Principles to Produce Nutrient Dense Crops and The Real Food Campaign
Dan Kittredge

- Grew up on and Managed Many Hands Organic Farm in Barre Ma.
- Closely connected to Nofa for 25+ years
- Worked with Farmers in India, Siberia, Central America and across the US
- E.D. Remineralize the Earth
- Director Real Food Campaign.
Real Food Campaign

- To restore human health by renewing the minerals and life in soils to optimize the nutrient quality of food.
- To support farmers to apply biological principles of 21st century agriculture in effective soil stewardship.
- To create Standards and Certification to deliver authentic Nutrient-Dense foods to consumers.
Overall Campaign Steps

- Farmer education and Empowerment
- Broad and comprehensive research Documentation of principles and results
- Serious achievable standards with direct ramifications for Soil, Plant, Animal, Human and Environmental Health.
- Consumer Education and resource database
Protocols for the Year

- Biological Innoculation
- Soil Mineral Balancing
- Nutrient Drenches
- Foliar Sprays
Management practices for the Year

- Soil testing
- Tissue analysis
- Sap monitoring
- Visual field analysis
- Tillage and Covercropping
- Rotation management
Plant vitality monitored

- Complete Carbohydrate Production
- Complete protein Production
- Fat and Oil (essential) Production
- Enzyme, Vitamin, Hormone Production. Secondary Plant Metabolites.
Introductory outline

Introductory outline

Introductory outline
Requisite Assumption

- Maximum **BIOLOGICAL VITALITY** is the objective of our agricultural endeavors.

- In soil life, crops, animals and humans
**Biological Vitality Defined**

- Maximization of the DNA potential.
- Correlates with vital health.
- Maximum production.
- Healthy immune system = disease and insect resistance.
- Maximum nutrition in crops.
- If the plant’s reproductive organs are healthy, it is maximizing its potential to reproduce crops that are healthy.
End result called

**Nutrient Dense**

Easily verified by

**High Brix**
CURRENT TRADITIONS IN BIOLOGICAL MANAGEMENT

- Organic
- Biodynamic
- Permaculture
- And others, ex. sustainable

These traditions do not educate the farmer in the overall principles of maximizing biological vitality and systems.

They are process-based protocols without a clear nutritive outcome as a standard.
What is Nutrient Density?

- High Brix
- Heavy test weight
- Will Dessicate
- 100%+ Pre 1940 USDA average mineral levels and spectrum
- More filling

- Flavor/refractometer
- Lb’s/bushel, seed/lb
- Shelf life vs. rot
- Complete proteins, amino acid ratios, ORAC, enzymes, phytonutrients
- Minerals vs. calories
How to Get There?

- Intelligent use of scientific principles
- Chemistry
- Physics
- Biology
- Microbiology
- Sound farm management practices.
What Happens?

- Reduced weed pressure/weeds get disease & infestation
- Reduced to removed crop disease & infestation
- Shorter time to harvest
- Increased yield
- Increased flavor and shelf life
More requisite assumptions

- **Scientific Principles are critical tools**
- **Technology is a potentially very valuable ally**
- **Dogma is dangerous**
  - ex. mining is bad
  - products of human induced chemical reactions are bad
  - tillage is bad
Fighting is out of style

- Solving the dialectic
- Fighting weeds, insects and diseases is the old mentality. It has not solved any problems.
- Solution to the dialectic is in conceiving of the objective as building the biological system in which crop plants out compete.
- Build the soil properly and the insects and disease will attack the weeds!
Solution to the Dialectic

- Understanding and operating from the energetic reality underpinning physical systems.
Foundational Parameters for Biological Function
Soil

- Balancing biologically available minerals
- Anion/Cation Balancing
- ERGS/Paramagnetism and Energy flow
- Bacterial/fungal ratios
Plant

- Protein Synthesis vs. Proteolysis
- Carbohydrates and Sugars
- pH
- Conductivity
- Brix
Soil Testing

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

- Humus 30-40 min  Lubke test
- Sodium <35 ppm
- ORP 28
- pH 6.5
- Copper 0.8-2.5 ppm
- Iron 10-25 ppm
- Zinc 1-6 ppm
- Manganese 8-30 ppm
- Boron 0.8-1.2 ppm
- Sulphur 30 ppm
- Organic Matter 4% min
- Formazon 600
Energy Flow in Nature

QuickTime™ and a decompressor are needed to see this picture.
RBTI

- RBTI suggests that plants live off the energy released by elements not off the elements themselves "per se."
- In other words Reams was concerned with increasing the energy, or magnetism, of crops through the use of specialized fertilizers.
A generation lost

- RBTI anion-cation Connundrum
- Anionic energy denotes the vegetative stage of plant growth
- Cationic energy denotes the fruiting stage.
- Reams use of these two terms differs from their common usage in soil chemistry, wherein an anion is a negatively charged ion (NO$_3^-$, PO$_4^{3-}$, SO$_4^{2-}$) and a cation is a positively charged ion (NH$_4^+$, Ca$^{2+}$, K$^+$, Mg$^{2+}$).
Bacterial and Fungal Ratios

- Trajectory of soil evolution from stone to climax forest.
- Initially highly bacterial dominant 1,000 to 1 by weight and volume to finally highly fungal-dominant 1,000 to 1 by weight and volume.
- Crop plants have primary symbiotic relationships just to the fungal side of the center of the spectrum. And weeds just to the bacterial side.
- Soil mineral ratios and energy levels determine ideal habitat for specific species of soil life.
ERGS

▪ **ERGS testing is a rapid and inexpensive way to monitor energy flow in the soil.**

▪ **Real Time management decisions including application of seaweed, biological inoculants, humates, micronized minerals and molasses are practical ways to keep ERGS readings at ideal levels, facilitating maximum biological growth.**
Energy

Energy balancing is at the root of Mineral Balancing.

Balancing and increasing potential energy is at the root of Soil Building

+/− balance, spin and quantity

Battery is plates with an electrolyte. Maximum potential difference is a fully charged battery
Protein Synthesis vs. Proteolysis

- Complete proteins and non-reducing sugars are the objective of photosynthesis.
- This is what mammals are designed to digest.
- Free N, amino acids, and simple reducing sugars are what insects can digest.
- Sufficient Ca, P, S etc critical.
- Refractometer ideal tool for measuring.
**CALCIUM**

- **Primary base against which other materials are reacted to release energy.**

- **Key to successful foliar sprays.** *Calcium channels in cell primary channels for movement of compounds.*

- **Key for intracellular communication.** *Telephone lines.*
Phosphorus/Phosphate

- All minerals which enter a plant except nitrogen enter attached to a phosphate ion. 
- Key for ATP. Energy which fires the factory of the plant. 
- Shortage of phosphate means a breakdown of the transmission of energy in plants and as such prevents growth.
Work of Phil Callahan

- Insects tune into the radio and infrared signals in their environment to seek, identify, track and home in on their mates and foods.
Weeds

- Prefer bacterial dominant soil.
- Sour grass weeds, functional calcium deficiency
- Broadleaf weeds, phosphorus / potassium ratio imbalance
- Succulants, functional carbon deficiency
Brix and Refractometer

- Refractometer measures quantity of dissolved solids in a fluid.
- Measured in degrees brix
- Higher brix correlates directly with higher mineral content, more complete proteins, increases phytonutrients, and vitamins.
- Also correlates with better flavor, more sweetness and longer shelf life.
- High brix crops will not rot. They desiccate.
BrixChart

- Preliminary Standard for Nutrient Density
  Good or Excellent on the Brix Chart
Electrical Conductivity

- Energy available for plant growth
- Measures the quantity and mobility of ions (cations & anions) and is perfect for seeing an overview of the amount of nutrients available to the crop.
- Soil EC below 200 ergs/microsiemen implies an insufficiency of energy available for the electrical/chemical reactions necessary for healthy plant growth. 1000 too high
- Ideally 200-600 in the soil, and 2000+ in plant sap
**pH**

- pH is a measure of the ratio of H$^+$ to OH$^-$ ions.
- The pH of vinegar is 2.5-3. How much calcium is present?
- The pH of ammonia is 12. How much calcium is present?
- The pH of pure water is 7. How much calcium is present?
P H

- **Ideal sap pH-level for optimal plant growth and production is pH 6.4**
- **If sap pH exceeds 6.4, this probably means a shortage of the anions nitrogen, phosphate or sulfur. At pH 8 the odds of insect trouble is 100%.
- **Conversely, if sap pH is lower than 6.4, then there is a cation problem, with possible deficiencies of calcium, magnesium, potassium and/or sodium. Low sap pH suggests a far greater potential for foliar disease. At pH 4.5 the probability for fungal appearance is 100%**.
How?

- Soil available mineral balancing
- Proper biological inoculation
- Water management
- Real time soil and plant sap analysis
- Nutrient Drenches and Foliar feeding
- LaMotte soil test and proper amending
- Key role of mycorrhizal fungi
- Drip, sprinklers etc
- Refractometer, electrical conductivity and pH meters
- Micronized minerals, humates, biological inoculants, sea minerals, molasses, etc.
Warning

- This process does not happen overnight.
- Expect 3-5 years for transition.
- Insufficient energy in the soil to feed biological digestion of mineral amendments will result in diminished energy for crop growth.
**Nutrient Density as a Quality Standard**

- When the biological system is functioning at a high level, there are direct mineral, vitamin, trace element, and nutrient improvements that are easily verifiable in crops.
- This nutrient improvement referred to as nutrient density is the general standard to validate the success of biological agriculture.
- From the consumer's perspective, Nutrient Dense crops correlate directly with superior flavor, superior shelf life, and a broad range of health benefits related to the body's complete nutritional needs being met.
Corollaries for Human Health

Dr. Richard Olree shows a clear relationship between specific mineral deficiencies and specific DNA malfunction, now understood to be causative factors in most chronic illness. Minerals for the Genetic Code
Working standard/definition of Nutrient Density and its status

- **Nutrient Density** as quality standard is, as of yet, not technically defined.

- A collaborative process of specialists in the production of Nutrient Dense Crops is currently underway to determine a clear, inexpensive empirical test for all agricultural crops. This process will conclude in one to two years.

- This is a project of the Real Food Campaign, which will be touched on at the end of this workshop.

- The current working suggestions include a field Brix test, calcium, magnesium, vitamin A, vitamin C and selenium level and ratio tests and antioxidant levels lab tests.
Why These factors?

- **Brix**: greater refraction of light through sap corresponds with complex carbohydrates, complete proteins, and non reducing sugars, which correlate directly with nutrition and flavor.

- **Calcium, Magnesium, Vitamin A, Vitamin C, Selenium, {Boron, Potassium, Phosphorus and Nitrogen}**: these minerals, in predetermined quantities and rations correlate directly with the presence and healthy relationship of a number of other trace elements and vitamins.

- A limited number of test factors limits the cost of the test.

- **ORAC/Antioxidant levels**: a specific elevated level of antioxidants generally implies overall nutritive value, energetics and phytonutrients.
Overall Campaign Steps

- Consumer Awareness/brix database
- Broad and comprehensive research
  Documentation of principles and results
- Serious achievable standards with direct ramifications for Soil, Plant, Animal, Human and Environmental Health.
- THANK YOU, and Best of luck.