Principles, Protocols and Products to Produce Nutrient Dense Crops 2011 Course II

Course II

- Principles and Theory
- Soil Mineral Balancing
- Field Management Practices
- Plant Vitality Monitoring
- Protocols for the Year
- Review and Questions

Principles and Theory

- Address limiting factors in system
- Support soil biological system
- Monitor plant development to fine-tune system
- Measure and taste results

Soil Mineral Balancing

- What is soil mineral balancing?
- Reams anion/ cation balancing
- Soil Testing
- Soil and Crop Fertilizers

Math for Minerals

- PPM - Parts per Million -
- PPA - Pounds per Acre
- 2,000,000 pounds of soil in the top six inches of an acre
- PPA = PPM X 2
- Necessary level of Phosphorus and Sulfur 75 PPM = 150 PPA

Sulfur

- Need 75 PPM or 150 PPA
- Report level 25ppm = 50 ppa
- Needed level = 100 ppa
- Gypsum is CaSO4 + 2H2O
- Atomic weight Ca =40, S =32, O = 16, H = 1
- 40+32+((6X16) = 96)+4 = 172
- 100/172=.59, 40X.59=23.5, 32X.59=19
- 100lbs gypsum = 23.5lbs Ca, 19lbs S

Mineral levels

- Greensand = 7-9% K - 52% Silica
- K-Mag (Sul-po-mag) 22%K - 22%S - 11%MG
- Rock Phosphate = 22% P - 20% Ca
- Hi-cal Lime 38-40% Ca
- Dolomitic Lime 30% Ca - 10% Mg

Mineral Levels

- Solubor = 20% BORON
- Borax = 11% boron
- Cobalt Sulfate = 27% Cobalt
- Copper Sulfate = 37% Copper
- Manganese Sulfate = 32% Manganese
- Zinc Sulfate = 35% Zinc
- Molybdenum need up to 1/2lb per year, check percentages
- Selenium need up to 1/4lb per year, check percentages.

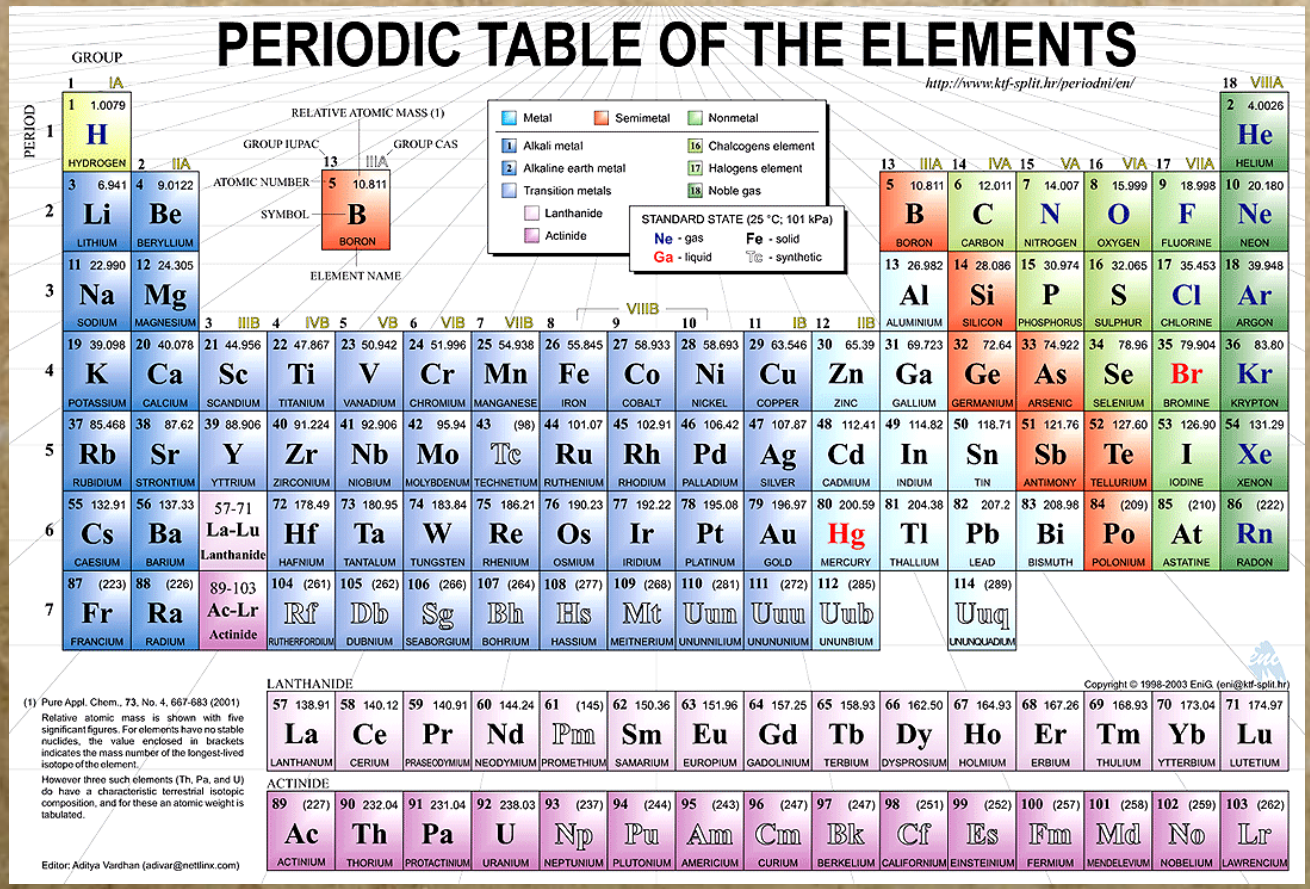
Conversions

- 500lbs per acre = 11.5 lbs per 1000sq ft
- 100lbs per acre = 2.3 lbs per 1000sq ft
- 20lbs per acre = .46 lbs per 1000sq ft
- 5lbs per acre = 2 ounces per 1000sq ft

Soil Testing

- Strong Acid/Weak acid
  - Savings vs. Checking Account
- CEC/Biologically available mineral balancing
- pH for mineral solubility in solution
- Mineral ratios for optimal soil life and plant symbiosis, and energy

Soil Testing Continued



Source: http://en.loadtr.com/Periodic_Table_could_have-438617.htm

Field Management Practices

- Tillage
- Fertilizer
- Bedmaking
- Seeding and Transplanting
- Infrastructure: spreaders, drip irrigation, foliar systems
  - Water test

Tillage

- Rototillers
- Broad Forks
- Plows
- Harrows
- Spaders
- Bedmakers

Beds

- General proposal to institute semi-permanent raised beds with drip systems, and white clover or mulch pathways
- Set for width of equipment
- Integrate with “plasticulture”
- Facilitate more stable and developed biological matrix

Fertilizer/Plant Transplant

- Apply when tilling in cover crops, after making beds, before putting down plastic, or in row.
- Consider integrating not just NPK, but Ca, Mg, Traces, Humates, biological inoculants, sea salt, enzymes, kelp

Plant/Transplant

- Bacterial/Fungal Inoculant
- Enzymes
- Sea Minerals
- Micronized Minerals/Traces
- Humates
- Conductivity Minimum 150-200

In General

- Once a plant shows deficiency symptoms, you have limited the genetic potential of that crop in that year. Epigenetics.
- Why guess when you can test. In high value crops it is very affordable to make changes and test regularly.

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.
- 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.

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.

Nutrient Drenches

- Supplemental feeding in season guarantees plant availability of broad spectrum fertility through season
- Use soil conductivity monitoring as means to determine necessity of drench
- 150-200 at plant/transplant, 600-800 at fruit fill stage.

Water or Irrigation test

Understand what effect irrigation water you may be using is having on the mineral availability and levels from the perspective of your crop.

Water test - Logan Lab

- pH - 6 ideal for irrigation and tank mixing.
- EC <1.5 desired range, >1.5 potential problem, >3 may burn crops
- SAR <6 desired range will add Ca. >6 will strip Ca and burn.
- Ca. 40-120 ppm desired range

Water test continued

- Mg 6-24 ppm desired range
- K 5-10 ppm desired range
- Na ppm desired range
- Fe 2-5 ppm desired range
- Alkalinity 1-100 ppm desired range
- Carbonate <50 ppm desired range
- Bicarbonate <120 ppm desired range

Water test continued

- Chloride <140 ppm desired range
- Sulfate <400 ppm desired range
- Salt Conctrtn <960 ppm des range
- Boron .2-.8 ppm desired range
- Cation/Anion Ratio 1:1 ideal ratio

Plant Vitality Monitored

- Complete Carbohydrate Production
- Complete Protein Production
  - Effect on insect pressure
- Fat and Oil (essential) Production
- Enzyme, Vitamin, Hormone Production.
- Secondary Plant Metabolites.

Plant Vitality Monitored

- Brix monitoring
- Soil Conductivity
- pH of Plant Sap

Brix Monitoring

- The unit representative of the sugar or solid content in a solution.
- Use of refractometer
- How to take a sample
- Target Brix readings: sap = 12; fruits and roots vary (see chart)

Soil Conductivity

- A measure of the quantity and mobility of ions in the soil
- Measured in Ergs/microsiemens
- Correlates to nutrient availability to plants
- Monitoring throughout the season
  - 200 in spring
  - 600 at fruit fill

pH of Plant Sap

- Low Brix, high soil conductivity - check plant pH
- Ideal: 6.4
- < 6.4 predicts Ca, K, Mg, and Na deficiencies
- > 6.4 predicts N, P, and S deficiencies

Foliar Sprays

- Foliar fertilizers are 100-800% more efficient than dry fertilizers applied to soil
- Applications
  - Timing
  - Frequency
  - Recipes

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

Seminal Thinkers

- Please submit insights and leads of your own.
- Integrating Geometry, chemistry, physics, metaphysics, biology, nutrition, genetics, quantum mechanics

Some

- Steiner, Rudolf - Soul Forces
- Reams, Carey - Millhouse units
- Albrecht, William - Mineral Balancing
- Tainio, Bruce - Field tuners, enlivened somatids
- Callahan, Phillip - paramagnetism, insects and antenna
- Russell, Walter - Theosophy, metaphysics, underlying structure of matter

More

- Reich, Wilhelm
- Besant, annie and Leadbeater, charles Theosophy/Anthroposophy
- Olree, Richard - minerals in genetics
- Schauberger, Victor - spin in water
- Heironymus, galen - field tuners
- Naissons, Gustaf - somatids
- Krasilnikov - somatids
- Emoto, Masaru - structure and emotions in water

Secret Life of Plants

- Cleve Backster - verification of human inention and plant response - 1966 - lie detector, school for polygraph examiner
- Marcel Vogel - plants respond to the thoughts of the people whose presence they are in - invented red color in television

Secret Life

- Pierre Savin - philodrendron turned on and off model train - plants respond best to people with whom they have a bond
- V.G. Karamov
- A.R. Bailey
- Jagadis Chandra Bose

Real Food Campaign

- Bionutrient Food Association
- Increase Quality in the food supply
- Spectrophotometer
- Join research project for this year - fill out grower community page on realfoodcampaign.org