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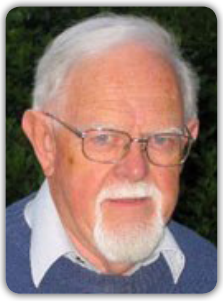

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The Organo-Zeolitic bio-fertilizer: A new approach to Plant Nutrition

It is now generally understood that natural porous materials that exhibit a negative surface charge adsorb metal cations, water (due to its dipole property) and other cations such as ammonium NH4+. The latter plays an important role in soil nitrification. Plant growth studies have shown that together with an organic component, either animal or plant waste, zeolitic tuff in particular can be used to great advantage as a biological plant fertilizer (bio-fertilizer). Experimental work has shown that ammonium ions produced during decomposition of the organic waste are adsorbed to the zeolite surface. On addition to the soil, the ammonium ions are back exchanged by potassium and oxidized by soil micro-organisms. Using molecular biological technology Crenarchaeota appear to be the main ammonium oxidizing organisms in the organo-zeolite-soil system. This process greatly sponsors nitrification. The high ion mobility of aqueous leachates suggests that hydrogen ions liberated by the ensuing enzyme activity ionize cations from the plant substrate providing elements in trace concentrations which are both essential and beneficial for plant growth. The organic material provides phosphorus but is not entirely clear how this element is ionized; most likely due to the activity of mycorrhizal fungi. Using activated carbon to replace zeolitic tuff in the bio-fertilizer has resulted in a growth enhancement of *Brassica napus*, within the experimental error of that grown with the organo-zeolitic bio-fertilizer. Current work with diatomite also appears to provide another alternative to the use of zeolitic tuff. The use of such alternatives will extend the range of natural materials required for the preparation of the bio-fertilizer and so avoid the over exploitation of zeolitic tuff, although world resources will be far from exhaustion in the near future.

When one considers the damage done to arable farmland due to the long and over use of chemical fertilizers it is time to use a more scientific approach and bio-fertilizers of the type described appear to be the answer to providing plant nutrition in the future.

Speaker Biography

Peter J Leggo after following an academic career in geology, ten years spent as a consultant in mineral resources. Returning to academic research in 1996 the current work on biological fertilizers was pursued. Having now retired from the Department of Earth Sciences, University of Cambridge further research in plant nutrition is conducted from a home base but still using the university laboratory facilities.

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