ONLINE ISSN : 1349-1008
PRINT ISSN : 1343-943X

Plant Production Science
Vol. 10 (2007) , No. 2 232-241

Effects of Soil Clay Content on Water Balance and Productivity in Rainfed Lowland Rice Ecosystem in Northeast Thailand

Mitsuru Tsubo[1)], Shu Fukai[1)], Jayampathi Basnayake[1)], To Phuc Tuong[2)], Bas Bouman[2)] and Dome Harnpichitvitaya[3)]

1) School of Land, Crop and Food Sciences, The University of Queensland
2) Crop, Soil and Water Sciences Division, International Rice Research Institute
3) Ubon Ratchathani Rice Research Center

(Received: June 12, 2006)

Abstract: Water availability is one of the determinants of productivity of rainfed lowland rice (*Oryza sativa* L.). Quantifying water losses from a paddy field, such as deep percolation and lateral seepage, assists estimation of water availability to the rice crop and development of appropriate water management in the lowlands. The main objective of this study was to evaluate paddy water availability and productivity across various soils in Northeast Thailand. The daily rate of downward water flow from standing water in the field (D) varied between 0 and 3 mm day^{-1} from clayey to sandy soils when the standing water was connected to groundwater table. However, when the standing water was separated from groundwater table, D increased up to 5 mm day^{-1} on soils with very low clay content in the topsoil. Daily net lateral water flow from the field (L) averaged over the season varied between 5 and 24 mm day^{-1} for the outflow and between 3 and 16 mm day^{-1} for the inflow. Both the inflow and outflow tended to be associated negatively with the soil clay content. The seasonal water loss through D plus L during the growing season in the lowlands was also negatively related to the soil clay content. The yield of a major rainfed lowland rice cultivar in Northeast Thailand (KDML105) varied from 2 to 4 t ha^{-1} across the region, and the water productivity (the ratio of grain yield to cumulative rainfall from transplanting/seedling establishment to maturity) ranged from 3 to 9 kg ha^{-1} mm^{-1}. High clay

soils could provide good standing water until late in the growing season, so the high production efficiency was measured on such soils.

Keywords: *Oryza sativa*, Paddy, Percolation, Seepage, Water table

To cite this article:

Mitsuru Tsubo, Shu Fukai, Jayampathi Basnayake, To Phuc Tuong, Bas Bouman and Dome Harnpichitvitaya: “Effects of Soil Clay Content on Water Balance and Productivity in Rainfed Lowland Rice Ecosystem in Northeast Thailand”. Plant Production Science, Vol. **10**, pp.232-241 (2007) .

doi:10.1626/pps.10.232

JOI JST.JSTAGE/pps/10.232