs/Chelated-Micronutrients.pdf>
- BorrePlex OA – Calcium Lignosulfonate & Lignosulfonic Acid - available from Nolt’s at \$72.50 per 5 gallons
 - http://www.agrian.com/pdfs/BorrePlex_OAc_Liquid_Label2.pdf