

Field Lab Report: The Growing Crop Cultivating Soil Health



Reduced Tillage at Newmiln: July 2016 Meeting

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)

We looked at plots of spring wheat that had been established using different tillage methods. As well as looking at the growing crop, we also went through soil analysis results. Did good soil biology result in a good crop?

Trial setup

The field being used has just come out of a 3 year grass ley, and 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**

Soil analysis results of the trial plots

We carried out several measurements and soil analyses before sowing. These included: earthworm counts, pH, phosphate, potash, magnesium, nematodes, potentially mineralisable nitrogen (PMN), labile carbon, loss on ignition (to measure organic matter), bait lamina sticks (to measure biological activity), and soil structure score.

By most measurements, soil quality was best in the control and plastic sheeting plots; poorest in the ploughed plot; and somewhere in the middle in the rotovated plot. More detailed results are available in the **Soil Testing** report.

Visual appraisal of the trial plots



1. Control (left in grass)

This plot had been topped and was in good condition. There were some dock plants present and no annual weeds. There is no crop here, so there will be no yield assessment. The soil in this plot will be tested as a comparison against the other plots.



2. Rotovated

This was the least successful plot, with lots of grass weeds, and potentially the lowest yield.

Sowing was carried out successfully in a reasonably good seed bed. The weed burden was very high in this plot, with lots of grass weeds having a detrimental effect on the crop.

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3. Sheeted with black plastic

This was a reasonably successful plot, with few weeds, and a good potential yield (though probably not as high as the ploughed plot).

Sowing conditions were poorest here. The plastic sheeting was removed immediately before sowing, and the soil was still quite wet, resulting in smearing, and a poorer establishment. Most weeds were killed by the black plastic; however rhizomatous weeds (couch and docks) were not. There was a much lower weed burden here than in the rotovated plot.



4. Ploughed and sown with a one-pass drill

This was the most successful looking plot, with fewest weeds, and potentially the highest yield.

The establishment conditions were best for this plot, with the seed sown in good, friable soil. This plot had the most successful establishment, which is probably why the crop looked so good.

Conclusion

In this field lab, weed control and good establishment conditions were more important factors for growing a good crop than good soil biology and other measures of soil quality. Ploughing is an excellent method of weed control and seedbed preparation. In this trial preparing the seedbed by ploughing and cultivating produced the best looking crop, despite having the poorest measurements of soil biology.

Soil quality, including soil biology was much better where tillage was reduced. Using the plastic sheeting not only improved soil quality, but also reduced the amount of weeds. Despite having the poorest establishment, the crop in the sheeted plot still looked pretty good, and could potentially yield quite well. If this method could be combined with better establishment conditions (i.e. taking the plastic off a few days earlier to let the soil to dry out) then there is potential for a very good crop, grown in a biodiverse soil, that could be resilient to climatic and disease challenges.

Next Steps

This trial will continue at Newmiln farm. By the end of the year we plan to:

- Measure crop yield in each plot
- Figure out the different costs of establishment

Following discussion about reduced cultivation in this field lab, the group decided that it would make sense to repeat the trial on the same plots, with some slight changes:

- Use a breathable woven terran mesh on part of the plastic sheeting plot
- Investigate slug numbers



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