

Natural zeolites

Some potential agricultural applications for developing countries

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Zeolites, a suite of porous, fine-grained minerals commonly found in certain near-surface, sedimentary rocks, have special physical and chemical properties that could make them valuable to farmers in developing countries. Zeolites have been used to improve soil fertility; develop slow-release fertilizers; improve animal waste disposal; and improve animal health. To date most research on zeolite deposits and their various applications has been undertaken by the industrialized nations. Some zeolite deposits, however, also exist in developing countries and the likelihood of the existence of additional deposits in those countries is high. However, thorough assessment of the mineralogy, geology, and various agricultural uses is still needed. Strengthening developing countries' geological surveys in non-metallic mineral exploration and assessment will improve the likelihood that the use of zeolites will reach their full potential in developing country agriculture.

Some 50 species of a certain group of natural minerals called zeolites have their atoms arranged so that they form hollow cages with tiny openings through which other ions or molecules of the right size can pass. Larger ions or molecules are screened out from the cages and channels of the zeolites. Because of these unique properties and behaviour, zeolites are referred to as 'molecular sieves'.

Rarely in our technological society does the discovery of a new class of inorganic materials result in such a wide scientific interest and kaleidoscopic development of applications as has happened with the

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zeolite molecular sieves' (Breck [6]). Such was the optimism as much as 15 years ago when the properties of natural and synthetic molecular sieves gained considerable scientific attention. With steadily increasing knowledge of zeolites and their applications (Pond and Mumpton [31]), today it seems evident that those minerals can play an increasingly important role in agriculture.

Much of the 'zeo-agricultural' research conducted in developed countries seems relatively successful, indicating that similar successes could be achieved in developing countries as well. Those successes will probably occur in such areas as improving soil fertility and animal waste disposal, developing slow-release fertilizers and in improving animal health. Certainly additional possibilities exist but those few potential uses will illustrate the general principles of how the many species of zeolites function and why they behave as they do. The important role of zeolites in aquaculture is not addressed in this paper; however, Pond and Mumpton [31] have given considerable attention to the topic.

