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Athrofa y Gwyddorau Biolegol, Amgylcheddol a Gwledig
Institute of Biological, Environmental and Rural Sciences

Cynllun PROSOIL+ Project

PRIFYSGOL ABERYSTWYTH UNIVERSITY

"Inspiring Farmers to Safeguard Soils"

PEN Y GELLI: A Participatory Research Farm Case Study

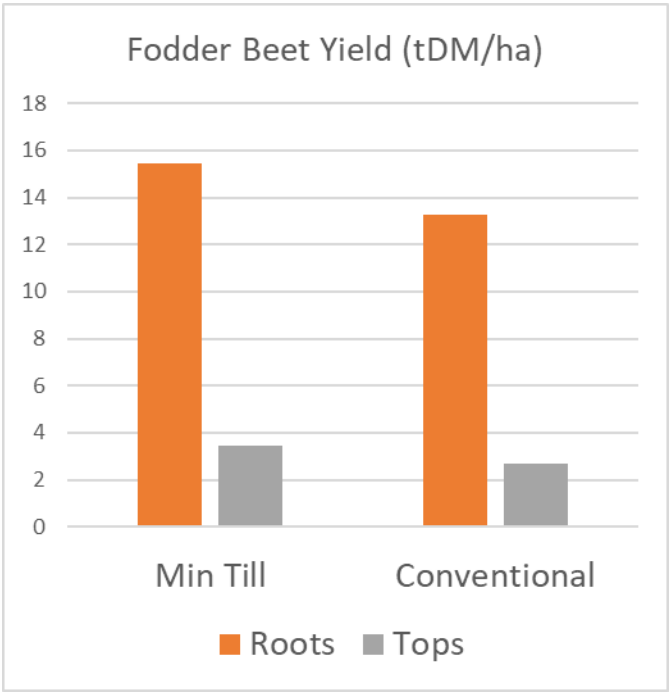
Farm Facts

Pen y Gelli covers 65 ha (**160 acres)** with land near the Menai Straits. Alwyn and his son Huw run a flock of 440 ewes -240 **Polled Dorset** (January lambing) along with 200 **Signet recorded pedigree Texels** (March lambing) and 20 **Limousin suckler** cows. Soils are predominantly **sandy loam** supporting the beef and sheep enterprises. Grazing for the sheep enterprise is managed on a rotational 1ha paddock system.

Alwyn Philips

Min Till Fodder Beet

We looked at ways of establishing a crop of fodder beet by min-till techniques. In the farm system, paddocks are taken out of the rotational grazing platform and sown with fodder beet. Crop establishment by ploughing and power harrowing was compared with min till which successfully grew a good crop which was grazed by Dorset ewes. The quality of the crop was good with tops containing 17% crude protein with an ME of 12MJ/kg DM; and roots with 6% CP and 13MJ/kg ME. The project looked at the effect of the two establishment methods on dry matter yield of the fodder beet (see chart). This was an interesting first for Penygelli with intentions to make further progress with a strip-till precision drill cultivation technique whilst investigations are carried out to assess the benefits that this could bring to soil health.



This project is funded through the Welsh Government Rural Communities - Rural Development Programme 2014-2020, which is funded by the Welsh Government and the European Union

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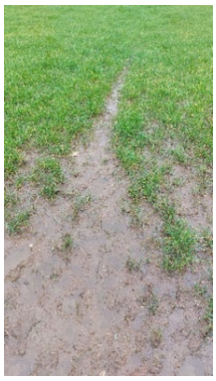
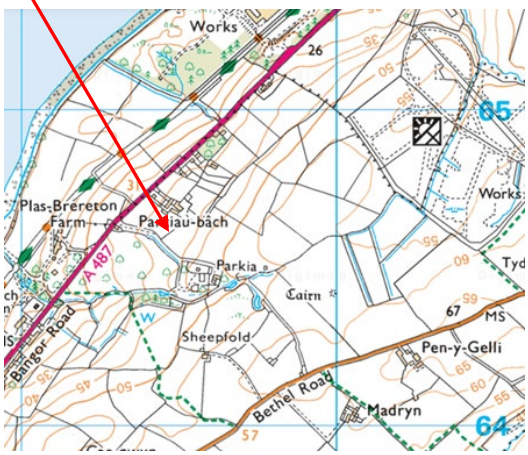
A pilot investigation into methods to monitor weather and land management that enable more effective soil protection on farm

To enable better protection of soils in areas of high livestock trafficking on sloping ground that is subject to potential water run-off a series of "virtual gateways" in-field have been created by spraying off areas of the ground 2m x 1m bare of vegetation aligned down the slope of the selected field site on farm. Water and soil movement through these gateways will be monitored using aerial drone technology. There are five areas marked by the posts visible in the image below leading towards the field gate. Once the site was prepared, drone flights over the site were planned to gather images. To date one preliminary UAV flight has taken place to record baseline images.



Source: Digimap Ordnance Survey

Drone images are processed through software which builds a digital elevation map of the land surface. The soil erosion is related to how much the elevation has lowered; we can also see where eroded soil has deposited - by looking for areas where elevation has increased and this is something that can be done accurately- to millimetre precision. In addition, soil moisture distribution, soil health indicators (such as earthworm numbers) and soil chemical status (pH, and nutrient changes) also provide useful information.

The benefits and limitations of this technology:

1. We can measure the amount of soil erosion and identify precisely where soil has been eroded.
2. We can fly over after each precipitation event, given us a much better idea about how soil responds to each weather event.
3. Changes occurring at the site captured by drone images can be analysed and interpreted with the objective of enabling the farmer to use the information to plan strategies on farm that better protect the soils on sloping ground and heavily trafficked areas.

As a consideration for future work, we found that the use of drones on the project was highly weather dependent; suitable weather windows for operation are infrequent during a time of year when data capture is needed.

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IBERS PROSOIL+ Project Research Link

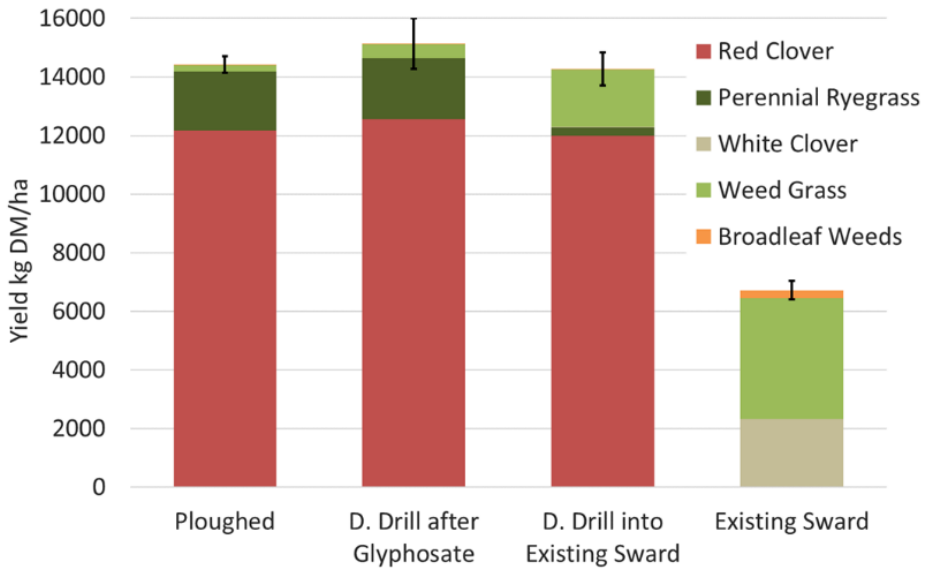
The Sward Establishment Plots of perennial ryegrass and red clover were established either a) after ploughing after glyphosate, b) by direct drilling after glyphosate or c) by direct drilling without glyphosate application. This was to test the hypothesis that direct drilling will produce similar forage yield to the ploughed treatment, but with less cost and less environmental impact.

In summary, we found
a) forage yields after re-seeding were significantly greater regardless of how the sward was established;
b) more weed grasses after direct drilling into an existing sward *without* weed control;

c) yields were comparable from swards established by direct drilling after glyphosate and swards established by cultivation

Main Message:

The **COST BENEFIT** of direct drilling would make it *the most economic option* with which to establish a new sward containing these species.



Alwyn Phillips: "Being part of PROSOIL and PROSOILplus over the last 13 years has demonstrated the importance of healthy soils in extreme wet and dry years. I've benefitted from the advantage of being involved in participatory research on a commercial farm over a longer term which takes out misleading results that may have incorrectly influenced our management decisions when based on a single year alone. Soil structure, health and management are a major component in the Sustainable Farming Scheme (SFS) and what I've learnt from being part of the PROSOIL /PROSOIL+ projects will be invaluable to me. My objective now is to put into practice what I have learnt across the whole farm."

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