

HUMUS

Humus is the stable form of organic matter found in the soil. It is derived from dead plant and animal residues that have undergone extensive decomposition. Humus is the organic or non- mineral material that makes up a large part of any fertile productive soil that is in good condition.

Physical Description of Humus:

Humus is derived from a variety of plant and animal materials and develops under a wide range of environmental conditions. These factors make it impossible to give an absolute description of humus. The general character of humus is that of a black or brown, loose, porous, absorbent substance such as can be scraped up from the forest floor where no fires or human interference have prevented natural decay.

Role and Benefits of Humus in the Soil:

- Improves the structure and texture of the soil.
- Increases the water holding capacity of the soil.
- Modifies the chemical content of the soil by returning chemicals to the soil in a highly usable form.
- Increases the nitrogen content of the soil.

Early Decomposition and Development of Humus:

During early decomposition of plant and animal residues, some of the carbon, hydrogen, oxygen and nitrogen are quickly dissipated as water, carbon dioxide, methane and ammonia. Other constituents decompose more slowly and are converted into more stable forms that are stored in the soil as humus. Humus may continue to undergo further decomposition, although at a much slower rate. One benefit of the breakdown of humus is the release of nutrients that are usable by plants as food.

Chemical Properties of Humus:

The chemical composition of humus varies because it results from different types of plant and animal residues and depends on the action of living soil organisms. Humus-making material is made up of carbohydrates (simple sugars and starches), pectins, cellulose and proteins. These are the principal nitrogen forming materials in the soil. The presence of proper amounts of air, water, and heat fosters an increase of microorganisms and hastens their work of decomposition. More soluble compounds, which are essential elements for plant growth, are also produced by the process of the decay of humus-making materials and the formation of humus. These compounds are phosphorus (phosphates), sulfur (sulfates), calcium, magnesium and potassium.

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Humus Depletion:

In gardens or crop areas where cultivated plants are grown, humus is constantly being depleted from the soil by a succession of plantings. This depletion is greatest when the plant residues are removed from the site rather than incorporated into the soil and left to decay. Adding more humus in the form of compost or manure restores the organic balance of the soil.

Soil Balance:

Adding the wrong quantities of humus-making materials to the soil at the wrong time can upset the normal chemical reactions in the soil to such a degree as to be harmful. For example, adding too much peat moss can loosen the soil to the extent that it dries out rapidly. Large quantities of humus-making materials such as straw, spoiled hay, fresh grass clippings or green manure may create a toxic condition that does not favor plant growth and may deplete the supply of available nitrogen in the soil. These conditions may cause problems such as nitrogen deficiency in plants that are usually temporary in nature. Overall, the benefits of adding humus to the soil far outweigh these temporary issues.

Historical Anecdote:

The colonial settlers in America adapted to farming on soils that were developed under forest vegetation. As the settlers spread westward in the early 1800's, they found the tall grass prairie lands. The tough sod made the prairie difficult to plow and at first prairie lands were avoided. New tools and techniques were developed for plowing and once the sod was broken it was readily apparent that grassland soils were superior to forest soils. Now, the great productivity of the American prairie is well known. Studies have shown that grass lands produce about twice as much organic matter (humus) as forestlands. This is due in part to the grasses adding more organic matter to the soil every year than do trees.

The Wise Garden Encyclopedia edited by E.L.D. Seymour 1990 *Fundamentals of Soil Science, Seventh Edition* by Henry D. Foth
A Book About Soils for the home gardener by H. Stuart Ortloff and Henry B. Raymore
"Humus", *Microsoft Encarta Online Encyclopedia* 2004

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