# Cover Crops – My Experience


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# Why Did I Try Grow Green Cover Crops

- As an experiment – 5 x 1ha trials at Cuplahills in 2014 for Kings
- 6 x 1ha trial plots in 2015 (Turnip Rape & Mustard new this year)
- Ongoing cropping – winter peas, phacelia, clover, legumes
- To introduce more organic matter into the soil – no FYM available
- To reduce risk of water erosion by providing a green cover
- To scavenge soil nitrogen
- To reduce bagged nitrogen input in next crop
- To reduce risk of nitrogen leaching into drains and water courses
- To provide wildlife cover & feed in winter (partridge, pheasant, deer)
- EFA cover crop requirement

# 5 Trial Plots: Planted 8th Sept 2014

- Trials sown into 21ac of Propino spring barley ground that yielded well
- Harvested 8-10th August 2015
- Straw baled except on endriggs
- Sown 8-10th September 2015
- One pass with a power harrow & drill
- 10kg N/Ha applied on most fields
- Cambridge rolled
- Approximately 72ac of other SB & WW stubbles planted
- Trial with no Nitrogen on WW stubble
- Trial with 20kg Nitrogen put on one WW stubble

# Big Boys & Their Toys

# Vetch & Forage Rye: 9/10/14 => 25 days

- Vetch (legume)
- Forage Rye
- Vetches grow at lower temp & continue to fix N
- Forage rye is leafy with deep roots
- Recommend:  July / August sow
- £40kg/ha - £48/ha (up to 50kg/ha)

# Soil Vitality Mix: 9/10/14 => 25 days

- Oil Radish
- Strigosa Oat (rogueing!)
- Berseem Clover
- Vetch
- Phacelia
- Recommend:  July / August sow
- 25kg/ha - £44/ha

# Oil Radish & Tillage Radish: 9/10/14 => 25 days

- Oil Radish (80%)
- Tillage Radish (20%) – Tap root
- Good for breaking up compacted soils
- High quantity of green matter
- 15kg/ha (around £45/ha)

# Oil Radish: 9/10/14 => 25 days

- Oil Radish (100%)
- Good for breaking up compacted soils
- High quantity of green matter
- 18kg/ha - £45/ha

# Oil Radish After W Wheat (poor yield) +20kgN/Ha
# Planted: 11/9/14 – Photo: 10/12/14 => 95dys

# 6 Species Grown at Cuplahills: 8th Dec 14 = 93 days

Oil Radish

Forage Rye

Vetch

Tillage Radish

Phacelia

Berseem Clover

# Oil Radish

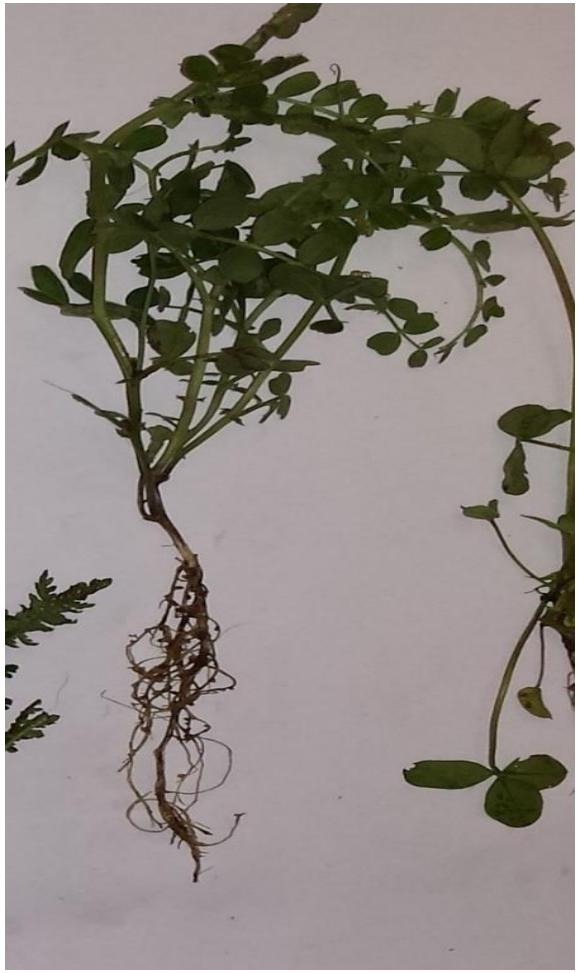
- Brassica
- Fast growing
- Excellent at scavenging Nitrogen and hence preventing leaching
- Improves soil structure by producing high organic matter yields
- Deep soil penetration
- Removes moisture
- Club root resistant
- Died back a bit in the cold

# Tillage Radish

- Brassica family
- Fast growing
- Excellent at scavenging Nitrogen and hence preventing leaching
- Improves soil structure by producing high organic matter yields
- Deep soil penetration
- Removes moisture
- Club root resistant
- Died back a bit in the cold

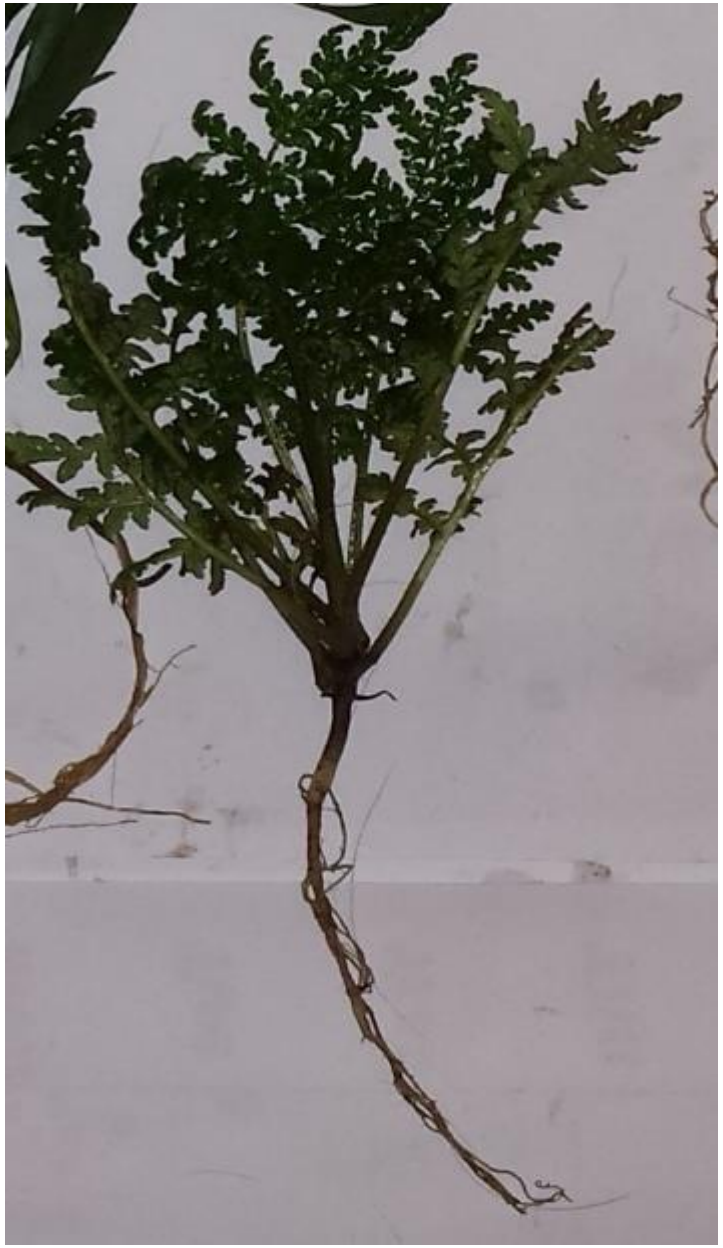
# Vetch

- Legume family
- Fast growing
- Fixes atmospheric N using root nodules
- Good frost resistance
- Deep soil penetration
- Removes moisture



# Phacelia

- 10 Dec 14 = 93 days
- Germinates in lower temperatures
- Fast growing
- Extensive root system develops
- Good frost resistance
- Deep soil penetration
- Removes moisture
- Great purple flower for bees if left to grow



# Berseem Clover

- 10 Dec 14 = 93 days
- Legume family
- Fixes atmospheric N using nodules
- Germinates in lower temperatures
- Fast growing
- Extensive root system develops
- Relatively poor frost resistance

# Cover Crop Trials 2015: Sown 13/9/15, Photo 27/10/15 = 44 Days






# 2015 Trials – Good Growth @ 44 days – Compaction Issue

# Cuplahills Cover crop trial results

| | Fresh wt Tonne /ha | DM Tonne /ha | %N | "N" KG /HA | Crude Protein % | ME MJ /KG |
|---|---|---|---|---|---|---|
| Rye /vetch | 3.1 | 0.51 | 5.24 | 26.7 | 33 | 11.2 |
| Vitality mix | 5.3 | 0.72 | 4.61 | 33.2 | 29 | 10.6 |
| Structure mix | 4.7 | 0.59 | 4.5 | 26.5 | 28 | 11.3 |
| Radish x2 + tillage | 4.9 | 0.65 | 3.54 | 23.0 | 22 | 11.3 |
| Radish 18 kg /ha | 6.7 | 0.84 | 3.98 | 33.43 | 25 | 11.2 |
| Radish 9 kg /ha | 6.7 | 0.81 | 3.96 | 32.00 | 25 | 11.1 |
| Radish Non demo | 12.2 | 1.28 | 5.77 | 73.8 | 36 | 11.7 |
| *Turnip rape AF* | *14.5* | *2.21* | *3.89* | *86.00* | *24* | *11.9* |

# Scotland Green Cover

## Three Site Summary - January 2015

Kg Nitrogen per hectare recorded in green material per site plus average of the 3

| Crop | Borders | Lothian | Fife | Average Kg N/ha |
|---|---|---|---|---|
| Oil radish | 44 | 62 | 46 | 51 |
| Oil/tillage radish | 50 | 56 | 23 | 43 |
| Turnip rape | 47 | n/a | 86 | 67 |
| Vitality Mix | 50 | 42 | 33 | 42 |
| Structure Mix | n/a | 29 | 27 | 28 |

# Oil Radish Benefits – Quantifiable

| Seedbed Nitrogen Applied (kg of N/ha) | 30 | 20 | 10 | 0 |
|---|---|---|---|---|
| Fertiliser Cost (£/ha) | 18 | 12 | 6 | 0 |
| Seed Cost (oil radish @18kg/ha @ £2.10/kg) | 38 | 38 | 38 | 38 |
| Contracting Establishment Cost (£/ha) | 50 | 50 | 50 | 50 |
| Fuel Cost (£/ha) | 5 | 5 | 5 | 5 |
| **Total Establishment Cost (£/ha)** | **111** | **105** | **98** | **92** |
| **Total Establishment Cost (£/ac)** | **45** | **42** | **40** | **37** |

| | Per Ha | Per Ac |
|---|---|---|
| Cost to Establish Oil Radish + 30kgN/ha (£) | £111 | £45 |
| *Total N Available in Green Matter (kg/ha)* | *50* | *20* |
| *Nitrogen Value (£/kg N)* | *£0.70* | *£0.70* |
| *Value of Nitrogen Scavanged (£)* | *£35* | *£14* |
| N Saving on Next Crop 15kgN/ha @ 61p/kg (£) | £11 | £4 |
| Net Cost of Green Cover (£) | £100 | £41 |

| | | |
|---|---|---|
| EFA Multiplier Effect = 3 (GCC) : 1 (Fallow) | £300 | £122 |
| S Barley Gross Margin (£) | £371 | £150 |
| Financial Benefit of Using EFA Green Cover | £70 | £28 |

# Oil Radish Benefits: Non-Quantifiable

- Organic matter build up
- Improved soil biota
- Improved water quality
- Nitrogen produced by Legumes
- Forage for livestock
- Environmental habitats for wildlife
- Reduced soil erosion risk
- Carbon sink development (environmental)

# Green Cover Crop Observations

- Green cover crops in the trials did not like any kind of compaction
  - Headlands suffered, tramlines, even combine tracks
- Excessive chopped straw reduced growth on S Barley land
  - Soil bacteria starved of Nitrogen?
- W Wheat stubble performed better than S Barely stubble
  - Residual nitrogen effect => more soil N after W Wheat?
- Reducing seed rate by 50% made little difference
  - Opportunity for savings on seed cost
- Oil Radish attacked by Flee Beatle
- Oil Radish provided a host for Flea Beetle throughout 2015
- Oil Radish allowed to grow through summer = topping problem!

# Summary of Issues to Consider

- Previous crop
  - Residual Nitrogen available / yield / compaction / straw
- Planting time
  - Early establishment key to growth
- Period of time required for good growth
- Drilling
  - Best method / speed / compaction / tilth
- Can Nitrogen be applied (NVZ)
- Crop rotation
  - Flee Beetle / Club Root
  - Availability of N to next crop – malting barley concerns
- EFA requirement
- Forage production for livestock
- Many benefits but need to consider the cost v benefit
  - Long term benefit to soil Organic Matter

# Livestock Benefit

- Best Green Cover at Cuplahills: 1.28t DM/ha (oil radish + 30kgN/ha)
- Suckler cow requirements per day during pregnancy = 12.5 kg DM/dy
- Suckler cow for 5 months needs 1,875kg DM = 1.5ha/cow

- Cost to grow Green Cover (30kgN/ha) = £111/ha
- Cost per cow = £111 x 1.5ha/cow = £167/cow (could be halved to £83)
  - Say 40 cows on 60ac
- Management – say 1hr/dy @ £10/hr = £38/cow
- Fencing – estimate at: = £20/cow
- Total wintering cost: = £225/cow (double stocking rate £142)

- Cow away wintering cost £12/hd/wk = £257/cow

# W Barley v S Barley Gross Margin

| | | | | |
|---|---|---|---|---|
| **Spring Barley** | | | | |
| Sales 3t/ac | 7.41 | t/ha @ | 160 | 1186 |
| Seed | 183 | kg/ha @ | 400 | 74 |
| 2 sprays - no desiccant | | | | 87 |
| Liquid Fertiliser 127kg N/ha | | | | 150 |
| Contracting | | | | 320 |
| Total Growing Costs | | | | 632 |
| Gross Margin (£/ha) | | | | 554 |
| Gross Margin (£/ac) | | | | 224 |
| **Winter Barley** | | | | |
| Sales 3.5t/ac | 8.65 | t/ha @ | 130 | 1124 |
| Seed | 190 | kg/ha @ | 400 | 77 |
| 3 sprays - no desiccant | | | | 99 |
| Liquid Fertiliser 127kg N/ha | | | | 201 |
| Contracting | | | | 442 |
| Total Growing Costs | | | | 818 |
| Gross Margin (£/ha) | | | | 306 |
| Gross Margin (£/ac) | | | | 124 |

## Formulating diets

Diets must provide the required nutrients for maintenance, activity, lactation, growth and pregnancy. Guidance on the nutritional requirements of suckler cows are shown below.

### Rules of Thumb

- Suckler cow maintenance = 5 + 0.1 liveweight
- Lactation = 1 litre = 5MJ

Therefore a 650kg suckler cow producing 13 litres of milk a day requires:

- Maintenance: 5 + 65 = 70MJ/day
- Lactation: 13 x 5 = 65 MJ/day

Total ME requirement for the cow is 135MJ/day.

### Nutritional requirements

| Period | DM Intake (kg) | MJ (ME/ day) | Crude Protein (% DM) |
|---|---|---|---|
| Dry cow | 9.5-10 | 75 | 8.5 |
| 6 weeks post calving | 12.6 | 140 | 12+ |
| 18 weeks post calving | 12.5 | 130 | 11.5 |

It is important to remember that the overall diet should be formulated to provide suckler cows with the following nutrients, not forgetting to check that fresh clean water is always available:

**Carbohydrates** **Proteins** **Fats** **Macro elements** **Trace elements** **Vitamins**