FIELD LAB: GOOD GREEN MANURES
Field lab report

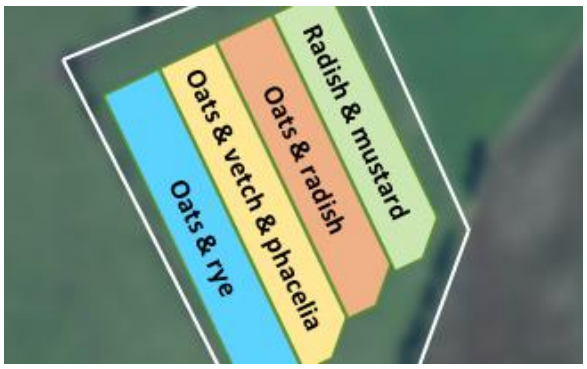
This field lab started in 2016 in south Lanarkshire to find out if green manures can:

- *Improve soil quality*
- *Benefit the following crop*
- *Justify their cost*

Four different green manure mixes have been sown in this field lab: ***radish and mustard****;* ***oats and radish****;* ***oats, vetch and phacelia****; and* ***oats and rye****. These are all greening compliant.*

Establishment of the green manures

The green manures were sown in September, following winter barley. Three of the mixes (oats and radish; oats, vetch and phacelia; and oats and rye) were sown with a one-pass, while the radish and mustard mix was broadcast sown onto stubbles after a light harrowing.



There was a fortnight's delay before the radish and mustard mix was sown, resulting in the establishment of several winter barley volunteers. The plots sown with the one-pass established very well, with no volunteers. The green manures will be incorporated in spring (probably March), before a spring barley crop.

Table: Green manure seed mix components and sowing rates

RADISH AND MUSTARD		OATS AND RADISH		OATS, VETCH & PHACELIA		OATS AND RYE	
Mustard	10 kg/ha	Oats	120 kg/ha	Oats	100 kg/ha	Oats	90 kg/ha
Radish	10 kg/ha	Radish	15 kg/ha	Vetch	20 kg/ha	Rye	90 kg/ha
				Phacelia	5 kg/ha		

Assessments

A sample was taken from each plot and sent off for a full forage analysis in December. This included analysis for dry matter, protein, energy, digestibility, and trace elements. In mid-January assessments were carried out in the field: soil structure; earthworm numbers and weight; and green manure yield.

The soil structure and earthworm assessments were both done with 3 spade-width squares of soil from each plot. Soil structure was scored with the Visual Evaluations of Soil Structure (VESS) system, and earthworms were taken away to be counted and weighed. Yield was assessed by cutting and removing all material within a 0.5 m^2 quadrant. This was then weighed, and its dry matter yield calculated.

Results so far

The radish and mustard plot contained a lot of winter barley volunteers, and was also established differently to the others. These things should be taken into account when looking at the results.

Yield

Oats and rye had the highest yield on both a fresh weight and dry matter basis.

Forage analysis

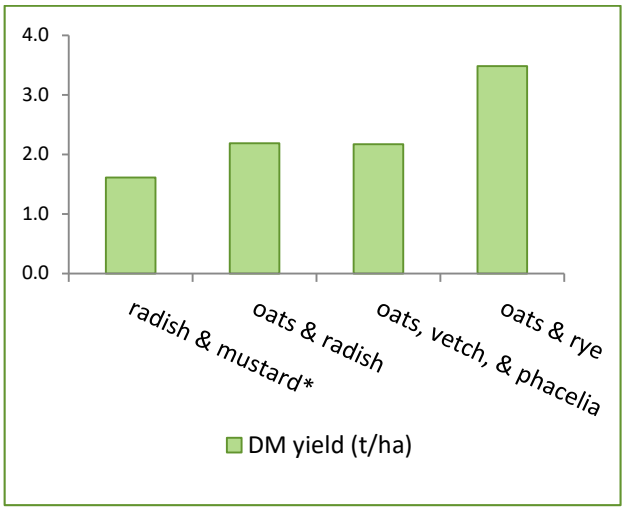
Radish and mustard (and winter barley volunteers) had the highest protein, and the oats and rye had the highest energy (both measured by kg of dry matter). These plots will not be grazed, so we are more interested in the protein content being an indicator of nitrogen that could benefit the following crop. To get an idea of this we converted the protein content to an area figure (per hectare). Because the oats and rye had by far the biggest yield, they also had the best energy and protein figures, on an area basis.

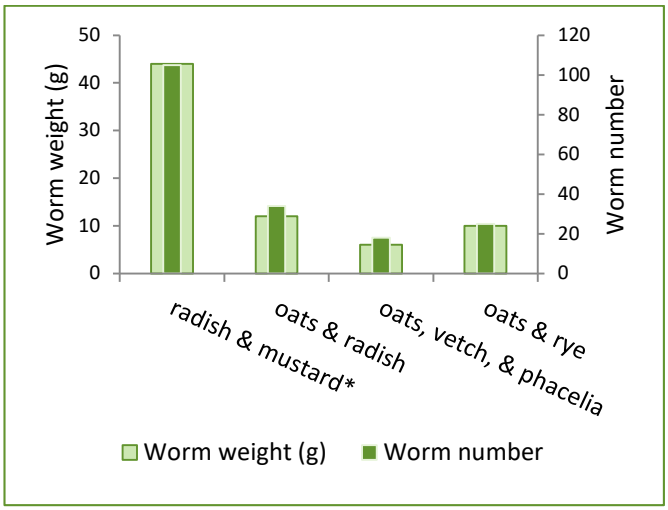
Soil structure

All of the plots had very good soil structure. The oats, vetch and phacelia plot had the best soil structure, and the oats and radish had the poorest (although it was still very good).

Earthworms

The earthworm numbers were by far the highest in the radish and mustard plot. This is the plot that had the least cultivations as it was broadcast sown after a light harrowing. The high earthworm numbers were probably more to do with the cultivations than the seed mix.





Which green manure is best, and next steps

The results tell us different things, and at this stage we can't tell which green manure is best. How the following crop of spring barley performs will be crucial. Will one part do better than others? Will the soil structure benefits and earthworm numbers make any difference? Will some green manures increase soil organic matter?

We will continue to do assessments, and we will also hold some meetings on the farm to see how things progress. If you want to be part of it or if you want more details about the field lab, get in touch with dmichie@soilassociation.org.

Funding for this activity is made available through the SRDP Knowledge Transfer and Innovation Fund (which is jointly funded by the Scottish Government and the European Union), with partner funding from Quality Meat Scotland, Forestry Commission Scotland, Innovative Farmers and The Prince of Wales's Charitable Foundation.