GOLD NUGGET

Acid Rain And Nutrient Overloading Part 1

Acid rain

'Acid rain' is a broad term that refers to a mixture of wet and dry deposited material from the atmosphere containing higher than normal amounts of nitric and sulphuric acids. The precursors of acid rain formation result from natural sources, such as volcanoes and decaying vegetation, and human-made sources, primarily emissions of sulphur dioxide and nitrogen oxides that result from fossil fuel combustion. Acid rain occurs when these gases react in the atmosphere with water, oxygen and other chemicals to form various acidic compounds. The result is a mild solution of sulphuric and nitric acid. When sulphur dioxide and nitrogen oxides are released from power plants and other sources, prevailing winds carry these compounds across state and national borders, sometimes hundreds of kilometres.

The damage that results from acidic deposition has been investigated in all groups of soil organisms. Increasing soil acidity can affect microorganisms that break down organic matter into nutrient forms that are then available to plants. In general, a reduction of species diversity is observed in the presence of acid rains; however, common patterns cannot be identified as the effects vary greatly due to the diversity of microbial functional groups. Considering microfauna, the ability of protists to form resistant structures may be an important feature providing shelter from acid stress.

Among the mesofauna, sensitivity to acidity is higher in collembolans and mites, whereas many species of enchytraeids are tolerant of acidity. Soil acidification also impacts earthworm communities and their activity. In fact, they tend to escape from acidic soils and may eventually die when pH values become too low (pH 2). Furthermore, an inverse relationship between the acidity of the soil and the burrowing rate has been shown; as the environment becomes more acidic (pH 4), earthworms failed to burrow quickly.

Acid rain can also have negative effects on plants. Increasing soil acidity allows aluminium to be solubilised. In its free organic form, aluminium is toxic to plant roots and can lock up phosphate, thereby reducing the concentrations of this important plant nutrient. Nevertheless, under such circumstances it has also been shown that ectomycorrhizal fungi on the roots of some trees help supply much-needed calcium in forest soils subjected to acid rain.

Nutrient overloading

Soils across the globe are receiving nutrient inputs from human activities at rates that exceed those from natural processes. For example, nitrogen (N) inputs to ecosystems are 30 - 50 % greater now than they were 100 years ago. Similarly, phosphorus (P) inputs via fertiliser applications to agricultural lands are now estimated to be approximately 25 thousand million kg per year, rates that far exceed pre-industrial inputs. These excess amounts of N and P typically enter ecosystems via the direct application of chemical fertilisers or manure to soils in agricultural and pasture soils.

To be continued…

Soil Lovers say: ***While Acid Rains Are Damaging To The Soil, Far Greater Are The Application Of Chemical Fertilizers***

Ref: **A Global Atlas of Soil Biodiversity p121**