Putting a value on IPM

Dr Henry Creissen
Research Fellow, Scotland’s Rural College
Impact Officer, Plant Health Centre

henry.creissen@sruc.ac.uk
Integrated Pest Management process
VI IPM Assessment Plans

♦ Tool to facilitate discussion between farmer and agronomist
♦ Data collection
  ♦ Baselines
  ♦ IPM score (0-100)
  ♦ Identify issues/topics
  ♦ Direct R&D + KTE

• SFI IPM1 £989/annum
IPM Tool

Create IPM plans for your farm

Start now
MY FARM - WINTER BARLEY DISEASE CONTROL MEASURES - 2023

Please select the category that best describes what actions you plan to implement or not implement.

**Control volunteers & weeds**

- **Useful for**: Brown Rust, Mildew, Seed borne Diseases, Take-All, Yellow Rust

  - Use in current cropping season
  - Intend to use in future seasons
  - Not suitable for my farming system
  - No intention to implement

<table>
<thead>
<tr>
<th>Last year selection</th>
<th>Last year notes</th>
</tr>
</thead>
</table>

**Decision support (including thresholds)**

- **Useful for**: Brown Rust, Leaf blight, Eyespot, Mildew, Yellow Rust

  - Use in current cropping season
  - Intend to use in future seasons
  - Not suitable for my farming system
  - No intention to implement

<table>
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</table>

**Field history, rotation & break crops**

- **Useful for**: Eyespot, Leaf and Glume Blast, Take-All, Yellow Rust

  - Use in current cropping season
  - Intend to use in future seasons
  - Not suitable for my farming system
  - No intention to implement

<table>
<thead>
<tr>
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</table>

**Hygiene**

<table>
<thead>
<tr>
<th>Last year selection</th>
<th>Last year notes</th>
</tr>
</thead>
</table>
VI IPM Assessment Plans: IPM scores

<table>
<thead>
<tr>
<th></th>
<th>Arable</th>
<th>Grass</th>
<th>Hort</th>
</tr>
</thead>
<tbody>
<tr>
<td>England</td>
<td>13764</td>
<td>912</td>
<td>329</td>
</tr>
<tr>
<td>Scotland</td>
<td>2034</td>
<td>207</td>
<td>26</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15798</strong></td>
<td><strong>1119</strong></td>
<td><strong>355</strong></td>
</tr>
</tbody>
</table>
UK Arable: High/Low IPM adopters

Max

Bottom 25% farmers

Top 25% farmers

IPM Points awarded

Max

Max

Max

Max

Cont. cereals
Rotation
Var. choice
Prevention measures
Planning factors
Discussion group.
UK Grassland: High/Low IPM adopters

Max

Max

Max

Max

Max

Bottom 25% farmers

Top 25% farmers

IPM Points awarded

Prevention measures

Planning factors

Spray adj.

Cultural adj.

Discussion group.
UK IPM Score - Arable area
UK IPM Score - Grass area
IPM score by crop
What factors influence your decision to **adjust your spray programme** (e.g. changes in timings, rates, products) throughout the season?
Q. How familiar are you with IPM? (1-5 scale)
IPM information source preference

Arable

- Contractors
- Social media
- Other farmers (not including discussion groups)
- Farming press
- Farmer discussion groups
- Information and updates from membership, levy and research organisations
- Evaluating previous control strategies
- Open days/crop walks
- Independent (e.g. AICC member) or in house agronomist
- Agronomist employed by a distributor

Grasslands
## Who needs to know what?

### Farmers top 10 pest threats

<table>
<thead>
<tr>
<th>Pest</th>
<th>Farmer</th>
<th>Agronomist</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slugs</td>
<td>26.37%</td>
<td>33.3%</td>
</tr>
<tr>
<td></td>
<td>(n=72; rank = 1st)</td>
<td>(n=9; rank = 2nd)</td>
</tr>
<tr>
<td>Couchgrass</td>
<td>14.65%</td>
<td>Did not mention</td>
</tr>
<tr>
<td></td>
<td>(n=40; rank = 2nd)</td>
<td></td>
</tr>
<tr>
<td>Leatherjackets</td>
<td>12.45%</td>
<td>14.8%</td>
</tr>
<tr>
<td></td>
<td>(n=34; rank = 3rd)</td>
<td>(n=4; rank = 8th)</td>
</tr>
<tr>
<td>Unsure</td>
<td>9.16%</td>
<td>Did not mention</td>
</tr>
<tr>
<td></td>
<td>(n=25; rank = 4th)</td>
<td></td>
</tr>
<tr>
<td>Blackgrass</td>
<td>8.79%</td>
<td>25.9%</td>
</tr>
<tr>
<td></td>
<td>(n=24; rank = 5th)</td>
<td>(n=7; rank = 4th)</td>
</tr>
<tr>
<td>Dockens</td>
<td>7.33%</td>
<td>Did not mention</td>
</tr>
<tr>
<td></td>
<td>(n=20; rank = 6th)</td>
<td></td>
</tr>
<tr>
<td>Cabbage Stem Flea Beetle</td>
<td>6.96%</td>
<td>7.4%</td>
</tr>
<tr>
<td></td>
<td>(n=19; rank = 7th)</td>
<td>(n=2; rank = 16th)</td>
</tr>
<tr>
<td>Thistles</td>
<td>6.96%</td>
<td>Did not mention</td>
</tr>
<tr>
<td></td>
<td>(n=19; rank = 8th)</td>
<td></td>
</tr>
<tr>
<td>Chickweed</td>
<td>6.59%</td>
<td>3.7%</td>
</tr>
<tr>
<td></td>
<td>(n=18; rank = 9th)</td>
<td>(n=1; rank = 38th)</td>
</tr>
<tr>
<td>Mildew</td>
<td>6.23%</td>
<td>Did not mention</td>
</tr>
<tr>
<td></td>
<td>(n=17; rank = 10th)</td>
<td></td>
</tr>
</tbody>
</table>

### Agronomists top 10 pest threats

<table>
<thead>
<tr>
<th>Pest</th>
<th>Agronomist</th>
<th>Farmer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Septoria</td>
<td>37.0% (n=10; rank = 1st)</td>
<td>5.13% (n=14; rank = 17th)</td>
</tr>
<tr>
<td>Slugs</td>
<td>33.3% (n=9; rank = 2nd)</td>
<td>26.37% (n=72; rank = 1st)</td>
</tr>
<tr>
<td>Ramularia</td>
<td>29.6% (n=8; rank = 3rd)</td>
<td>6.23% (n=17; rank = 11th)</td>
</tr>
<tr>
<td>Blackgrass</td>
<td>25.9% (n=7; rank = 4th)</td>
<td>8.79% (n=24; rank = 5th)</td>
</tr>
<tr>
<td>Aphids</td>
<td>22.2% (n=6; rank = 5th)</td>
<td>5.86% (n=16; rank = 13th)</td>
</tr>
<tr>
<td>Nematodes</td>
<td>18.5% (n=5; rank = 6th)</td>
<td>4.40% (n=12; rank = 22nd)</td>
</tr>
<tr>
<td>PCN</td>
<td>18.5% (n=5; rank = 7th)</td>
<td>5.13% (n=14; rank = 16th)</td>
</tr>
<tr>
<td>Leatherjackets</td>
<td>14.8% (n=4; rank = 8th)</td>
<td>12.45% (n=34; rank = 3rd)</td>
</tr>
<tr>
<td>Yellow rust</td>
<td>14.8% (n=4; rank = 9th)</td>
<td>0.37% (n=1; rank = 411th)</td>
</tr>
<tr>
<td>Barren brome</td>
<td>11.1% (n=3; rank = 10th)</td>
<td>4.03% (n=11; rank = 23rd)</td>
</tr>
</tbody>
</table>

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**2021 Phone Survey: 267 farmers and 26 agronomists in Scotland.**
...How?

<table>
<thead>
<tr>
<th>Information Source</th>
<th>Farmer</th>
<th>Agronomist</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other farmers (not including discussion groups)</td>
<td>68.9%</td>
<td>57.7%</td>
</tr>
<tr>
<td>Farmer discussion groups</td>
<td>60.3%</td>
<td>53.9%</td>
</tr>
<tr>
<td>Farming press</td>
<td>59.6%</td>
<td>30.8%</td>
</tr>
<tr>
<td>Information and updates from membership</td>
<td>46.1%</td>
<td>53.9%</td>
</tr>
<tr>
<td>Levy and research organisations</td>
<td>46.1%</td>
<td>53.9%</td>
</tr>
<tr>
<td>Open days/crop walks</td>
<td>43.5%</td>
<td>53.9%</td>
</tr>
<tr>
<td>Social media</td>
<td>30.3%</td>
<td>57.7%</td>
</tr>
<tr>
<td>Product manufacturer representative</td>
<td>26.2%</td>
<td>46.2%</td>
</tr>
<tr>
<td>Contractors</td>
<td>18.7%</td>
<td>19.2%</td>
</tr>
</tbody>
</table>

Respondents could choose all that apply.

2021 Phone Survey: 267 farmers and 26 agronomists in Scotland.
Phone surveys conducted in 2021 revealed preferred IPM information sources of 267 farmers and 26 agronomists in Scotland.

Size of the circle = source popularity.
Support payments for IPM – Sustainable Farming Incentive

- **Aim:** Determine the structure of economic incentives for farmer participation in the scheme


1. Training and planning
2. Habitat for natural enemies
3. Crop diversity
4. Pest and disease resistance
5. Decision support
6. No insecticide/molluscicide
7. Pesticide alternatives
Support payments for IPM

- Increasing the number of **crop types in rotation** was popular
  - not relevant to horticulture.

- **Companion cropping** was the least popular
  - High failure rate, complex agronomy and high management costs.

- **Not using insecticides**
  - perceived to be high risk in some crops.

- **Decision support systems**
  - adoption is higher in horticulture.
Support payments for IPM

- **Variety choice** can be dictated by market esp. horticulture.

- **Bioprotectants** more widely used/available in horticulture.

- **Habitat for natural enemies**, largely supported under **other schemes**. High costs and limited/delayed returns.

- **IPM planning** was widely accepted as valuable IPM action.

- **Flexibility within the standard is key to ensuring wide scale uptake.** Some of the options may not be applicable to certain groups of growers – non-arable rotations, those renting land on a short term basis.
Carlsberg signs up 23 farmers to grow ‘regenerative’ barley

We also already pay for actions to support the sustainable management of soils through the SFI arable and horticultural soils standard. These actions are:

- completing a soil assessment and producing a soil management plan
- testing soil organic matter
- adding organic matter
- having green cover on at least 70% of the land in the standard over winter (with the 70% including 20% multi-species cover crops at the intermediate level)

In addition to what is already available, we plan to pay for new actions in SFI on arable land covering:

- an adviser visit to assess and advise on integrated pest management and help to produce a plan
- an adviser visit to review and improve nutrient use efficiency
- establishing and maintaining in-field flower-rich strips, which will provide habitat for natural pest enemies
- establishing and maintaining grassy field corners and blocks
- establishing a companion crop for integrated pest management
- no use of insecticide

More detailed information on the actions we will be adding to SFI in 2023 is included later in this document. We are also exploring how we can pay for actions covering:

- tillage practices, including no till and direct drilling
- using precision farming approaches
IPM under non-inversion tillage

- Which diseases increase/decrease?
  - Variety performance?
  - Fungicide requirement?

Variety and fungicide decisions based on the pathogens and level of risk present in each tillage system?

- Other factors to consider:
  - Rotational effect on diseases
  - Previous / cover crop management
  - Tillage / system stage
  - Local disease pressure
Winter barley min till IPM

- **3 Tillage type**
  - Direct Drill (+straw)
  - Direct Drill (-straw)
  - Plough
- **2 Varieties**
  - Surge (res)
  - KWS Tower (sus)
- **4 fungicide programmes:**
  - 0/1/2/3 sprays
- **2 sites:**
  - Durie farm (Leven)
  - Mylnefield (Dundee)

<table>
<thead>
<tr>
<th>Trts</th>
<th>T0 GS 25-30</th>
<th>T1 GS 31</th>
<th>T2 GS 39-45</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Untreated</td>
<td>Untreated</td>
<td>Untreated</td>
</tr>
<tr>
<td>1</td>
<td>Untreated</td>
<td>Siltra Xpro 0.6l/Ha</td>
<td>Untreated</td>
</tr>
<tr>
<td>2</td>
<td>Untreated</td>
<td>Siltra Xpro 0.6l/Ha</td>
<td>Siltra Xpro 0.4l/Ha</td>
</tr>
<tr>
<td>3</td>
<td>Cyflamid 0.3l/Ha + Comet 0.4l/Ha</td>
<td>Siltra Xpro 0.6l/Ha</td>
<td>Siltra Xpro 0.4l/Ha</td>
</tr>
</tbody>
</table>
Winter barley min till IPM

- More trash borne disease (Rhynchosporium) in direct drilled + crop residue plots
- More initial inoculum

<table>
<thead>
<tr>
<th>Tillage***</th>
<th>Fungi *</th>
<th>Variety NS</th>
</tr>
</thead>
<tbody>
<tr>
<td>DD</td>
<td>DDS</td>
<td>P</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Newton & Creissen unpublished
Winter barley min till IPM

- Most profitable PPP programme = ★

![Graph showing yield t/ha for different tillage methods and sites, with stars indicating the most profitable PPP programme.]

- Tillage***
- Fungi **
- Site ***
- Variety NS

Ploughed historically

Reduced till historically

Newton & Creissen unpublished
Alternatives to conventional fungicides

• **Biostimulants**
  - Non-microbial e.g. seaweed extracts, chitin
  - Microbial e.g. non-pathogenic fungi (*Trichoderma* spp. etc.), AMF

• **Elicitors**
  - Mimic action of natural elicitors e.g. Chitosan,
  - Generate natural elicitors e.g. phosphite
  - Signal mimic e.g. BION
  - Pathogens

• **Biofungicides**
  - Bacteria e.g. *Bacillus* spp.
  - Fungi e.g. *Trichoderma* spp.

*What’s on the label!*

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**Biopesticides**

Do you make use of biopesticides or low risk plant protection products?

- [ ] Yes
- [ ] No
- [ ] Planning to

Add your notes about biofungicides
Untreated – no fungicide

**Biological** – Serenade (1.0 l/ha) @GS 30. Revystar (0.5) + Folpet (0.5) @GS 45

**Elicitor** – Laminarin (0.75 l/ha) @GS 30. Revystar (0.5) + Folpet (0.5) @GS 45

**T2 fungicide only** – Revystar XE (1.0 l/ha) + Folpet (1.0 l/ha) @GS 45

**T1+T2 fungicides** – Ascra X Pro (0.6 l/ha) + Folpet (0.75) at GS 30. Revystar (0.75 l/ha) + Folpet (0.75 l/ha) @GS 45
Regen Spring Barley - 2023

Yield (t/ha)

**Min**
- Untrt: 6.0 ± 0.2
- Bio: 6.5 ± 0.3
- Elicitor: 6.2 ± 0.2
- 1 fungi: 6.7 ± 0.4
- 2 fungi: 7.0 ± 0.5

**Plough**
- Untrt: 7.2 ± 0.2
- Bio: 7.5 ± 0.3
- Elicitor: 7.4 ± 0.2
- 1 fungi: 7.8 ± 0.4
- 2 fungi: 8.2 ± 0.5

*** Tillage
*** PPP
NS Cover crop
**Regen Spring Barley – 2023 Fusarium**

*Fusarium* detected in stem base tissue of barley
No symptoms of infection/disease
Not detected in corresponding soil samples

D= direct drill
P= plough
F=Fallow
M=Mustard
R=Radish
V=Vetch

Non-inversion tillage = increased Fusarium risk?
Integrated approach needed to increase IPM adoption
Acknowledgements

VI/NFU/PHC IPM assessment plan
Henry Creissen, Hernan Degiovanni, Fiona Burnett, SRUC
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Henry Creissen, Elliot Meador, Hernan Degiovanni, SRUC

Barley IPM under reduced tillage
Henry Creissen, Neil Havis, James Douglass, SRUC
Adrian Newton, James Hutton Institute
Doug Christie, Drurie Farm, Leven

Creissen et al. 2019 Pest Man.Sci. 75
Creissen et al. 2021 Pest Man.Sci. 77
Abstract deadline 1st Nov

Submit an abstract for CPNB 2024 - Association of Applied Biologists (aab.org.uk)