Field Lab Report: Soil Testing
Cultivating Soil Health

Reduced tillage at Newmiln: background and baseline results

The cultivating soil health field lab started in 2016, at Newmiln farm, Perthshire, courtesy of Hugh Grierson Organic. It is investigating if reduced tillage methods can:

- **Improve soil health** (to improve the resilience of the cropping enterprises)
- **Reduce production costs** (to investigate if savings can be made by reducing tillage)
- **Improve the farm's carbon footprint** (by reducing the number of cultivations)

Trial setup

The field came out of a 3 year grass ley, and was sown out to Paragon spring wheat at a rate of 237 kg/ha on the 22nd April. It was split into four areas at the start of 2016. Before sowing these areas were:

1. **Left as a grass ley and not sown (control)**
2. **Rotovated, then sown with a 3 m Claydon drill**
3. **Sheeted with black plastic and then sown with a 3 m Claydon drill**
4. **Ploughed (as normal), cultivated, then sown with a 3 m Claydon drill**

1. Control

2. Rotovated

3. Black plastic **4. Ploughed**

Soil sampling and analysis

Soils from each of the four areas will be sampled and tested throughout the duration of the field lab for a range of things. In spring 2016 the areas were sampled and tested for:

1. **Earthworm counts (number and diversity)**
2. **Potentially mineralisable nitrogen (PMN) – *an indicator of soil biology***
3. **Nematode numbers – *nematodes are a type of soil organism***
4. **Soil pH (with a 'routine' analysis)**
5. **Nutrients – phosphate (P), potash (K), and magnesium (Mg) ('routine' analysis)**
6. **Organic matter (by loss on ignition)**
7. **Labile carbon – *represents fuel for biological activity***
8. **Bait lamina sticks – *the amount of bait eaten measures biological activity***

Results so far

These results were intended for use as a baseline for comparison with future results: the same areas will be tested for the same things later on. However they are already telling us an interesting story about what may be happening with soil health. The results themselves should be treated with caution as they are 'indicative' (because of the scale and nature of the field lab).

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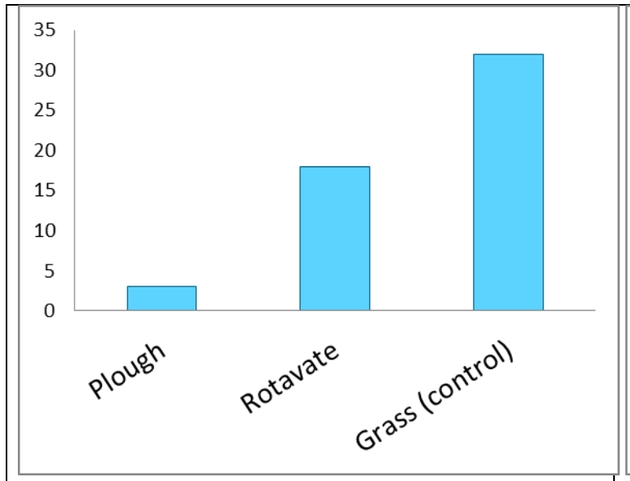
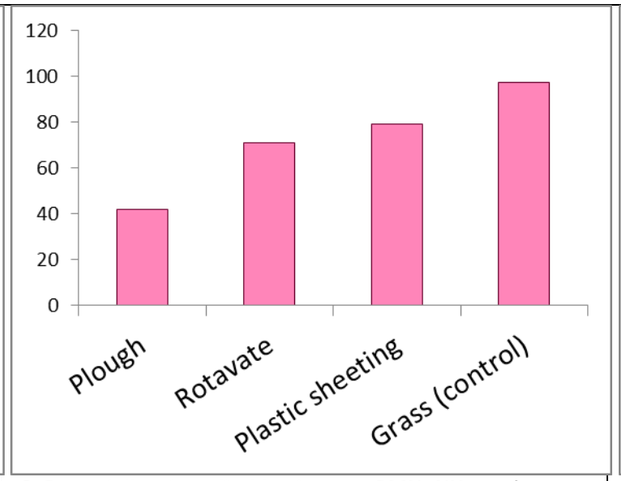
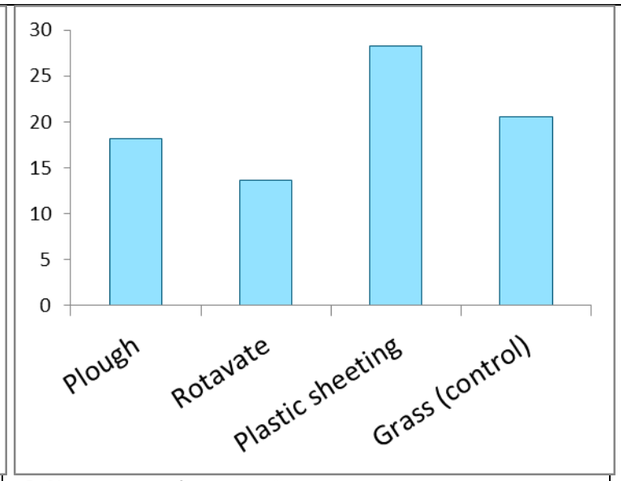


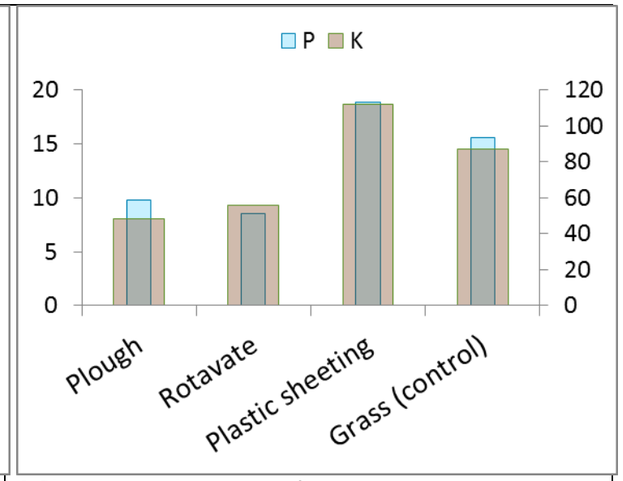
1. Earthworm numbers



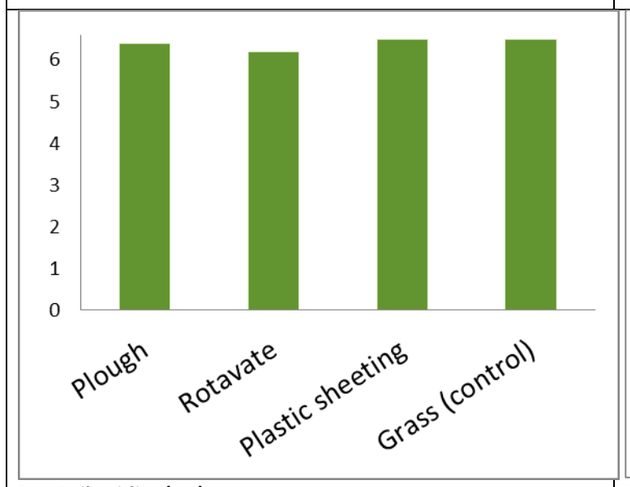
2. Potentially mineralisable nitrogen, PMN (NH_4 µg /g)



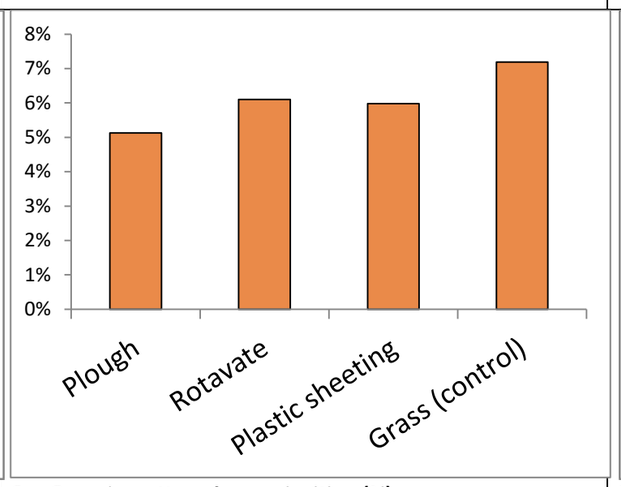
3. Nematodes (/g fresh soil)



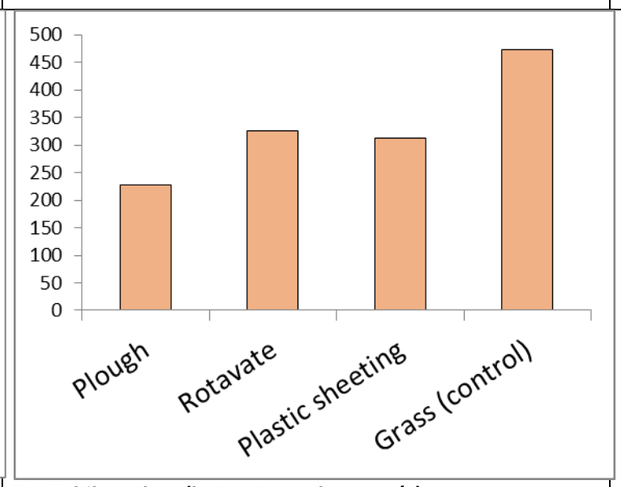
4. Phosphate and potash (mg/l)



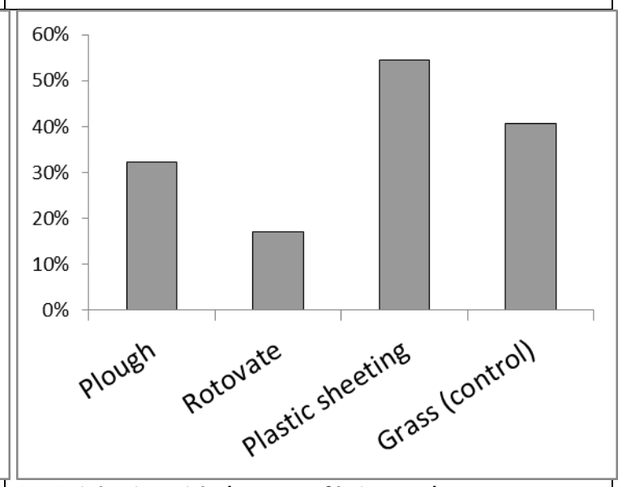
5. Soil acidity (pH)



6. Organic matter – loss on ignition (%)



7. Labile carbon (hot water carbon, µg /g)



8. Bait lamina sticks (amount of bait eaten)

Results: description and discussion

Unsurprisingly, a grass/clover ley (the control plot) is good for earthworms, and ploughing is not. Potential biological activity, as measured by labile carbon was highest in the control plot, and lowest in the ploughed plot. Biological activity, as measured by PMN, nematode numbers, and the bait lamina sticks was high in the plots that were sheeted in black plastic.

The soil pH of each area was about the same, which was expected. Both the P and K status in the uncultivated areas were higher than in the cultivated plots, which was unexpected. This could be due to natural variation in the field, rather than as a result of the types of cultivations and decaying plant material in the plots. It will be interesting to see if this is repeated next year.

In this trial, sheeting off the plots appeared to have the dual benefit of controlling weeds, and improving soil biology. This was a demonstration rather than a scientific trial carried out by a trials team, so caution should always be taken with the results.

Want to get involved?

If you are interested in this field lab and would like to be a part of it, then get in touch: dmichie@soilassociation.org.

Thanks to Hugh Grierson, Newmiln Farm, Perthshire, and Professor Bryan Griffiths, Crop and Soils Systems, SRUC