

A modified soil tilth index and its relationship with rice yield

ABSTRACT

This study was conducted to investigate the effect of rotary tillage on some soil physical properties (bulk density, cone index, plasticity index, aggregate uniformity coefficient) and organic matter, and to develop and evaluate a soil tilth index based on changes of these soil properties. The tillage treatments were 4×3 factorial combinations of forward speeds obtained with four selected tractor transmission gears (Gear 1 High, Gear 2 Low, Gear 3 Low and Gear 4 Low), and three rotary tilling speeds (140 rpm, 175 rpm and 200 rpm) of commonly used tillage implements in Malaysian paddy fields. Experimental results indicated a significant decrease in bulk density of the soil due to rotary tillage. The other soil parameters were not significantly affected by the tillage operation. Analysis of variance indicated significant difference ($p < 0.01$) among the rice yield means. Bulk density was identified to have a high positive correlation with the rice yield. A tilth index consequently developed with bulk density, cone index and plasticity index gave better predictability ($r^2 = 0.56$) of rice yield than when individual soil properties were considered. Results of the study suggest that tilth index may assist in yield prediction by comparing measured soil conditions in a paddy field.

Keyword: Crop yield; Paddy field; Rotary tillage; Soil physical properties; Tilth index