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MicroSoil®

The Missing Link for Soil Bio-Recreation©
EARTH REGENERATION AT ITS BEST

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Welcome to the MicroSoil® BASED BIOSPHERE MANAGEMENT SYSTEM

This treatise is intended as a guideline to solve the increasingly chronic problems of infertile soils, nutrient deficient crops, pests and diseases, resulting from a perceived panacea of inorganic fertilizers, pesticides, herbicides and guessing, all of which fail to deal with the real cause – a poorly nourished soil.

The intent of this treatise is to offer knowledge and solutions, which, when properly implemented, will recreate the natural soil ecosystem, resulting in maximum productivity and profitability.

It has been said that we are sustained by water flowing from the mountains en route to the sea. In its course, water runs over, under and around rocks, reducing them to sand, silt and microscopic particles of clay. Rocks are soils waiting to be born through the reactions with water, weather, microorganisms and chemistry.

The carbonic acid fraction of water provides the initial chemistry which releases (frees) minerals (cations and anions) to solution from the clay and organic matter to make minerals available for root uptake – the basis of plant nutrition.

Soil and top soil are produced naturally at a rate of 1 mm in 200 – 400 years. A full soil profile develops in 2000 – 10,000 years.

World-wide, soil is lost at a rate of 10 – 40 times faster than its replacement. The land itself may impose the biggest limit on food production. World-wide loss of agricultural land is 6 million hectares (ha) per year from a world-wide total of 12 million ha (0.5% per year). At this rate, in 20 years there will be 10% less agricultural land. If there is 3% less green space around the world, the whole earth is going to die, because of the lack of oxygen.

The earth's population is projected to balloon to 11 billion by 2050. Additional food to feed

250%-plus increase in population will have to come from improved technology. New agricultural technology must play a key role. Within the next 60 years, depending on projected population growth, world food supply must be increased by at least as much as was achieved during 12,000 years since the beginning of agriculture.

World food supplies are at a crucial turning point, and more bad weather could completely deplete supplies and cause a food crisis of catastrophic dimensions. We are at a critical point in history, for we face both a threat and an opportunity.

The opportunity exists in the critical analyses and understanding of the precise mechanisms involved in the soil-water-plant-animal-human matrix, which leads to more efficient methods of productivity and increased profitability, while at the same time, preserving and enhancing human health and the soil ecosystem and the environment at-large.

It is primarily the microbial interactions in soil that are responsible for the biological control of plant disease, turnover of organic matter, and the release and recycling of essential plant nutrients

UNDERSTANDING THE MICROBIAL CONNECTION

Due to phenomenal microbial proliferation, the soil is depleted of oxygen at numerous microsites in the rhizosphere. Thus, oxygen-free anerobic microsites are formed. Anerobic microsites play an important role in ensuring plant health and vigor.

Ethylene, a simple gaseous compound, is produced in these anerobic microsites. Ethylene is a critical regulator of the activity of soil microorganisms, and as such, affects:

1. Turnover of soil organic matter (OM).
2. Recycling of plant nutrients.
3. Incidence of soil-borne diseases.

Ethylene temporarily inactivates the soil microbes resulting in less demand for oxygen. Oxygen diffuses back into microsites, reducing ethylene production. When concentrations of ethylene in the soil fall, microbial activity recommences. Favorable conditions are then recreated for ethylene production and the cycle goes on. Some of the more important functions of ethylene are as follows:

1. Induces seed germination.
2. Induces root-hair growth - increasing efficiency of water and mineral absorption.
3. Provides for disease/wounding resistance.
4. Enhances fruit ripening.

A dynamic equilibrium exists in the soil-water-plant-animal-human matrix. Since the human element is the major cause for soil ecosystem degradation, only the human element can restore the balance.

Biomassters Global, Inc. maintains that the global trend of soil depletion can be reversed through the use of **MicroSoil®**, a natural concentrate of beneficial nitrogen-fixing microorganisms combined with natural enzymes, polysaccharides and polypeptides in conjunction with a 100% natural balance blend of **PureFulvic™ Trace Minerals and Elements.** **MicroSoil®** assists in the growth and proliferation of nitrogen-fixing organisms and beneficial native soil microorganisms, to enhance and optimize the decomposition of soil organic matter, thus, releasing the essential nutrients critical to soil health, plant growth and plant immunity.

One of the ways that **MicroSoil®** accomplishes this is by creating favorable soil conditions for ethylene production. A major reason why agricultural soils fail to produce ethylene is because of the conventional farming practices, which change the form of soil nitrogen. In virgin soils, virtually all the nitrogen present is in the ammonium form, with just a trace of nitrate nitrogen present. When the soil ecosystem is altered by current farming techniques, virtually all of the nitrogen occurs in the nitrate form. Plants and microorganisms can use either form of nitrogen, however, nitrate nitrogen inhibits ethylene production in the soil, in little more than trace amounts. Ammonium nitrogen has no such inhibitory effect on ethylene production.

When all of the oxygen is consumed in the microsite, one of the most important changes that takes place is that iron goes from the oxidized or ferric form to the reduced or ferrous form. In aerated soils, virtually all the iron exists as minute crystals of iron oxide and in this oxidized or ferric form, is immobile in the soil. If oxygen is completely consumed in microsites, and reducing conditions exist, these crystals break down, and iron is then transformed into the highly mobile ferrous or reduced form. Ethylene production occurs in soil only when iron is in the reduced or ferrous form. In other words, ferrous iron is a specific trigger for ethylene production. If there is no oxygen in the microsite, but nitrate nitrogen is present, then the chemical changes leading to the reduction of iron from the ferric form to the ferrous form are inhibited. This is how nitrate nitrogen stops ethylene production.

Ferrous iron triggers the release of soil ethylene, because this form of iron reacts with a precursor of ethylene that is already in the soil. This precursor originates from plants, accumulating to appreciable amounts only in old, senescent leaves. When the leaves fall to the ground, the precursor accumulates in the soil. Then, when conditions become favorable for mobilization of ferrous iron, ethylene is produced. In addition to this, ferrous iron displaces the essential plant nutrients held on the surfaces of clay and organic matter, which results in these nutrients being released into the soil solution and made available for root uptake.

RECAPITULATION

Soil conditions necessary for ethylene production are as following:

1. Initially, intense aerobic microbial activity in the rhizosphere to ensure that oxygen-free anaerobic microsites form.
2. Existent conditions in microsites to sufficiently reduce ferric iron to ferrous iron to trigger ethylene release.
3. Nitrate nitrogen maintained in trace amounts, otherwise ferrous iron will not be mobilized.
4. There must be adequate reserves of the ethylene precursor in the soil (organic matter).

All of the above results in the mobilization and recycling of essential plant nutrients.

About the Aurthor: Dr. Layan Dawud Said was born in Oakland and educated at the University of California with degrees in Soil Physics and Plant & Soil Sciences in International Agriculture. He has an extensive 30 year background of research and field experience in the U.S.A., East/West Africa, Mexico and throughout the Caribbean while devising and utilizing agro ecological farming methods. He too, was responsible for developing protein and carbohydrate production systems appropriate for various biomes especially for use in the semi-arid tropics.