EC 1561 • May 2003
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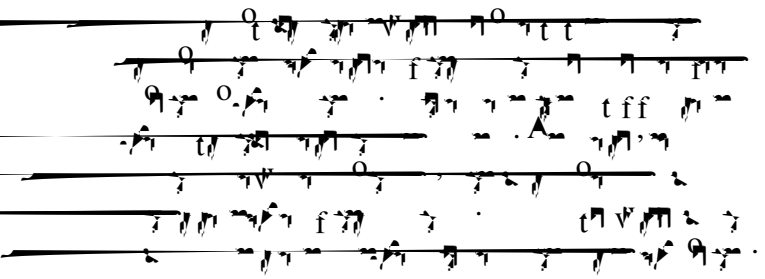
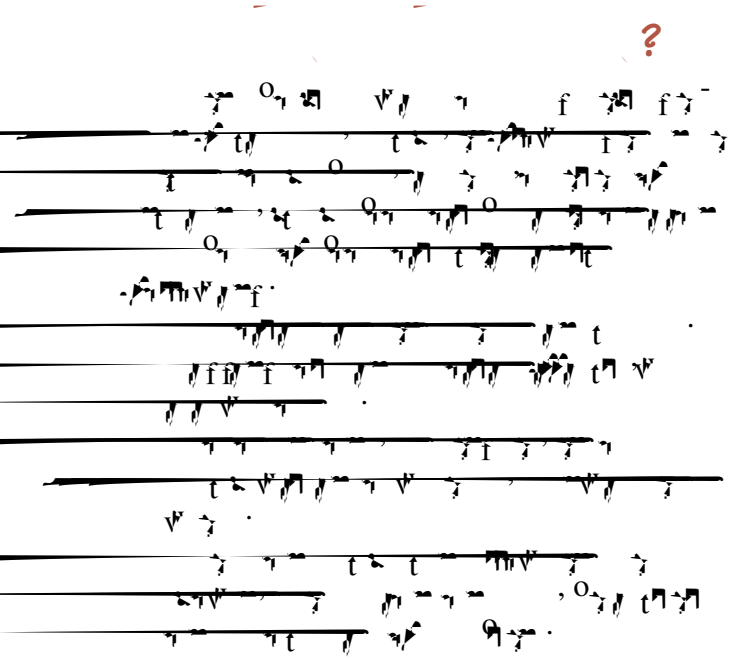
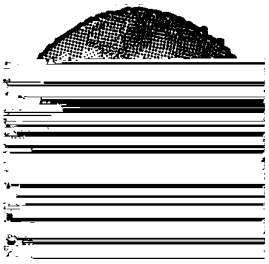




Soil layers. Note that most of the organic matter is found in the top layers of soil.

Silt



Sand

Clay

Soil particle sizes. The larger sand particles allow water to drain quickly through soil. Clay particles tend to pack more closely together, causing water to drain more slowly.

are examples of aggregation and are the result of sticky substances released by soil bacteria after feeding on organic matter. Aggregation generates soil structure.

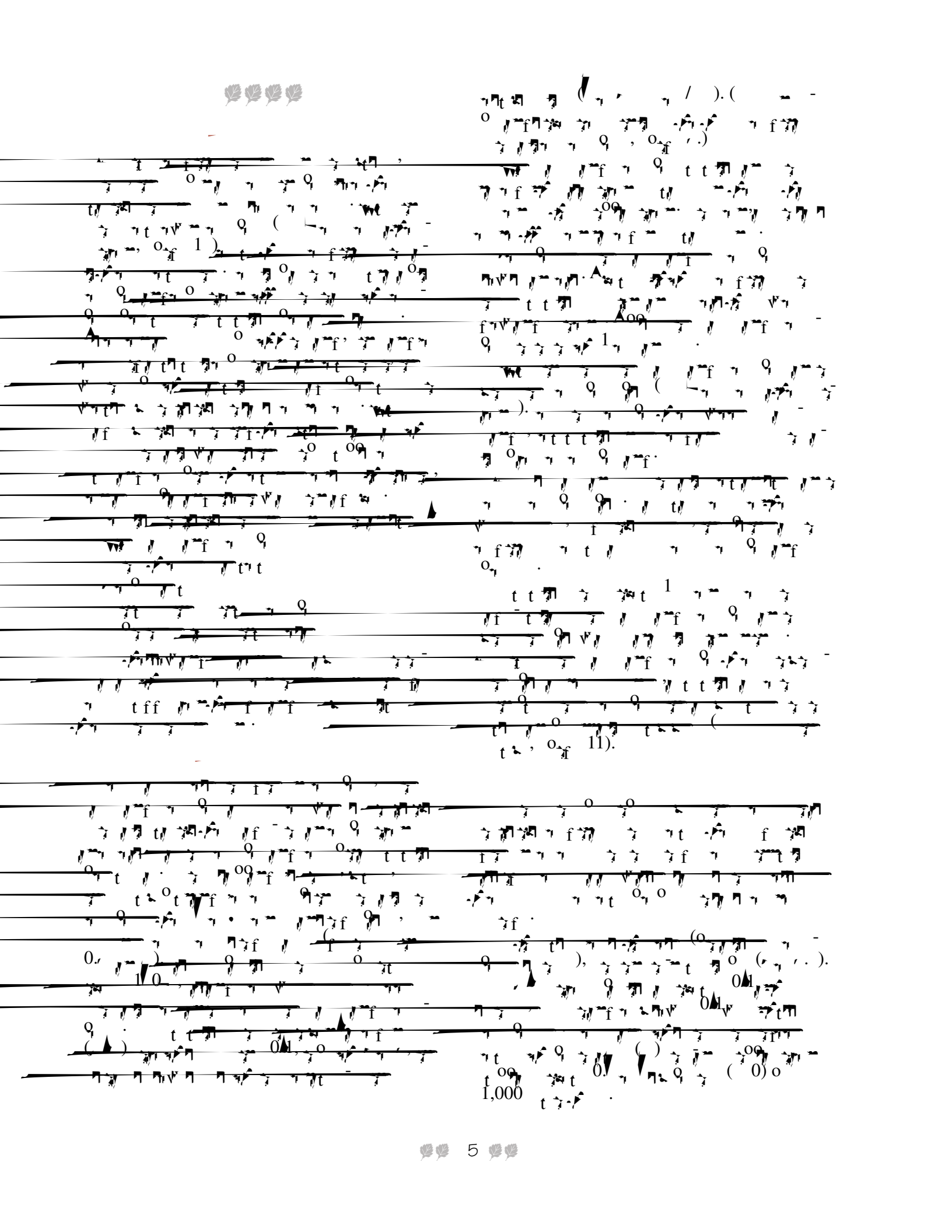
¥ Use your nose. Soils with adequate organic matter content have the rich smell of earth. Soils that have poor air circulation, a result of reduced organic matter content, may smell sour.

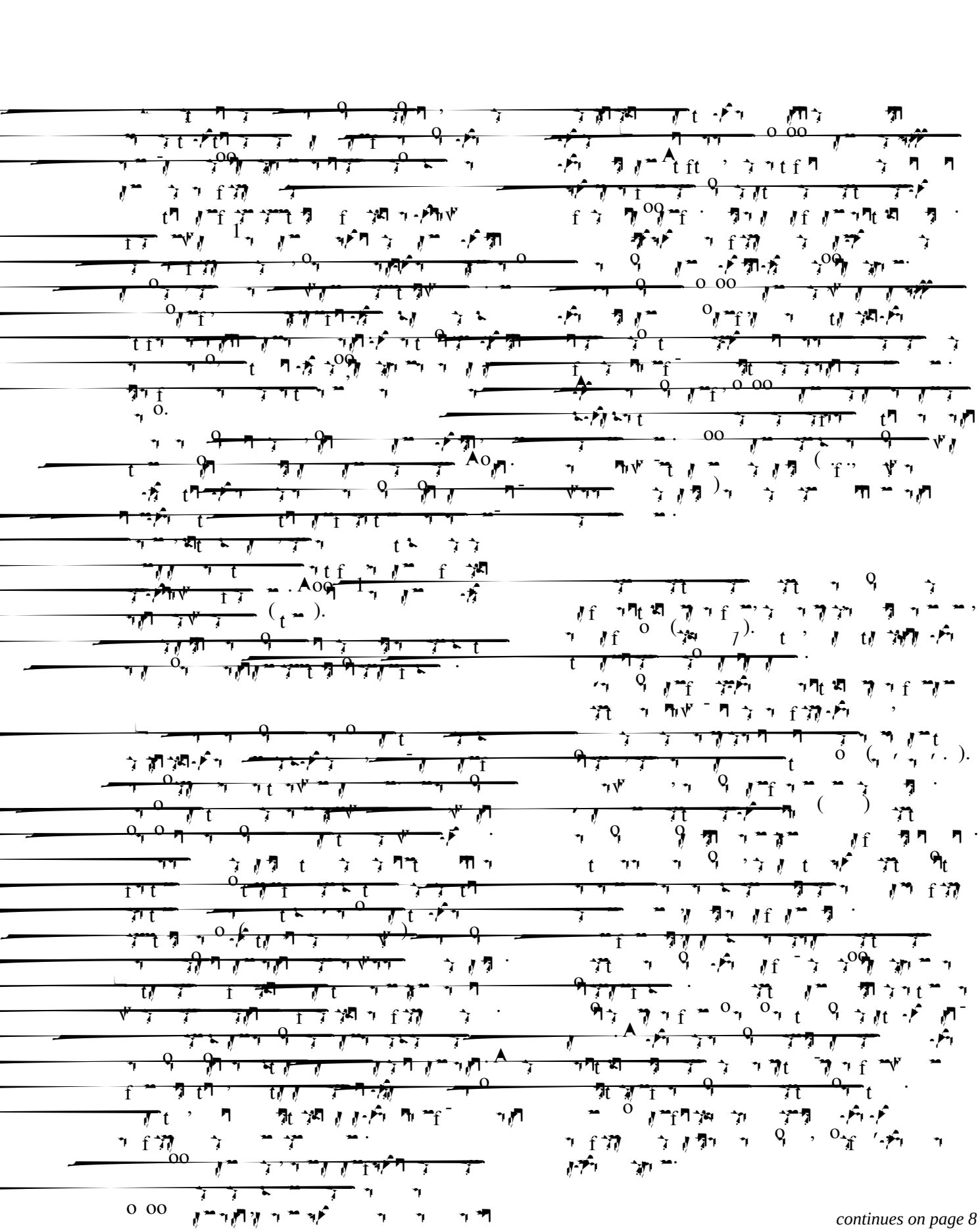
Both fresh and composted organic materials are useful for amending soils. Fresh organic material is rapidly decomposed by microorganisms in a compost pile or in the soil. The microorganisms use the organic material as a food source and release carbon dioxide to the atmosphere. As decomposition proceeds, the remaining organic compounds are more resistant to decomposition. (They have less ÒfoodÓ value to microorganisms.)

Decomposition is usually very rapid for the first 30 days after application of fresh leaves, fruits, or other vegetative material to soil (Figure 1). When decomposition of fresh organic materials takes place in soil, the sticky exudates produced by soil organisms help glue soil particles together, improving soil structure. The volume of material will be reduced rapidly as decomposition takes place.

Soil microorganisms require nitrogen for their growth, so the process of degrading fresh organic matter in the soil sometimes causes a nitrogen deficiency for plants. If you use fresh plant material, allow it to decompose in the soil for several weeks before planting into it. Also keep in mind that very woody materials, such as sawdust or sawdust-bedded manures, may cause nitrogen deficiency in soils for a long time, even after composting.

When organic materials are composted before use, the rapid decomposition phase takes place in the compost pile instead of in the soil. Organic matter supplied by compost lasts longer in soil than fresh organic matter because much of the decomposition has already occurred. However, composted organic matter is a poorer food source for soil organisms compared to fresh organic matter, so less of the sticky exudates that build soil structure are produced in the soil after compost application.





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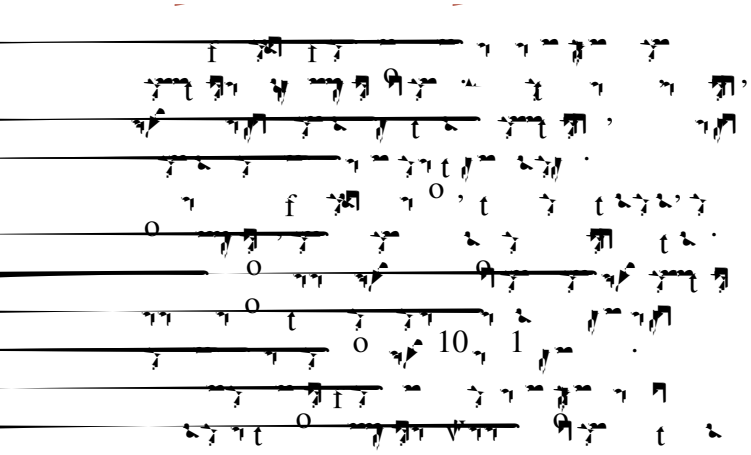

Construct raised beds several inches above the existing grade to provide sufficient rooting volume. The width of the raised bed should reflect the size of the plant at maturity. The larger the plant, the wider the root system is likely to be. Thus, the bed probably should be at least twice the diameter of the shrubÕs expected width at maturity.

Mulching the soil surface with 2 to 4 inches of coarse compost, wood chips, bark, or similar materials is a way to add organic matter to existing shrub beds and under trees. Mulch can suppress weeds, conserve soil moisture, and moderate soil temperatures, all of which improve plant growth even if soils are not amended before planting. If you amended a shrub bed prior to planting, mulching the bed afterward will help maximize the benefit of the soil amendment. Mulching to conserve soil moisture is particularly useful for raised beds, since water tends to evaporate more readily from beds than from flat soil.

Over time, earthworms and other soil organisms incorporate some of the mulch into the soil, providing a natural soil amendment process similar to what happens under a forest.

After topsoil is removed or buried, you are left with subsoil, a poor medium for plant growth. Subsoil typically is low in organic matter and impervious to water, air, and plant roots. This problem is often addressed by spreading topsoil over the compacted subsoil layer. Before you use this approach, consider several potential problems:

¥ The quality of the added topsoil may not be significantly better than the existing soil. Unlike compost, there are no standards for topsoil quality, so before accepting delivery of topsoil, inspect it and try to assess organic matter content and other quality issues such as the presence of weeds or weed seed.

¥ Even if the topsoil quality is good, the layer of soil will be thin and may not allow for extensive root growth, as roots will tend not to grow into the compacted soil below. One result can be reduced growth, but more importantly shallow root systems increase the likelihood of blow-down in high winds, especially in the case of trees.

¥ The subsoil layer beneath may impede drainage, causing problems with growth and root diseases.

In most cases, the best alternative is to amend the existing soil with organic matter, then bring in topsoil for areas of the landscape where added soil will have the most benefit (e.g., a raised-bed garden).

Gypsum is sometimes recommended for improving soil structure for soils west of the Cascades. Gypsum is calcium sulfate, and it is claimed to break up and loosen clay soils. In fact, soil response to gypsum is variable. There is no consensus among soil scientists that gypsum will improve soil structure in heavy clay soils.

A single addition of organic matter to soil will not necessarily have long-term effects on soil quality. Over time, the organic matter content of the soil will decline because of decomposition. To maintain the organic matter content of the soil, further organic matter incorporation, mulching, or establishment of a perennial grass sod will be required.

Addition of organic matter will not eliminate the need for watering flower beds and vegetable gardens during dry summer weather. You probably will find that gardens amended with organic matter require less frequent irrigation,

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without discrimination based on race, color, religion, sex, sexual orientation, national origin, age, marital status, disability, or disabled veteran or Vietnam-era veteran status.