Stepping Up IPM

Promoting improved IPM Decisions and demonstrating that IPM Works

How can IPM tools be easily applied in different regions?

2019 - 2024

2020 - 2024
What IPM Tools are available?

- Monitoring tools
- Decision support tools
- Variety selection tools
- Application tools
- Behavioural and socioeconomic tools

Catalogue of IPM Decisions Support Systems

Details nearly 100 pest forecasts, thresholds etc. from across Europe.

IPM Resource Toolbox

Making tools from across Europe accessible
IPM Decisions Platform

Quick access to IPM Decision Support
- Simple ‘click and go’ platform to find and run DSS

Adopt systems from other countries
- Testing/comparing decision support systems

Validate systems in new regions
- Ensure systems developed elsewhere continue to work in different areas

Create new decision support systems
- Creating new systems and combining existing systems for holistic IPM
The IPM Decisions Platform

1. Create an IPM Decisions account and login
2. Add your farm(s)
3. Add crop/pest combinations
4. Select decision support systems
5. Monitor DSS outputs for period of high risk

Sneak Preview...
ADAS Boxworth

3WHHC

SPECKLED LEAF BLOTCH OF WHEAT
High risk of infection

Thale-cress

GLUME BLOTCH OF WHEAT
Sclerotinia Hutleyi Mod A (SEPTO/ARHU)

Garden carrot

CARROT RUST FLY
Carrot rust fly temperature model (PSLRTEMP)

Brassica

RADISH FLY
Cabbage fly flight period temperature model (DELARADC)

Legend / Example

Crop EPPO Code
Latin name of the plant

PEST
No existing status

CARROT RUST FLY
Cannot dive status

LEAF SPOT OF CELERY
No risk of infection

PURPLE CLOVER
Medium risk

WALL SPEEDWELL
High risk
ADAS Boxworth

**3HWC**

**SPECKLED LEAF BLotch OF WHEAT**

**Thale-cress**

**GLUME BLOTCH OF WHEAT**

**Garden carrot**

**DAUCS**

**Brassica**

**1BRSE**

**CARROT**

High risk of infection

Other: The warning system model «Carrot rust fly temperature» is based on a Finnish temperature-based model (Markkula et al. 1998; Tilikkala & Ojanen 1999; Markkula et al. 2000). The model determines the start of the flight period for the 1st and 2nd generation of carrot rust fly based on accumulated degree-days (day-degrees) over a base temperature of 5.0 °C. VIPS uses the model for the 1st generation only. Standard air temperature (temperature measured 2 m above ground) is used in the model. Degree-days are defined for this model as the sum of the difference between a base temperature of 5.0 °C and the mean temperature for all days with a temperature >5.0 °C, in other words (daily mean temperature – 5.0 °C) from 1 March (beginning when the ground has thawed).
Crop / Pest Combination: DAUCS - Garden carrot | PSILRD - Carrot rust fly

Type of the output: Risk indication

Description: Other: The warning system model «Carrot rust fly temperature» is based on a Finnish temperature-based model (Mäntylö et al., 1998; Tikkanen & Ojanen, 1999; Mäntylö et al., 2000). The model determines the start of the flight period for the 1st and 2nd generation of carrot rust fly based on accumulated degree-days (day-degrees) over a base temperature of 5.0°C. UPLS uses the model for the 1st generation only. Standard air temperature (temperature measured 2 m above ground) is used in the model. Degree-days are defined for this model as the sum of the difference between a base temperature of 5.0°C and the mean temperature for all days with a temperature > 5.0°C. In other words (daily mean temperature - 5.0°C) from 1 March (beginning when the ground has thawed).

Creation Date: Dec 10, 2021

DSS ID: ind/RA/RA/PSILRD

DSS Model ID: PSILARTEMP

Warning Status Representation: High risk of infection

Warning Message: Green warning indicates that the flight period has not yet begun. Yellow warning indicates that the flight period is beginning and that flies can be coming into the field. Red warning indicates peak flight period. Gray warning indicates that the flight period of the 1st generation is over. Be aware that in areas with field covers (plastic, single or double non-woven covers, etc.) with early crops the preceding season (either on the current field or neighboring fields), the flight period can start earlier due to higher soil temperature under the covers.
User can compare two DSS for the same pest, with different developers. Can check validity based on supporting information and compare risk predictions between DSS.

User access background parameters of existing DSS to better suit a different region.

User selects most appropriate DSS, and checks validity based on supporting information provided.
Varying ecology of pests

• Collating DSS across Europe creates a matrix of DSS/pest/crop/region.
• Duplication of Crop/Pests DSS from different regions.
• Gaps in some regions for pests with DSS available elsewhere.
• Opportunities to adapt DSS developed for pest/crop in one region to another.
Varying ecology of pests

Cabbage Root Fly
*Delia radicum*

- Causes damage to various brassicas
- Forecast models based on climate predicts activity
- BUT need to know emergence of local population, which can vary between regions
Varying ecology of pests

- In USE Dashboard, user would see model was developed in XXX and that it hasn’t been validated in YYY, with warnings.
- In COMPARISON, User could see contrasting models (if available).
- In ADAPTATION, User could adjust the model to suit local conditions.
Validating DSS for application in new regions

- Are the predictions accurate?
- Are the predictions useful?
- Is it sufficiently risk averse?
- Where/when have they been verified?
- Costs/benefits to the farmer?
- Costs/benefits to the environment?

<table>
<thead>
<tr>
<th>DSS name &amp; description</th>
<th>Crop</th>
<th>Target pest</th>
<th>known to be validated</th>
<th>description of model published</th>
<th>developed since</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crop Protection Online</td>
<td>wheat</td>
<td>Aphids in wheat</td>
<td>1</td>
<td>1</td>
<td>1990</td>
</tr>
<tr>
<td>Crop Protection Online</td>
<td>barley</td>
<td>Aphids in barley</td>
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<td>1</td>
<td>1990</td>
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<tr>
<td>Crop Protection Online</td>
<td>oat</td>
<td>Aphids in oats</td>
<td>1</td>
<td>1</td>
<td>1990</td>
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<tr>
<td>Crop Monitor Pro</td>
<td>Winter wheat</td>
<td>All wheat pests inc. slugs</td>
<td>1</td>
<td>1</td>
<td>1990</td>
</tr>
<tr>
<td>Crop Monitor Pro</td>
<td>Winter oilseed rape</td>
<td>All OSR pests inc. slugs</td>
<td>1</td>
<td>1</td>
<td>1990</td>
</tr>
<tr>
<td>GAIA</td>
<td>Almonds</td>
<td>almond fruit wasp</td>
<td>1</td>
<td>1</td>
<td>1990</td>
</tr>
<tr>
<td>GAIA</td>
<td>Grapes</td>
<td>European grapevine moth</td>
<td>1</td>
<td>1</td>
<td>1990</td>
</tr>
</tbody>
</table>
Applying IPM tools in different regions

Technical considerations
• Ecology of pest and occurrence of pesticide resistant variants

Socioeconomic considerations
• Farmer/advisor/researcher/industry relationships
• Access to tools
• Farm type (size/sector)
Increase user access to, and uptake of, IPM DSS

**Understanding current incentives and barriers to IPM Decision Support Systems**

**2020 workshops**
- 16 workshops across 12 EU countries
- 395 participants
- Farmers, agronomists, researchers and developers took part

**2021 workshops**
- 12 workshops across 10 EU countries
- 475 participants
- Farmers, agronomists, researchers and developers took part
Access to IPM tools, and willingness to use them

Farmers
• Almost all farmers have smartphones and home computers
• Over 50% of farmers are already using DSS
• Farmers are very willing to try new products and services

Agronomists
• Very confident that decision support systems compliment their work
• Mostly believe DSS are generally accurate (*healthy skepticism in UK*)
• Majority recommend that farmers use DSS, but suggest it takes time to get them to use them

But...
• Agronomists are not providing support in selecting or using online decision support systems
Trust in IPM DSS

Who trusts DSS?

• Farmers with larger farms trust DSS more
• Integrated and biodynamic farmers tend to trust DSS more
• Regular exposition to DSS manufacturers’ demonstrations increases trust
• Interestingly, being exposed to DSS marketing negatively affects a farmer’s trust

Who is more likely to use DSS?

• Farmers with higher education
• Those with larger farms
• Vegetables producers
• Those having speed internet in both the office and the fields
• Obviously, those who are willing to pay for DSS are more likely to use it.
• Flowers producers are less likely to use DSS

Paper in prep...
Key considerations for applying IPM tools regionally

Technical

• Compare known ecology of target pest at location of tool development and target new region for application.
• Review the parameters set within the DSS, and consider relevant adjustments to fit new region
• Validate with field trials, ideally within a network of engaged farmers willing to demonstrate result

Socioeconomic

• Compare current tool uptake and management options available to growers at the location of development and new region for application
• Review any additional drivers of IPM uptake that may differ between locations that may influence uptake.
On farm demonstration

- Engaging demonstration events associated with a consistent support network is the best route to increasing uptake of new tools
WHERE

Country: UK
Crop: Wheat
Site: Cambridgeshire
Coordinates: 44°51′24.60″N - 9°51′16.33″E
Varieties: Skyfall

WHAT

DSS tested: for managing wheat pests and diseases

HOW

On farm application:
- One tramline (or a portion > 0.5 ha) managed according the DSS;
- One tramline (or the rest of the farm) managed traditionally;
- Data will be collected to demonstrate the impact of using DSS on crop performance
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