

Identification of potential fertilizer management zones based on the spatial variability of surface soil pH in a vegetable field, Sri Lanka

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Site specific management of soil pH and nutrients is important for the effective use of soil inputs to obtain a higher yield at a minimum cost. This study was conducted to explore the variability of surface soil pH and subsequent delineation of potential management zones in an intensively cultivated vegetable field in the Wet Zone of Sri Lanka. The experimental site was located in the Doragala area which covers Kandy, Galigamuwa Lithosols complex. Thirty one topsoil (0–30cm) samples were taken by employing a stratified random sampling scheme. Soil pH was measured using 1:2.5 soil to 1M KCl. Descriptive statistics of the soil pH were calculated using SPSS 18 statistical software. The experimental variogram for soil pH was calculated and a theoretical model was fitted using variowin software. A map of soil pH was developed using the ordinary kriging interpolation technique. The fuzzy k-means technique was used to establish the management zones. The soil pH showed a normal distribution with a skewness of 0.231. Soil pH of the field was in the range of 5.80 to 7.05, with a mean value of 6.41. The spherical model fitted to the experimental variogram of soil pH showed a sill variance of 0.11 and a range value of 23.3 m. The ordinary kriged map showed a strong spatial variation of the soil pH within the field. The fuzzy k-means classification procedure revealed that the field can be divided into two potential management zones. Moreover, the average soil pH values were significantly different across these potential management zones (pH=6.1 and 6.7, respectively). This study revealed that the within-field variability of soil pH in the selected field is significant and this variability is sufficiently structured to identify two potential management zones to support nutrient management. However, further studies are needed to assess the production and economic benefits.

Key words: Liming, management zones, spatial variability, variogram

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