

# Evaluation of spatial heterogeneity for the design and layout of experimental sites



Harper Adams  
University College

Krištof K., Misiewicz P. A., White D. W., Chaney K., Godwin R. J.

## Aim:

To evaluate the effects of spatial variation of the soil physical conditions in the field site to study alternative traffic management systems for arable crop production.

## Hypotheses:

The physical properties of the soil of the field selected for the long-term study on the effect of field traffic and cultivation systems at HAUC will be variable. Knowing the extent of the variability before the final plot location will help reduce the heterogeneity in the final long-term experiment.

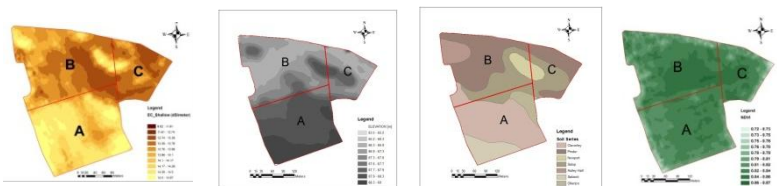
## Objectives:

1. The detection and evaluation of the soil profile to identify the spatial variability in soil properties for the selected field(s) and the impact on soil water content and crop yield.
2. Make recommendations for potential layout and establishment of experiments on the selected field(s).

## Research background:

Literature review gives an indication that agricultural fields have spatial variation of soil conditions, therefore, it is necessary to investigate spatial heterogeneity of the field(s) selected for a long-term study on the effect of field traffic and cultivation systems on soil sustainability, crop growth and energy requirements (Blackmore *et al.*, 2003; Godwin and Miller, 2003).

EMI scans  
Drainage system  
Soil properties  
Satellite images  
Yield maps



## Methodology:

Spatial heterogeneity of the selected field(s) will be evaluated during a 12-months period. This will involve consideration of soil properties, soil moisture content and crop growth, which will be monitored across the field(s) at the range of periods during the year.

A series of map will be created to express recommendations for optimal location of field trials designed to evaluate the effects of alternative traffic management systems in arable production, which will be investigated by Emily Smith in a PhD project titled: Improving Soil and Crop Yield Sustainability with Controlled Traffic Farming and Low Pressure Systems.

## References:

1. Blackmore S., Godwin R.J., Fountas S. 2003. The Analysis of Spatial and Temporal Trends in Yield Map Data over Six Years, *Biosystems Engineering*, Volume 84, Issue 4, Pages 455-466, ISSN 1537-5110, 10.1016/S1537-5110(03)00038-2.
2. Godwin R.J., Miller P.C.H. 2003. A Review of the Technologies for Mapping Within-field Variability, *Biosystems Engineering*, Volume 84, Issue 4, Pages 393-407, ISSN 1537-5110, 10.1016/S1537-5110(02)00283-0