PRECISION FARMING

FACT SHEET 6

What is precision farming?

Traditionally, management decisions on a farm have been made at the whole-field or whole-farm scale. Precision agriculture or 'precision farming' uses computer and GPS (Global Positioning System) technologies on tractors and combine harvesters to record actions or direct inputs and treatments to localised conditions **within a field** to improve the accuracy of applications. Many new tractors and combine harvesters are sold with performance monitoring equipment installed. In addition to this equipment, the preparation of detailed digital maps is required that record in-field variability and which are used by the on-board equipment to control delivery rates.

Precision farming requires 3 steps –

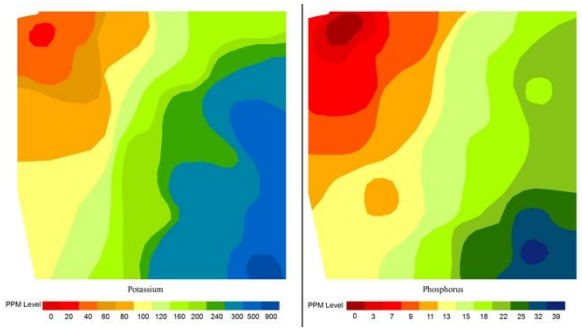
1. Developing accurate digital maps that record the spatial variability of factors that affect crop yield or quality (e.g. soil type, soil moisture and structure, crop canopy and nitrogen take-up, weeds or pests).

2. Using the on-board technology in conjunction with digital maps/data to optimise the computer-controlled application of location-specific management actions (e.g. fertiliser or pesticide applications) within a field.

3. Using the monitoring data produced by the technology to guide future management decisions.

Nutrient mapping

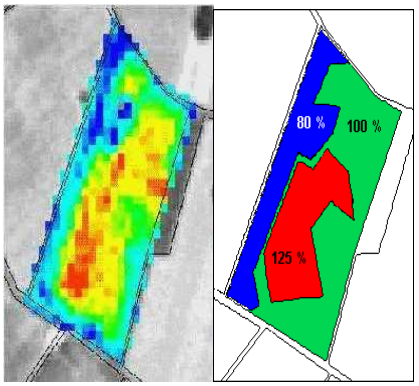
A service provider obtains samples from selected fields to measure various nutrients and soil condition factors (e.g. P, K, Mg and pH) recording the position of the samples using GPS. Digital maps for each field are created showing nutrient variation across them. The results are used in conjunction with a cropping plan, soil type, target yields, etc., to programme variable rate spreading data that can be fed into a tractor GPS system.



Satellite imaging of vegetation quality

Satellite sensors can measure light reflected from the canopy of a crop. The reflectance characteristics distinguish between a thick healthy crop, a thinner crop and even bare ground. When fertiliser applications are due, an up-to-date satellite image is obtained, and is calibrated by a 'ground-truthing' process and converted into a Leaf Area Index (LAI) map that indicates areas of the field that have either more forward or backward crops.

Variable need Variable rate



Controlling nitrogen application rates

This information provides the basis for nitrogen application decision-making. Digital map data can be fed into a tractor GPS system to control application of nitrogen rates to each part of a field in accordance with crop requirements.

Email: wensumalliance@uea.ac.uk

Living With Environmental Change

Llywodraeth Cynulliad Cymru
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Points to consider

Around 20% of arable farms currently use this technology and it can help improve yields, lower fuel use, fertiliser and pesticide costs and allow irrigation water to be used more efficiently. However, it may not be cost-effective for everyone as the costs of the equipment may not be offset by the increased income and cost savings generated, particularly if application rates are already efficient and/or there is little variability within fields. Investment in staff training may also be required to ensure the technology is applied to maximum effect.

Why is precision farming of interest to the Wensum DTC project?

Diffuse pollution is negatively affecting the river Wensum. Farming is not the sole cause of diffuse pollution but it does contribute approximately 60 per cent of nitrates, 25 per cent of phosphorus and 70 per cent of sediments entering our waters, amongst other pollutants (Defra website *www.**defra**.gov.uk*). Defra's England Catchment Sensitive Farming Delivery Initiative programme operates in the Wensum catchment and is encouraging land managers to undertake measures funded under Defra's agri-environmental stewardship schemes that will help to reduce diffuse pollution.

In this project, state-of-the-art measuring devices will be used for long-term monitoring to help provide the 'evidence base' to assess how well these measures are working.

In addition, this project is anticipating working with farmers practising precision farming methods to gain further insights into the impacts of this technology on reducing diffuse pollution.

WENSUM ALLIANCE Research Team at UEA

The Wensum Alliance is being led by Dr Kevin Hiscock and Prof. Andrew Lovett from the School of Environmental Sciences at the University of East Anglia in Norwich. The first phase of the project runs until 31 March 2014. For further details please contact:

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If you would like to join the **Wensum Alliance** and be part of this project, please get in touch. Your local knowledge, experience, expertise and advice will be invaluable in helping to develop the right catchment and farm management solutions for reducing pollution in the Wensum catchment.

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