Garden Soil Prep

Proper soil preparation is vital to any successful vegetable or annual flower garden. We need to provide sufficient nutrients and organic material prior to planting to ensure production and performance during the subsequent growing period. Most gardeners till in the soil amendments. However, tillage is not an absolute necessity (e.g. lasagna gardening, no-till agriculture). Either way, when these materials are combined with proper proportions and placement, your flowers and vegetables will flourish.

Organic matter improves overall soil tilth for seedling establishment and root growth. In challenging situations, organic matter will improve water infiltration and drainage of clay soils as well as water and nutrient holding capacity of sandy soils. Soil organic matter breaks down into humus with the help of native soil microbes, worms, and insects. As the soil microbes, worms, insects and plant materials live and die, they also become soil organic matter. Organic matter is rapidly broken down in our alkaline soils and by the summer heat, so the organic matter pool must be replenished each year.

Good sources of organic matter are garden compost, composted manures, green manures (crops specifically grown to be tilled in), and other “non-woody” material. Peat moss is also a source of organic matter, but it is mined from bogs and not truly a sustainable resource. Straw, sawdust, wood chips, and other “brown” materials are low in nitrogen and should be composted with other “green” wastes or other nitrogen-containing material before being added to the garden. Alfalfa meal, feather meal, blood meal, and cottonseed meal are organic matter sources that also provide nitrogen and other essential plant nutrients.

A few years ago, I started using alfalfa cubes (a type of horse feed) as my organic matter/nutrient source. They contain a high percentage of nitrogen and are not too expensive. I moisten them, allow them to expand, and incorporate them through light tillage. My original supply was from Idaho and certified as “noxious weed-free”. When I could no longer access that product, I started using another brand of alfalfa cubes from Arizona and found that undesirable Bermudagrass seed was present. I liked the alfalfa cubes because they contained larger pieces of hay and stems which would break down more slowly. Alfalfa is also used to make rabbit and horse pellets. The finer fragments in the rabbit and horse pellets lead to more rapid decomposition. I have not used them myself, but they do work similarly and can be easily top dressed in mid-season to make additional nitrogen available.

Whatever your organic matter source, it can be spread 2 to 3 inches thick on the soil surface and tilled in to a depth of 10 to 12 inches. Deep tillage may be necessary if there are tree roots in the garden area. Phosphorus fertilizer can also be added prior to tilling. A soil test can provide information regarding nutrient levels present in your garden soil, but my experience has been that plant-available phosphorus often limits production in home garden soils. Nitrogen is also a necessary nutrient, but you must consider the nitrogen content of the organic matter source used as well as the crop being grown. If you are in a limestone area, an addition of soil sulfur will decrease soil pH and increase availability of iron, phosphorus and other nutrients. You can use a shovel to till, but a broad fork will do more tilling in less time while also preserving soil structure. A rototiller will make tilling large areas easier but will cause more damage to soil structure.

An alternative to spreading organic matter and fertilizers over the entire garden is to prepare soil in beds or rows only. This conserves your organic matter supply by strategically placing it where the plant roots will be. When planting a row or a bed:

1. Remove the first shovel depth of soil and place it to the side
2. Place 3 inches of compost, a layer of rich compost (from composted chicken manure), and a tiny amount of triple super phosphate (0-45-0) in the hole, then till it in

3. Rake the soil placed on the side back into the hole and mix again
4. Once the amending and tilling are done, the entire area should be raked until it is level. Irrigate to settle the soil and allow it to dry for a day or so. Never work the soil when it is soaking wet as this will cause compaction and/or degrade soil structure.
5. Rake again and plant seeds or transplants. If transplants are used, consider "butterflying" the root system at planting time. This is done by splitting the root system partially in half from the bottom and spreading the split portion before planting. Nitrogen can also be side dressed and watered in during the growing season for nitrogen demanding crops such as corn.

There are many variations on this theme and other methods are outlined in various vegetable and flower gardening books. In arid regions, annual flowers and vegetable crops always perform best when organic matter is added to the native soil. Cover crops are another way to incorporate organic matter. Nitrogen and phosphorus are also needed to grow vigorous, productive plants. Periodic soil testing will help determine if subsequent additions of phosphorous are necessary. After some experience, gardeners generally adapt these basic recommendations into methods that work for them.

Proper soil preparation before planting leads to healthy and productive vegetable crops. Photo by Jeff Schalau, University of Arizona.

Additional Resources:

Cover Crops
University of Arizona Cooperative Extension, Backyard Gardener #27

Ten Steps to a Successful Vegetable Garden
University of Arizona Cooperative Extension

Soil Testing
Texas A & M University

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