

“Inspiring Farmers to Safeguard Soils”

Newsletter 4

Welcome to the fourth and final newsletter of the PROSOILplus project. In this newsletter, we summarise how project activity on farms around Wales and at IBERS Aberystwyth on the research plots has worked to safeguard soil and optimise nutrient use efficiency from soil on livestock farms

#1: Regional Development Group news

The groups discussed the importance of liming and its link to soil health: lower, more acidic soil pH's will lead to:

- Declining **bacterial** activity
- Dominance of **fungal** activity
- Declining **earthworm** activity below pH 5.5 and organic matter build up on the soil surface
- Inhibition of **nitrification** (NH₄ to NO₃) at pH's below 5.5
- Less **N fixation** by legumes below pH 6.0
- Restricted availability of **macro-nutrients** (N, P, K, S) and some **trace-elements** at pH's below 5.5

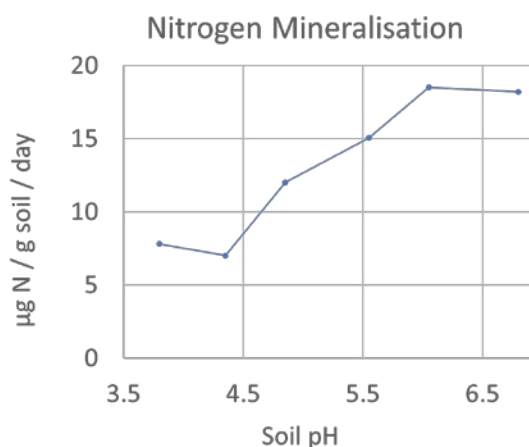
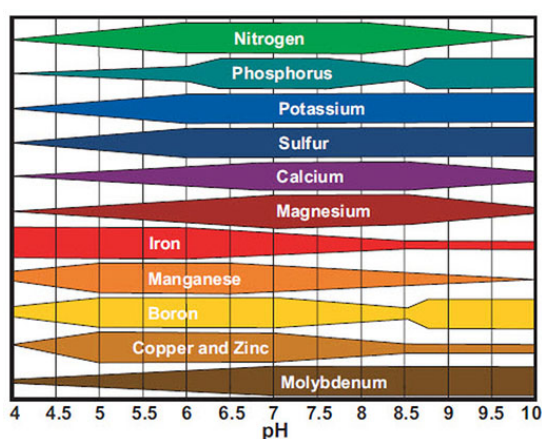


Fig 1 Element availability across pH range (Truog, E. (1946); Fig 2 Nitrogen Mineralisation (Hopkins *et al* 1990)

In discussion all members of the groups re-affirmed the importance of testing farm soils regularly and applying lime to raise soil pH to target levels

#2: Summary of soil carbon evaluation on the Participatory Research Farms

Why was the evaluation important?

- Soils with a high stock of carbon have limited potential for further C sequestration. However, it is important that management practices maintain these stocks
- Soils with low C stocks can capture carbon but only with marked changes in management
- Soils under C friendly management (high inputs/limited disturbance) indicate potential for increased stocks



What we did:

- We sampled to establish a baseline for soil carbon stocks taking account of differences in soil type and major management practices. Three sites at each farm were sampled; long term pasture (same management), regularly cropped/reseeded (changed management) and undisturbed woodland for comparison

What we found:

- Management matters- lower C stocks in more frequently cropped fields; highest in woodland soils
- The more disturbance the less carbon (moving from ploughing to direct drilling may help)
- In a deep soil more C is present and sampling depth is important (if possible sample to 50cm)
- Soil Organic C is higher where the organic matter inputs are higher; more diverse multi-species leys may also help
- Active Carbon levels are an indicator of recent inputs of carbon (higher with muck and compost inputs)

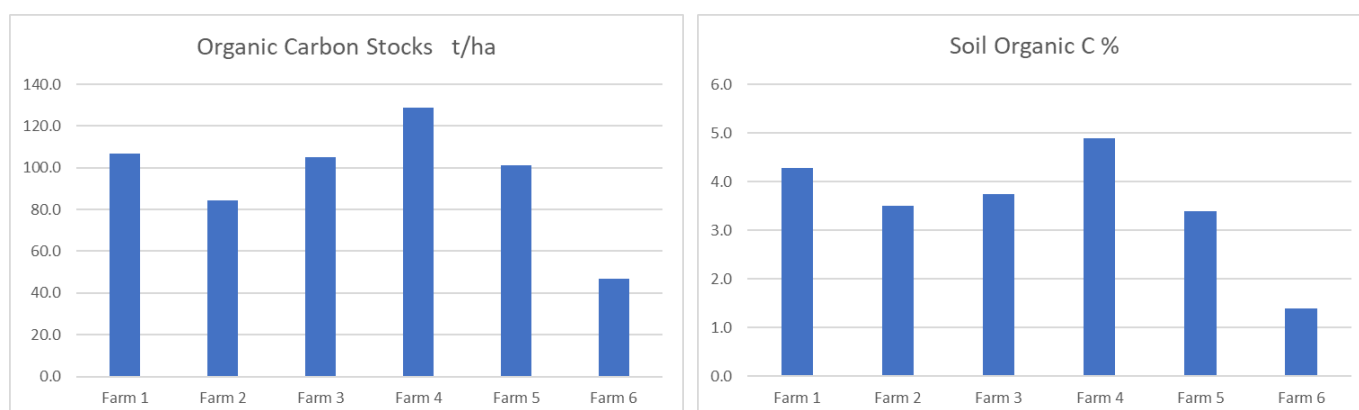


Fig 3. Organic Carbon Stocks and Soil Organic Carbon % on PROSOIL+ Participatory Research Farms

#3: IBERS Research Experiments

- Water infiltration- Water infiltration rates are a good indicator of soil health. Soils that are unable to absorb high rainfall events lead to surface run off and loss of soil and nutrients into water courses. Wet soils limit the opportunities for grazing and shorten the grazing season. With increasing high rainfall events, increasing the water holding capacity of Welsh soils will be required to help tackle climate change.
- At IBERS, research plots of red and white clover have significantly higher rates of water infiltration compared with ryegrass. Plots of chicory and plantain have higher rates of water infiltration compared with ryegrass (Fig 4).

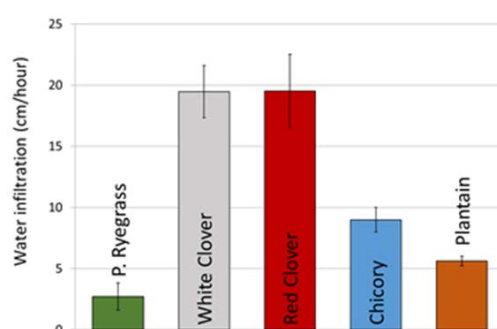


Fig 4

What action can I take?

- Check soils for compaction – based on the depth there are various mechanical solutions including pasture slitters and sward lifters
- Check soils for earthworm numbers – earthworms are natural soil aerators as they burrow through the soil profile
- Maximise the use of red and white clovers
- Consider using more mixed species leys
- Make sure you regularly test your soils to assess pH and nutrient status and lime accordingly
- Consider assessing the soil carbon status of your soils and making use of this knowledge in planning your carbon footprint and net zero farming

The PROSOILplus project

The overall aim of the project is to safeguard soil and optimise nutrient use efficiency from soil on livestock farms. The objectives are:

- *Managing & protecting landscapes*
- *Conserving & enhancing biodiversity*
- *Managing soil to conserve carbon & reduce erosion*
- *Support co-operation for technology changes*
- *Improving water surface run-off & managing water to help reduce flood risk*

We hope you have enjoyed reading this final newsletter. Case studies reporting on project activity that has taken place on the Participatory Research Farms will be available Spring 2023; You will find more information on our website www.prosoil.wales. If you have any queries, please email Jan Newman at jln@aber.ac.uk