

Determination of Optimal Grid Size for Mapping Soil Property Distribution for Paddy Cultivation

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The importance of understanding spatial variability of soil properties is connected to crop management and planning. This understanding makes it possible to treat soil not as a uniform, but a variable entity to increase the production in paddy cultivation. This study was conducted to propose an optimum grid size for selected soil properties in Bakamuna area in Polonnaruwa district of Sri Lanka. The study area consisted with 6.25 km² and 96 soil samples were collected within the plough depth of 0-15 cm. The number of samples distribute as 96 samples in 200 m grid size, 37 samples in 400 m grid size, 16 samples in 800 m grid size, 8 samples in 1 km and 2 samples in 2.5 km grid size. The variability of soil pH, electrical conductivity, available P, exchangeable K, available Zn and soil texture were subjected to descriptive analysis and Inverse Distance Weighted interpolation (IDW) technique. Soil pH showed Coefficient of Variation (CV) range from 1 - 7% in different grid sizes, which could be categorized as properties with low variation where CV was less than 10%. Electrical conductivity showed CV range from 30 — 60% in different grid sizes. Exchangeable K range from 10 — 80% and available Zn range from 20 — 60% of CV values indicating medium variability, (CV 10 —100%). Soil available P showed higher CV (>100%) values for 200 m, 400 m and 1 km grid sizes and rest of grid sizes showed medium CV values. Soil texture showed low variability distribution in paddy soil. This study shows the intensity of sampling is related to variability of soil properties. Sandy clay and sandy clay loam soil texture were observed in study area. Sandy clay loam soil texture was found only for two soil samples out of 96 in 200 m grid size. These results indicate 2.5 x 2.5 km grid size is optimum for determine the soil texture. Electrical conductivity and available Zn represent higher spatial variability in 800 x 800 m grid size indicating optimum grid size for mapping of those soil properties. 1 km grid size is optimum grid size for exchangeable K, available P and soil pH.

Keywords: Rice, Grid sampling, Soil properties, Coefficient of variation