MAPPING OF MAJOR PLANT NUTRIENTS AND CROP PRODUCTIVITY USING GEOSTATISTICAL TECHNIQUES FOR FERTILIZER MANAGEMENT

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ABSTRACT

Soil samples from a farmer's field at Khutti village in Dera Ismail Khan district of North West Frontier Province were collected at a regular grid spacing of 50m x 15m to prepare maps of major plant nutrients for variable-rate fertilizer management. All the soil samples were analysed for pH, lime, organic matter, texture, mineral N, and AB-DTPA extractable P and K. A uniformity trial was laid out on wheat with a uniform rate of 120-90-60 kg N-P_2O_5-K_2O ha^{-1}. The soil was alkaline, highly calcareous, low in organic matter, and adequate in P and K. However, there was considerable variation in soil P, ranging from 2.06 to 10.82 mg kg^{-1} with a mean of 5.72 mg kg^{-1} and a coefficient of variation (CV) of 45.3%. This was followed by mineral N (CV=38.2%). Similarly grain yield had a considerable variation, ranging from 3 to 6 t ha^{-1} with a mean of 4.365 t ha^{-1} (CV=24.1%). Geostatistical technique of semivariogram analysis showed that sand content and grain yields were spatially distributed in the field. Maps of soil fertility and crop productivity of the farm were prepared using the geostatistical technique of kriging. Based on these maps, the farm was divided into different zones for fertilizer management.