Pollinator Declines

All pollinators (365)
137 bee species
228 hoverfly

© JNCC
Why do we need pollinators?

• Increase fruit set, quality and yield 75% crops worldwide (Klein et al. 2007)
• Valuation to UK agriculture £600 Million/annum (Vanbergen et al. 2014)
• 85% of the world’s flowering plants (Ollerton et al. 2011)
Does diversity matter?

Stabilises Pollination

Adapted from Garratt et al. 2014 & Garratt et al 2013
Are declines impacting production?

Questionnaire study
• 10 European countries
• Farmers & beekeepers

Almost half of farmers are not considering pollination as an agricultural input that could increase yield. Breeze et al. 2019

Pollination deficit

- 51% Perceived no deficit
- 49% Perceived a deficit
- 56% introduced managed pollinators
- 44% did nothing
Agricultural Drivers

Negative Drivers
- Loss of semi-natural habitats
- Loss of traditional practices
- Use of agrochemicals
- System specialisation
- Managed pollinators

Positive Drivers
- Voluntary initiatives
- IPM
- Agri-environmental policy
- Regulatory Compliance
- Diversification
- AECS, EFAs
- eco-schemes

Drivers:
- Climate change
- Urban development
- Pathogens & Parasites
- Afforestation
- Invasive species
Why do we need intensive agriculture?

Population growth & diet shifts developing countries

- 70% increase in food demand (Government's Foresight Report)
- 50% increase in food production (Defra 2008)

United Nations Department of Economic and Social Affairs: World Population Prospects: the 2012 Revision
Need to get the balance right!

Agricultural Production vs Environmental Quality

Maximise Food Production

Minimise Environmental Impacts
Landscape Scale Approach

Aims

• What habitats are important?
• Do different habitats complement each other
  – Support different species, Provide different resources, Support resources at different times
What habitats do pollinators use? How does this change through the season?

Habitat: 12 habitats either

- Dominant
- Important for biodiversity

Cole et al. 2017
Habitat utilisation

• Standardised transect walks
• June – September
• Bumblebees, hoverflies & butterflies
Key results

Woodlands undervalued
Survey timing
Survey methods
Temporal variation in habitat utilisation

Habitats compliment each other at the landscape scale.
The importance of flowering plants

- Abundance of pollinators driven by flowering plant richness
Ecological Focus Areas

- Riparian Buffers
- N-Fixing crops
- Field margins
- Forest edges
- Catch cover
- Fallow land
- Agroforestry

Aim:
Evaluate the resources different EFAs offer to determine how well they are performing for pollinators.
Cluj Workshop

What Resources?
- Nesting sites
  - Bumblebees
  - Solitary bees
- Hoverfly larvae
  - Insectivorous
  - Saprophytic
- Floral
  - Early, mid, late season
  - Open flowers, tubular flowers

Define management
- Standard
- Pollinator friendly
Delphi Technique

22 experts from 18 countries scored EFAs under standard & pollinator-friendly management.

Average score per region calculated.

Experts revise scores based on group response & justify scores.

Final Scores Derived

- Northern Europe: 8 countries
- Southern Europe: 5 countries
- Eastern Europe: 5 countries

SRUC
Floral resources S. Europe

<table>
<thead>
<tr>
<th>Mean score</th>
<th>Floral</th>
<th>Nesting</th>
<th>Syrphid larvae</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catch crop</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N-fixing cop</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fallow</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotational coppice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Afforested</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agroforestry</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group of trees</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Line of trees</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hedge</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Isolated tree</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pond</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ditch</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field margin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stonewall</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terrace</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
In NW Europe, even under pollinator-friendly management no single habitat provided all resources.
# Uptake

<table>
<thead>
<tr>
<th>Fallow</th>
<th>N-fixing crop</th>
<th>Catch crop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early flowers</td>
<td>Mid flowers</td>
<td>Late flowers</td>
</tr>
<tr>
<td>Open flowers</td>
<td>Tubular bee nesting</td>
<td>Solitary bee nesting</td>
</tr>
<tr>
<td>Bumblebee nesting</td>
<td>Insectivorous hoverfly</td>
<td>Saprophytic hoverfly</td>
</tr>
</tbody>
</table>
Habitat use: Bumblebees

July/Aug

April

May

Habitat bundles

Nest
CAP Post-2020 Policy Implications

**Improve Habitat Quality**

- Guidelines on pollinator-friendly management
- Incentivise positive management
  - result-based payments
- Create an effective monitoring framework
  - Robust ‘user-friendly’ indicators

**Enhance Landscape Diversity**

- Support landscape scale initiatives
- Facilitate collaboration between farmers
- Habitat bundles – pollinator packages
- Integrate Green Architecture delivery vehicles
  - AECS, eco-schemes, enhanced conditionality
Pressures on Farmers

- Protection of Assets
- Climate change
- Pests, weeds & diseases
- EU & Global Policy/legislation
- Changes to AES, subsidies, chemicals
- Local, EU & Global Markets
Thanks for your attention!


@LornaCTweets  Lorna.Cole@sruc.ac.uk