

# Family Gardens Program

## Gardening 101 Packet

### Insects

Insects are an important part of every garden and play a significant role in plant life. There are over one million types of insects in the world. Only about 5% of all insects are bad, while 95% of insects are either good or neutral (Ahamad, Tripathi, & Singh, 2015).

Beneficial (or good) insects can be categorized into three groups: predators, pollinators, and recyclers.

- **Predators** prey on and eat bad insects. This helps us reduce the pests that may kill our plants and helps us reduce or eliminate the use of harsh chemicals or pesticides in our garden. Ladybugs and praying mantises are examples of predators.
- **Pollinators** help spread pollen in order for plants to reproduce and make fruits, vegetables, and other plants. Butterflies, bees, birds, bats, and many other animals are pollinators.
- **Recyclers** decompose/break down or recycle waste and trash. Recyclers include termites, beetles, and flies.

### Worms

Earthworms, also known as ringed worms because they have segmented bodies, are extremely beneficial for a garden. They feed on bacteria, fungi, other decaying materials, and vegetation from the surface of the soil and underneath the soil. One earthworm can digest 36 tons of soil in one year (US Department of Agriculture and Natural Resources Conservation Service, 2003). As earthworms burrow and feed, they improve soil quality. The presence of earthworms in soil usually indicates a healthy system because they stimulate microbial activity, mix soil, improve water-holding capacity, and provide channels for root growth. Other animals and plants benefit from this.

### Controlling Pests

Pests including harmful bugs, plants, and rodents, can be a major barrier to growing abundant plants and vegetables in the garden. There are several methods within both organic and inorganic gardening that can be used to prevent invasion from these harmful species. Organic

gardening does not involve the use of pesticides or chemicals to get rid of harmful pests. There are many natural methods that organic and traditional farmers use including planting different types of plants and using diatomaceous earth. Diatomaceous earth is a product made from fossilized remains of hard-shelled algae that causes insects to dehydrate and die.

Pests can be a major concern not only for school gardens but also for schools as a whole. Ensuring safe and healthy learning environments is a priority for school administrators, teachers, staff, and parents. There are various organizations that work on addressing pest concerns including your local state education department and national organizations like the Environmental Protection Agency's Integrated Pest Management program.

Harmful impacts on the environment from pesticides include:

- Loss of biodiversity, water pollution, soil contamination, and pest resistance (Sustainable Table, 2015).

## **Natural Methods for Controlling and Preventing Pests**

There are several ways to control and prevent pests in the garden. Alternative, organic pesticides can be made at school and are more environmentally friendly than conventional chemicals found in stores.

Homemade liquid pesticides include dishwashing detergents and powders (see instructions below).

- Make a mix of 1 tsp. of dishwashing detergent, 1 qt. of water, and 1 cup of vegetable oil. Shake well and apply every week to kill aphids, squash bugs, and other harmful insects on contact.
- Powders such as talcum powder can get rid of corn ear worms. Sprinkle the powder on the soil and leaves after it rains when the leaves are dry (Garden Guides, 2010).

Certain plants and vegetables can be planted together so that they benefit each other and ward off many harmful insects. This method is called companion planting. Planting basil near cabbage, peppers, tomatoes, and beans can kill flies and mosquitoes. Flowers such as marigolds kill nematodes and can be planted near asparagus, cabbage, cucumbers, potatoes, and tomatoes. Herbs such as sage repels slugs, bean beetles, and cabbage moths.

Natural predators can manage and protect your garden from damaging insects. You can plant parsley, dill, and yarrow to attract the wasp that kills destructive worms. Milkweed, hydrangeas, and goldenrod attracts the soldier beetle which eats caterpillars, aphids, and grasshopper eggs (Garden Guides, 2010).

# SOIL

Soil is the foundation of a garden. Soil influences the productivity of plants and the different soil types can affect the diversity of plants that grow in an area. Soil needs to be cared for. The quality and characteristics of the soil that plants grow in are important factors that either help or hinder plants' survival (Haferkamp, 1988). Healthy soil is important for a thriving garden. When we use soil to grow our food, the plants take important nutrients they need to grow from the soil. Those nutrients must be returned to the soil in order to continue growing bountiful crops. This chapter will introduce the importance of soil, discuss several ways that nutrients are stripped from soil, and ways to revitalize soil.

## All About Soil

Soil is formed slowly as rock erodes from the Earth's surface into tiny pieces (Flynn, n.d.). Natural soil formation processes can take more than 100 years to form just one inch of topsoil. As organic matter (dead tissue of plants and organisms) decays, it mixes with inorganic material (such as rock particles, minerals, and water) to form soil. Soil is a mixture of four basic components: mineral particles, organic matter, air, and water (LifeLab, 2014). Bacteria, fungi, and other microorganisms living in soil breakdown the organic material. The left over decaying organic material is a substance called humus. Humus helps the soil retain moisture and nutrients, improves the physical structure of soil, and allows living organisms to feed and reproduce. Living organisms (e.g., earthworms and insects) play a key role in the development of soil through the digestion of the organic material and are important for maintaining healthy soil, and ultimately healthy plants.

There is some confusion about the difference between dirt and soil. Dirt is misplaced soil such as the dirt you find under your fingernails or dirt on your shoes. Soil, on the other hand, is a living environment that provides plants a home with access to water, nutrition, and oxygen. The contents in soil vary by location and are constantly changing. There are many different types of soils that are categorized by their texture and size. The three basic particle sizes, from largest to smallest, are sand, silt, and clay.

## Compost

When plants and animals die in nature, they fall to the ground and eventually decompose, returning nutrients to the soil. When a garden is harvested, this natural cycle is interrupted (Dickerson, n.d.). Composting is a way to mimic nature by returning unused plant materials back to the soil (LifeLab, 2014). We could just put pieces of fruits and vegetables, leaves, and stems into the soil, but it would take a long time for the soil bacteria and fungi to break them down. By building a compost pile, we can speed up the natural decomposition process.

Compost is a mixture of decomposed items that are used to help our soil by replenishing essential nutrients. Compost comes from a natural process of decay (or rotting) and re-birth. It is nature's way of recycling.

There are many benefits to composting. Compost not only replaces nutrients used by plants but also improves the garden soil structure by adding humus. Humus gives the soil body and makes nutrients and water more available to plants. Composting also allows students to see that organic matter such as food wastes and leaves can change over time into a valuable fertilizer that builds the garden soil. Composting can significantly decrease the amount of garbage thrown into the landfill – this helps our environment!

A healthy compost pile requires a balance of carbon and nitrogen (Lanza, 1998). Carbon sources include woody, dry materials such as sawdust, straw, fallen leaves, and dry grass clippings. Nitrogen sources include green, wet materials such as fresh grass clippings, manures, and kitchen waste. Do not compost meat, bones, grease, or dairy products because they can attract pests and other unwanted creatures. In addition, you do not want to add metal, glass, or plastics to the compost pile because they do not decompose. You can tell that the pile is ready when it is dark brown and looks like soil, is not made up of easily recognizable ingredients and has an earthy odor (Sunset Books, 1990). The outside of the pile will not fully decompose, so you have to check at least 25 centimeters (about 6 inches) into the interior of the pile. The process will take about 2-4 months if you turn your compost pile frequently.

## Winterizing the Garden

Winterizing your garden keeps it safe throughout the harsh winter months. Simply put, you just need to clean and cover up your garden to properly prepare it for winter. Three concepts are important to understand: clearing and weeding, adding compost, and mulching.

The first step in winterization is to pull out old vegetable plants and vines from the garden. In addition, it is important to weed the garden before winter to minimize the number of weeds that pop up in the spring. Adding compost to your garden can also help the soil gain nutrients it may have lost during the last spring. For more information, see the *Compost* and *Building Lasagna Beds* sections. More information about mulch can be found below.

### Mulch

Mulch is any type of material that is spread on or laid over the surface of the soil as a covering. It is used to retain moisture in the soil, suppress weeds, keep the soil cool, and make the garden bed look more attractive. Organic mulches also help improve the soil's fertility because they are decomposable. Types of mulch include wood chips, newspaper, and straw.

## **Chips**

Wood chips can be utilized as mulch for pathways or to suppress weeds. Untreated wood chips are best.

## **Newspaper**

Newspaper as mulch is becoming more and more popular. Most newspapers have switched over to organic dyes, especially for their black and white sections. Shredded newspaper has been used for years to keep plant roots moist while shipping. Layered sheets of newspaper also have great moisture retention abilities, and they act like other organic mulches as far as suppressing weeds and controlling soil temperatures. They are also great for smothering existing grass when starting a new garden bed.

To use newspaper as mulch in the garden, spread a layer of 4-8 sheets of newspaper around the plants. Moisten the sheets to keep them in place. On windy days, it is easier to moisten the sheets before you place them down. Cover the newspaper with a 1-3 inch layer of organic mulch and the weed protection should last throughout the growing season.

## **Straw**

Straw is also a popular mulch for the vegetable garden. Straw keeps the soil and soil-borne diseases from splashing up on lower plant leaves and make paths less muddy. Straw decomposes very slowly and will last the entire growing season. It also makes a nice home for spiders and other beneficial insects that will move in and help keep the pest population in control. And finally, straw is easy to either rake up or work into the soil when it is time to plant a new crop or put the vegetable garden to bed for the winter.

## **Building Lasagna Beds**

Lasagna beds are a cost effective, simple method of preparing your garden for growing vegetables and herbs. Similar to how lasagna is made, this method layers organic materials on top of one another.

### **When should you build a lasagna bed?**

The best time to start a lasagna bed is in the fall, to allow the materials a chance to compost down during the winter. Just cover it with straw or hay and come spring, you are ready to plant!

If you are making the lasagna bed in the spring, make sure to add more soil and compost to the top of your layers so your seedlings can be planted right away.

### **What materials do you need?**

Lasagna beds are made by layering carbon (“brown”) and nitrogen (“green”) containing materials. Below are some suggested materials:

<b>Carbon</b> (dry/brown)	<b>Nitrogen</b> (wet/green)	<b>Other Materials</b>
<ul style="list-style-type: none"> <li>• Leaves (chopped)</li> <li>• Straw</li> <li>• Shredded paper</li> <li>• Peat moss</li> <li>• Sawdust</li> <li>• Wood chips</li> <li>• Pine needles</li> <li>• Other</li> </ul>	<ul style="list-style-type: none"> <li>• Animal manure</li> <li>• Grass clippings</li> <li>• Coffee/Esspresso grounds</li> <li>• Vegetable/kitchen scraps</li> <li>• Fish meal/emulsion</li> <li>• Other</li> </ul>	<ul style="list-style-type: none"> <li>• Cardboard</li> <li>• Water</li> <li>• Shovels</li> </ul>

## Steps

1. You want to cover the entire area with cardboard. Soak this layer with water. This will act as your weed barrier that will keep weeds from growing into your garden.
2. Start layering: Put down a layer of brown materials (about 4 to 5-inches) first.
3. Alternate green and brown layers.
  - a. In general, you want your brown layers to be twice as deep as your green layers (no need to be exact). At the end you want your layered bed to be about 2 feet tall. You'll be amazed at how much it will shrink down in just a few short weeks.
4. If you are preparing beds in fall, you can add straw or hay on top of the beds. If you are preparing beds in the spring (or a couple weeks before planting), spread composted soil on top of your layers.

This information was adapted from [Building Lasagna Beds](#) created by Kim Howell-Costion.





Tuba City, AZ Garden Expo 2016, *Lasagna Bed Demonstration* (Photo by Alicia Tsosie).

## Seed Saving

Seed saving is a very important part of gardening. It saves money, allows your plants to adapt to the specific climate, and improves its ability to thrive in its environment. Once you start saving seeds you can become a resource in the community for people who wish to start a garden. With research you'll be able to learn more about specific seed saving techniques. Organic Seed Alliance has a great website (<http://seedalliance.org/>) that you can use as a resource for seed-related publications. For a comprehensive seed saving guide that can be used to learn more about seed growing basics, visit [http://www.seedalliance.org/uploads/publications/Seed\\_Saving\\_Guide.pdf](http://www.seedalliance.org/uploads/publications/Seed_Saving_Guide.pdf).

Seed saving is important to preserving seed heritage and tradition in American Indian communities. Historically, Native communities saved their seeds, making those seeds unique and diverse. Heirloom seeds are seeds who have a direct connection to the past; they are an ancestral blueprint of the kinds of seeds that were grown in the past. Heirloom seeds can be found in various sizes, colors, tastes, and shapes compared to other types of hybrid seeds. Saving heirloom seeds is important to cultural and food preservation. Several tribes maintain their own seed banks to preserve their cultural plants (Rogers, 2011).

A major reason for saving Native seeds that have originated from your area and/or Tribe are the cultural significance and roles that they have in ceremonies, songs, and stories.

## Seed Storage

Seeds need to be dried before keeping them in storage. Keep in mind that seeds are alive, but they breathe very slowly. To keep the seeds alive for a long time, keep them under low temperature and low humidity during storage.

- *Humidity:* Seeds will absorb moisture from the storage environment. Therefore, high humidity levels cause seeds to increase their respiration rate and use their stored energy. Make sure your seeds are dry enough (seed moisture content around 7–8%) before storage, and keep them in an air-tight bag.
- *Darkness:* Exposure to sunlight will shorten the life of the seeds. Use dark-colored jars or nontransparent containers to protect the seeds from sunlight.
- *Temperature:* For most vegetable seeds, a temperature below ~60°F (15°C) is ideal. You can keep the seeds in an air-tight container and place the container in the refrigerator.



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