

基于GPS和GIS的田间土壤特性空间变异性的研究

Spatial variability of soil properties in the field based on GPS and GIS

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英文关键词: precision agriculture; GPS; geo-statistics; GIS; soil properties; spatial variability

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中文摘要:

以一块面积约为13.3 hm²的冬小麦田为研究区, 利用GPS接收机定位, 按50 m×50 m设置网格, 共取63个采样点, 测定土壤表层(20 cm)内的土壤有机质、全氮、碱解氮、速效磷、速效钾、容重、田间土壤含水率和电导率, 研究麦田土壤特性的空间变异规律。采用传统统计学和地统计学相结合的方法对所取的数据进行了分析, 利用Arcview3.2软件的空间分析功能, 绘制了表达这些土壤特性随机性和结构性的半方差图和空间分布图。研究表明: 所有土壤特性均服从正态分布; 土壤容重具有弱变异强度, 其它土壤特性具有中等变异强度; 土壤有机质、全氮、碱解氮、速效钾和电导率具有很强的相关性, 土壤容重、速效磷和含水率具有中等强度的空间相关性, 土壤特性的相关距变化范围为246.8~426.8 m。该成果可为农田的定位施肥、灌溉以及其它的农田精细管理提供依据。

英文摘要:

With the help of GPS and GIS, spatial variability of soil property was measured and analyzed by using statistics and geo-statistics, which was tested in a 13.3 hm² field of winter wheat. Sixty three sampling points were collected on a 50 m grid in soil surface (0~20 cm) of the field, and the points were oriented by GPS receipt machine. The soil property included total N, available N, organic matter, available P, available K, bulk density, the moisture content and electrical conductivity, which were studied using spatial distribution maps and semi-variograms that can explicitly express the random and structural of soil property. The research result showed that all soil spatial characters are normal distribution; bulk density exhibited weak spatial variability, and others exhibited moderate spatial variability; the soil organic matter, total-N, available N, available K and electricity conductivity have exhibited strong spatial correlation, and soil bulk density, available P and the moisture content have exhibited moderate spatial variability, and the range of soil properties correlation distance was 246.8~426.8 m. All these results can serve as a basis for precision fertilization, precision irrigation and precision management in farm.

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