What is Organic Gardening?

- Organic Gardening is a system of gardening that attempts to utilize only sustainable, ecologically sound gardening practices.
- Rejects the use of artificial pesticides.
- Rejects the use of chemical fertilizers.
- Emphasizes building soil organic matter and relies on natural sources of supplemental nutrients.

Why Organic Gardening?

A 2010 report by The President’s Cancer Panel entitled, “Reducing Environmental Cancer Risk: What We Can Do Now,” says:

• “Exposure to pesticides can be decreased by choosing, to the extent possible, food grown without pesticides or chemical fertilizers … Similarly, exposure to antibiotics, growth hormones, and toxic run-off from livestock feed lots can be minimized by eating free-range meat raised without these medications.”
Soil Health

Soil Test

• Soil Test Kits are available from Ag Extension.

• Collect, combine, and dry soil samples from throughout your garden.

• Add dried soil to the test kit box, complete the soil test kit form, and return to Ag Extension.

• Carefully review the soil test results, and apply at no more than the rate recommended. (See Fertilization Section)

• You may wish to convert the inorganic fertilizer recommendation to an organic one. (See Fertilization Section for information on converting your inorganic fertilizers to organic)

Soil Health

Cover Crops and Soil Preparation

• In the fall after crops are harvested and beds are idle, plant cover crops such as clover, oats, winter peas, hairy vetch, or cereal rye. (don’t let them go to seed)

• Or, gather and add at least 2 inches of organic matter to your soil. Good sources of organic matter include compost, coffee grounds, composted manure, shredded leaves, and grass clippings from chemical free lawns.

• In late winter, incorporate cover crops and organic matter by lightly turning the soil to a depth of about 4 inches, preferable with a pitchfork or broad fork.

Raised Beds

• Raised beds allow you to focus your soil improvement efforts on the specific areas where you are growing crops. They also tend to drain well and warm up a little earlier in the spring.

• Raised beds can be as simple as raking soil up to form elevated rows that are higher than the paths between them, or they can be made more permanent by using boards or other materials to contain them.

• Do not use pressure treated lumber, unless it is clearly labeled as safe for contact with food crops. Untreated cedar is preferred, though pine treated with linseed oil or other natural wood sealers can be safely used.
Water Harvesting
Rain Barrels

• A rain barrel can be made using an approximate 55 gallon plastic food grade barrel connected to a downspout, with a water faucet placed at the bottom and an overflow placed near the top.

• Be sure to direct overflow away from the foundation of your house, and to screen the top inlet opening to keep mosquitoes and debris out.

• Elevate your rain barrel as much as possible to generate good water flow at the outlet faucet.

• Plastic food grade barrels can be found locally at the Farmers Co-op, Farrer Brothers, etc. Fittings can be found at most hardware stores.

• If possible, place rain barrels in the shade or on the east or north side of your home or other structure to reduce heat gain from direct sunlight.

• Clean your rain barrel at the end of each season, and leave disconnected from your downspout for the winter, or use a water diverter in your downspout to divert water from your rain barrel on through your downspout.

• Some studies suggest that rain barrel water should not be used on vegetables due to possible contamination from shingles, bird droppings, and algae growth. If this is a concern, use rainwater barrels to water shrubs, trees, flowerbeds and potted plants.
Ready Made Rain Barrels

Homemade Rain Barrels

Fitted with Hand Pump

Homemade Rain Barrels

Water Harvesting
Air Conditioner Condensation

• During the summer months your A/C unit will produce and discharge as much as 5 to 10 gallons, or more, of pure, distilled water per day. The higher the humidity, the more water it produces.

• Locate your A/C condensation discharge drain pipe and place a 5 gallon bucket under it.

• Some discharge drains are located at or near ground level and may need an extension pipe or hose to reach a location low enough to place a collection bucket under it.

• Or, you may need to excavate a hole in the ground near your drain and place your collection bucket in the hole below ground level to catch condensation either directly from the discharge drain pipe or from an extension pipe or hose.

• Be careful not to block or obstruct your A/C discharge drain!

• Enjoy free distilled water all summer!
Fertilization

- If your soil test recommends fertilizers and other soil amendments, consider using OMRI listed (Organic Materials Review Institute) or NOP listed (National Organic Program) fertilizers, or make your own.
- Always read and follow all label instructions!
- An objective of organic gardening is to build your soil fertility and let your soil feed your plants.
- By using organic gardening practices, you may over time be able to increase soil fertility enough to greatly reduce or even eliminate the need for added fertilizers.

Fertilization

- Primary nutrients are Nitrogen (N), Phosphorus (P), and Potash or Potassium (K), as well as trace elements.
- If your soil test recommends fertilizers, apply a ready made organic fertilizer at the rate and ratio recommended.
- A publication entitled, “Converting Soil Test Results to Organic Fertilizer Recommendations”, is very helpful and is available from the Georgia Cooperative Extension. Service http://extension.uga.edu/publications/detail.cfm?number=C853

Fertilization

- Some organic sources of fertilizers and their approximate N/P/K analysis follow. Consider using OMRI or NOP listed products when possible.
- The following materials should be readily available at most garden centers, and may be combined to equal the approximate fertilizer recommendations from a soil test.
- Source: University of Georgia Extension

Organic Fertilizers

- Blood Meal: (12/1.5/0.6) Medium to rapid release, derived from dried slaughterhouse waste.
- Bone Meal: (0.7 to 4.0/11.0 to 34.0/0) Slow to medium release, derived from dried slaughterhouse waste.
- Fish Emulsion: (5.0/2.0/2.0) Medium rapid release.
- Granite Dust: (0/0/6.0) Slow release, trace elements.
- Greensand: (0/1.0 to 2.0/5.0) Slow release, also improves structure of clay soils.
- Colloidal Phosphate: (0/18.0 to 24.0/0) Slow release, derived from marine deposits, 2% of Phosphorus is available per year. Can also use Rock Phosphate.

Organic Fertilizers

- Alfalfa Meal: (3.0/1.0/2.0) Slow to medium release, seed meals are derived from the processing of vegetable oil.
- Cottonseed Meal: (6.0/2.5/1.7) Slow to medium release.
- Soybean Meal: (6.7/1.6/2.3) Rapid release.
- Kelp Meal: (0.9/0.5/1.0) Slow release, also contains a wide range of trace minerals, growth regulators, and natural hormones.
  *Most organic fertilizer constituents also improve soil structure by adding organic matter.

Organic Fertilizers-Free Stuff!

- The following materials can usually be found or gathered for free for use in your garden!
- They act as both fertilizers and soil conditioners by adding nutrients and organic matter to your soil.
- They are generally added to your garden beds and incorporated into the soil in the fall and winter, or are added to your compost bin.

Source: Organic Lawn Care Manual, Paul Tukey
Organic Fertilizers-Free Stuff!

- **Coffee Grounds**: (2/0.3/0.3) Slow release, should be balanced with wood ash or garden lime.

- **Compost**: (1/0.5/1) Slow release, balanced fertilizer, the basis of organic gardening.

- **Grass Clippings**: (4/1/3) Slow release, should not come from chemically treated lawns.

- **Cover Crops**: (.75/.2/.5) Slow release.

- **Leaves**: (.8/.4/.2) Slow release, should be finely shredded.

- **Dried Manure (Horse)**: (0.6/0.2/0.5) Slow release, should be well cured.

- **Dried Manure (Steer)**: (2.0/0.5/1.9) Medium release, should be well cured.

- **Wood Ash**: (0/2/6) Rapid release, will raise the soil pH similar to lime.

Organic Fertilizers-Free Stuff!

Free Leaves Free Coffee Grounds

Organic Fertilizers-Free Stuff!

- **Compost Tea**
  - Compost tea can readily be made from well cured compost using only a small aquarium pump, a bubbler stone, mesh bag and 5 gallon bucket.
  - Add a scoop of compost to 5-gallon bucket of water, or place it in a mesh bag suspended in bucket of water.
  - Add 1 tablespoon of blackstrap molasses to the water.
  - Place bubbler stone in bucket and turn on the pump.
  - Your compost tea should be ready in about 24 hours.
  - Compost tea is a slow release balanced fertilizer and has mild fungicide properties.

Organic Pest Control

Types of Pests

- **Piercing and sucking**: very difficult to control, generally a contact pesticide is required and must be sprayed directly on pests.

- **Chewing**: easier to control, can generally be controlled by spraying a liquid pesticide (stomach poison or neurotoxin) on plants being affected. Affects only pest which are feeding on your plants and only after being ingested by the pests.
Organic Pest Control
Horticultural Practices

- Insecticides should be used as a last resort, and used beginning with the least toxic. First try alternatives.
- Many pests and their eggs can simply be hand picked.
- Use row covers or insect netting on crops until the first blooms appear.
- Keep your garden clear of debris, and practice proper crop rotation year to year.
- Grow flowering plants in your garden to encourage beneficial insects.
- Attract birds by providing perches, feeders, and water.

Pest Control
Organic Pesticides

- If pesticides are needed, consider using homemade or purchased OMRI or NOP listed products, spray only when and where needed, and only late in the day after bees and other beneficial pollinators are no longer active.
- Always read and follow all label instructions. Just because a pesticide is labeled for organic use doesn’t mean that it is not dangerous to humans and wildlife.
- Generally speaking, insecticidal oils and soaps are non-selective and must be sprayed directly on the pest to be effective; while those that are first sprayed on plants and then consumed by pests are more selective.
- Some common organic pesticides follow.

Source: Good Bug, Bad Bug – Jessica Walliser

Organic Pesticides

- **Beneficial Essential Oils**: Made from the oils of various plants, including clove, wintergreen, cinnamon, rosemary, and peppermint.
- **Bt (Bacillus thuringiensis)**: A naturally occurring bacterium that is used to control foliar feeding caterpillars and worms. It affects pests once it is ingested.
- **Citrus Oil**: Coats and suffocates pest.
- **Diatomaceous Earth**: Made from the crushed exoskeletons of microscopic sea organisms. Controls soft bodied pest by lacerating their bodies and thereby dehydrating them.

Organic Pesticides

- **Horticultural Oils**: Controls soft bodied pest by dehydrating and suffocating them.
- **Insecticidal Soap**: A contact pesticide made from fatty acids that controls pest by dehydrating and suffocating them. Can be bought ready to use or can be homemade.
- **Iron Phosphate**: Used to control slugs and snails, and is not harmful to pets. (Pets that ingest conventional slug bait may become sick) Breaks down into iron and phosphorous.

Organic Pesticides

- **Kaolin Clay**: A naturally occurring clay from the weathering of aluminous materials such as feldspar. It is a white powdery clay that deters pest from landing on vegetables and fruits, creates an unsuitable surface for feeding and egg laying, and acts as an irritant to the pest.
- **Milky Spore**: A naturally occurring bacterium that controls grubs, but does not harm other forms of soil life or mammals.
- **Neem Oil**: Made from the seeds of the tropical neem tree. Does not harm soil life or mammals. Is effective against a wide range of pests and also serves as a fungicide.

Organic Pesticides

- **Pyrethrins**: Made from the powdered, dried flower heads of a species of chrysanthemum. (Do not use the synthetic form called pyrethroids) Pyrethrins are a fast acting contact pesticide effective against a wide range of pest, but also affects many beneficial insects and aquatic life, and should be used only with caution and as a last resort.
- **Spinosad**: Derived from the aerobic fermentation of a bacterium found in the Caribbean Islands in 1982. Spinosad is effective against a wide range of pest, but has a low toxicity against most beneficial insects. It activates the nervous system of pest causing loss of muscle control.
Pest Control
Homemade Organic Insecticidal Soap, Horticultural Oil, and Fungicide

- **Insecticidal Soap**: Combine 2 teaspoons of dishwashing soap in 1 gallon of water, and apply with a 1 quart spray bottle or larger 1 gallon pump sprayer. Controls soft bodied pests.

- **Horticultural Oil**: Combine 2 tablespoons of vegetable oil and 1 teaspoon of dish soap in 1 gallon of water, and apply as a spray on dormant fruit trees.

- **Fungicide**: Combine 2 tablespoons of baking soda or potassium bicarbonate and 1 teaspoon of vegetable oil per gallon of water to use as a fungicide. (Caution—baking soda adds small amounts of sodium to the soil)

Pesticide Bee Safety

- European honeybees and native bees are required for the pollination of many vegetable and fruit crops. Without adequate populations of bees, production of many crops would be impossible.

- Bees may be killed while foraging on blooming plants that have been treated by some pesticides, including insecticides such as carbaryl (Sevin), Penncap-M, nicotinoids and others, some of which may be unintentionally carried with pollen back to the hive.

- Dust and wettable powder formulations tend to be more hazardous to bees than larger granules and emulsifiable concentrates.

Pesticide Bee Safety

- Apply insecticides only when bees are not actively foraging. Honey bees are active primarily from morning until late afternoon, therefore some insecticides may be safely applied in the late afternoon or evening.

- Be very cautious when applying insecticides to vegetables and fruits that are in bloom.

- READ THE LABEL! Are there bee precaution directions listed under environmental hazards?

- It is a violation of federal law if you do not apply insecticides according to the label.
Pesticide Label

- **Read and Follow the Environmental Hazards**
  
  Example: Spinosad (organic)
  - Is toxic to bees for 3 hours following treatment, and is toxic to aquatic invertebrates. Do not apply to blooming, pollen-shedding, or nectar producing parts of plants if bees may forage during this time period.
  - Max Number of Applications Per Season (beans-6)
  - Min. Number Days to Wait Before Reapplying (beans-5)
  - Min. Number of Days to Wait From Last Application to Harvest (beans-3)

Organic Weed Control

- **Cover Crops**
- **Pine Straw Mulch**

Organic Weed Control

- Corn Gluten is an effective pre-emergent herbicide
- Keep beds well mulched
- Hand pull and/or hoe weeds regularly
- Break the weed/seed cycle—do not let weeds go to seed!
- Consider raised beds

Garden Design Magazine - April 2011

Michele Owens

- **Forget the Chemicals**: Organic soils encourage a greater balance and diversity of microbes to serve plants and better control pathogens.
- **Add Organic Matter**: Compost, cover crops, manure, and mulch offer habitat to beneficial soil creatures.
- **Rethink the Tiller**: Tilling disrupts soil communities and fungal networks.
- **Consider Heirloom Vegetables**: Plant varieties that precede the development of chemical fertilizers and pesticides.
Helpful Resources

UT Extension Publications:

- Guide to Spring-Planted Cool-Season Vegetables (SP 291-0)
- Guide to Warm-Season Garden Vegetables (SP 291-P)
- Fall Vegetable Gardens (SP 291-G)
- Organic Vegetable Gardening (PB 1391)
- Managing Landscape and Garden Waste (PB 1578)
- Composting Yard, Garden, and Food Waste at Home (PB 1479)
- Disease Resistance in Recommended Vegetable Varieties for Home Gardens (SP277K)
- Tree Fruit, Tree Nut and Small Fruit Cultivar Recommendations for Tennessee (PB746)

NGO, State and Federal Government Resources

- UT Ag Extension - eOrganics
  http://www.extension.org/organic%20production
- UT Organic and Sustainable Crop Production
  http://organics.utk.edu/
- TN Department of Agriculture - Organics
  http://tennessee.gov/agriculture/topic/ag-farms-organics
- Organic Materials Review Institute (ORMI)
  http://www.omri.org/
- USDA National Organic Program
  http://www.ams.usda.gov/AMSv1.0/nop
- National Sustainable Agriculture Information Service
  http://attra.ncat.org/

Books

- Good Bug, Bad Bug – Jessica Walliser
- The Organic Lawn Care Manual – Paul Tukey
- Carrots Love Tomatoes – Louise Riotte
- The Organic Manifesto – Maria Rodale/Eric Scholser
- Animal, Vegetable, Miracle – Barbara Kingsolver
- The Omnivore’s Dilemma – Michael Pollan
- Mini Farming – Brett Markham
- Square Foot Gardening – Mel Bartholomew
- The Winter Harvest Handbook – Elliot Coleman
- Root Cellaring - Nancy and Mike Bubel
- Putting Foods By – Janet Green, Ruth Hertzberg, Beatrice Vaughn
- Decoding Gardening Advice: The Science Behind the 100 Most Common Recommendations - Gilman, Jeff

Television Programs

- Volunteer Gardener
  http://www.volunteergardener.org/
- Growing a Greener World
  http://www.growingagreenerworld.com/

Other Web Sites

- Resource Guide for Organic Insect and Disease Management
  http://web.ppmb.cals.cornell.edu/resourcguide/
- Rodale Institute
  http://rodaleinstitute.org/
- Rain Barrels

Thanks! Questions?