GOLD NUGGET

Anthropogenic Ecosystems – Agroecosystem

Agroecosystems are natural ecosystems that have been modified by humans to produce food, feed, fibre and fuel. Defined by a combination of plant-growing pin days, climate and soil types, agroecosystems are extensive and diverse. They make up more than 40 % of the Earth's land area: 1.8 and 3.6 thousand million ha for crops and livestock, respectively. While they coexist with natural terrestrial ecosystems, agroecosystems have been modified extensively supporting non-indigenous, domesticated plant species, including crops such as grains, legumes, oilseeds and pastures. Agroecosystem soils have been modified through intensive management practices, such as cultivation, grazing, plant product and residue removal, the addition of fertilisers and pesticides, irrigation, flooding and the creation of drainage systems. Some have been transformed to such an extent that they require reclassification or are deemed 'new soils. Over the past 60 years, global increases in crop and livestock production systems have also coincided with substantial erosion problems, loss of carbon and nitrogen, salinisation, acidification and increased pest incursions, to the point that the conservation of soil resources and soil quality is a critical priority globally. Several countries are addressing soil decline issues both through voluntary and regulated soil-conservation strategies, such as satellite-guided controlled field traffic systems, direct drilling, integrated pest management, targeted fertilizer application, diversified crops, cover cropping, plant-residue retention, rotational grazing, liming and subsoil manuring.

Soil biodiversity

The soils of the world's agroecosystems contain biota that are visible to the naked eye as well as those that can only be seen with the aid of a microscope. These range from micro- and mesofauna to microorganisms and microfauna. The application of genetic tools, involving the direct extraction of soil DNA and RNA, has allowed researchers to measure the most abundant, as well as the rarest, biota, particularly those at the microscopic level. Generalisations can be made about the relative influence of various factors in shaping bacterial communities at the phylum level based on a number of surveys globally. The common taxa or groups that make up agroecosystem biodiversity are now well described. Bacteria are by far the most diverse of the soil biota, with more than 30 groups (phylum levels) routinely identified in even the most disturbed agroecosystems, such as in hydrocarbon-contaminated sites and rice-paddy soils. The 'agriculturally significant' functions associated with the modification of soil structure, the mixing of organic material, the mineralisation of nutrients, the promotion of plant growth, the control of pathogens and the remediation of herbicides attributable to these taxa are also becoming more easily identified.

Research is enabling the identification of characteristic soil biological communities for many land uses. All features of the habitats that make up global agroecosystems, including the chemistry, structure, input and disturbance regimes, plant diversity and growth cycles, provide the critical metadata needed to describe the current and future status of soil biodiversity. It enables the prediction of long-term impacts of agricultural management regimes. which will improve restoration efforts and provide decision support to land managers who wish to manage their soils sustainably into the future.

Soil Lovers say: ***Regenerative Agriculture Naturally Improves Restoration Efforts***

Ref: **A Global Atlas of Soil Biodiversity p88**