2010 Course 4

Nutrient Dense Crop Production Series

Dan Kittredge Presenter

Dan@realfoodcampaign.org

978 257 2627

In Season Monitoring and Management

- Visual Signs of plant growth, shape and structure.
- Water and Saturated paste tests for proactive availability monitoring.
- If plant structure is built well now. Yield potential through the season is established.

Review and Integration of Principles

- Soil mineral balancing to address underlying deficiencies.
- Biological inoculation to address underlying deficiencies.
- Real time management to assess functionality of soil and plant.

Assessing plant status

- Start with overview of patch. General glance across field.
- Questioning attitude. Ask. Listen. Throughout the day, when working in the crop. What comes to you?
- Sentience, Intuition, Spirit, Devas, Kinesthetic, Gut feeling.

Questions

- Are new growth tips standing erect?
- Do honeybees work the flowers vigorously?
- Is the plant growing rapidly?
- Are stems solid or hollow?
- What weed families are dominant?
- How many flowers are setting per bunch

Questions

- How thick are the stems?
- How thick are the calix's
- How thick are the leaves?
- What color are the leaves?
- What color is the sap?
- What is the spacing between nodes?
- How many petals are on each flower?

General Parameters

- Stem size - Bigger is better
- Stem Strength - Should be able to bend between the fingers. See how much a stem will bend before breaking. Greater flexibility is a sign of improved quality.
- Stem hairs - More and longer is better.

General Parameters

- Solid stems in grains and brassicas especially. Hollow connotes functional Ca deficiency.
- Stem shape - round is preferred. Oblong connotes Ca deficiency.

General Parameters

- Internode Points - Shorter internodes build stockier plants which can build higher yields. In tomatoes and vine crops 4-6 inches between nodes should be the max. Try for shorter.

General Parameters

- Leaf Thickness - Thicker is better. Facilitates greater photosynthesis and nutrient transport. Fe, Mg and K associated with this.
- Leaf shape. Shorter wider leaves correlate with higher production potential and stockier plants. Ex tomato plant. 1X5.5 inches or 2.5X4 inches

General Parameters

- Leaf Density - plants highly loaded with leaves have higher productive capacity.
- Leaf sap color - darker color more chlorophyll. Mg and B+K associated with this. More photosynthetic potential. N will make plant look greener, but not sap darker.

General Parameters

- Number of flowers per cluster - greater number of flowers greater number of fruit. Mn often limiting factor in flower number and fruit set. 4-6 flowers to 12-15.
- Size and strength of flowers critical. Size of calix.

General parameters

- Check pH and Brix of crops and weeds next to them. As the soil becomes strengthened, the brix rises and balances in the crops, and drops and imbalances in the weeds.
- What weed families are present? Not individual weeds, but general trends.

Ca Signs

- Often Ca shortages show up in tandem with other shortages. Most common, B and Si.
- Stem and leaf strength and ability to flex and bend back are correlated to Ca.
- Strong cell walls which correlate to fungal resistance.
- Roundness of stems sign of good Ca presence.

Ca Signs

- Adequate Ca correlates to same leaf size across the plant. Consistency.
- Adequate Ca will help plant vibrate at a higher frequency increasing the plants ability to pull nutrients to it.
- Leaves will curl upward in Ca shortage in cucurbits and will also become brittle. This will correlate with B also.
- In Solenacious crops Ca shortage may cause leaves to curl down.

Si Signs

- Vine crops will become resistant to powdery mildew with sufficient Si. Synergist with Ca. Sufficient Si will make very strong cell walls.
- Grasses and cucurbits especially need Si. Si supplementation will cause leaf hairs to increase in size and vibrancy. Micro transmitters.

B Signs

- Boron facilitates Carbohydrate transport down to roots and nutrients up to leaves. Insufficient B will correlate with stagnant brix readings in crops, not fluctuating the day.
- Adequate levels of Ca in the soil and bottom of the plant but not in the top of the plant will correlate with B deficiency.

B Signs

- B pushes nutrients upward and outward in the plant. Catalytic effect in moving nutrients.
- Close attention to inside and outside brix and pH in a leaf. If inside of leaf is in better shape than outside probably a B deficiency.

K signs

- Potassium is a transport element, and catalyst in plant sizing. K deficiency will show up in leaf, fruit, and stem if size is not there. Lack of K is obvious in size and shape of fruit.
- Delicious apple shape shows insufficent K. Should not be oblong, should be as round on flower end as stem end.

K Signs

- K shortage will be obvious in thin stems, calix's and leaves.
- K shortage in vine crops will show as a light or yellow band on the outside rim of the leaf.
- In tomatoes, bottom leaves curling up that turns into early blight is a sign of K deficiency.

Mg Signs

- Mg produces chlorophyll and has enzyme cofactors that turn plant sap a deep true green. High levels of Mg will cause a very dark sap which shows a very healthy plant.
- Discoloration in color on veins light and dark to white perhaps lower leaves first then across plant is Mg deficiency.

Zn + Mn

- Zn critical for creating complex compounds that address Early and Late Blight
- Mn critical for creating complex compounds that address downy and powdery mildew

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.

Plant Framing and Fruiting

- A plant will generally start seriously building its frame 4-6 weeks after it has been transplanted.
- Saturated paste test 3-4 weeks after transplant = 1-2 weeks before framing and fruiting = time to adjust for deficiencies. Proactive monitoring.

Framing and Yield Potential

- 3-4 weeks after bulking point it becomes difficult to significantly impact yield potential.
- Getting past bulking point with healthy form, healthy root system, and sufficient mineral availability Significantly Increases Potential For Yield.

Further Reading

- Ask the plant by Charles Walters
- Farm Management Handbook by bruce Tainio.

Lab Tests

- 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.
- Saturated Paste test.
  - See what nutritional components are available for your plants in real time.

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

Saturated Paste Test

- Soluble Salt - 300-750 ppm
- Chlorides - 25-50
- Bicarbonate - 50-100
- Phosphorus - .5 ppm
- Calcium as % should be greater than Mg and K. As a % the Ca:Mg ratio 3:1 or a ppm ratio of 5:1. Ideal range 30-50 ppm, 60%

Saturated Paste Test

- Magnesium - 6-10 ppm, 18-20%
- Potassium 15-25 ppm, 15%
- Sodium 5 ppm, <5%
- Sulfer 5 ppm
- Boron .1 ppm
- Iron .3 ppm
- Manganese .15 ppm
- Copper .05 ppm
- Zinc .1 ppm
- On traces +- .02 ppm variability from ideal ok

Class review of results so far

- Reports and specific questions.

Fungal & Insect system enhancers

- Escentshield - 2% solution. Phenolics or phytoalexins. Innate plant compounds that they synthesize to protect against insects and diseases. Monoturpenes, Alkeloids. Control microbes, insects and fungi.
- Mycostat for diseases. Specifically prophilactically for late blight. Putting on what the plant should be creating to help it be resistant. For plants that have been genetically bread for other qualities have had the propensity to build these complex compounds bread out of them. Hybrids esp.