MAIN ISSUES IN RICE PRODUCTION ON WETLAND ACID SOILS IN THE TROPICS

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ABSTRACT

Wetland acid soils have great potential for rice and other food production although a large portion of this vast area is economically marginal. Current demographic pressure, particularly in Asia, has promoted numerous subsistence farmers to search more cultivable lands including acid soils in remote areas for growing rice as a stable food by taking risks in new land exploitation. Acid problem soils reduce markedly the land capacity to achieve potential yields of rice and may lead to thorough crop failure in severe conditions. This is due to dissolved toxic substances in severe conditions. This is due to dissolved toxic substances in the soil solution, such as Al, Fe, Mn, etc., which are frequently the combined with acid-induced deficiencies in P, K, Ca, Mg, Co etc. The nutritional disorders would render rice more susceptible to insect pests and diseases and be aggravated by erractic climate. Thus, rice yields vary greatly from 0 to 3t/ha at the farmer level.

The reclamation of wetland acid soils is rather delicate as it is determined by various factors including physical, biological and socio-economic aspects. Both developers and small farmers have had bitter experience in development work and crops cultivation in wetland acid soils, encountering uncontrolled adverse environments, notably location acidity, different inherent problem soils, uneven soil distribution, water shortage, etc. When swamp land development is deliberately planned and implemented, and its water drainage and irrigation are well managed, the research tasks for acid soils will be much alleviated, as a result of less acid conditions in the field. The environmental impact of such a new land opening is presently a controversial matter, especially in the development of acid sulphate soils, tidal acid lands and peat soils.

Recent research has helped, with little improvement in rice production on wetland acid soils and not much more can be expected in the foreseeable future. A more dedicated effort is essential to upstream research to obtain a more basic knowledge of problematic soils, hydrology, and mechanisms of plant-water-soil interaction in adverse conditions. The implication of genetic engineering, for instance generically engineered protoplasts, and distant hybridization in rice varietal improvement would shed light on the breakthrough in rainfed rice production on acid soils. Tissue culture would provide an effective screening method for varietal tolerance of some physical stresses, such as acid

toxicities, salinity (tidal acid lands), etc. Microbiological studies would encourage the potential use of mycorrhiza in phosphorus-deficient soils, efficient nitrogen-fixing Clostridium strains, and anaerobc cellulolytic bacteria for N-fixation in peat soils, agricultural wastes and compost in order to improve soil fertility for rice cultivation. In addition, the applied and adaptive research should be geared to develop low-cost and locality-specific technologies, ensure the sustainability of continuous food production, and be oriented towards integrated farming systems, crop diversification and intensification on wetland acid soils, thereby aiming at generating rural employment and improving the socio-economic conditions of farmers.