Measuring IPM adoption

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Leading the way in Agriculture and Rural Research, Education and Consulting
Integrated Pest Management process

PREVENTION

EVALUATION

INTERVENTION

DETECTION
VI/PHC 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

Research Article

Measuring the unmeasurable? A method to quantify adoption of integrated pest management practices in temperate arable farming systems
Distribution of IPM scores

<table>
<thead>
<tr>
<th></th>
<th>Arable</th>
<th>Grassland</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. completed</td>
<td>4723</td>
<td>292</td>
</tr>
<tr>
<td>Mean score</td>
<td>64.8</td>
<td>56.9</td>
</tr>
</tbody>
</table>
Country difference: Arable IPM

SRUC
Rotations: continuous cereals (5+ years of cereals in same field)
Soil cultivation

% Sample

England  Northern Ireland  Scotland  Wales

Direct drill  Min-till  Reg. plough  Reg. subsoil  Rot. Plough  Strip till
Problem pests: Arable

England
- Black Grass: 2,000
- Septoria: 500
- Slugs: 1,500
- Yellow Rust: 1,000

Northern Ireland
- Blackspot: 4.0
- Fathen: 3.0
- Nematodes: 4.0
- Slugs: 4.0

Scotland
- Mildew: 30
- Septoria: 20
- Slugs: 40
- Wild Oats: 10

Wales
- Black Grass: 7.5
- Flea Beetle: 2.5
- Septoria: 5.0
- Slugs: 12.5
- Wild Oats: 20
Weed Prevention: Arable

Crop inspections

Precise control e.g. spot spray, roguing

Optimal timing

Cleaning machinery etc.

Stale seedbed

% Sample

England
Northern Ireland
Scotland
Wales
Factors influencing decision to adjust spray programme

High influence | Moderate influence | No/low influence

- Weather conditions and forecasts
- Resistance management
- Predictions of Decision Support Systems (where available)
- Observed levels of pest/weed/disease presence in the field (including thresholds)
- Lack of availability of plant protection products
- Industry crop monitoring information (e.g. aphid/disease alerts)
- Growth stage of the crop
- Crop economic potential
- Calendar date
- BASIS qualified agronomist recommendation
- Availability of plant protection products
- Actions of/advice from other farmers in the area

Arable
Factors influencing decision to adjust spray programme

- Weather conditions and forecasts
- Sward growth potential
- Qualified adviser recommendation
- Price of herbicide products
- Presence of clover
- Predictions of Decision Support Systems (where available)
- Observed levels of weed presence in the field
- Lack of availability of herbicide products
- Growth stage of the weed
- Growth stage of the sward
- Calendar date
- Availability of herbicide product information
- Availability of a contractor
- Actions of/advice from other farmers in the area

Legend:
- High influence
- Moderate influence
- No/low influence
Arable: High/Low IPM adopters

- Cont. cereals
- Rotation
- Var. choice
- Prevention measures
- Planning factors
- Discussion group.

IPM Points awarded

Max

Bottom 25% farmers
Top 25% farmers
Grassland: High/Low IPM adopters

**IPM Points awarded**

- **Prevention measures**
- **Planning factors**
- **Spray adj.**
- **Cultural adj.**
- **Discussion group.**

Legend:
- **Max**
- **Max**
- **Max**
- **Max**

- **Bottom 25% farmers**
- **Top 25% farmers**
IPM Score - Arable area
IPM Score - Grass area

![Graph showing IPM score vs. grassland area with different categories indicated.]

- Temporary
- Permanent
- Rough

[Graph image with axes labeled: IPM Score on the y-axis, Grassland (ha) on the x-axis. The graph shows a scatter plot with various data points clustered in different areas.]
Knowledge => Uptake

Arable

Grassland

Q. How familiar are you with IPM? (1-5 scale)
Info 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

- 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
Information source is key
Information source is key
VI/PHC IPM assessment plans

♦ Assess overall IPM strategy
♦ Tool to facilitate discussion => IPM action plan
♦ High adopters:
  ♦ More preventative measures
  ♦ Consider more factors when IPM planning
  ♦ Actively seek IPM knowledge
♦ IPM advice: clear, consistent, evidence-based
♦ Continually developing sector specific plans
  ♦ Arable
  ♦ Grassland
  ♦ Specialist horticulture (coming soon)
# Crop Specific IPM plans (LMP)

## Environmental Land Management: Test & Trial project

<table>
<thead>
<tr>
<th>Pest Issues</th>
<th>STHV aphid vectors</th>
<th>Caterpillar larvae</th>
<th>Flies</th>
<th>Fruit Fly</th>
<th>Leafhopper</th>
<th>Oulina</th>
<th>Saddle gall midge</th>
<th>Slugs</th>
<th>Summer adults</th>
<th>Wheat bulb fly</th>
<th>Insectivorous birds</th>
</tr>
</thead>
</table>
| **Rotation** | Avoid following 
Wheat 
Barley 
Bean 
Lentil 
Pea | Avoid following 
Wheat 
Barley 
Bean 
Lentil 
Pea | Avoid following 
Wheat 
Barley 
Bean 
Lentil 
Pea | Avoid following 
Wheat 
Barley 
Bean 
Lentil 
Pea | Avoid following 
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Barley 
Bean 
Lentil 
Pea | Avoid following 
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Pea | Avoid following 
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Barley 
Bean 
Lentil 
Pea | Avoid following 
Wheat 
Barley 
Bean 
Lentil 
Pea | Avoid following 
Wheat 
Barley 
Bean 
Lentil 
Pea | Avoid following 
Wheat 
Barley 
Bean 
Lentil 
Pea |
| **Drilling method** | In Use | In Use | In Use | In Use | In Use | In Use | In Use | In Use | In Use | In Use | In Use |
| **Crop Establishment** | Extra 
outlining | Extra 
outlining | Extra 
outlining | Extra 
outlining | Extra 
outlining | Extra 
outlining | Extra 
outlining | Extra 
outlining | Extra 
outlining | Extra 
outlining | Extra 
outlining | Extra 
outlining |
| **Crop Management** | Link to 
Decision Support Tools | Link to 
Decision Support Tools | Link to 
Decision Support Tools | Link to 
Decision Support Tools | Link to 
Decision Support Tools | Link to 
Decision Support Tools | Link to 
Decision Support Tools | Link to 
Decision Support Tools | Link to 
Decision Support Tools | Link to 
Decision Support Tools | Link to 
Decision Support Tools | Link to 
Decision Support Tools |
| **Resistance Assessment** | Monitoring 
pest management plans | Monitoring 
pest management plans | Monitoring 
pest management plans | Monitoring 
pest management plans | Monitoring 
pest management plans | Monitoring 
pest management plans | Monitoring 
pest management plans | Monitoring 
pest management plans | Monitoring 
pest management plans | Monitoring 
pest management plans | Monitoring 
pest management plans | Monitoring 
pest management plans |

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**Crop Establishment**

- **Do you support resistance to plant protection products used to control the pest?**
  - Yes: Not Used
  - No: In Use

- **Have you checked with IPM resistance has been reported in the UK?**
  - Yes: In Use
  - No: Not Used

- **Has resistance been found?**
  - Yes: Not Used
  - No: In Use

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**Crop Management**

- **Link to Decision Support Tools**
  - Short: Not Used
  - In Use: In Use

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**Resistance Assessment**

- **Do you support resistance to plant protection products used to control the pest?**
  - Yes: Not Used
  - No: In Use

- **Have you checked with IPM resistance has been reported in the UK?**
  - Yes: In Use
  - No: Not Used

- **Has resistance been found?**
  - Yes: Not Used
  - No: In Use
Crop Specific IPM plans (LMP)

### Non-chemical control strategies in arable crops – Weeds in cereals

<table>
<thead>
<tr>
<th>Current chemical control for comparison</th>
<th>Sensitivity weeds</th>
<th>Herbicide resistant grasses</th>
<th>Herbicide resistant BLW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field history, rotation &amp; break crops</td>
<td>4 3 4 5 4 4 4 4 4</td>
<td>1 4 4 3 4 4 3 3 127</td>
<td>4</td>
</tr>
<tr>
<td>Select low-risk locations</td>
<td>3 4 3 5 4 4 3 3</td>
<td>1 4 3 3 4 3 3 3 374</td>
<td>4</td>
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<tr>
<td>Drawiag</td>
<td>2 2 4 5 2 3 3 4</td>
<td>5 9 423</td>
<td>4</td>
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<tr>
<td>Early harvest</td>
<td>4 3 4 5 3 4 4 4 4</td>
<td>297,425,557</td>
<td>2 4 4 3 5 5 3 3 294</td>
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<td>Flooding</td>
<td>3 2 3 4 2 2 4 1</td>
<td>536</td>
<td>3 2 3 3 4 1 1 536</td>
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<tr>
<td>Hygiene</td>
<td>4 4 4 4 5 5 5 4 4 5</td>
<td>75,347,275,545</td>
<td>2 4 3 4 5 5 3 3 294</td>
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<tr>
<td>Primary cultivations (crop residue burial)</td>
<td>4 4 3 5 4 5 4 5 343,388,453,568</td>
<td>4 3 3 3 4 5 3 4 4</td>
<td></td>
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<tr>
<td>Secondary cultivations (drilling method)</td>
<td>4 4 3 5 4 3 4 5 343</td>
<td>3 4 3 3 4 3 4 4 401</td>
<td></td>
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<tr>
<td>Seed rate</td>
<td>4 4 2 5 5 3 4 4</td>
<td>343</td>
<td>3 3 2 3 5 3 3 3</td>
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<tr>
<td>Seedbed quality</td>
<td>3 3 5 2 3 3 3 3 3</td>
<td>3 3 3 2 2 3 3 3</td>
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<td>Sowing date</td>
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<td>343,390,82,371</td>
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<tr>
<td>Stubble management</td>
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<td>391,193</td>
<td>4 3 3 3 4 3 3 4 13,217</td>
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<tr>
<td>Use of cover crops</td>
<td>3 2 2 5 2 4 2 4 4</td>
<td>34,410,147</td>
<td>4 2 2 3 2 4 2 4 314</td>
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<tr>
<td>Varieder choice</td>
<td>3 3 3 5 3 4 3 3 3 345,76,133,151</td>
<td>3 3 3 3 4 3 4 3 3</td>
<td></td>
</tr>
<tr>
<td>Various mixtures</td>
<td>Bioproductants &amp; low risk PPPs</td>
<td>2 2 1 2 496,178</td>
<td>2 2 1 2 1</td>
</tr>
<tr>
<td>Additional (if necessary)</td>
<td>2 2 2 2 2 2 3 3 3 3 3 3 3 3 3 3 3 3 3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Environmental Land Management: Test &Trial project**
Crop Specific IPM plans (LMP)

- Focussed on effective evidence-based IPM methods
- 1-2 hours
  - Enables farmers to create IPM LMPs
  - Guides users towards effective IPM methods
  - Provides users with links to further guidance
  - Records current implementation of IPM
  - Records commitments to implement additional IPM

Behavioural Insight (interview) results

- Key barriers to uptake of IPM practices were highlighted as ‘economic’, ‘lack of knowledge or understanding of IPM’, and ‘mindset or habits’
Measuring to inform IPM decisions

♦ Assess overall strategy
  ♦ Benchmark against yourself
  ♦ Action plans to increase IPM adoption

♦ Crop*pest specific approaches
  ♦ What are the pest x crop issues?
  ♦ Current adoption recorded
  ♦ What did/didn’t work?
  ♦ => Next steps

Reduction in risk associated with pests and pesticides
Integrated approach needed to increase IPM adoption

Dara et al. 2019. J. of IPM 10
Acknowledgements

- VI/NFU/PHC IPM assessment plan
- Henry Creissen & Elliot Meador, SRUC
- Spencer Collins & Alison Taylor, NFU
- Fiona Burnett, SRUC
- Sonia Humphris, PHC
- Neal Evans & Jim Orson, Voluntary Initiative

  Creissen et al. 2019 *Pest Man.Sci.* 75
  Creissen et al. 2021 *Pest Man.Sci.* 77

- Test & Trial Funding: Defra
- Project management
  - Chris Hartfield, NFU, Phil Walker & Neil Paveley, ADAS
- *IPM Land Management Plan tool*
  - John Gadsby, ADAS
- Behavioural insight
  - Kath Behrendt, Holly Clarkson, Kathleen Wolton & Olivia Green, ADAS
Measuring IPM adoption

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Thank you