Biopharmaceutical and biomedical applications

Complex interactions between soil organisms, such as avoiding predation and competing for food and space, has led to the evolution of a range of mechanisms that allow organisms to gain advantage, in both attack and defence.These are known as antibiotics. One of these is the well known penicillin and semi-synthetic derivatives e.g. streptomycin and tetracyclines - all isolated from soil actinomycetes, Besides antibiotics, other valuable therapeutic agents and supplements may be found in soil organisms. Steroids and other hormones, forms of amino acids are also common products of microbial synthesis by either naturally occurring or genetically engineered soil microorganisms. In recent years, some microbial secondary metabolites (e.g. red pigments) have also been discovered that exhibit potential anti-tumour and cholesterol-lowering activity

Bioindicators

Most soil organisms are sensitive and respond quickly to changes in their environment. This trait makes them ideal (bio)indicators of environmental and ecological changes. Such change may compromise soil quality and/or ecosystem functions or specific ecological processes, and may result from natural or anthropogenic stressors, such as contamination and pollution. Now the substantial indicator potential of the soil biota (including abundance, diversity and biological function) is increasingly recognised in order to complement soil quality assessments, site-specific management strategies or progress monitoring of ecosystem recovery and restoration.

A number of soil invertebrate groups can be used as bioindicators, including earthworms, enchytraeids, terrestrial isopods and collembolans. Plant species, such as the turnip, oats and lettuce can also be used for their bioaccumulating capacity to detect pollutants in soil. Litter dwellers (e.g. ants and termites, centipedes and millipedes, snails and other molluscs, ground beetles) or foliage inhabitants (e.g. ants and some groups of leaf beetles, moths and spiders) may also be selected accordingly.

Future prospects and expectations

The concept of 'biotechnology' has existed for thousands of years in the leavening of bread, brewing and other fermentation processes as well as in direct interventions in animal and plant breeding in farm and agricultural systems. Industrial biotechnology involves industrial-scale processes. soil biodiversity is likely to be an important source of new products for industrial purposes.

Currently, the scale at which biotechnological production is required in order to meet societal, commercial and industrial requirements is enormous. Along with global climate change and over-population, new challenging targets and refreshing prospects are expected from industrial and environmental biotechnology. The impacts of such environmental and societal pressures reflect on agriculture, land-use and water supply and, consequently, on the availability of food, energy and fresh water. Adaptation strategies may rely on new and improved crop varieties, with higher nutritional value and increased resistance to drought, pests and diseases, as well as on the exploitation of alternative food products, biomass and bioenergy sources and effective water purification strategies. It is vital that we explore the breadth of the options that soil biodiversity provides.

Soil Lovers say: ***Soil Biodiversity Will Be A Vital Cog In The Machine Of Many Adaption And Mitigation Strategies.***

Ref: **A Global Atlas of Soil Biodiversity p100**