GOOD GREEN MANURES

Leslie Sloan [1]

[1] Mains of Thankerton, Lanarkshire

Green manures

- ***Crops grown with the intention that they will be ploughed in to benefit the following crop***
  - Green manures
  - Green cover
  - Cover crops
  - Catch crops

Why grow them?

- **Greening compliance**
  - Counts as an EFA (environmental focus area)
  - Establishment of a temporary crop in the autumn
  - Weighting factor of 0.3 x
  - Incorporate before spring crop
  - Must not be used for agricultural production, **i.e. no grazing**

Why grow them?

- **AECS option**
  - *Stubbles followed by green manure in an arable rotation*
  - £498.49 /ha
  - No sprays: before or during
  - No nutrients (fertiliser, dung, etc.): during
  - Establish in spring (after 1st March)
  - Keep until 15th August or 1st March

Agronomic benefits*

- Soils?
- Weeds and pests?
- Yield?
- Biodiversity?

*Cover crops: a practical guide to soil and system improvement, NIAB (2015)

Soils

- Big root system benefits:
  - Soil structure
  - Organic matter
  - Soil biology
- Provide ground cover during soil erosion risk periods

Weeds and pests

- Short term weed control
  - Suppression of weeds before following crop
- Longer term weed control (i.e. sterile brome)
  - Stale seedbed approach: allow weeds to germinate in the back-end, then destroy before they set seed
- Pest control
  - Brassicas may have biofumigant activity against soil-borne pests

Yield

- Nitrogen retention – ‘catch’ crop
- Nitrogen fixation from any legumes in the mix
- Improved soil structure
- Weed reduction?
- Increase in pollinators (for oilseed rape and pulse crops)

Biodiversity

- Winter cover and habitat
- Benefits birds, mammals, and insects
- Flowering species in summer benefits pollinators

Seed mixes

- An **AECS** mix must have at least one annual flowering plant, e.g. clover, phacelia, vetch, and must be established from 1st March

- An **EFA** compliant mix requires <u>two</u> or more of these:

Barley	**Oats**	**Triticale**	**Rye**
Clover	**Vetch**	**Alfalfa**	
Mustard	**Radish**		
Phacelia			

Seed mix components

- These components can be split into 4 broad groups
- These groups have different characteristics

Group	**Crops**			
Cereal	Barley	Oats	Triticale	Rye
Legume	Clover	Vetch	Alfalfa*	Peas
Brassica	Mustard	Radish		Rape
Other	Phacelia		Chicory	Buckwheat

*** Unlikely to do well in wetter, more acidic Scottish soils**

Green manures

- The different characteristics of the groups give them advantages and disadvantages

Group	**Advantages**	**Disadvantages**
Cereal	**Establishment, seed availability**	**Pest/disease 'green bridge'**
Legume	**Fixes nitrogen**	**Establishment (back end)**
Brassica	**Establishment, roots open up the soil**	**Clubroot risk, can dominate the mix when mature**
Phacelia	**Beneficial to pollinators**	**Poor frost tolerance**

Field lab

- Green manure mixes* sown on a farm in Lanarkshire
- In between winter barley and spring barley
- Sown for EFA compliance
- **Will there be any other benefits?**

*** Courtesy of Hutchinsons, thanks to Keith Brand**


Trial site
Covington Rd
River Clyde
Covington
Quothquan
Covington Rd
A73
Station Rd
Thankerton
Boat Rd
A73
River Clyde


Trial site


Radish & mustard
Oats & radish
Oats & vetch & phacelia
Oats & rye

Seed mixes

Oats, vetch, & phacelia

oats	@ 100 kg/ha;
vetch	@ 20 kg/ha;
phacelia	@ 5 kg/ha

Oats and rye

oats	@ 90 kg/ha;
rye	@ 90 kg /ha

Oats and radish

oats	@ 120 kg/ha;
radish	@ 15 kg/ha

Mustard & radish*

mix	@ 20 kg/ha

**Established following discing winter barley stubbles, and then sowing. Lots of winter barley volunteers.*


Mustard & radish


Oats, vetch & phacelia

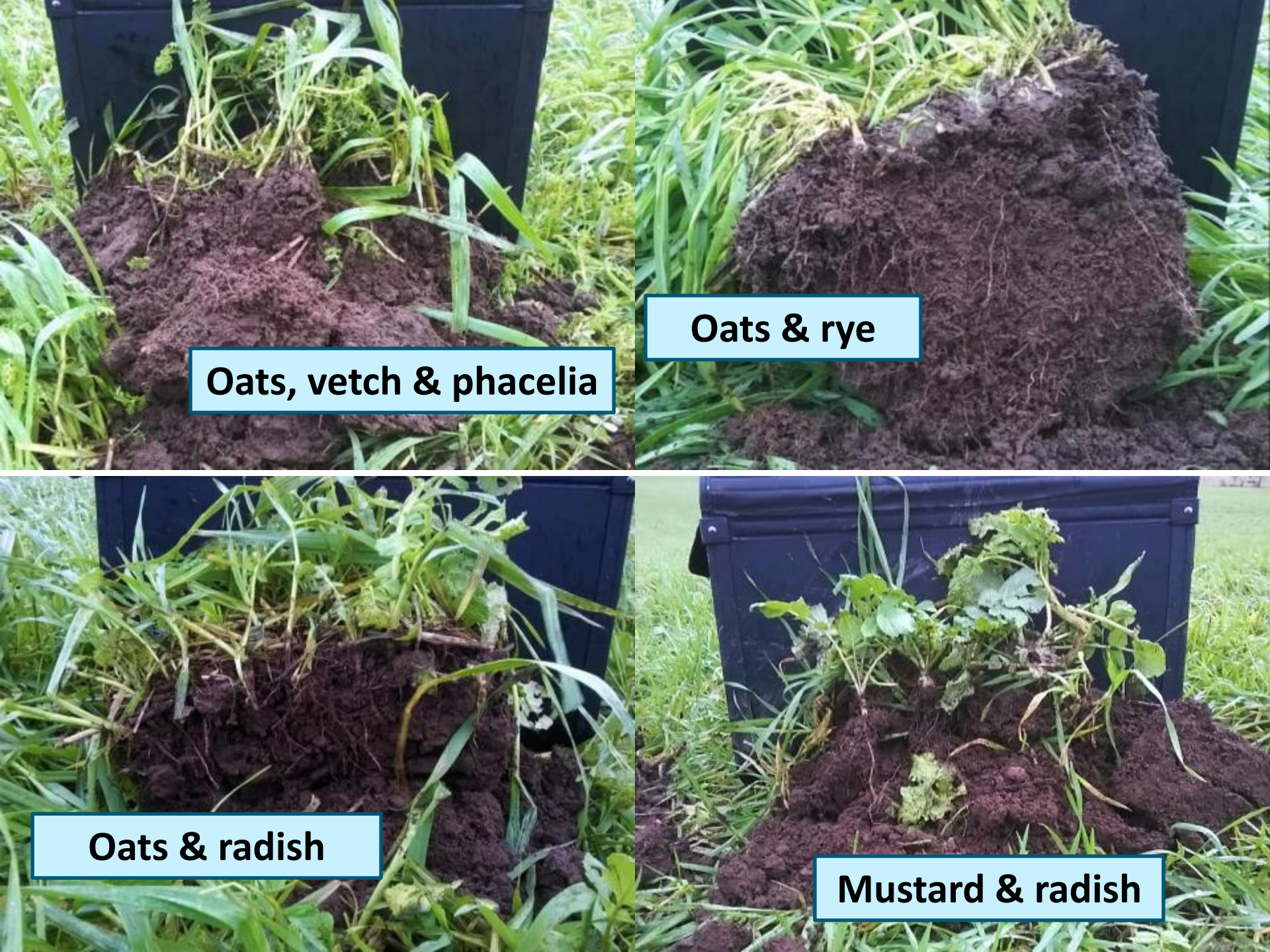

Oats & rye

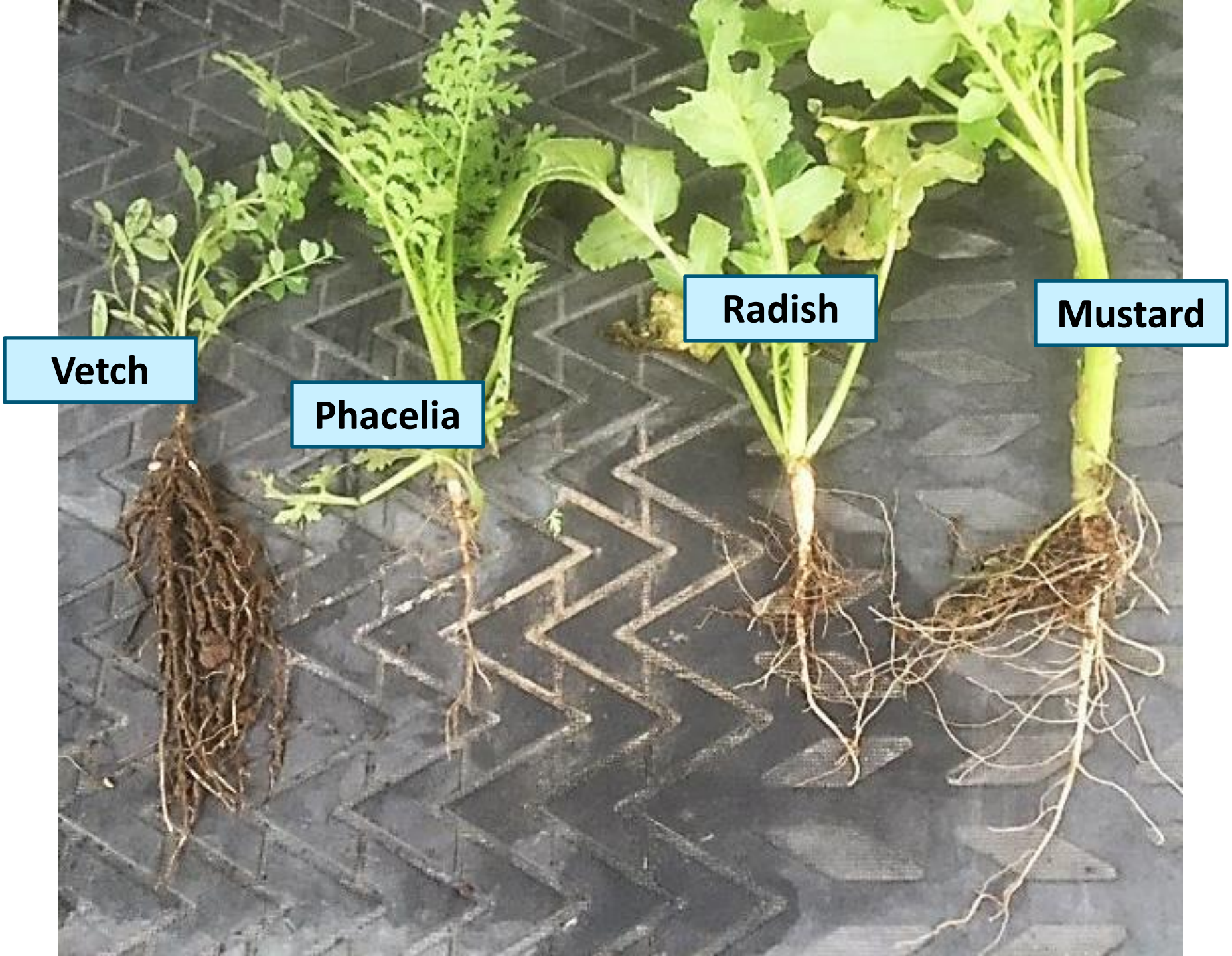

Oats & radish


Mustard & radish

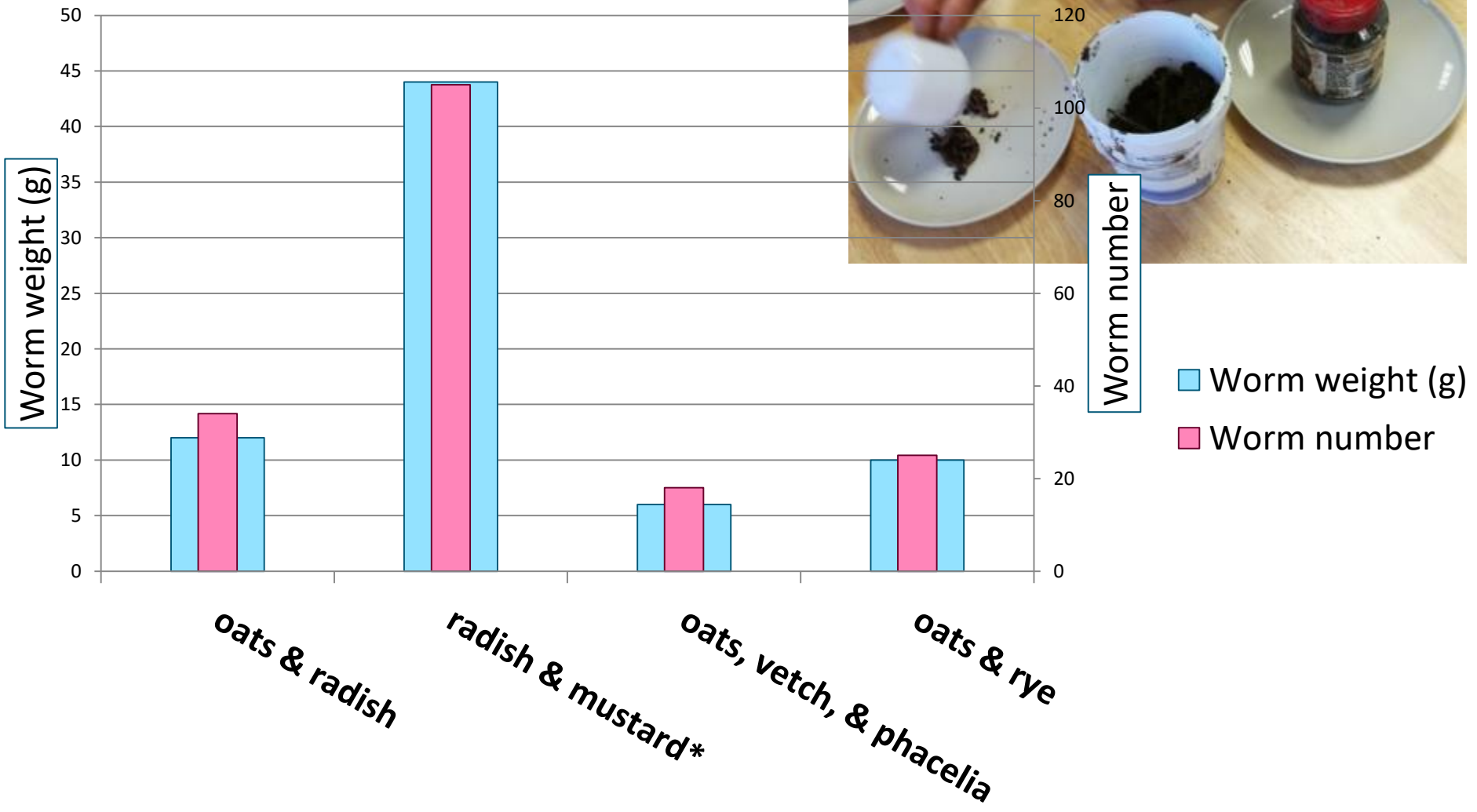
Assessments

- Cost (seed, cultivations)
- Green manure
  - Yield – potential for organic matter?
  - Protein – amount of N for following crop?
- Soil
  - Visual Evaluation of Soil Structure (VESS)
  - Earthworm number, weight and diversity
- Following crop
  - **Yield**
  - Weeds / volunteers
  - Visual assessment (residual nitrogen)

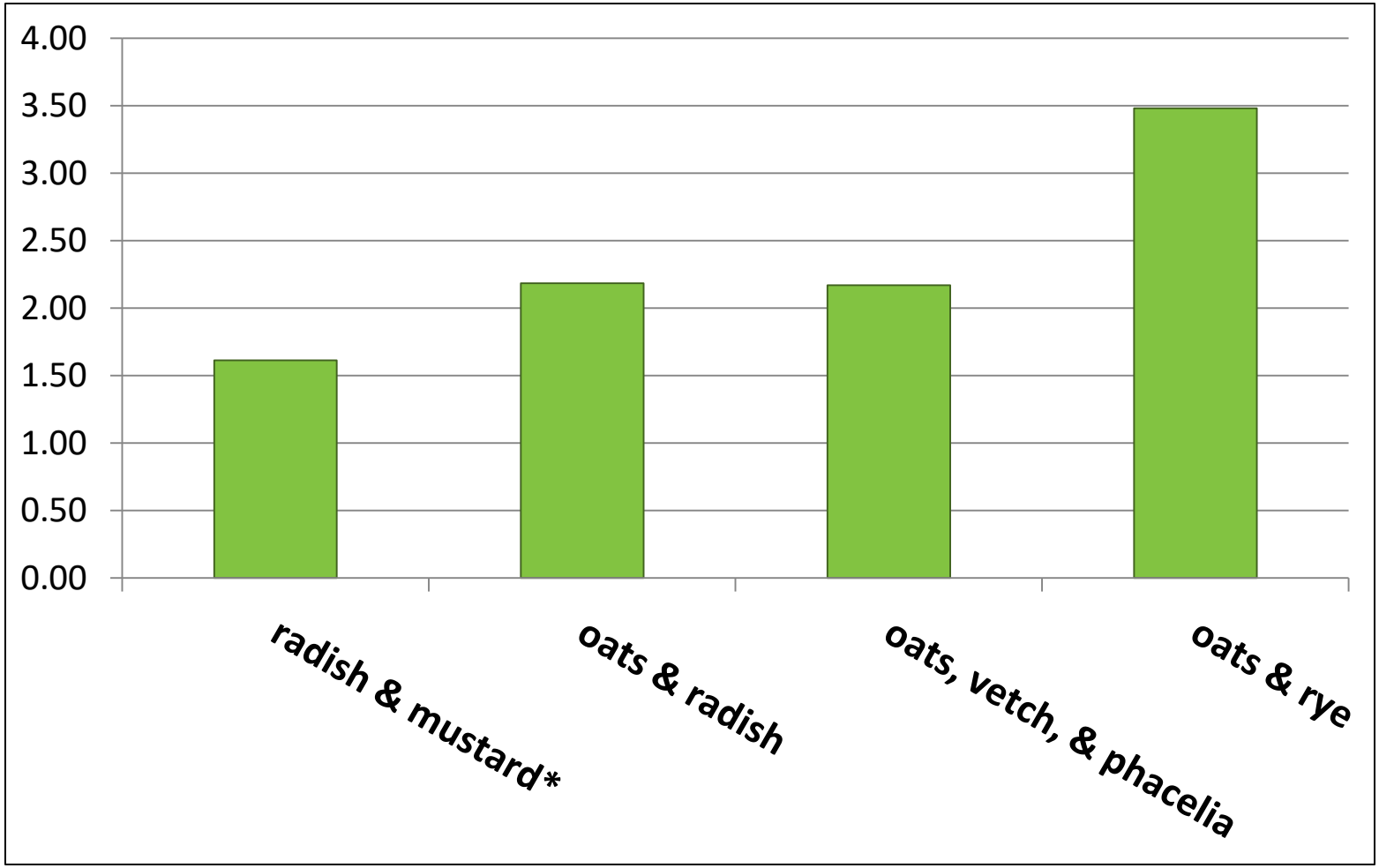

Oats, vetch & phacelia
Oats & rye
Oats & radish
Mustard & radish


Vetch
Phacelia
Radish
Mustard

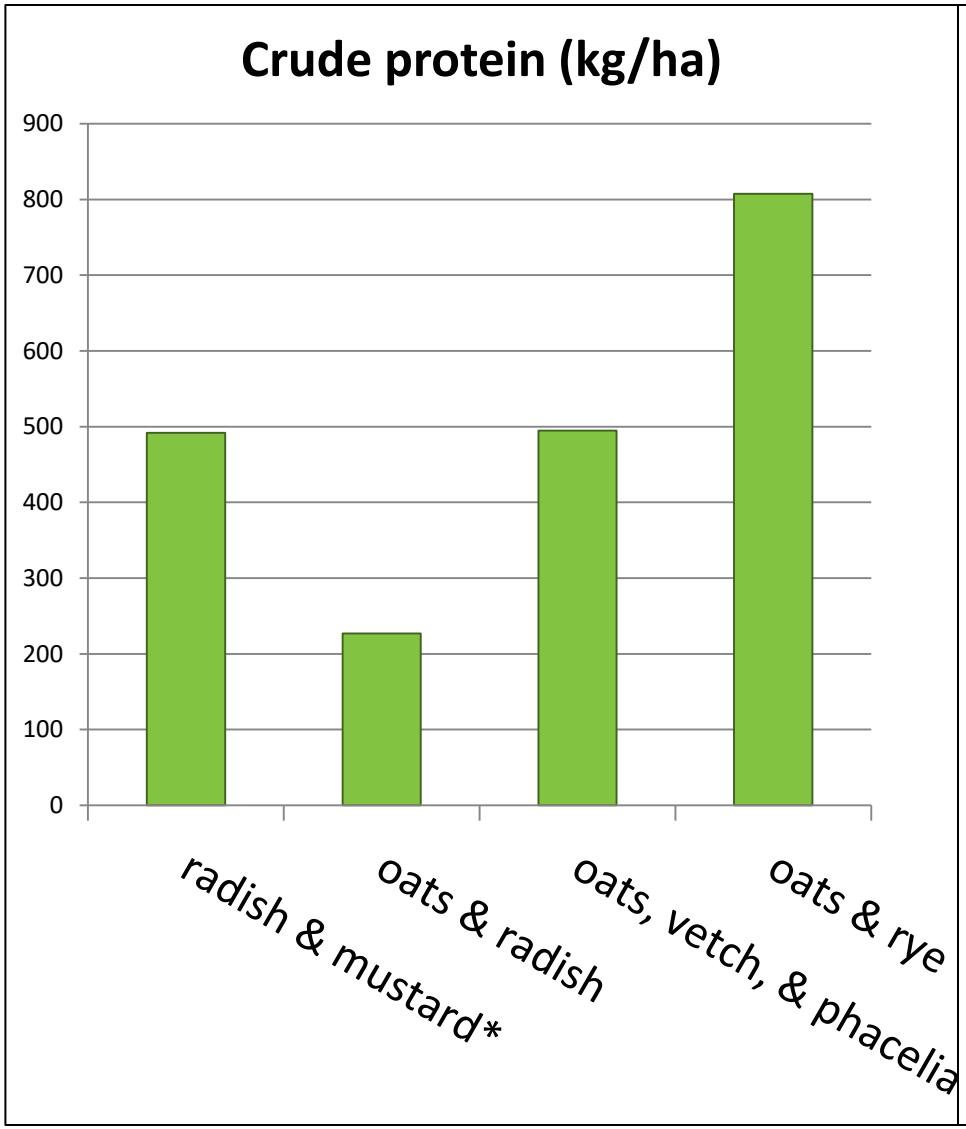
Earthworms

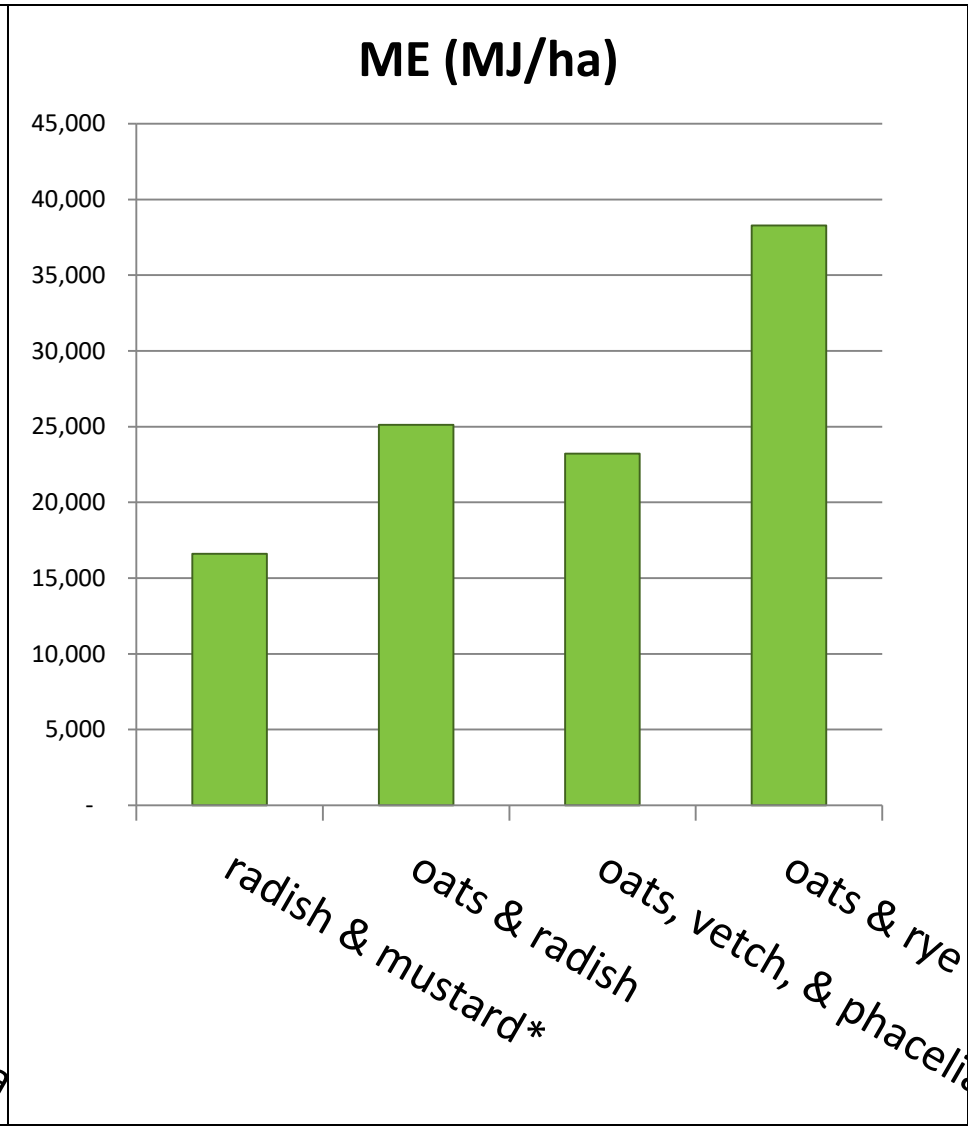

Worm weight (g)
Worm number
50
45
40
35
30
25
20
15
10
5
0
120
100
80
60
40
20
0
oats & radish
radish & mustard*
oats, vetch, & phacelia
oats & rye
Worm weight (g)
Worm number

Dry matter yield (t/ha)



Protein and ME (per ha)





So what's best?

- In this trial…
- Oats, vetch, and phacelia for **soil structure**
- Mustard and radish (least cultivations in establishment) is best for **earthworms**
- Oats and rye for **bulk** and **nitrogen**

- We won't really know until the following crop of spring barley is ready

What next?

- A visit to Leslie's in spring to see the green manure
- Measurements in the green manure and spring barley crop
- Look at the results, and think about what they mean
- SRUC and the James Hutton Institute are also doing green manure trials, look at their findings
- **Are green manures worth sowing?**

The European Agricultural Fund for Rural Development: **Europe investing in rural areas**

The Scottish Government

QMS

Forestry Commission Scotland

The Princes Charities

Innovative Farmers

Part of the Duchy Future Farming Programme