Potential for cover crops in Northern Ireland

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Various names used
► Cover crops – cover the ground
► Catch crops – ‘catch’ nutrients preventing them from being lost
► Green manures – improve soil characteristics or benefit succeeding crop

Any species or mixture of species can be used
► selection may be restricted within some schemes

Most work at Oak Park (and abroad) on single species
► Limited information on benefit of mixtures over single species
► Legume/non-legume mixtures have been investigated
Various different uses

- Nutrient capturing
- Soil enhancing
- Pest control
- Weed suppression
- Green manures
- Animal grazing
Options

Grass/cereals
- Risk of pest/disease carryover
- Some can have negative effect on succeeding crop (e.g. rye)
- Risk of weed problems in succeeding crop
- Some possibly less suitable for reduced tillage
- Potential source of forage

Brassicas
- Fast growing and relatively cheap
- Limited disease/pest risk for cereals (if no volunteers)
- Can reduce pests, diseases and weeds
- Can host sclerotinia
- Can be tall – difficult to plough without chopping
Options

Phacelia
► Relatively expensive seed
► Small seed - difficult to broadcast
► Establishment requires cultivation
► Different family to crops – good disease break
► Generally good weed suppression
► Can be easier to incorporate than brassicas

Legumes
► Potential to fix nitrogen and reduce fertiliser requirement
► Seed can be expensive
► Good from disease/pest risk
► Can be poor for N leaching
Establishment

- Earlier the better
- Keep costs down – no ploughing
- Roll to ensure better germination
- No fert. needed
# GLAS

## List of Prescribed Catch Crops

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>SEED RATE KG/HA</th>
<th>SPECIES</th>
<th>SEED RATE KG/HA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buckwheat</td>
<td>35 – 50</td>
<td>Rye</td>
<td>70 – 90</td>
</tr>
<tr>
<td><strong>Crimson Clover</strong></td>
<td>10 – 15</td>
<td>Tillage Radish</td>
<td>5</td>
</tr>
<tr>
<td><strong>Berseem Clover</strong></td>
<td>10 – 15</td>
<td><strong>Vetch</strong></td>
<td>12</td>
</tr>
<tr>
<td>Forage/Fodder Rape</td>
<td>3 – 5</td>
<td>Leafy Turnip</td>
<td>5</td>
</tr>
<tr>
<td>Mustard</td>
<td>15 – 20</td>
<td><strong>Peas</strong></td>
<td>30</td>
</tr>
<tr>
<td>Oats (&amp; Black Oats)</td>
<td>75 – 100</td>
<td><strong>Beans</strong></td>
<td>100 – 120</td>
</tr>
<tr>
<td>Phacelia</td>
<td>5 – 10</td>
<td></td>
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</tr>
</tbody>
</table>
Potential benefits

- Reduction of nutrient loss (mainly nitrate)
- Reduction of pests, diseases, weeds
- Prevention of erosion
- Improvement of organic matter
- Improvement of soil structure
- Increased nutrient supply to next crop
- Potential to reduce fertiliser inputs
- Source of forage
- Yield benefits
Cover crops or natural regeneration can substantially reduce nitrate leaching on leaching prone soils

Winter 06  Winter 07  Winter 08

Premrov et al. 2014
Effects on pests, disease and weeds

♦ Can have variable effects

♦ If cover crop is a host of the disease it can carry disease
  ► Rhyncho
  ► Mildew
  ► Aphids (BYDV)
  ► Take-all

♦ Weed effects generally related to fast growth and height

♦ Pest/disease reducing effects can be variable
  ► Can be variety dependent eg nematode reducing varieties of radish
Improvement of organic matter/soil structure

♦ Effects on total organic matter will be small
  ► 3 t/ha DM input ~ 0.01-0.02 % increase in organic matter

♦ Effects on fractions of organic matter may be greater
  ► Can have positive biological effects

♦ Effects will be governed by inputs

♦ Reduce effect of rainfall on soil surface

♦ Improve aggregate stability

♦ Can affect soil water and temperature
Potential disadvantages

♦ Negative effects on succeeding crop
  ► Allelopathic effect
  ► Carryover of pests/disease/volunteers

♦ Cost
  ► Incurs additional cost in the system
  ► Yield benefits are variable and often small
  ► Can be a net cost on the system when economic costs outweigh benefits
  ► Management can help
**Effect on yield Expt. A 2004-2006 Light soil (relative to bare stubble)**

NR -  > natural regeneration without stubble cultivation
NR +  > natural regeneration with stubble cultivation
Effect on yield Expt B 2004-2006  Light soil (relative to bare stubble)
Effect on yield 2004-2006 Medium soil (relative to bare stubble)

Spring barley yield (t/ha)

- Mustard
- Oats
- Peas
- Radish

Yield (t/ha)

ns

ns

ns

ns

Agriculture and Food Development Authority
Small effects of sown species compared to NR (2007)
Small effects of sown species compared to NR (2014)
Cover crops can accumulate large amounts of N but accumulation is very variable
Effect of cover crops on fertiliser N requirement

- Many factors involved
- Somewhat comparable to organic manures
- Variable and difficult to predict
What to sow?

Factors that need to be considered

♦ Seed cost
  ► Cost of expensive seed may not be recouped

♦ Rotation
  ► Avoid crops that will cause problem for succeeding crop
    ► Disease, volunteers, pests

♦ Method of sowing
  ► Mixtures of big and small seed difficult to broadcast

♦ Benefits required
  ► Some crops better for soil structure improvement
  ► Some better for positive effect on succeeding crop (e.g. legumes)
When to sow?

- With spring crop
  - Undersown grass/clover – not for grassland establishment

- Before harvest
  - Spread into growing crop
  - Allows early establishment
  - Can cause harvesting problems

- At harvest
  - Autocast type system

- Post harvest
  - In combination with normal tillage operation (min-till or stubble cultivation)
  - Additional operation if not using autumn cultivation already
  - Normally some cultivation + consolidation required

*(n.b. scheme conditions may dictate sowing date)*

Growth declines with temp
Early sowing essential
Late Aug – early Sept
Time of sowing effect and compaction

July 30

Sept 23

Photos: December 23

November 2
Cover growth is dependent on available N

Excessive growth can indicate excessive fertiliser N application to previous crop
Leguminous cover crops can reduce fertiliser N requirement

Spring barley yield (t/ha)

NR | Mustard | Hairy vetch | Peas | Lentil | Grass pea
---|---------|-------------|------|--------|---------
No fert N | + 120 kg N/ha

NR: No Treatment
Legume N benefit can vary between seasons
Conclusions

Cover crops in Northern Ireland?

- Have positive environmental effects
  - Reduced N leaching (where leaching is a problem)
- Can improve soil structure/soil ‘quality’
- Can increase or decrease pests and diseases
- Effects on yield variable
- Effects on N requirement small (exception of legumes)
- Covers invoke additional costs (seed, sowing, destruction)
- Economic benefits can be small in the absence of financial incentive
  - Dependent on management, crop choice and year