FARM ADVISORY SERVICE

This event is being run by SAC Consulting

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Cover Crops and Green Manures

What are green manures?

- Green manures
- Green cover
- Cover crops
- Catch crops

What crops are best?

Depends on what you want to achieve different crops have varying effects / benefits.

The main benefits identified can be categorised as:-

- Soil structural improvement
- Soil stabilisation
- Organic matter improvement
- Soil biology improvement
- Weed suppression
- Pest control
- Nitrogen retention
- Nitrogen fixation
- Increased pollination
- Increased biodiversity

Potential problems

Care has to be taken with green manures / cover crops as there may be disadvantages depending on the green manure used and the following crop.

The following disadvantages may occur

- Pest and disease green bridge between crops
- Time to get crop established soil temperature may not be suitable in the autumn to establish certain crops
- Clubroot risk with brassicas
- Some crops susceptible to frost and not winter hardy
- Length of time for legumes to fix nitrogen may not be available
- Getting crop sown timeously may be an issue due to harvest autumn workload.
- Seed burden acting as weed in following crop.

What are green manures? - brassicas

Green Manure crop	Sowing Date	Soil Type	Benefits
Mustard	March - September	Most	Large volumes of organic matter helps improve soil texture and water retention.
Brown mustard (Caliente)	March – mid October	Most	Large volumes of organic matter helps improve soil texture and water retention. When ploughed in it gives off gases which help reduce potato cyst nematode levels in the soil.
Fodder radish	May - August	Most	Long tap roots penetrate deep into soil and draw up nutrients. Produces lots of foliage which helps improve soil structure.
Tillage radish	May - August	Most	Large bulb which penetrates into the ground to help improve soil structure.

What are green manures? - legumes

Green Manure crop	Sowing Date	Soil Type	Benefits
Red clover	April to August	Loam or sandy soil	Fast growing perennial, excellent nitrogen fixer, smothers weeds and tap root helps soil structure.
Sweet clover	March – May & August to September	Most (does well on hard compacted soils)	Has vigorous root system and draws up minerals and penetrates heavy soil, produces lots of leafy foliage which adds organic matter to soil.
White clover	March - August	Most (can tolerate poor drainage)	Excellent long term green manure for between semi permanent crops such as soft fruit.
Crimson Clover	April - September	Loam or sandy soil	Fast growing bulky plant which fixes nitrogen and smother's weeds.
Vetches (winter tares)	March – May or July to September	Most	Good nitrogen fixer and weed suppressor, helps prevent nutrient leaching overwinter.
Field beans	September to November	Most avoid dry soils, likes heavier soils	Particularly good on heavy soils, fixes nitrogen and helps soil structure.
Yellow Trefoil	March - August	Copes with light dry soils prefers non acid soils	Low growing so works well with tall companion crops, fixes nitrogen and suppresses weeds.

What are green manures? - other

Green Manure crop	Sowing Date	Soil Type	Benefits
Italian ryegrass	March - October	Most	Good at mopping up nitrates and releasing them slowly when incorporated.
Phacelia	March - September	Most (but likes dry soils)	Quick growing, weed suppressing that produces lots of organic matter.
Buckwheat	May - August	Most (does not like heavy soils)	Quick growing, weed suppressing.
Forage Rye	March – May or August to November	Most (likes clay soils)	Excellent for overwintering and covering soil to prevent leaching.
Vetches (winter tares)	March – May or July to September	Most	Good nitrogen fixer and weed suppressor, helps prevent nutrient leaching overwinter.
Field beans	September to November	Most avoid dry soils, likes heavier soils	Particularly good on heavy soils, fixes nitrogen and helps soil structure.
Yellow Trefoil	March - August	Copes with light dry soils prefers non acid soils	Low growing so works well with tall companion crops, fixes nitrogen and suppresses weeds.

Mains of Loirston Project - 2017

- **GRN 1 - 4.00kg/ha red clover, 10.00kg/ha mustard, 40.00kg/ha triticale = 54.00kg per hectare @ £84.00 / hectare**
- **GRN 2 - 2.00kg/ha red clover, 3.00kg/ha oilseed radish, 10.00kg/ha Italian ryegrass = 15.00kg per hectare @ £58.00 / hectare**
- **GRN 3 = 4.00kg/ha red clover, 4.00kg/ha chicory = 8.00kg per hectare @ £88.00 / hectare**
- **GRN 4 - 30.00kg/ha spring vetch, 120.00kg/ha rye = 150.00 kg per hectare @ £130.00 / hectare**
- **GRN 5 - 60.00kg/ha spring vetch, 10.00kg/ha Italian ryegrass, 10.00kg/ha mustard = 80.00kg per hectare @ £180.00 / hectare**

Growing

- GRN 1

Growing

- GRN 2

Growing

- GRN 3

Growing

- GRN 4

Growing

- GRN 5

Yeild

Plot	Wet Yield (t/ha)	Dry Yield (t/ha)	N (kg/ha)	P (kg/ka)	K (kg/ha)
1	33	9.4	227	68	142
2	110	39.7	276	151	292
3	67	12.3	268	89	218
4	33	10.3	164	35	18
5	44	14	182	50	120

Following Crop Yield

Plot	Yeld (t/ha)
1	9.4
2	9.4
3	9.0
4	9.1
5	9.1
Control	8.1

Mains of Loirston Project - 2018

- **Grn 6 - £92.00/ha - triticale 80kg/ha, cocksfoot 2kg/ha, crimson clover 2kg/ha, oilseed radish 2kg/ha, quinoa 1kg/ha, phacelia 0.5kg/ha.**
- **Grn 7 – £99.00/ha - triticale 40kg/ha, cocksfoot 5kg/ha, crimson clover 2kg/ha, oilseed radish 1kg/ha, chicory 2kg/ha, phacelia 0.5kg/ha.**
- **Grn 8 - £102.00/ha - triticale 180 kg/ha, cocksfoot 2kg/ha crimson clover 4kg/ha, oilseed radish 2kg/ha, quinoa 1kg/ha, phacelia 0.5kg/ha.**
- **Grn 9 – £99.00/ha - triticale 40 kg/ha, cocksfoot 5kg/ha, crimson clover 2kg/ha, oilseed radish 1kg/ha, chicory 2kg/ha, phacelia 0.5kg/ha.**

Mains of Loirston Project - 2019

- **GRN 1 - £76.00 per hectare - spring oats 40kg/ha Italian ryegrass 10kg/ha red clover 3kg/ha**
- **GRN 2 – £174.00 per hectare – buckwheat 40kg/ha, chicory 2kg/ha, red clover 3 kg/ha**
- **GRN 3 - £84.00 per hectare - Italian ryegrass 10 kg/ha, Chicory 2kg/ha, Red Clover 3 kg/ha**
- **GRN 4 – £135.00 per hectare - 30 Buckwheat 30kg/ha, Italian ryegrass 10kg/ha, Crimson Clover 3 kg/ha**
- **GRN 5 – £120.00 per hectare - Italian Ryegrass 10 kg/ha, Borage 5kg/ha, Crimson Clover 3 kg/ha**

Key lessons

- Soil structure improves for following crop
- Ground is drier compared to stubbles
- Worm numbers increase especially on the fields with higher soil N
- Following crop yields are higher than those without a green manure
- Organic matter increasing??

Any Questions?