

ORGANIC GARDENING



An Educational Class Presented By
Harvest Farm Founders Committee
February 2010

Introduction to Organic Gardening:

What Is It? Its Benefits and Why?



Why Organic?

- Concerns about
 - Our health
 - Our food
 - Our planet and its environment
- Our role in the circle of life and how this affects future generations

What Is Organic Gardening?

- Growing vegetables and plants
 - In a sustainable way
 - Without the use of synthetic chemical fertilizers, pesticides, and herbicides
- Uses natural decomposed animal or plant matter to grow healthy, nutrient rich, chemical free food

Why Is Organic Gardening Beneficial ?

- Supports and replenishes the planet's natural resources by:
 - Recycling plant and animal materials back into nature, thus completing the life cycle
 - Feeds and supports soil health and its organisms
 - Reduces water runoff and water pollution
 - Reduces unnecessary waste
 - Works with nature to maintain health and balance in life

Why Is Organic Gardening Beneficial?

- Helps to feed the soil by improving:
 - Soil texture and structure by adding humus
 - Soil aeration and drainage
 - Soil beneficial organisms (good bacteria/fungi, earthworms)
 - Soil fertility, nutrition, and health

Why Is Organic Gardening Beneficial?

- Healthy soil leads to overall better plant health
- A healthy plant is able to:
 - Fight disease, pests, and stress from the environment
 - Provide us with nutrient rich food by working in unison with the nature

Why Is Organic Gardening Beneficial?

- Eases concerns about our food:
 - Knowing what has been used to produce our food from beginning to end
 - Produces cleaner, healthier, more nutritious food
- What this means:
 - We're healthier by not ingesting toxic chemicals found in fertilizers, pesticides, and herbicides.
 - We are able to fight off stress and disease better ourselves as living organisms.

How “Organic” Can You Go?

- Organic gardening can have different levels of application intensity
- Two examples are:
 - Certified Organic Producers
 - Home Gardeners

How “Organic” Can You Go: Certified Organic Producers

The USDA certified organic symbol means product (fresh or processed foods, seeds, and plants) meets national organic standards:

- Contains at least 95% or 100% certified organic ingredients
- Facility is certified annually by a USDA accredited inspection agency like the NOP (The National Organic Program)

How “Organic” Can You Go: Home Gardeners

May choose any combination of organic principles to use in their own gardens like (strictest to relaxed applications):

Level of Organic Gardening	Seeds& Plants		Amendments & Fertilizers		Herbicides& Pesticides		
	Certified (1) Organic	Non-organic	Certified Organic	Organic/Natural	Certified Organic	Organic/Natural	Synthetic Chemicals
A	Green	White	Green	White	Green	White	White
B	Green	Light Green	Green	Light Green	Green	Light Green	White
C	Green	Light Green	Green	Light Green	Green	Light Green	Red (2)

- 1) Only USDA certified seeds and plants are guaranteed to be non-GMO (genetically modified organisms) or non-GE (genetically engineered).
- 2) Only when necessary in extreme cases with garden problems.

How “Organic” Can You Go: Harvest Farm

Application B is what Harvest Farm is implementing:

Choosing certified organic or non-organic seeds and plants to be grown organically by refraining from using synthetic chemical fertilizers, pesticides, fungicides, and herbicides.

Level of Organic Gardening	Seeds & Plants		Amendments & Fertilizers		Herbicides & Pesticides		
	Certified (1) Organic	Non-organic	Certified Organic	Organic/Natural	Certified Organic	Organic/Natural	Synthetic Chemicals
B	Green	Light Green	Green	Light Green	Green	Light Green	White

- 1) Only USDA certified seeds and plants are guaranteed to be non-GMO (genetically modified organisms) or non-GE (genetically engineered).

How Is This Helpful to You?

- This knowledge assists you in identifying, selecting, and purchasing the correct products for use in organic gardening at Harvest Farm or at home.

What to Look for?



For more information on Organic Gardening:

- www.georgiaorganics.com
- www.rodaleinstitute.org
- www.organicgardening.com
- www.ams.usda.gov/AMSv1.0/NOP



Introduction to Soils

Soil is a Medium for Plant Growth

- Anchorage
- Water
- Oxygen
- Nutrients



Soil Makeup

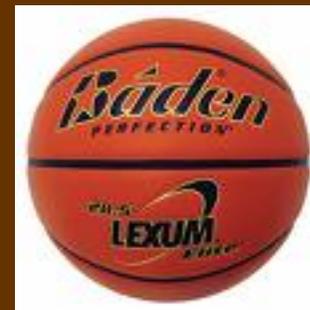
- Clay

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- Silt



- Fine sand

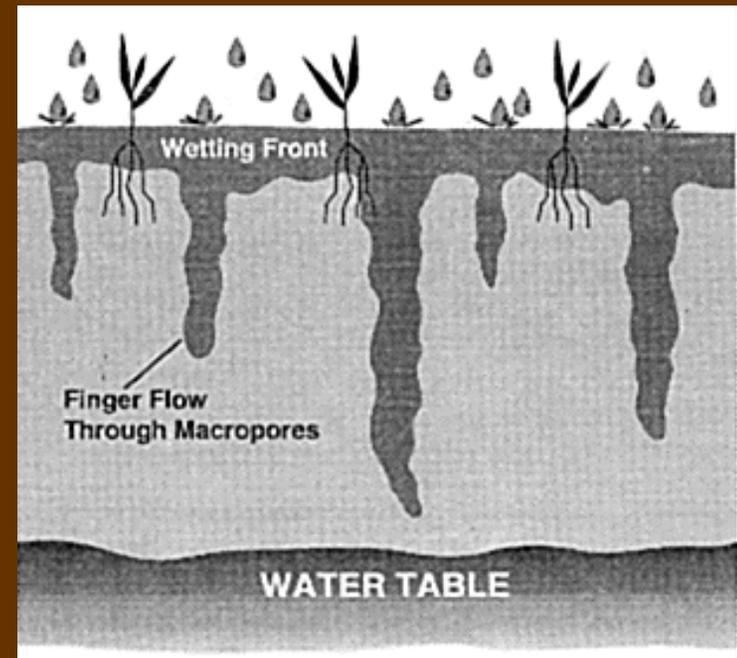


- Coarse sand



Soil Texture

- Also affects how the soil will hold onto water
- Sand – water will flow through rapidly
- Silt – water will flow through easily
- Clay – water will hang out



Soil Texture



Sand

Clay



Clay Gets a Bad Rap

- Having clay is a blessing and a curse
- Clay is an overachiever in terms of holding onto water (due to surface area)
- Clay also holds onto nutrients rather than letting them leach away
- So having some clay is not a bad thing!



Beware of the perched water table

- If planting area is bottomless, be sure to till/dig up the ground and mix in amendments
- If you don't mix it in, you will have a wet layer or perched water caused when water percolates through amendment and meets natural ground with different soil texture
- Your plants risk having “wet feet”
- If planting area has a bottom, use soil-less mix

Get to Know Your Soil!



- The pH level and the nutrients in your soil are unique and should be tested
- Call your extension office to ask how to test your soil
- Obtain soil collecting bags from the extension office and follow directions on front of bag
- You will receive an analysis of your soil and recommendations from the testing facility

Soil Testing Results

- Soil testing will not test for nitrogen because it is too mobile
- Testing facility will give recommendations on nitrogen depending on plants you want to grow





pH and Soil

- pH is the level of acidity or alkalinity of the soil
- In the South, we have mostly acidic soil due to the amount of rainfall which leaches away bases and parent material of granite, sandstone and shale
- pH is measured on a scale of 1-14, with 1 being the most acidic and 14 being the most alkaline
- A pH of 7 is neutral
- pH testing kits can be purchased at hardware and gardening stores

Why Do We Care About pH?



- The pH level of the soil directly affects a plant's ability to absorb the nutrients in the soil.
- If the pH is too high or too low, some important nutrients will become unavailable to the plant and cannot be absorbed.
- With the correct pH, the plant will be able to absorb these important nutrients.

pH Tolerance of Popular Vegetables

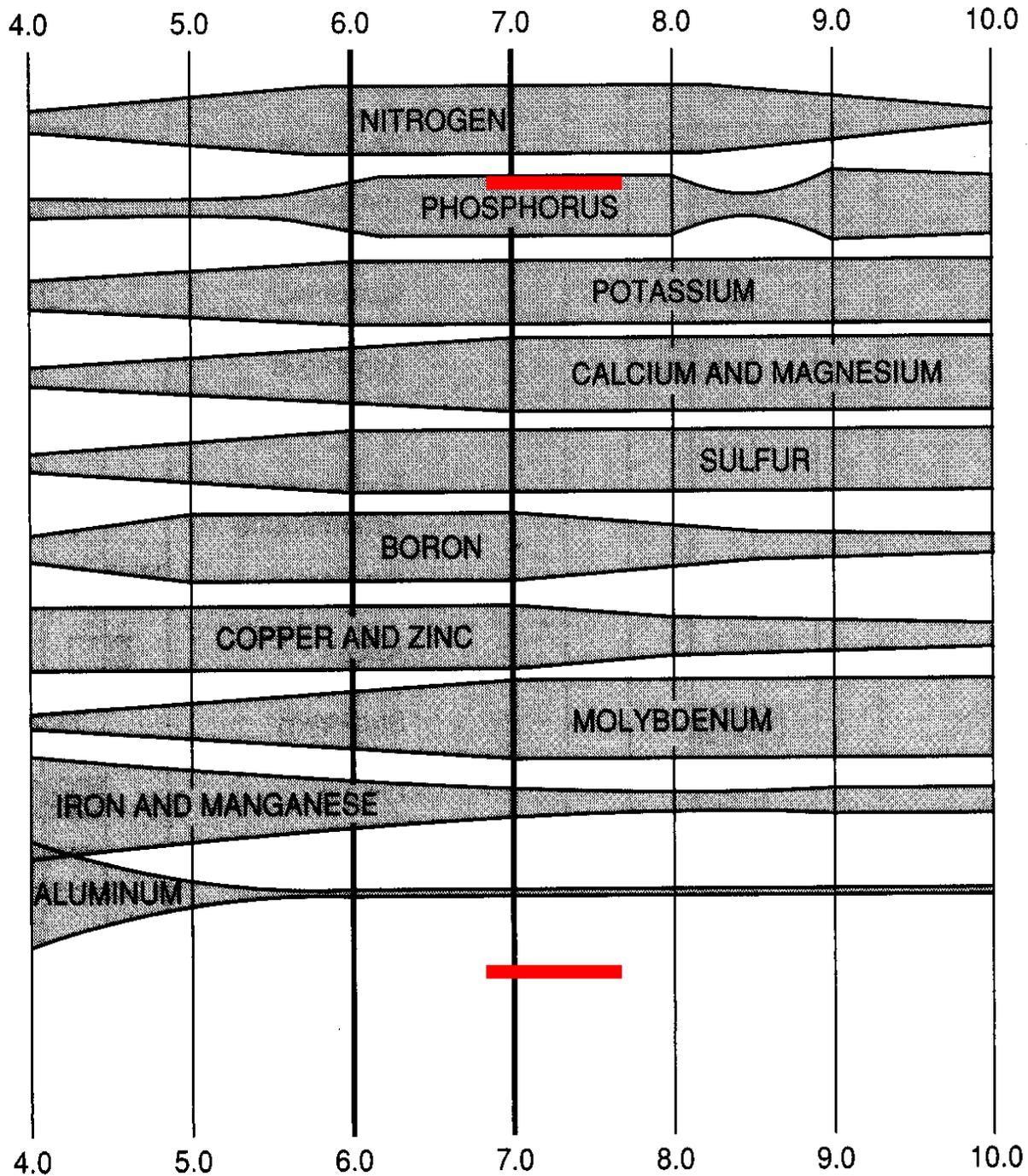
- pH of 6.0 to 6.5

- Beans
- Carrots
- Corn
- Cucumbers
- Eggplant
- Parsley
- Peas
- Peppers
- Radishes
- Summer squash
- Tomatoes

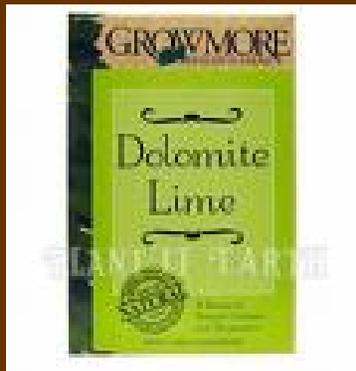
- pH of 6.5 to 7.0

- Beets
- Broccoli
- Cabbage
- Cauliflower
- Swiss chard
- Lettuce
- Melons
- Onions
- Spinach
- Winter squash





Most Vegetables Like pH Between 6.0 and 7.0



- If you want to **RAISE** the pH (make less acidic) use **LIME**

("sweetens" the soil)



- If you want to **LOWER** the pH (make less alkaline) use **SULFUR**

SEEDS & PLANTS: QUESTIONS TO CONSIDER



COMPANION PLANTING



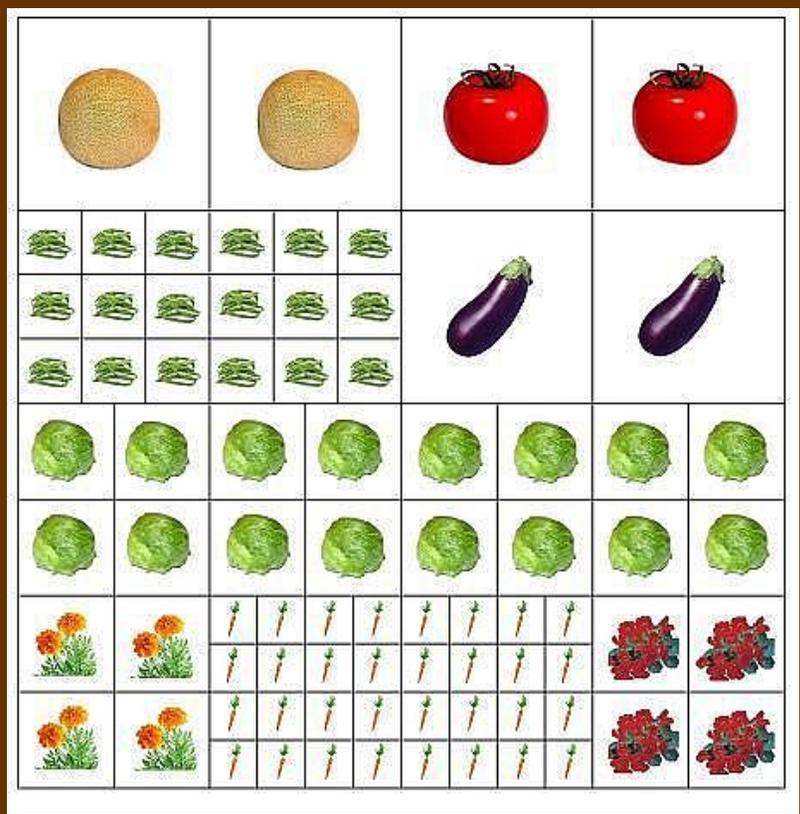
WHAT IS COMPANION PLANTING?

- Promotes organic gardening as an alternative to chemical insecticides, pesticides, and herbicides.
- Some plants are co-beneficial and help one another in their growth and health.



SQUARE FOOT GARDENING

- Method of placing plants closely together in a grid layout
- More abundant crop yields
- Reduces weeds and pests



CHEMICAL-FREE PEST REPELLANT

- Companion planting promotes a chemical-free way to repel pests by using other plants in close proximity.



BENEFITS THROUGH SOIL NUTRITION

- Nutrient replacement in the soil
- “Three Sisters” method – corn, beans, squash
- Beans and other legumes with cabbage, broccoli, and cauliflower
- Pumpkins and corn



OTHER PLANTING METHODS

- Mix veggies that feed at different soil levels, i.e. carrots and onions
- Use plants with natural odors that repel pests and insects, i.e. marigolds



FRIENDS LIKE BEING TOGETHER

- Potatoes = bush and pole beans, carrots, onions, eggplants, marigolds
- Eggplants = peppers, beans, garlic, marigolds
- Pumpkins = corn and squash
- Tomatoes = basil and parsley



ORNAMENTAL PLANTS BENEFIT VEGETABLES

- Certain flowers trap or isolate insects.
- Examples include:
 - Yellow-colored Nasturtiums
 - Scented geranium
 - Milk weeds
 - Goldenrods
 - Hydrangeas



OTHER COMPANION PLANTS

- Orange Nasturtiums
- Rosemary
- Marigolds
- Ladybug and honeybee attractors



WHY IS IT IMPORTANT?

- Certain plants thrive from the mix of natural chemicals found in other plants.
- Higher crop yields
- Better defense against disease and insects



FOES OF VEGETABLES & HERBS

- Tomatoes: corn and potatoes
- Onions: bush or pole beans
- Peas and beans: chives and garlic
- Carrots: dill
- Potatoes: melons, cucumbers, squash, tomatoes



WEB RESOURCE – SQUARE FOOT GARDENING

www.growveg.com



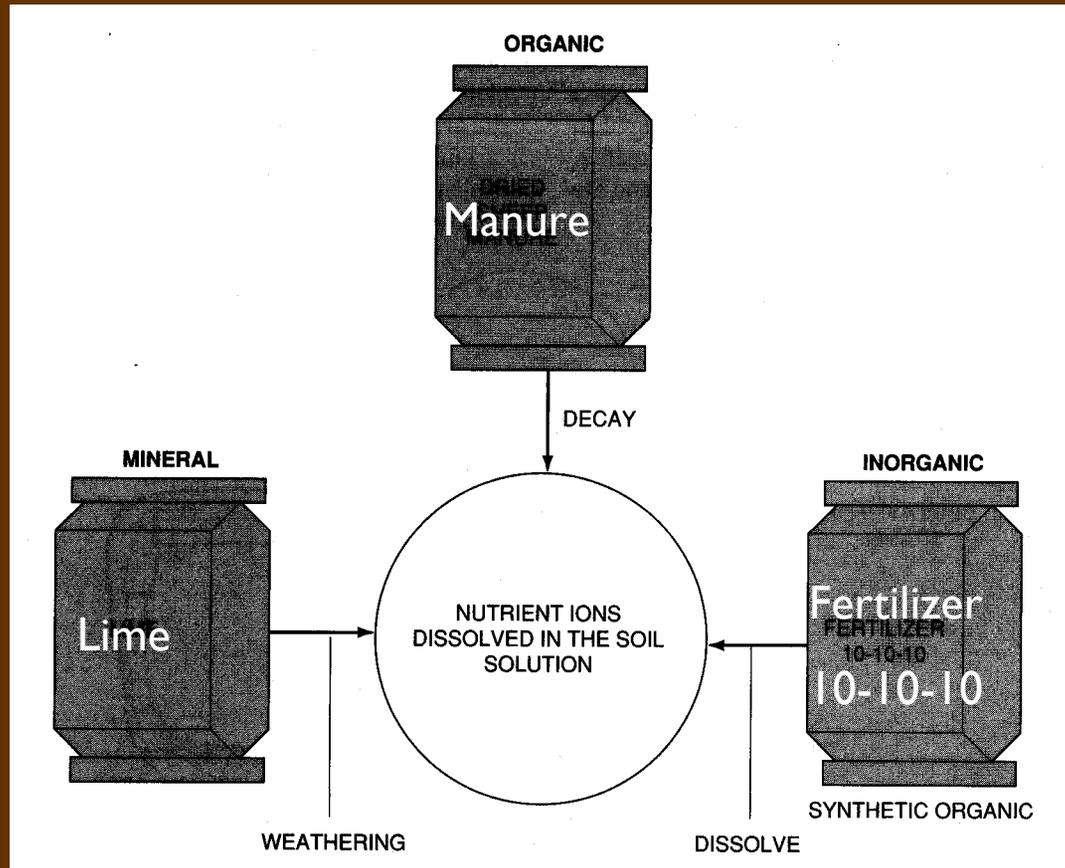
FERTILIZERS



Using Fertilizers

- First, know your soil: what, if anything, does it need?
- Well-amended humus-rich soil may need little to no fertilizer
- If your pH is unknown, you may be wasting your time and money adding fertilizers that cannot be absorbed by plants

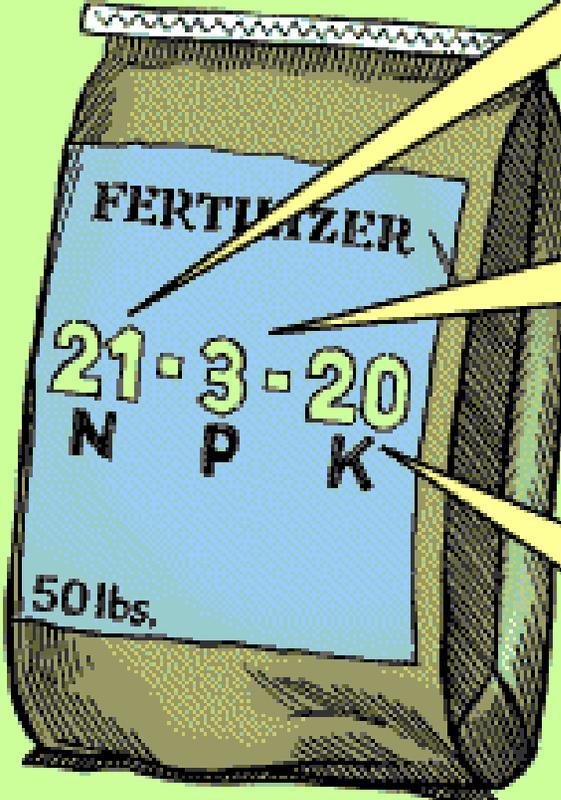
Fertilizers



- Dissolve slowly
- Low nutrient content

- Must be composted
- Slow release
- Low nutrient content
- Dissolve quickly
- High nutrient content

Fertilizer Content



FERTILIZER
21-3-20
N P K
50 lbs.

Nitrogen: key nutrient in plant growth.
21% N in a 50 lb. bag = 10.5 lbs. N

Phosphorus: important for establishment.
3% P in a 50 lb. bag = 1.5 lbs. P

Potassium: will increase stress tolerance.
20% K in a 50 lb. bag = 10 lbs. K

P & K needed only as soil test indicates



N NITROGEN for green, healthy growth

P PHOSPHORUS for roots and blooms (reproduction)

K POTASSIUM for overall health

Nitrogen

- Very soluble so it will leach out quickly
- Shoot for 10-15% for flowering and vegetable/fruit plants and shrubs
- 15-20% for turfgrass and foliage shrubs

Phosphorus

- Not available to plants if pH is not adjusted toward neutral; not easily leached; can build up in soil to toxic levels if overapplied
- Shoot for 10-15% if test level is low to medium
- Less than 10% if test level is high

Potassium

- Potash
- 2nd only to N in quantity used

Use this based on test results!

Fertilizer Types

- Inorganic (manufactured) fertilizers are in a soluble salt form so over-fertilizing can burn plants.
 - Salts, through the process of osmosis, will rob water from plants
- Organic fertilizers (i.e. manures) are usually very low in nutrients by weight and release nutrients slowly. There is little chance of burning plants. Some organics can be very high in specific nutrients.

Ways to Impact Nutrient Uptake

Raises Fertility	Lowers Fertility
High clay content	High sand content
High humus content	Loss of organic matter
Good structure	Compaction
Warm soil	Cold soil
Deep soil	Shallow soil
Moist soil	Dry or wet soil
Good drainage	Excess irrigation or drainage
Fertilization	Erosion
Desirable microbes	Root damaging pests
Near neutral pH	pH too acid or alkaline

Mix-it-Yourself All Purpose Fertilizer

1 part blood meal
2 parts bone meal
3 parts wood ashes
4 parts composted leaf mold

10 parts total

1 part has 2.6/4.9/2.4

Apply at planting and once a month (diluted by half)

*courtesy of Square Foot Gardening

N/P/K Amounts of Common Organic Materials

- Blood Meal 15/1.3/7
- Bone Meal 4/21/2
- Cocoa Shell Meal 2.5/1.5/2.5
- Coffee Grounds, dried 2/4/7
- Cottonseed Meal 7/2.5/1.5
- Dried Blood 12-15/3/-
- Fish Emulsion 5/2/2
- Soybean Meal 6/1.2/1.5
- Wood Ashes -/1.5/7
- Composted Leaf Mold .6/2/4
- Oak Leaves .8/4/2

N/P/K of Manure

- Cattle Manure, fresh .3/.2/.4
- Cattle Manure, dried 2/1.8/2.2
- Horse Manure, fresh .4/.2/.4
- Horse Manure, dried .7/.3/.6

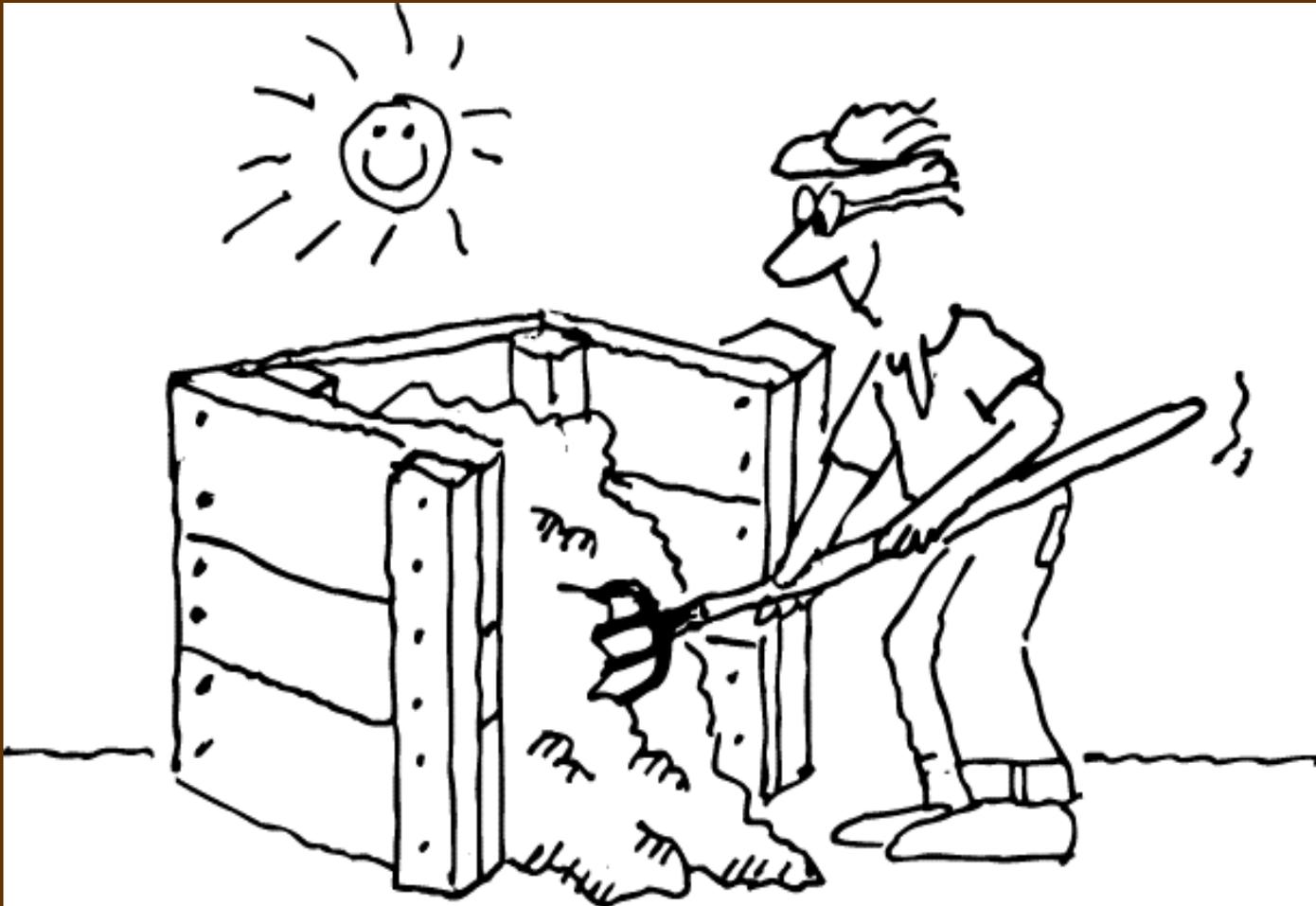


Speaking of Manure....

- Problems of manure
 - » Phosphorus build-up from repeat applications
 - » Leaching/runoff of nitrogen
 - » Pathogens
 - » Nutrient losses



COMPOSTING



Ingredients to Add to Compost Pile

- Straw
- Hay
- Leaves
- Grass clippings (dried)
- Old sod
- Reject or soiled garden produce
- Vegetable and fruit peels
- Newspaper (shredded)
- Eggshells (crushed)
- Stable or poultry manure
- Tea bags



Ingredients to Add in Limited Amounts to Compost Pile

- Corn cobs
- Shredded twigs
- Shredded bark
- Pine needles
- Hedge trimmings
- Wood shavings
- Sawdust
- Coffee grounds
- Peanut shells



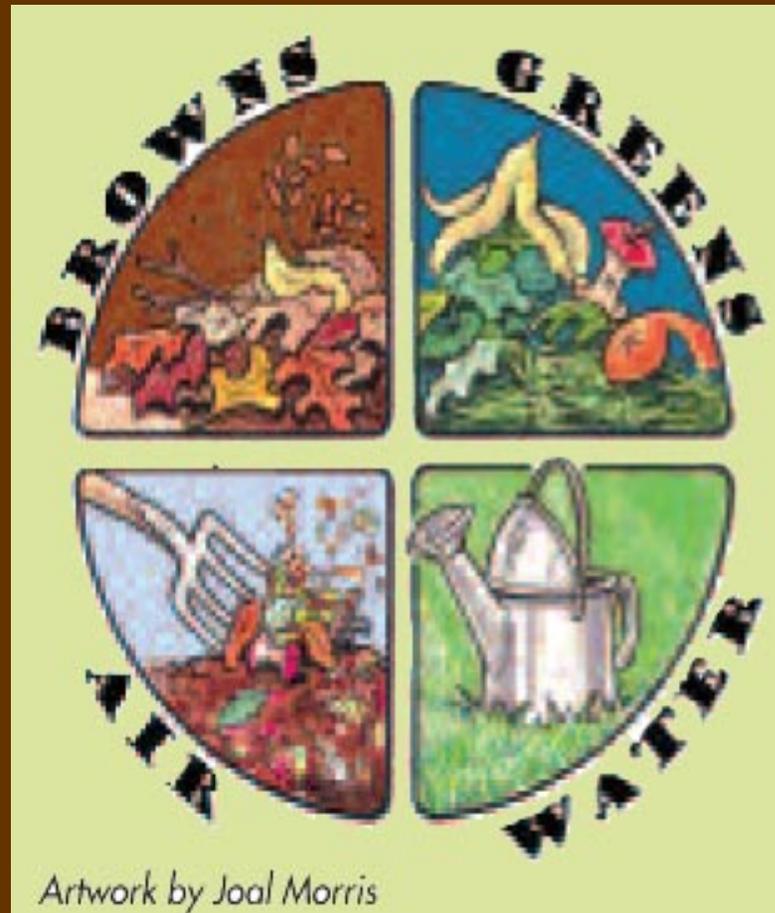
Ingredients NOT to Compost

- Diseased or pest-laden materials
- Meat or bones
- Grease
- Whole eggs
- Cheese
- Seeds and fruit pits
- Cat or dog manure
- Bakery products
- Dairy products
- Food or kitchen scraps



These items can potentially slow down decomposition and attract rodents and other undesirable critters

Go Green...and Brown



Rate of Composting

- It matters what you put in your compost pile!
- The components will either speed up decomposition OR slow it down
- Too much carbon (sawdust) will slow down decomposition
- Add nitrogen (i.e., blood meal) to speed it up
- Anything less than 20:1 C:N ratio will speed up decomposition
- Make sure your items are chopped up or shredded to expedite the decomposition process (i.e., it is easier to eat!)

Material	C:N Ratio
Soil microflora, average	8
Sewage sludge	7
Garden soil	12-15
Young alfalfa	13
Mature alfalfa	25
Compost	15-20
Rotted manure	20
Lawn clippings, fresh	31
Corn stover	60
Straw or leaves	60
Newspaper	120
Pine needles	225
Sawdust	400-600

When is compost ready to use?

- When it is dark and crumbly
- When it is no longer steaming (decomposition has ceased)
- Average time: 6-8 months
- Closely tended: 6-8 weeks



Soil Amendments

- If you take care of your soil, it will take care of your plants!
- Less work and ultimately more enjoyment for you.



Adding Organic Matter

- Favorably affects soil structure and texture by increasing the water-holding capacity of sandy soils and the workability of clay soils
- Also increases nutrient-holding capacity and nutrient availability from the increase in microbial activity
- Add only 25% by volume of organic matter
- Too much organic matter can harm plants due to organic acids released during decomposition

Adding Humus is Like Adding Sponges

- Think of little sponges between the clay “stack of cards” and the sand “marbles”



When you go to the store to buy “soil”, what are you really buying?



Commercially Available Soils

- Super Premium Planting Mix with Mycorrhizal Fungi: aged pine bark, mushroom compost, forest products compost, chicken manure
- Potting Soil with Mycorrhizal Fungi: aged pine bark, Canadian spruce peat moss, mushroom compost, forest products compost, perlite, wetting agent AND fertilizer (.1/.08/.04: seabird guano, feather meal, bat guano and kelp meal)
- Vegetable and Flower Soil: aged pine bark, chicken manure, mushroom compost, forest compost, perlite
- Garden Soil: aged pine bark, top soil, peat moss
- Azalea and Camellia Soil: aged pine bark, peat moss, mushroom compost, forest compost, perlite and worm castings
- Organic Soil Conditioner: forest products compost, chicken manure



Using Compost as an Amendment

- Is a great idea to improve structure
- Not a great source of nutrition due to slow release
- Best to supplement with some fertilizer



Irrigation



2 Main Problems

TOO
MUCH
WATER



TOO
LITTLE
WATER



Get to Know Your Plant!



Watch for wilting and graying

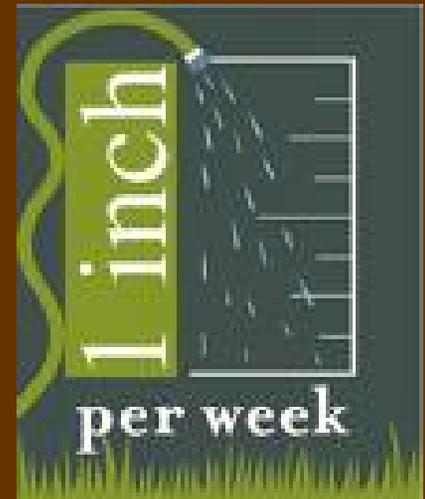
Water

- Is an ingredient in photosynthesis
- Is a solvent for nutrients and other materials
- Transports food from one area of plant to another
- Cools the plant during transpiration
- Gives plant rigidity/turgor
- Makes up 95% of the plant!



Goals for Irrigation

- ONE (1) inch per week
- You may decide not to apply it all at once but divide the application
- Use the pie pan test
- If it rains, you may not need to water that week
- Get to know your soil: does it drain quickly or slowly; you may need to irrigate more regularly
- Too much runoff? Increase frequency and reduce length of time to irrigate: water every other day or several cycles during one day.



More Best Management Practices

- Deep watering encourages strong, healthy root system
- Slow-release fertilizers provide a more even uptake of nutrients, resulting in more uniform growth, which is more water efficient. Excess nitrogen causes rapid growth and increased need for water
- Avoid fertilization in periods of limited rain and high temperatures: fertilizer can cause root burn
- Reduction in canopy will reduce transpiration/water loss



Options for Watering

- By hand: you are forced to be more intimate with your plants and learn their needs
- Use perforated milk jugs and liter bottles
- Soaker hoses: not very efficient in terms of uniformity: application of water at one end will be different from opposite end; use only short lengths to minimize this; use looping
- Drip tube: a better option; emitters are more uniform; can be expensive



Timing of Watering

- Time of day: Early morning watering is often recommended since there is less evaporation and wind.
- Do not water in the heat of the day. You will lose water to evaporation.
- Experts differ on whether watering in the evening and/or overnight causes disease.



Mulch

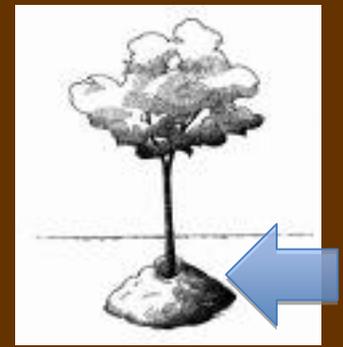




Mulch is a must!

- Conserves moisture by preventing evaporative water loss from soil
- Prevents temperature fluctuations in soil moisture
- Prevents crusting of soil
- Insulates roots from summer heat and winter cold
- Helps to control weeds that compete with plants for moisture
- Reduces rain splatter which can spread soil-borne diseases
- Creates a buffer zone between turf and ornamental plantings
- Prevents trunk injury from weedeaters and lawn mowers

Best Mulching Practices



- Apply mulch 3-5 inches over area extending beyond the canopy **Never do this!**
- Too much mulch will encourage shallow root growth
- Keep 2-3 inches away from trunk to prevent wood rotting diseases
- Avoid plastic film under mulches. Plastic prevents water, nutrients, and oxygen from reaching the roots. It also inhibits gas exchange.
- Landscape fabric is OK but don't put soil on top of it.
- No mulch volcanoes!

Good Mulches to Use

- Pine straw
- Pine bark
- Shredded or chipped hardwood bark
- Fall leaves
- Newspaper
- Landscape fabric with mulch



Bad Mulches to Use

- Grass clippings
- Pecan hulls
- Gravel
- Marble Chips
- Pea gravel
- Volcanic rock
- Plastic film

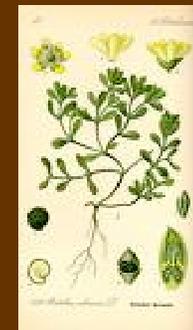


Do You Know Where Your Mulch Has Been?

- Wheat straw may have weed seeds
- Grass clippings may have pesticides
- Beware of adding materials with phytotoxins: lantana, black walnut
- Fresh wood chips may tie up nitrogen temporarily while decomposing, less risky if simply laid on top of soil vs. blended into soil



WEED CONTROL USING HERBICIDES THE ORGANIC WAY



What Are Weeds?

- Weeds are simply undesirable plants growing where they're not wanted in the garden.



Why Do We Need to Control Weeds in the Garden?

- Weeds:
 - Compete with crops for light, nutrients, and water
 - May harbor pests and disease
 - Can be invasive and rapidly spreading
 - Can be poisonous, irritants, or allergy triggers
- Due to these factors, most weeds are usually controlled with herbicides

What Is an Herbicide?

- An herbicide is any substance used to inhibit the growth, destroy or kill unwanted plants (weeds).
- These substances may come in the form of:
 - Liquids RTU (Ready-to-use) or Concentrate (need to add water)
 - Granular or Powder forms for spreading

How Do They Work?

- Herbicides work by:
 - Moving inside the plant's system through its roots or leaves to kill it (Systemic). These are usually Pre-emergent types that are used before weeds even show up.
 - Acting only on the outer visible portions of the plant to destroy or kill it. These are Post-emergent herbicides since the weeds are already growing. (Contact or Non-systemic)
- They are either selective (acting on specific weeds) or non-selective/broad spectrum (acting on a wide range of weeds)

Are They Recommended for Organic Gardening?

- Most conventional chemical herbicides on the market are not recommended for organic gardening applications because:
 - These substances are usually made up of synthetic chemical ingredients that are harmful to humans and animals if swallowed, inhaled, or absorbed through the skin
 - They can be costly
 - They persist in the soil and environment long after they've been applied
 - They can inhibit or interfere with the germination of seeds and kill young seedlings
 - They can be harmful to the beneficial organisms in the soil
 - Accidental drips or spray drift carried by the wind can kill neighboring plants

Organic Weed Control Applications at Home

- Some alternative “allowed” or “approved” herbicides on the market can be used in organic applications, but these are not to be applied to edible crops. These organic herbicides still need to be applied with caution.
 - ‘Organic Weed & Grass Killer’ products made from D-limonene (citrus oil extracted from citrus fruits) - NOT APPLICABLE FOR FOOD CROPS.
 - 20% vinegar (not readily available)
 - Corn gluten meal (a Pre-emergent herbicide often used on lawns, prevents weed seeds from germinating)
- Weed Torch
- Hand weeding is always the best option to use in any area of your garden, while maintaining a good 2” to 3” mulch around all your plants!

Organic Weed Control Applications at Harvest Farm

- Using chemical herbicides in organic gardening is not recommended due to the harm it can cause in the garden.
- Organic gardeners effectively control weeds in the garden by combining a few basic strategies.
 - Learn to identify weeds from the “wanted” plants in your garden or plot
 - Mulch beds with at least 2” to 3” in order to smother out sunlight to prevent weed seeds from sprouting
 - Hand weeding or hand pulling weeds when they first appear is very effective
 - Hand pulling weeds before they set seed
 - Use hand weeding tools to help assist uprooting plant by the roots (ex. hoe or cultivator rake)
 - Disposing of or composting the weeds once pulled
 - Using cover crops or green manures on bare areas if not in use and not mulched

Organic Weed Control Applications at Harvest Farm

- Cover crops can be used when you aren't actively growing food crops. Ex: winter or resting periods in the garden
- Cover crops or green manures are:
 - A living mulch
 - Grass, legume, or grain crops grown to protect and enrich the soil
 - Weed suppressants because they grow quickly to form a dense cover that newly germinating weed seeds can't compete in
 - A “green manure” because they pull nitrogen into the soil and can be tilled in and left to decompose increasing soil fertility and organic matter

Examples of Cover Crops and/or “Green” Manures:

- Alfalfa
- Buckwheat
- Clover (Red or White)
- Hairy Vetch
- Oats



For Help with Weed Identification

- University of Georgia: Weed Science
<http://mulch.cropsoil.uga.edu/weedsci/>
- Noxious weeds visit: GA-EPPC - Georgia Exotic Plant Pest Council
<http://www.gaeppc.org/index.cfm>

PESTICIDES & INSECTICIDES: THE ORGANIC WAY



WHY THE ORGANIC WAY?

- Using natural materials and products still in their original form
- Frequent monitoring is key to detecting insects and solving problems before they occur.
- Sound gardening begins first with building the soil, watering, mulching, and supplying nutrients.



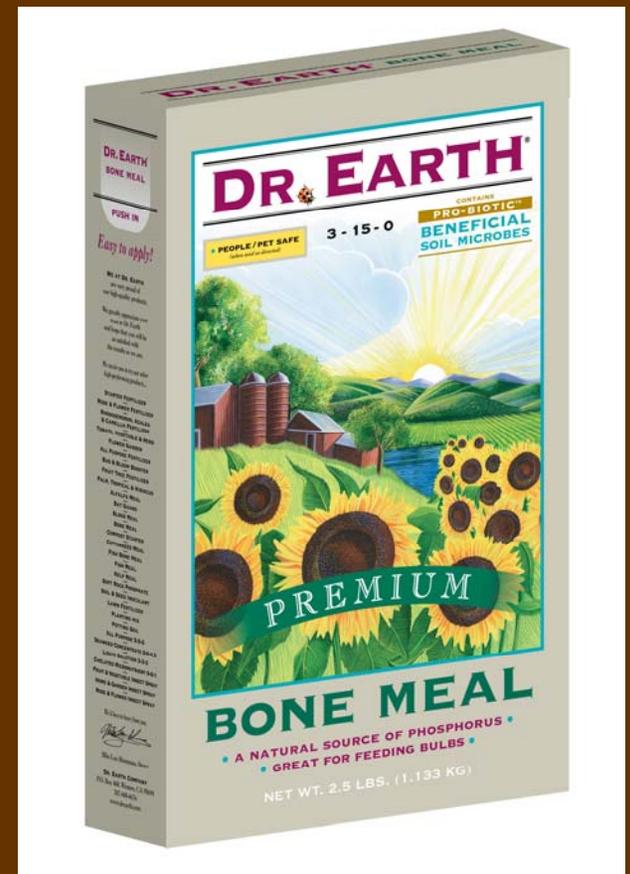
WHY THE ORGANIC WAY?

- Exposure to chemical pesticides is dangerous
- Toxic substances are harmful to both children and pets.
- Provides better exercise



ORGANIC FERTILIZERS

- Calcium
- Blood meal
- Bone meal
- Mineral rock
- Compost
- Worm castings
- Chicken manure
- Seaweed liquid



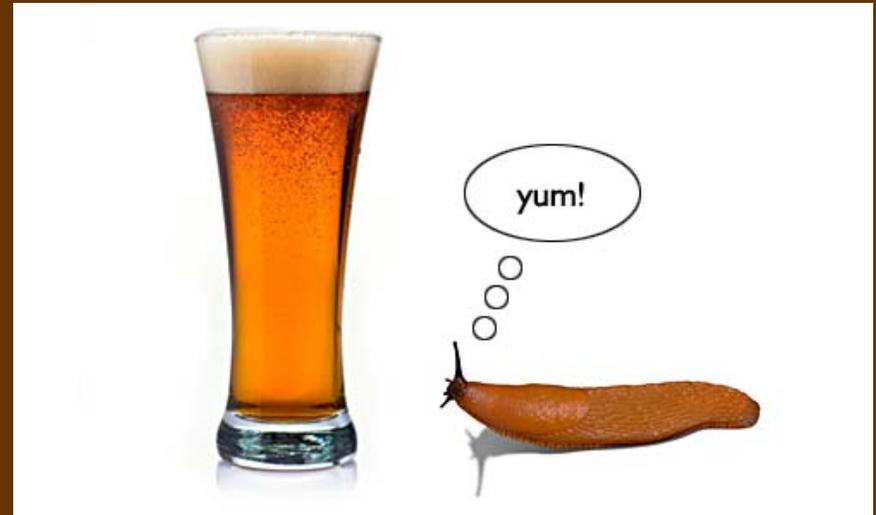
ORGANIC PEST CONTROL

- Organic sprays
- Organic compounds
- Physical barriers
- Trap plants
- Hand-picking
- Beneficial insects
- Companion planting



ORGANIC IDEAS

- Aluminum foil collar band on tomato stems
- Mineral oil prevents corn ear worms
- Beer drowns slugs
- Remove pests by hand or cut the affected part of the plant
- Use masking tape on your finger to remove pests from leaves



“ORGANIC” PRODUCTS REQUIRE CAUTIONS TOO

- Nicotine sulfate
- Rotenone
- Pyrethrins



SAFE ORGANIC CONTROLS

- Sabadilla dust
- Diatomaceous Earth (DE)
- Basillus Thringlensis (BT)
- Neem oil
- Insecticidal soaps



BENEFICIAL INSECTS

- Honeybees
- Wasps
- Spiders
- Ladybugs
- Dragonflies
- Ground beetles

