

MIXING

When the soil has dried sufficiently, spade or rototill to a depth of about 6–8 inches. Garden soil doesn't need to be "flour-fine." Leave marble-sized particles and crusting will not be as severe as with over prepared soil. You'll need to use a rake to pulverize clods. Level and compact the soil for a firm seedbed. The final soil surface should be as level as possible for uniform water penetration.

SOIL IMPROVEMENT

Clay soils have the ability to hold moisture well (often too well) and usually contain more nutrients than light soils. They dry slowly in the spring so early planting of crops is not possible. Water penetration is slow so irrigation water often runs off instead of entering the root zone.

Sandy soils are easy to work but have low water holding capacities, so plants may suffer from moisture stress in hot weather. Nutrients may be lost as irrigation water moves downward through the soil.

These almost opposite drawbacks of both soil types can be corrected by the same technique-adding organic matter. Fine clay particles can be physically separated by coarse organic material. Nutrient and water holding qualities of sandy soils can be increased. As the organic matter breaks down, its components continue to have soil improving characteristics.

Begin by incorporating 2 to 3 inches of organic matter 6 to 8 inches deep. This application will not last forever and you should plan to add about 2 more inches each year. With heavy soils, you'll need 2 or 3 years to see much of an improvement. Summer mulching or compost addition will be helpful.

SOURCES OF ORGANIC MATTER

You will need a lot to do the job so look for abundant, inexpensive materials. **Leaves** from deciduous trees may be gathered in the fall for composting and/or soil incorporation. Needles from conifer trees may also be used. **Bark, sawdust, shavings, and other wood products** are less likely to contain weed seeds than are manures. **Peatmoss** is an excellent material, high in organic matter and somewhat acidic. Cost is a major factor for the quantities needed. **Manure** may be available and is an excellent source of organic matter. If well handled, it may contain substantial nutrients when used in sufficient quantities. It may also be a source of viable weed seeds that survived the trip through the animal's digestive tract. **Straw**, depending on the kind, may also create weed problems. **Grass clippings, green manure crops and kitchen vegetable trimmings** may be used. These tissues are mostly water, their cells are not mature and don't contain the lignin and waxes which produce long term soil improvement. **Grass clippings** are an excellent material to mulch the garden soil surface to reduce weed problems and to conserve moisture. Don't apply a lot at once. A ½ inch layer will dry out quickly and not get slimy.

ADDING NITROGEN

Large quantities of mature, woody type products such as sawdust, bark, leaves, straw, etc., will promote nitrogen deficiency in plants because of their high carbon content. Overcome this problem by adding a nitrogen fertilizer when incorporating them into the soil.

Ammonium sulfate (21% nitrogen) is readily available and quite inexpensive. Use 1 pound (1 pint) per 100 square feet for each 1 inch of woody mulch mixed with the soil. You may substitute $\frac{2}{3}$ pound of ammonium nitrate (34%) or $\frac{1}{2}$ pound of urea (45%) for the one pound of ammonium sulfate.

Manures vary in their quality. If mixed with large amounts of bedding materials, there may not be enough nitrogen to decompose it and feed the crop. Use one-half the nitrogen rate suggested above. Use this one-half rate when a green manure crop is turned under also. If the manure is quite fresh and/or well protected from leaching by rains and other weather elements it may not need added nitrogen. For more details, refer to the "Mulches and Compost" fact sheet.

TOUGH CLAY SOILS

Although it may be expensive and difficult to apply, a 2-inch layer of sand, **in addition** to the organic matter, will help your ability to garden in soils with a high clay content. If sand is used without the organic matter, low grade concrete may be formed with the fine clay particles acting as cement!

SOIL AMENDMENTS

Soil preparation information from more humid areas may suggest time to neutralize acid soils. *Lime is not needed in Utah soils* because nearly all have an alkaline reaction.

Dolomite is another form of lime. *Gypsum* is neutral in its reaction and will not acidify alkaline soils. It may be promoted as an "alkali fighter." That reference is to the high sodium soils or "black alkali" areas where crops grow poorly, if at all. It is not needed on the general range of garden soils in Utah. Don't expect gypsum to alter the soil structure and improve its workability. Use organic matter to do that.

CHANGING A LAWN TO A GARDEN

It is best not to mix the sod into the soil. A thatch layer can make it difficult to establish a good seed bed. In addition, grass clumps may sprout and be a serious weed problem.

Sod strippers can be rented that will make grass removal easier and minimize soil losses. A sharpened shovel will cut the sod, but is a great deal of work if the area is large. Skim the sod just below the crown and don't remove an excessive amount of soil.

By saving the stripped sod, you have a good source of compost to add to the garden later. Stack the sod, soil side up with a sprinkling of ammonium sulfate between layers. Cover the whole pile with black plastic to kill the sod and promote decomposition.

Once the lawn has been removed, follow the soil preparation steps listed earlier.

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