

Spatial variability of clay content and saturated hydraulic conductivity in a paddy soil

ABSTRACT

The objective of this study was to quantify the spatial variability of clay content and saturated hydraulic conductivity (Ks) in a paddy soil over two consecutive cropping seasons. A total of thirty six soil samples from 0 -15 cm depth were collected from Semanggol, Perak, Malaysia (4.949418° N, 100.606614° E). Soils were analyzed to determine clay content and Ks. Data normality was tested and data that were not normally distributed were transformed using the appropriate function. Semivariogram and kriging analyses were employed to quantify the spatial variability of clay content and Ks. Spatial distribution maps were produced using measured and kriged values. In this study, Ks was highly variable with a coefficient of variation exceeding 100% at dry season and wet season. Clay content and Ks exhibited strong spatial dependence at dry season. The spatial dependence of clay content and Ks at wet season were strong and weak, respectively. The spatial variability of clay content best fitted a spherical model at both seasons. Meanwhile, Ks best fitted a n exponential model at dry season. The variability trends at both seasons, except for Ks at wet season, satisfied the criteria for interpolation accuracy. The spatial distribution maps showed a clear spatial structure in paddy soil across cropping seasons, indicating that cropping practices can affect site specific crop and management strategies.

Keyword: Spatial variability; Clay content; Saturated hydraulic conductivity; Paddy soil