

The North Wyke Farm Platform, a UK national capability for research into sustainability of temperate agricultural grassland management: Infrastructure and Instrumentation

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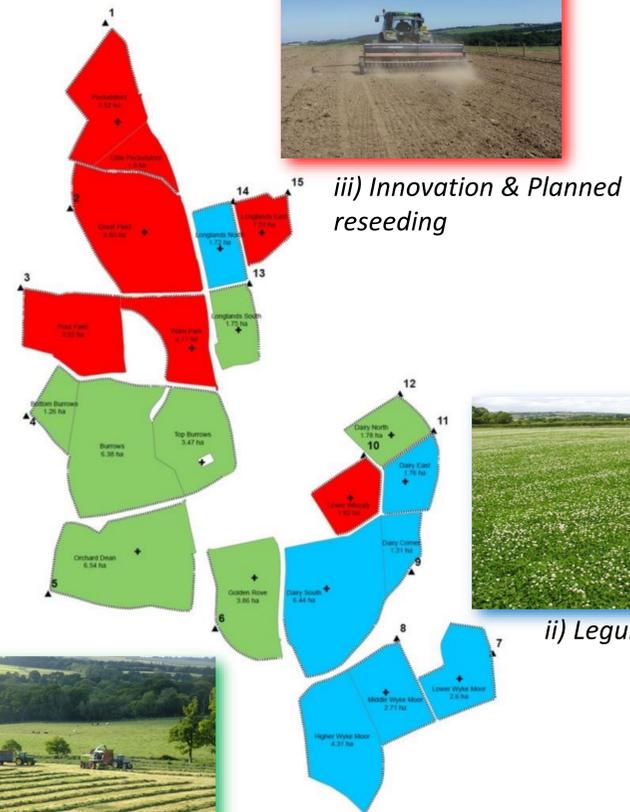
1. Introduction

The North Wyke Farm Platform (NWFP) at Rothamsted Research in the South-West of England is a large, farm-scale experiment for collaborative research, training and knowledge exchange in agro-environmental sciences. The aim at the 63 ha site is to address agricultural productivity and ecosystem responses to different management practices, capturing the spatial and/or temporal data necessary to develop a better understanding of the dynamic processes and underlying mechanisms. The data collected is publically available and can be used to model how agricultural grassland systems respond to different management inputs.

2. The three systems

The NWFP is divided into three 21 ha farmlets where, through beef and sheep production, 3 contrasting grassland systems are examined:

- Improvement of permanent pasture through use of mineral fertilisers.
- Improvement through the use of legumes.
- Improvement through planned reseeding and innovation.



iii) Innovation & Planned reseeding



ii) Legumes



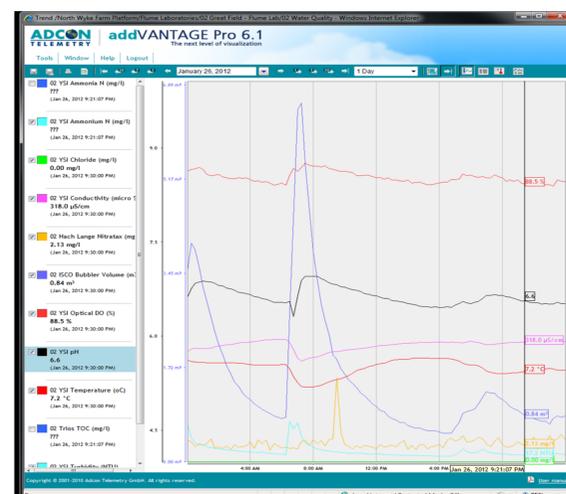
i) Permanent pasture & inorganic fertilisers

3. The Infrastructure

The 3 farmlets are further subdivided into 5 (15 in total) hydrologically isolated sub-catchments through a combination of the existing topography, the impermeable nature of the clay soils and through the introduction of French drains bounding the perimeters. The drains, dug to 0.8m, containing a perforated pipe and backfilled to the surface with stone, intercept surface and subsurface flow and channel it to one of 15 primary flow devices (H flumes). Each sub-catchment is equipped with a range of state of the art, in situ, environmental monitoring equipment, sensing in real time: the quantity and quality of run-off; a range of soil variables; meteorological parameters and greenhouse gas emissions.

4. The instruments and telemetry

Runoff water is pumped to a bypass cell every 15 minutes where a suite of sensors measure the following parameters: Ammonium; Dissolved Oxygen; Turbidity; pH; Conductivity; Temperature; Nitrate N and dissolved organic Carbon. In addition, total P is measured at one site within each farmlet. Each sub-catchment also contains a soil moisture station, measuring soil moisture at 3 depths (10, 20 and 30 cm), soil temperature at 15 cm, and precipitation using a tipping bucket rain gauge. The NWFP also has a fully equipped, centrally located automatic weather station and 3 automated mobile systems for measuring both Carbon dioxide and Nitrous Oxide GHG emissions. The data is transferred live to a centrally located base station via a UHF radio telemetry network and passed to a database with a web front end for archive and visualisation.



5. Summary

The NWFP has a network of 108 instruments collecting data on 198 parameters every 15 minutes. This dataset, combined with information about the inputs to the systems, the productivity of the systems, and data from numerous ground and aerial surveys creates a powerful archive for the research community to better understand the interactions between the productivity and sustainability of temperate grassland systems.