

Soil and Food Security

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During the World Food Summit of 1996 the Food and Agriculture Organization of the United Nations formally defined *food security* as “[existing] when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life”. One of the primary threats to food security is the degradation of least appreciated, non-renewable resource we use: **soil**.

Soil is considered a non-renewable resource as it takes thousands of years to form from eroding rocks and sediments and requires very specific topographical, meteorological, and biological conditions. This underappreciated phenomena has resulted in the unsustainable pillaging of the Earth’s soil through intense agricultural practises and has resulted in reduced soil health.

Soil health and food security go hand-in-hand and with estimates of the human population reaching 9 billion by 2050, a greater understanding and appreciation of soil needs to be reached. Only now are we starting to observe the effects of poor soil health on food production and appreciate the importance of maintaining healthy soils for greater food security.

Healthy soils function as living systems; they boast a huge diversity of micro-organisms (microbes) and provide vital services. These microbes maintain soil structure (soil is highly structured contrary to popular belief), regulate nutrient and water cycles within the soil and the atmosphere (including soil detoxification and decomposition of organic matter), carbon sequestration (i.e. the capture and long-term storage of atmospheric carbon dioxide, which aids in the mitigation of climate change), and are involved in symbiotic relationships with plants (some bacteria and fungi capture atmospheric nitrogen and convert it into a usable form for plants).

As food production demands have increased and agricultural practices intensified, a depletion in soil health has resulted and is threatening food security. As land is cleared for agriculture, the unseen root systems within the soil are destroyed. These root systems provide habitats and food sources for microbes and therefore, their degradation and destruction results in a decrease of microbe biodiversity within the soil. Without these microbes, the health of the soil deteriorates and plant life is unable to grow.

The loss of microbe biodiversity in soils has resulted in fertilizers and pesticides being required for crop production. They are required because nutrients cannot be recycled in the soil, as the recyclers (the microbes) have been eradicated. These fertilizers and pesticides are easily over- and mis-used which can result in soil and water contamination, thereby enhancing the threat to food security.

In recent years, we have come to realize that all the natural services provided by soil microbes cannot be artificially replaced, so it is paramount that sustainable practises are developed and implemented to ensure the viable future of food security. The protection of soil health is vital to maintain soil structure, nutrient and water cycles, and mitigate climate change: *none of which humans have been able to replicate*.

Renowned geneticist and leader of the “Green Revolution” in India, M. S. Swaminathan, once said “Soil anaemia also breeds human anaemia. Micronutrient deficiency in the soil results in micronutrient malnutrition in people, since crops grown on such soils tend to be deficient in the nutrients needed to fight hidden hunger.” Without healthy soils, food production can be seriously hindered and nutrient-deficient food would be produced; and as such, the importance of healthy soils needs to be promoted and realized.

In December 2013, the United Nations General Assembly declared that 2015 shall be the **International Year of Soils (IYS)**. The IYS aims to increase awareness and understanding of the importance of soil for food security and essential ecosystem functions. We trust that this article sparks your awareness of the issue and invites you to read further. More information regarding soil health protection and events during the IYS can be found on their website: <http://www.fao.org/soils-2015/about/en/>