

Using standard ICT & GIS to facilitate better nutrient management planning on Irish farms

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The Agricultural Catchments Programme (ACP) has developed a novel information management system to collate and manipulate multiple farm nutrient source and geo spatial data sets for coordinating nutrient management planning on farms. Farm fertiliser planning is mandatory under European Union (EU) Nitrates Directive rules (Statutory Instrument (S.I.) 610 of 2010) in Ireland. This legislation constrains the application of nitrogen (N) and phosphorus (P) in organic manures and chemical fertilizers on farms; and coupled with increasing costs of fertilizers since 2000, farmers are being challenged to re-evaluate their fertilizer input strategies in order to achieve higher levels of use efficiency of these nutrients. To achieve this, the development and implementation of a farm nutrient management plan (NMP) is a trusted tool. Historically, developing an NMP for a farm has been a time consuming task, demanding the collection of data from a number of disparate sources, and resulting in complicated and lengthy spreadsheet outputs.

Soil fertility and nutrient management underpins any successful farming enterprise. However, responding to agronomic, environmental, legislative, economic constraints on nutrient management can be challenging, especially in mixed farming systems which dominate in Ireland. The farmer or land manager's focus is often diverted away from the practical nutrient management task by the administrative paper work and data management needed to generate a legally sound fertiliser plan for his farm. This presents opportunities for ICT Researchers to work with farmers, agronomists and policy makers to overcome these mainly technological limitations.

This paper discusses the development of a novel prototype farm nutrient data management system which aims to facilitate better farmer buy-in, usability, and improved nutrient management practice leading to increased nutrient use efficiency and recovery on farms. It links up disperse farm system and geo-spatial datasets and challenges common ICT systems to extract and manipulate their most useful components as data moves along the nutrient management planning flow pathway. In this research existing ICT technologies were re-evaluated and linkages between these technologies and the data sets they capture were established. The new system combines data from; several comprehensive digitised geodatabases, soil analysis results retrieved using a laboratory information management system (LIMS) and farm nutrient application event data captured in a Nutrient Management Recorder (NMR) MS Excel spreadsheet. These data sources were stored centrally on a Document Management System (DMS) - MS SharePoint, which facilitates the development of a centralised relational database by providing a secure data holding warehouse.

This innovative technology also offers the facility to create maps representing the numerical data outputted from these NM plans. Maps can facilitate spatial representations for application rates for individual fields on a whole-farm basis making it easier to know where best to apply fertilizers and other compounds.

Benefits of this system include:

- Full utilisation of data through streamlining and visualisation
- Ability to overlay many years of data to track temporal changes in soil fertility and nutrient management
- Facilitates integration for geospatial analysis and other research against a wide variety of other datasets whilst maximising the integrity of the data
- Delivery of a workable ICT solution that is cost effective