精确农业田间土壤空间变异与采样方式研究

Spatial Variants and Sampling Strategies of Soil Properties for Precision Agriculture

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中文摘要：

以英国Hillsborough农业研究所附近的一块7.9 hm^2的牧草地为研究区，采用地统计的半方差分析和克立格方法研究其空间变异性和空间插值。同时对研究田块的样点根据不同间距、不同形状进行删选，对不同布局状况下的结果进行统计比较，以获取满足一定精度下的最少采样个数和采样形状。研究结果表明，单纯利用样方统计，土壤有效钾需要65个采样点，大致为原始采样点的一半。而在考虑空间采样形状和空间插值效果，再采用最小显著性差异（LSD）进行比较，该田块土壤有效钾采样最好使用规则三角网布点（样点数为62个）。

英文摘要：

Field nutrient distribution maps obtained from the study on soil variation within fields are the basis of precision agriculture. The quality of these maps and value for management depends on the accuracy of the predicted values, which in true depends on the initial sampling. To produce reliable predictions efficiently the minimal sampling size and combinati on should be decided firstly, which avoides the misspent funds for field sampling work. A 7.9 hectare silage field close to the Agricultural Research Institute at Hillsborough, Northern Ireland, was selected for the study. Grid sampling metho d (25m×25 m) was adopted and there were 123 sampling points in this field. Based on all sampling data, the least require d numbers of soil properties were calculated for a 95% confidence within 5% of population mean. Using the geo-statistical method of Kriging with the data in the various sampling combinations for soil available P and K were made at sampling poi nts from which the known values had been removed. These predicted data groups were compared using Least Significant Diffe rence (LSD) test method. The results showed that the 62 sampling size of triangle arrangement for soil available K were s ufficient to fulfil the required accuracy. The triangular design to be more efficient of Kriging than a rectangular or he xagonal sampling arrangement.

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