

# FIELD LAB: GOOD GREEN MANURES

## Field Lab Report: Benefits

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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. They were sown in September, and in early spring we looked at: soil structure, earthworm counts, full forage analysis, mineral content, available and total nitrogen content, and cost of establishment.

### Green manure evaluation



- Ploughed and sown with a one-pass (£100/ha\*)
- Highest seed cost (£100/ha/yr, full rate)
- 90 kg/ha oats, 20 kg/ha vetch, 5 kg/ha phacelia
- Benefits:
  - Best mix for improving soil structure
  - Good for total nitrogen (N) in soil, but not the best for available N
- Moderate earthworm counts
- Green manure yield: 2.2 t/ha (moderate)



- Ploughed and sown with a one-pass (£100/ha\*)
- Lowest seed cost (£61/ha/yr, full rate)
- 90 kg/ha oats, 90 kg/ha rye
- Benefits:
  - Good for improving soil structure, not as good as oats, vetch, and phacelia
  - Highest soil organic matter content
  - Highest N content in the green manure – and looked greenest of all the mixes
  - Excellent establishment
- Moderate earthworm counts
- Green manure yield: 3.5 t/ha (highest)



- Ploughed and sown with a one-pass (£100/ha\*)
- Moderate seed cost (£77/ha/yr, full rate)
- 120 kg/ha oats, 15 kg/ha radish
- Benefits:
  - Good for improving soil structure, not as good as oats, vetch, and phacelia
- Moderate earthworm counts
- Green manure yield: 2.2 t/ha (moderate)



**Radish & mustard (+ winter barley volunteers)**

- Light discing and broadcast sown (£40/ha\*\*)
- Moderate seed cost (£80/ha/yr, full rate)
- 10 kg/ha radish, 10 kg/ha mustard, plus barley volunteers
- Benefits:
  - Highest earthworm counts
  - Highest available N content
- Earthworm counts and available N probably higher due to sowing method, rather than mix
- Barley volunteers could potentially act as a 'green' bridge for disease
- Mustard died away as temperature fell
- Green manure yield: 1.6 t/ha (lowest)

\*\*£40/ha = £30/ha (discing) + £10/ha (broadcast sown)

\*£100/ha = £50/ha (ploughing) + £50/ha (one-pass sowing)

## Conclusions

None of the mixes emerged as a clear winner for all the things that we measured, so when you are choosing your mix you should think about what you want it to achieve.

- For **soil structure** we found that the most diverse mix (*oats, vetch, and phacelia*) was best. This mix contained a legume, and was best for **total nitrogen** in the soil.
- For **earthworms**, the mix that was established without ploughing (*radish and mustard*) was best.
- For **increasing organic matter, highest yield** (so potentially could increase organic matter most when incorporated), and **capturing most nitrogen** the best mix was *oats and rye*.
- For **cost**, the *oats and rye* mix was cheapest, and could be further reduced by cutting the seed rate.



**Oats, vetch & phacelia (left), next to oats & rye (right)**

The seed costs are relatively high, as a relatively high seed rate was used because of the later sowing date. So by reducing seed rate, and by using home saved cereals, seed costs could be reduced, particularly for the oats and rye mix which was very thick. This will obviously depend on time of year and weather conditions.

## Next steps

We will be going out and assessing the following crop. We will look at how green the crop is, to get an idea of the amount of nitrogen that was captured, and will also assess the yield of the following crop. We have added two new farms to the trial to look at summer green manures, and will be reporting on their 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](mailto:dmichie@soilassociation.org).

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