• Vegetable farming is not easy on the soil
• we want the best environment we can create to grow great vegetables
• Our goal is to create the BEST soil we can
How does one create great soil?

• Don’t abuse it
• Understand your PH, C/M ratio/CEC
• Compost
• Soil tests and Proper nutrients
• Cover crops
• good rotation
What’s the deal with peat moss?
Importing soil fertility

- Easy way out
- can be more expensive in the long-run
- Safe
- can store great quantities of NPK
- Early season soils are too cold to utilize soil fertility easily
Why Compost?

• The great Recycler
• Builds Soil structure
• Aggregate formation (soil fungi)
• Drought Protection
• Just in time nutrient delivery
• Growth stimulator
C/N ratio

• you want a “dirty” compost pile (add a starter/activator)

• ideal Carbon/ Nitrogen ratio is 25:1 to 30:1

• High N would be grass clippings, poultry manure, blood meal

• High C would be straw, sawdust, leaves
Compost ingredients

- Manure
- Wood chips
- Spoiled hay
- Vegetable scraps
- Whey
- Eggshells
What not to put in compost

- domestic animal manure
- humanure
- large amounts of pine needles
- sprayed grass clippings (can contain 2,4 d)
- anything you can’t handle....
Using manures

• Stabilize it first... Should not reek of ammonia... add carbon

• Watch your salt levels (especially in GH)

• Needs hot composted to get rid of disease and pathogens

• Stay away from pig manure - too many diseases (especially roundworms)
Composting methods

• Hot- Material is turned frequently to kill weed seeds, pathogens, is ready in a matter of weeks a month (temps up to 160 F)

• Cool- Material is piled and let sit, much less work but can take 6 months to 2 years. this method allows beneficial bacteria to live.

• Windrow- Compost is placed in long, semi-circle shaped piles which are mechanically turned

• Aerated Static- Material piled and air forced through it to help it cook faster
Soil tests

- Take them!!!
- Best idea of what is going on down below
- Same time of year each year
- Get micronutrients tested every 2 years or so
- Take them to a good lab
## SOIL ANALYSIS REPORT

**Sample Number** | **Lab Number** | **Organic Matter** | **Phosphorus** | **Potassium** | **Magnesium** | **Calcium** | **Sodium** | **pH** | **Acidity** | **C.E.C.** |
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Values on this report represent the plant available nutrients in the soil. Rating after each value: VL (Very Low), L (Low), M (Medium), H (High), VH (Very High). ENR - Estimated Nitrogen Release. C.E.C. - Cation Exchange Capacity.

Explanation of symbols: % (percent), ppm (parts per million), lbs/A (pounds per acre), mg/cm (milligrams per centimeter), meq/100g (milliequivalent per 100 grams).

Conversions: ppm x 2 = lbs/A, Soluble Salts mg/cm x 640 = ppm.

This report applies to the sample(s) tested. Samples are retained a minimum of thirty days after testing. Soil Analysis prepared by A & L EASTERN LABORATORIES, INC.

by: Paul Chu, Ph.D.
Logan Labs is great
Nutrient Dense

• Dan Kittridge, Real Food Campaign
• Jerry Brunetti, Agri- Dynamics
• John Kemp, Advancing Eco Agriculture
Measuring Brix

- The higher the brix the healthier the plant
- Higher brix is a result of better mineralization of the soil
- For the best brix, nutrients are foliar applied during the season.
The Big 5

- Nitrogen
- Phosphorous
- Potassium
- Sulfur
- Calcium
Micro-Nutrients

- Magnesium
- Cobalt
- Copper
- Iron
- Manganese
- Molybdenum
- Zinc
Sources for Micronutrients

- Lancaster Ag
- Nutrient Density Supply Co.
- SeaAgri, INC
Soil management

• Squeeze test for dryness
• Don’t compact by driving on wet
• bedding up in fall
• Some soils are just later
• Providing adequate drainage to heavier soils
Soil health resources

- Northeast cover crop handbook
- The real dirt
- Building soils for better crops
- Advanced biological farming
Growing Great Cover Crops
What is a cover crop?

Any crop that is covering the soil
Yes, weeds can be a cover crop!
Cover crops vs green manures
Why Cover Crops?

• Benefits soil: Stops erosion, sequesters carbon (organic matter), stabilizes soil moisture
• Manages Nutrients: adds or scavenges
• helps reduce weeds and flummoxes pests
Drawbacks

• Management

• establishment is when workload can be highest (spring and Fall)

• Weeds can establish in cover

• Uses soil moisture to grow (not a problem in irrigated vegetable land)

• difficulty incorporating at end of year.
Types of Cover Crop

- Winter vs. Summer
- Legume vs non-legume
- Annual, Biennial, Perennial
- Intercropped
- Cover Crop Mixtures
Non-Legume Cover Crops

- Adds Organic matter
- Reduces erosion
- Suppresses weeds
- Large amounts of residue (can be tough to manage for next crop)
- Can tie up Nitrogen
Examples of Non-Legume Crops

- Grasses (rye, oats, sorgum)
- Brassicas (tillage radish)
- sunflowers
- Buckwheat
Legume Cover Crops

- Annuals (Soybeans, field peas, cow peas, Sunhemp)
- Perrennials (red & white clover, medics, Alfalfa)
- Biennnials (sweetclovers, hairy vetch)
- Less residue
Ray Archuleta

Gabe Brown
What are you looking for in a cover crop?

- Partial season or full season?
- do you need nitrogen or carbon?
- are you looking to reduce erosion?
- Summer or Winter crop?
- Can you manage it with your equipment?
Plant Health = Disease Resistance
Fighting disease...

- good soil health
- variety selection
- adding mycorrhizae
- not working the soil too early or too late - the clump test
- good air circulation - giving plants necessary space, and uncovering so they can dry out
- clean seed, propagation trays, equipment
Aphids

• thrive in cool, wet environments with lush greens
• Love to be under rowcover
• Also can transmit many diseases
Surround
Crop Rotation
Why Rotate

• Decrease Disease
• Slow pests
• Soil Health
• Weed Pressure
How to plan a rotation

• Look at field history

• what do you want to accomplish?

• weed suppression

• soil health

• full season vs partial season crops
Write it down

• Keep good records, as simple as a journal but so much easier in the age of google docs
• we use an online spreadsheet program
• Helpful to know back at least 4 years
Vegetable Families

- **NIGHTSHADES** *Solanaceous* Tomatoes, Tomatillos, Eggplants, Peppers, Okra, Potatoes
- **MORNING GLORY** Sweet potato
- **MELONS & SQUASH** *Cucurbitis* Cucumbers, Zucchini & Summer Squash, Watermelon, Musk Melon, Pumpkin, Gourd
- **GOOSEFOOT** Beet, Spinach, Chard, Quinoa, Orach
- **SUNFLOWER** Sunflower, Jerusalem artichoke, Lettuce, Endive, Artichoke
Vegetable Families

- **COLE Brassicas**: Broccoli, Brussels sprouts, Cauliflower, Cabbage, Kale, Collards, Radishes, Kohlrabi, Rutabaga, Turnip, Mustard
- **ONIONS allium**: Onion, Leeks, Chives, Garlic
- **PEAS Legumes**: Peas, Runner beans, Bush beans, Fava beans, Garbanzo beans, Peanuts
- **GRASSES**: Corn, Millet, Rice, Barley, Wheat, Rye
- **PARSLEY**: Parsley, Carrots, Parsnips, Celery, Fennel, Cilantro/Coriander
Crops for weed suppression

Good
• greens
• corn
• potatoes
• Squash
• beans

Bad
• carrots
• onions
• peas
• leeks
• asparagus
Rotation in the field

• Preferred four years for most crops
• Tough with the amount of brassicas we grow
• We treat all greens direct seeded as one type has grown together (lettuce, radishes, spinach)
• Onions, carrots, long-season brassicas always in 4 year rotation.
Crop needs

• Check each individual crop needs (and what they take out)
• Beets need high amounts of K (Potassium)
• Celeriac and Celery like lots of Boron
• Corn and greens like lot of nitrogen
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Rotation in the greenhouse

- Very, very tough
- Never repeat the same crop
- Greens, tomatoes, greens
- Try to move beds around
- Would be great to uncover and freeze houses during winter time
To get the slides!
To get the slides!
Want the Slides?

Hey! This is our Chatbot, Mighty Max!

Thanks so much for being interested in the slides from Michael's presentation at the Practical Farmers of IOWA conference!

We'll get you the slides within a couple of days.

Stay tuned! If you ever change your mind and want us to stop chatting, reply with STOP and I'll go away!
For the slides of this talk, other great resources, and to get on our email list.

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