



# *Soil fertility and direct application fertilizers*

Don Appleton

Keyword

In many tropical countries, crops extract far more nutrients than are being replaced by fertilizers. High costs of imported fertilizers and low prices for agricultural products combined with the lack of efficient credit systems means that farmers cannot afford to purchase the fertilizers they need. The problems of soil infertility are particularly serious in tropical countries with lateritic soils (soils in which soluble elements have been leached leaving a concentration of iron and aluminium oxides). Some tropical countries have agromineral resources which they are unable to use for economic reasons such as inadequate internal demand, lack of capital or energy resources or because the deposit is too small or low grade.

Although rock fertilizers are unlikely to replace chemical fertilizers as the major source of plant nutrients, the direct application of finely ground phosphate rock, limestone, potassium feldspar and sulphur-rich rocks may be an appropriate method of providing nutrients under favourable conditions with suitable crops. However, the benefits manifest themselves over a relatively long period in the form of slowly increasing crop yields.

## **Phosphate rock**

Phosphate rock, formed as the result of sedimentary or igneous processes, is the essential raw material for the manufacture of phosphate fertilizers. Approximately 10% of total world production of phosphate rock comes from small mines and most of this is used as direct application fertilizer. For example, finely ground phosphate rock applied directly to acid soils gives good agronomic results for perennial crops such as tea and rubber in Sri Lanka and for a wide variety of crops including paddy rice, groundnuts, sugarcane, coffee, tea and rubber in India.

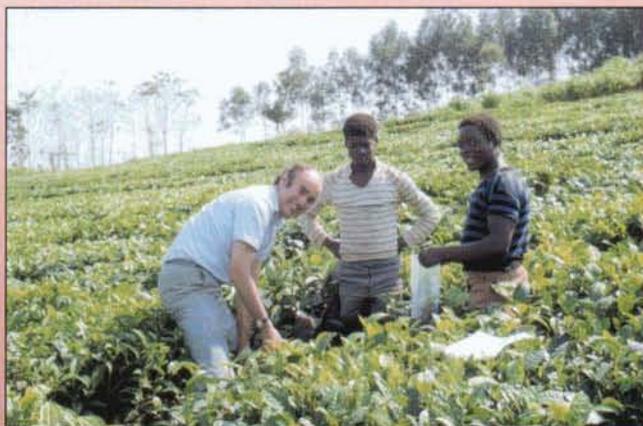
The BGS has carried out research on direct application phosphate rock fertilizers for the UK Department for International Development (formerly the Overseas Development Administration). The suitability of various phosphate rocks as direct application fertilizers was evaluated by determining their solubility (reactivity) when mixed with soils under a range of experimental conditions. Results showed that a phosphate rock from Malawi had potential as a direct application fertiliser for the tea industry.

# **Agriculture**

Subsequent agronomic evaluation confirmed that tea production increased when finely ground phosphate rock was applied.

## **BGS acts as consultants for the United Nations**

Food production in sub-Saharan Africa has declined as phosphorus has become increasingly deficient in most soils. The BGS has prepared a review for the Food and Agriculture Organisation of the United Nations (FAO) which summarises the quantity, quality and location of local phosphate deposits in sub-Saharan Africa. It assesses the potential development of these resources for export and for local use in agriculture, compares the effectiveness of local rock phosphates and phosphate fertilizer products and reviews the environmental issues related to hazardous elements in the phosphate rocks or by-products. The FAO requested the review to inform its soil fertility strategy in sub-Saharan Africa. The BGS has also provided consultancy services to the FAO to assist with the evaluation of the Ordovician phosphate rock resources in Bolivia and their potential use as a nutrient supply for plants.



*Left Agronomic evaluation of phosphate rock as direct application fertilizer for tea plants in Malawi.*

*Right Small-scale semi-mechanised phosphate rock mine, Eppawala, Sri Lanka.*

