

E R G O F I T O I N A C T I O N

Give Nature What Nature Wants

A Quick Course on Soil



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SOIL:

Healthy soil manages water like a sponge. Micro-organisms excrete well-balanced nutrients, which create spaces (aerating soil) enabling water and oxygen to surround root systems.

Ideal soil structure:

45% minerals and other nutrients, 25% air, 25% water and 5% humus. Soil is a living thing and just like all living things it needs to breathe atmospheric oxygen, digest nutrients, and process waste materials.

Macro-organisms and Micro-organisms are the lifeblood of soil. They contain electrolytes, minerals and more. Each cell within macro-organisms and micro-organisms has negatively and positively charged components, and these electrical charges must remain in correct balance. The use of chemical, toxic substances on soil causes these organisms to go dormant. As a result soil lacks oxygen and goes anaerobic compromising nutrient absorbability.



Plants absorb oxygen from carbon dioxide and water vapour through their leaves, stems and roots. Earthworms, beneficial-nematodes, bacteria etc. also need atmospheric oxygen to function. When soil is compacted plant roots are oxygen-deprived and can die. Oxygen deficient soil does not support aerobic life forms.

It becomes anaerobic, smelling sour or mouldy. Farm waste processed by anaerobic micro-organisms is embalmed and preserved instead of being decomposed. Anaerobic soil becomes a breeding ground for root and plant diseases, as well as various destructive pests.

All nutrients are made assimilable to roots by water molecules. If soil is compacted (tight) water remains on the surface unable to reach the plants' roots. If all the water is not absorbed at application a high percentage of it is lost to evaporation and run-off. Valuable topsoil is also removed with any water run-off.

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Agricultural waste contains carbon, nitrogen, phosphorus, potassium, calcium, and various trace elements. These compounds are held in plant residue in various forms (listed in order of their decomposition rates): sugar, starch, carbohydrates, organic acids, protein, lignin, wax and resin. Aerobic metabolism is the only way to convert these nutrients into forms that plants and soil can absorb. Fully processed organic material (by aerobic life forms) is called humus and humus is the most potent fertilizer you can get.

ORGANISMS:

Micro-organisms: (bacteria, fungi, protozoa and algae) are tiny processors of all types of matter within soil. They are responsible for breaking down different types of material into nutrients. Essentially an immense army of recyclers they work for our benefit provided that we don't interfere with their life-cycles and activities.

Macro-organisms: (earthworms, slugs and nematodes) collect and process plant residue. Worms eat dead material turning it into nutrient balanced topsoil and distributing it as deep as they burrow. Humus lines earthworm tunnels and is available as plant food for years. During dry seasons roots grow through the tunnels to find water. The soluble content of worm secretions is considerably higher than nutrient levels in the original soil and also distribute a plant growth stimulant. Worm tunnels aerate soil and provide routes for water to penetrate deep into root systems.

All of these organisms interact with one another in a multitude of ways. Soil rich with micro and macro-organism life is self-sustaining and requires less labour and irrigation to thrive.

WATER:

Water is the solvent that dissolves and hydrates compounds making them food for microbes. It is the primary means of nutrient transport to and within plants. Water molecules give a plant its rigidity and robustness against extreme weather.

Life within the plant relies on electrical impulses for intracellular functions. Growth and maturation processes depend on these functions which depend on moisture content.

95% of the water absorbed by plants is evaporated through the leaves. The pores on the surface of leaves must open for photosynthesis. When the moisture escapes it acts as a cooling system for the plant.

PHOTOSYNTHESIS:

A chloroplast combines energy from the sun with water vapour and carbon dioxide to create glucose. Consistent moisture supply is fundamental to this food production and is only achieved with healthy, spongy soil. Having spongy soil means that all the soil particles are hydrated, which means the crop will have consistent water and nutrient availability.

PLANTS:

Sunlight - Photosynthesis produces oxygen and simple sugars. These sugars along with other nutrients are used to make complex sugars, carbohydrates, and proteins.

Water - Transports nutrients through plant depending on where they are required. It is essential to the plant's functions of photosynthesis, respiration and transpiration.

Nutrition - Carbon, hydrogen and oxygen, are the three most essential elements. They make up 95% of a plant. 80% of the nutrients a plant needs are in the atmosphere, the rest are from soil (nitrogen, potassium, phosphorus, calcium, sulphur, magnesium and various trace nutrients).

Root system - Root growth determines the ability of a plant to take up nutrients and water. It depends on the surface area of the leaves and whether the soil is spongy. Good soil and high leaf surface area equals great root growth

INSECTS:

A basic fact about insecticides: they kill good and bad insects. Bad insects mutate and become immune to poisons faster than good insects (assassin bugs, damsel bugs, lady beetles, soldier beetles, praying mantis, wasps and spiders). The development of new insecticides to compensate for this immunity in pests has resulted in the development of over 40,000 different options for poisoning our crops today.

In relation to insects, finding a natural balance is the key to defence. An excessive amino acid level in plants attracts bugs because most of them can only digest this. A healthy plant has greater defence against insect attacks (besides low amino levels). The most sustainable way to combat pests is to inject life into soil and to give crops a fully balanced nutrient rich diet.



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