Organic Gardening

The Master Gardener Perspective

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What is Organic Gardening to YOU?

What is Organic Gardening?

- [Organic growing] seeks to maintain and improve the productivity of the land by encouraging and enhancing natural biological processes. Organic farmers nurture healthy plants by working to create a foundation of healthy soil. Great attention is paid to nurturing the soil with composts, cover crops, rock minerals and natural fertilizers. Plant disease and pests are controlled through the use of crop rotations, resistant varieties, cultivation, biological pest controls and botanical controls. The use of synthetic chemical fertilizers and pesticides are prohibited in certified organic production.“ – NOFA-NY Guidelines

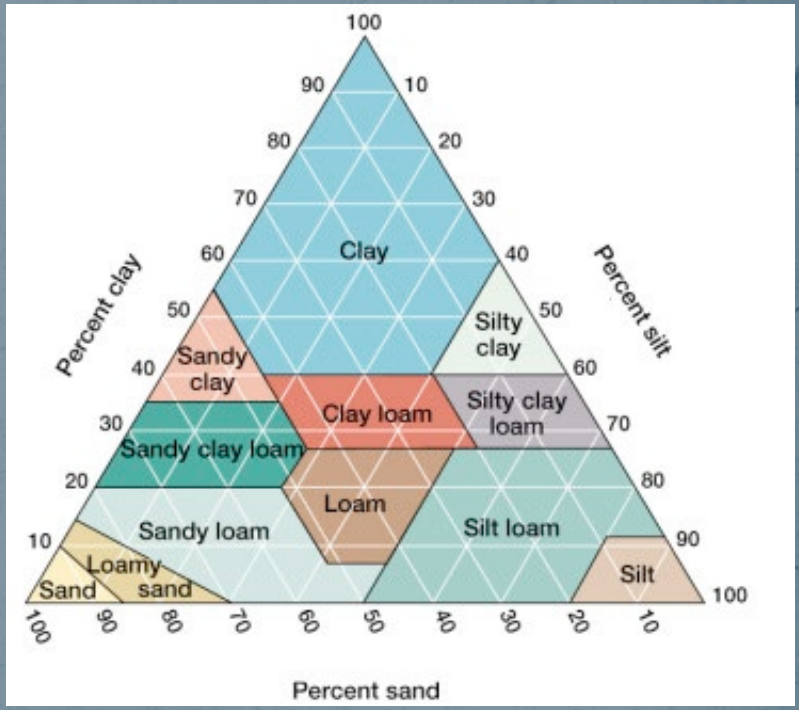
Breaking it down…

- Avoid the use of synthetic pesticides, herbicides, and fertilizers
  - Synthetic pesticide: chemically derived, not found in nature
  - Organic pesticide: Derived from natural products, often concentrated and refined
    - Neem (azadiractin)
    - Spinosad
    - Insecticidal soap
    - Bt

Properties of a good soil for organic gardening:

Soil Texture and Structure

- All soils are made of sand, silt, and clay
- Medium textured soils are usually best
  - Sandy to silty loams
- Structure is related to organic matter content



Source: http://wps.prenhall.com

Soil Nutrients

- Soil Nutrients:
  - Have soil tested by Cornell to determine N-P-K, pH, micronutrients, organic matter
  - Sample 6-10 inches deep
  - Take aggregate samples for each unique area
  - Preferably, test the fall before planting or earlier

Synthetic fertilizers

- Synthetic Nitrogen: **Haber–Bosch process**, is the nitrogen fixation reaction of nitrogen gas and hydrogen gas, over an enriched iron or ruthenium catalyst, which is used to produce ammonia.

- Ammonia is broken down into nitrate and nitrite forms of nitrogen—useful to plants.

- Process uses fossil fuels

Organic Amendments: Manures

Manure	% N	% P	% K	Amt. to supply 5 lbs N
Chicken	1.7	1.8	1.3	290 lbs
Sheep	1.3	0.9	1.9	380 lbs
Dairy	0.8	0.4	1.7	625 lbs
Cattle	0.8	0.6	1.1	625 lbs
Pig	0.6	0.5	0.6	830lbs
Horse	0.4	0.3	0.7	1250 lbs

Source: Fertilizing Gardens in South Dakota (Ex B744)

Additional Organic Amendments

Material	% N	% P	% K	Amt. to supply 5 lbs N
Blood Meal	13.0	0.9	0.5	38 lbs
Fish Meal	10.0	6.0	0.0	50 lbs
Bone Meal	3.0	22.0	0.2	165 lbs
Moist compost	1.0	0.4	0.6	500 lbs
Leaves	0.7	0.3	0.6	715 lbs
Fresh Lawn clippings	0.6	0.3	0.8	835 lbs

Source: Fertilizing Gardens in South Dakota (Ex B744)

Importance of Organic Amendments

- Build soil structure
- Improve water absorption and retention
- Increase CEC
- Enhance microbial activity

Source: http://www.agriculture.state.pa.us

How Much Fertilizer is Enough?

- Inorganic fertilizers: N-P-K
- 15-10-5 fertilizer is 15% Nitrogen by weight
- If you need 5 lbs N, divide 5 lbs by 0.15 = 33.33 lbs total fertilizer per 1000 square feet
- What if we wanted to get 5 lbs of N from sheep manure?
- 1.7% N by weight

Breaking it down…

- The soil is kept healthy, rich with nutrients and, most important, it is kept alive with a high content of microorganisms.
  - Organic fertilizers feed the soil
  - Tillage practices promote healthy biological activity
  - Diversity of crops promotes a balance of organisms.

Crop Rotation

- Next year, rotate your crops to different places in the garden.
  - Potatoes, tomatoes, peppers, and eggplant are all members of the solanaceous family
  - Beans and peas are legumes.
  - Radishes, rutabagas, and turnips are all cole crops just like cabbage, broccoli, cauliflower, and Brussels sprouts
  - Onions, garlic, leeks, shallots, chives are alliums.

Three years of gardening

Year One

Year Two

Year Three

- Remember to look back at the previous year's plan when creating a new plan
- Provide enough space for the plants and to harvest from the garden

Organic Pest Control

1. Identify the problem
2. Determine what level of control is needed/desired
3. Determine what control measures are available
   - Physical
   - Chemical
   - Biological
   - *Timing*

Physical Controls

- Exclusion (netting, row covers)
- Kaolin clay
- Trapping

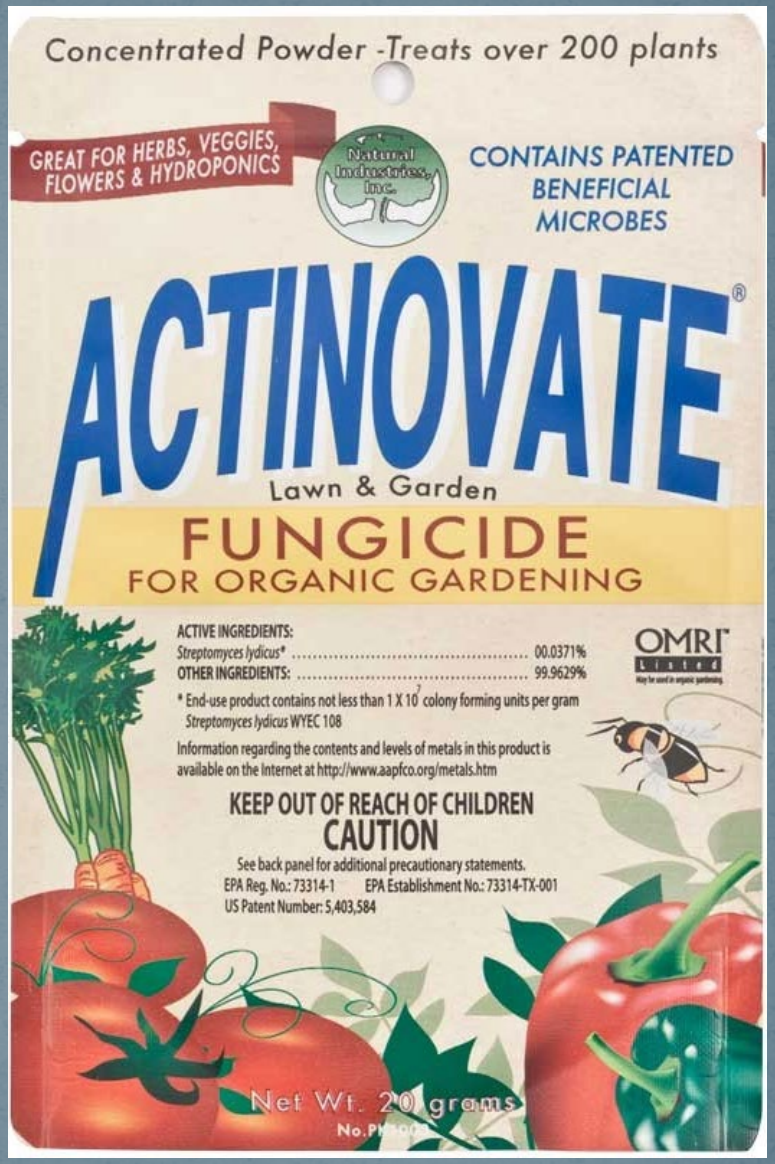
Chemical Controls

- Fungicides: Change environment on leaf surface
  - Home-made backing soda mixtures
  - Copper mixture (store-bought)
  - Lime-sulfur mixture
  - Can be harmful to humans!

- Insecticides: Often act similarly to their synthetic counterparts
  - Neurotoxins, endocrine disruptors, etc.
  - Can be harmful to humans!

Biological Controls

- Either strengthen the plant or change the environment of the pest



Timing

- Each pest will have a weakest point in its life cycle
- Each plant has stronger and more vulnerable points in its life cycle
- Promote the plants' strong points and target the pests' weak points!

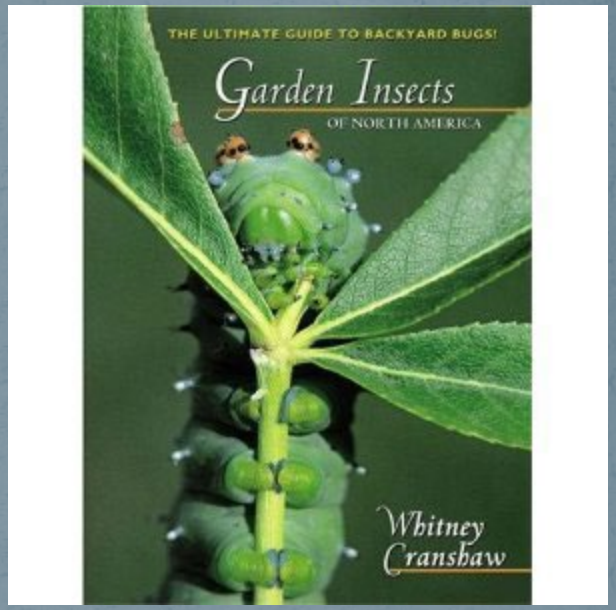
Examples of Organic Gardening

- Situation one: You receive a call from a gardener who is being overrun by flea beetles. How might you recommend organically solving this problem?

Example 2: What would you do if someone brought you this?

Insect Identification

- Is your insect a friend or a foe?
- Are there natural predators?
- What is the best way to control it?



Resources for you to use

- https://cals.cornell.edu/discover/agriculture/organic
- Organic @Cornell

- http://cuaes.cornell.edu/organic/
  - Organic Guides for Fruit & Vegetables

- http://web.pppmb.cals.cornell.edu/resourceguide/
  - Organic Resource Guide for Insect & Disease Management
- http://plantdiagnostics.umd.edu/
  - Plant diagnostics problem solver

Flea beetle solutions

- Row cover
- Trap crop
- *Microcotonus vittage Muesebeck, a native braconid wasp, parasitizes and kills the adult flea beetle.*
- Commercial formulations of insect-eating nematodes are effective agents for controlling flea beetles. Applied to the soil, the nematodes attack the beetle's larval stage, reducing root feeding and helping to prevent emergence of the next cycle of adults.
- Rotenone/insecticidal soap

Example 3:

- A homeowner calls you because their pine tree is turning yellow and needles are falling off. They want to know what they should spray to fix it. What do you tell them?

Pine Dropping Needles:

- Seasonal needle drop
- No need to spray anything
- Root cause: plant needs to shed old needles and make new ones.
- Solution: None!

Example 4:

- A homeowner calls you because her peony keeps dying from “a fungus” during the late summer. What can she do to save it?

-You go look at the peony, and it appears to have verticillium wilt, a soil borne fungus that causes individual stems to wilt.

Based on this diagnosis, what would you recommend to the homeowner?

Peony solutions

- Don't spray foliage for a soil borne problem
- Proper sanitation
- Plant resistant plants