Nutrient Dense Crop Production

And the Real Food Campaign

2010 Course III

Course Outline

- Addressing limiting factors - planting/ transplanting solution, drenches and foliar sprays.
- Crop and soil management - Conductivity, Brix, and pH
- What do we do with these results? How do we manage accordingly?

Course Outline Continued

- Trouble shooting - cases in point, potting soil, biology and cover crop residue.
- Integrating whole system understanding.
- Using plant and soil monitoring to trouble shoot problems.

Course Outlined continued

- Saturated Paste and Tissue Tests
- RFC Research Project - Involvement
- Simple Plant/Transplant, Drench and Foliar Mixes
- RFC Update

Course Outline Continued

- Hands on application of Foliar spray
  - Mixing measuring and math

  Hands on application of planting/ transplanting drench into field

  Field measuring, and math

Course Outline Continued

- Hands on Soil Conductivity testing
  - Plant sap Brix testing
  - Plant sap pH testing

When Saturated Paste and Tissue Testing?

Limiting Factors

- As with bio-inoculants, soil mineral balancing, planting/transplanting drench, regular drench and foliar are designed to address limitations as they are experienced in the plant.
- Less than ideal mineral and biological levels will show up as deficiencies in crops.

How to Discern Imbalance?

- Conductivity - soil energy levels need to be sufficient for crops to have access to the nutrition needed for optimal growth.
- Conductivity - corresponds to electrical energy flow in soil. Looking for minimum of 200 in spring. 600 at fruit fill. These numbers for good organic matter levels. Poor organic matter will require higher conductivity levels.
- Biological activity releases minerals into soil solution which increases conductive reading.
- Dropping conductivity reading corresponds to insufficient nutrition for crops.

Addressing deficient conductivity

- Planting/transplanting solution - Should supply sufficient nutrition for crop to have generous availability of nutrition needed to establish large strong root systems which are predictive factors in yield potential. Calcium and Phosphorus critical at this time.
- Often cold soils, or denuded will not be sufficient in energy and nutrition to establish this first key phase in field to optimal levels.
- Conductivity monitoring will proactively show general nutrient availability to crops. If this begins to drop a drench should be applied.

Discerning deficiency Brix

- Ideally, brix readings in plant leaf sap should not drop below 12. Early morning testing is best to show minimum levels. If 12 is not attained in mid afternoon of a sunny day, the plant is definitely stressed.
- Regular weekly monitoring is ideal for discerning movement in brix levels.
- Same point in plant is necessary for significant readings. I.e. fourth newest leaf.
- Same time in day as well.
- Brix below 12 shows the need for other monitoring activities if the desire is to address the problem.

Plant sap pH

- In organic systems, if brix is deficient, the best mode to determine cause of deficiency is plant sap pH.
- 6.4 pH in plant sap is ideal.
- Below 6.4 predicts a plant available deficiency probably of Calcium, Potassium, Magnesium or Sodium.
- Above 6.4 predicts a plant available deficiency of nitrogen, sulfates or phosphates.
- Most often low plant sap pH is due to Calcium or Potassium deficiency.

pH Imbalance Troubleshooting

- Low pH most common
- Potassium and Calcium deficiency most common
- Calcium is fixed in the plant, and Potassium mobile
- Calcium will be deficient in top of plant, and Potassium in the bottom.

pH Troubleshooting Continued

- Potassium increases brix where it is present.
- Higher brix at top of plant than bottom with low pH will be probable Potassium deficiency.
- Greater pH deficit at top of plant than bottom with low brix will be probable Calcium deficiency.

pH Troubleshooting Continued

- High plant sap pH is most often a shortage of Phosphates.
- For all deficiencies, solution predicted, apply test foliar spray consisting of predicted deficient nutrient and test plant brix after 2 hours.
- If you have addressed the deficiency, the brix should be up at least 1-2 points in the test plants.
- pH as well should begin to moderate.

Problems this year

- Potting soil
  - Water quality can significantly effect functionality of the biological system
  - Bicarbonates tie up anions like nitrogen and phosphates
  - Chlorine kills biology
  - If crops are slowing down, looking light colored use supplemental fish

Biology and cover crop residue

- Tilling in cover crops, applying biological inoculants, and planting/transplanting in short order can cause burning or worse as the biological flush present at the breakdown of green manures will greatly increase conductivity levels.
- This can burn plant roots with negative effect.
- Biology can even break down plant roots if they are weak and biology is thriving.
- Think compost pile

RFC Research project

- Replicated randomized trials in collaboration with U/Mass. Publishable science designed to document increase in nutrient levels. Looking for collaborators. See realfoodcampaign.org for documents and details or talk to Dan
- Free liquid fertility for crops to those who successfully complete the protocol.
- Simple focus in time and effort.

Standards Research

- In Collaboration with USDA Food Science Lab in Wisconsin
- Samples from Biologically oriented growers from across the country.
- Objective to develop a base line for data that will serve a process of quality standards creation.
- LEED type system, from good to best.

When problems persist

- Saturated paste test
- Tissue test
- Send out lab tests that tell what the plant is experiencing in it’s environment, and what mineral levels and imbalances are present.

Simple Solutions

- For those who do not want to bother with plant sap monitoring, soil conductivity testing, recipe building and effectiveness testing,
- Simple comprehensive planting/ transplanting drench
- Regular weekly/biweekly drench
- Regular weekly/biweekly foliar

RFC Update

- Website outline complete and buildout going on.
- Backend database and information management infrastructure being developed.
- Research locally for hard data on possibilities in increasing food nutrition, and nationally with data on what is being grown and what kinds of standards are possible.
- Numerous networks, contacts, and supporters.
- Need dough:)