

Assessment of salinity hazard by electromagnetism induction method in flooded sandy paddy soils

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Abstract

Salinity is a major constraint for rainfed rice production in Northeast Thailand sandy lowlands. Salinity surveys are currently performed using Electromagnetic Induction method (EMI) that is associated with soil conductivity measurements. Previous survey methods have consisted of performing EMI measurements during the dry season with the assumption that capillarity rise was the main cause of salt excess in the top layers of the growing rice. Hydrodynamic studies have demonstrated that in some cases the main process of salt enrichment of the top layer consists of the ascent of salt water from the aquifer during the rice cycle. An adaptation of EMI measuring device was realized in order to allow the surveys to be performed during the flooded period. Measurements in horizontal and vertical dipole configuration were performed in an area of contrasted salinity, comparing the obtained values with the conductivity of soil and water mixtures of the top layer. Measurements during rice flooding period indicated better relationship between salt contents and vertical dipole measurements than those performed during the dry season. Salinity in the top layers in the two different stages was identified with two different processes of spatial distribution: on the one hand, capillarity rise during the drying period, and on the other hand the circulation of saline solutions during the flooded periods. Therefore, EMI measurements during flooded periods should be recommended in salt-affected sandy paddy soils as more accurate and representative of conditions that influence plant performance.

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