

NATURAL ZEOLITES AS AN AGRICULTURAL RESOURCE IN THE HOT, WET TROPICS: SOUTH CHINA AS A MODEL

WALTER E. PARHAM¹

Food and Renewable Resource Program
Office of Technology, United States Congress
Washington, D.C. 20510

ABSTRACT

The use of China's Jurassic/Cretaceous zeolite deposits may offer some needed solutions to some of the renewable resource/agriculture problems of tropical China. At least 50% of China's tropical land bordered by the South China Sea is degraded, either barren or supporting scrub vegetation. Erosion is extensive and the intense tropical weathering has produced a thick weathered residuum over the common granite bedrock. The resulting soils are of low fertility and have low cation-exchange capacities (CEC). The use of clinoptilolite as a soil amendment might help improve the soil's CEC, minimize the loss of NH_4^+ from costly fertilizer, and, when combined with rock phosphate, increase the availability of P to the soil. In addition, the disposal of large quantities of swine manure is adversely affecting streams and rivers. Clinoptilolite, when mixed with swine manure, might make the manure's handling characteristics more desirable for use in the production of a valuable fertilizer. The use of such fertilizer may help agricultural production while simultaneously reducing water pollution. Clinoptilolite might also find use in dike/pond agriculture and aquaculture. Clinoptilolite additions to ponds could remove some NH_4^+ from the water, thereby reduce the growth of undesirable phytoplankton and algae. In addition, NH_4^+ is toxic to fish. Dredged pond muds containing NH_4^+ -exchanged clinoptilolite, when applied to dike crops, could act as slow-release fertilizer.

Because swine are abundant in China and because they are large grain consumers, Chinese agricultural scientists have suggested that the Chinese diet should shift to grass-consuming animals instead of pigs. Replacement of 5 to 10% of a pig's rations with clinoptilolite has been shown to improve the animal's grain utilization and to increase weight gain. Applying clinoptilolite in this way might help reduce grain consumption of swine, minimize the need for a rapid diet change of the populace, and provide time for additional relevant research.

INTRODUCTION

For about the last 20 years I have spent a significant part of my time dealing with natural resource issues of developing countries, particularly those in the hot, wet tropics. Increasingly, I am impressed with the

¹Dr. Parham delivered the Keynote Address at Zeolite '93 on the subject *Natural Zeolites in Agricultural Development and Environmental Protection in the Third World*, from which this paper was prepared.

need to blend science and technology with contributions from sociology, political science, and economics to address complex problems in developing countries. Generally, the academic training of many in science and technology lacks certain aspects of these other disciplines. Nonetheless, the social sciences are vital in dealing with natural resource problems. Without an interdisciplinary team, success may be difficult to achieve, and with such a team the chances for success generally improve. Similarly, within the science and technology community itself,

