



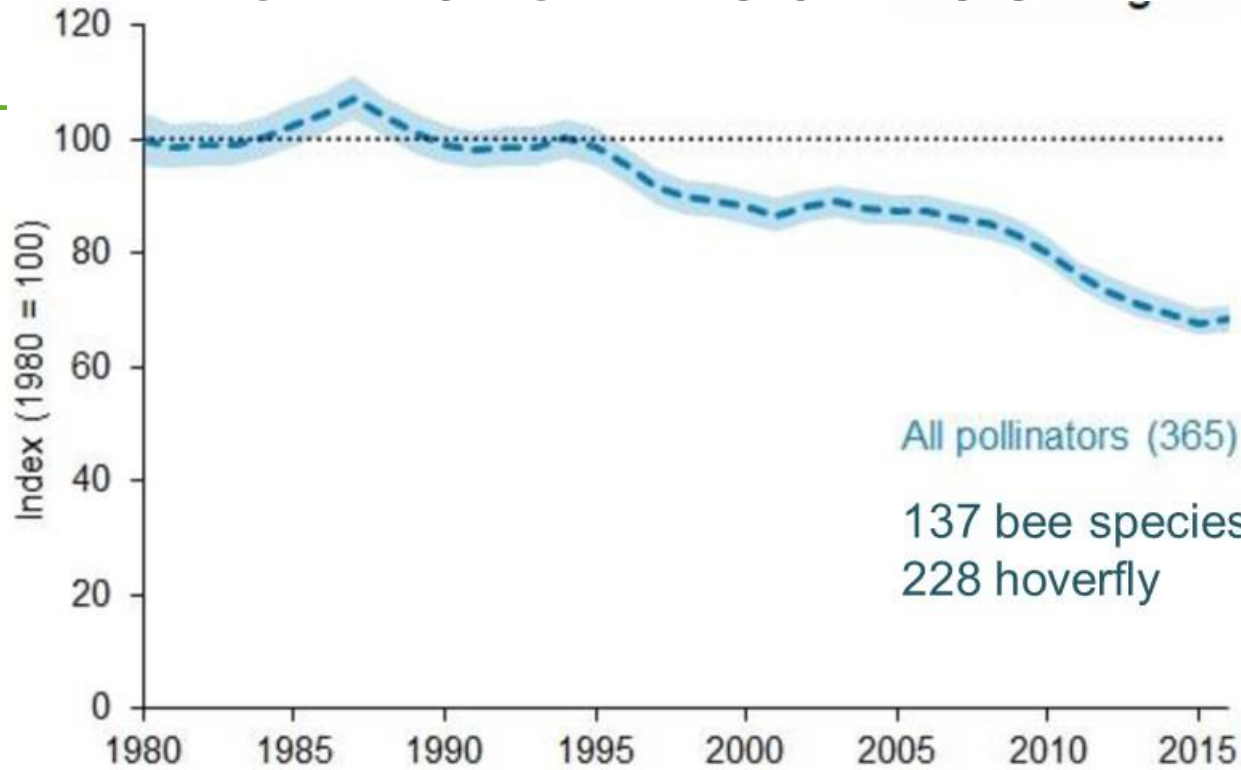
# SUPPORTING POLLINATORS AGRI- ENVIRONMENTAL INTERVENTIONS

Dr Lorna Cole



*Leading the way in Agriculture and Rural Research, Education and Consulting*

# Pollinator Declines



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Saturday 02 December 2017

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ing dramatic effect on pollination

arming are having a damaging effect on the  
arch claims.



Science News  
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Richard Alleyne »

In Science News



Total eclipse, in  
pictures

ARY



# Why do we need pollinators?



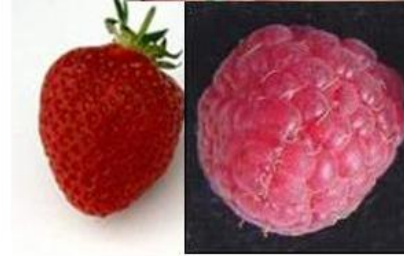
<https://escsecblog.com/2016/01/28/the-cuckoo-gypsy-bumble-bee-a-species->



<http://users.skynet.be/fa213618/Rhingia-campestris-03.jpg>



Without insect pollinators



With insect 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?



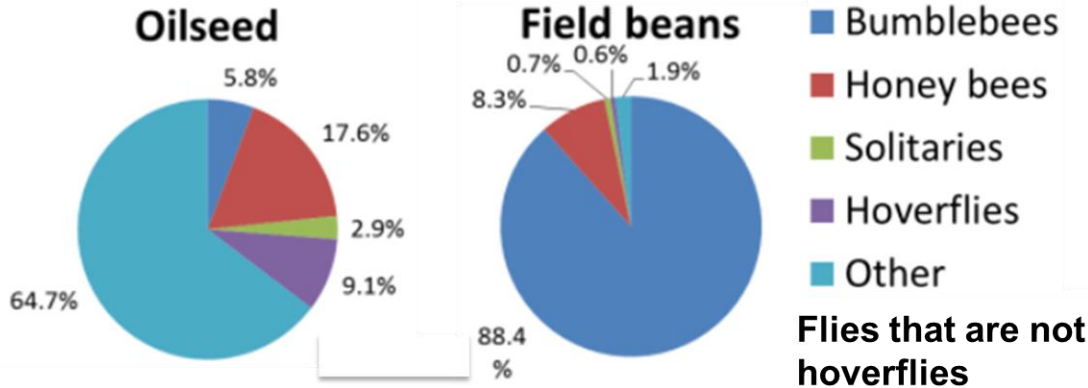
<http://sinwp.com/spirit/hc.htm>



<https://thegardenimpressionists.files.wordpress.com/2011/06/sdim2254-2.jpg>



[https://en.wikipedia.org/wiki/Western\\_honey\\_bee](https://en.wikipedia.org/wiki/Western_honey_bee)



Stabilises Pollination

# Are declines impacting production?

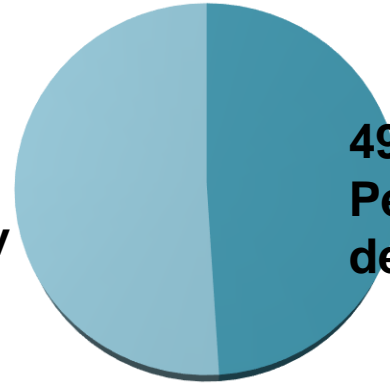
## Questionnaire study

- 10 European countries
- Farmers & beekeepers

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

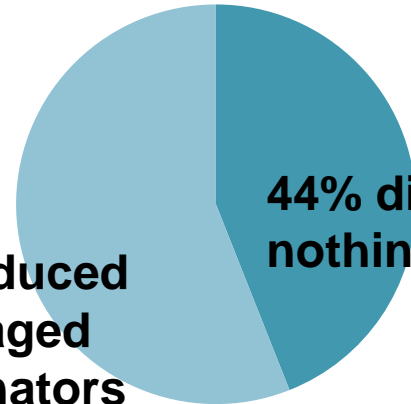
Pollination deficit

51%  
Perceived no



49%  
Perceived a  
deficit

56%  
introduced  
managed  
pollinators



44% did  
nothing

# Agricultural Drivers



**Climate change**

**Urban development**

Negative Drivers

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



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

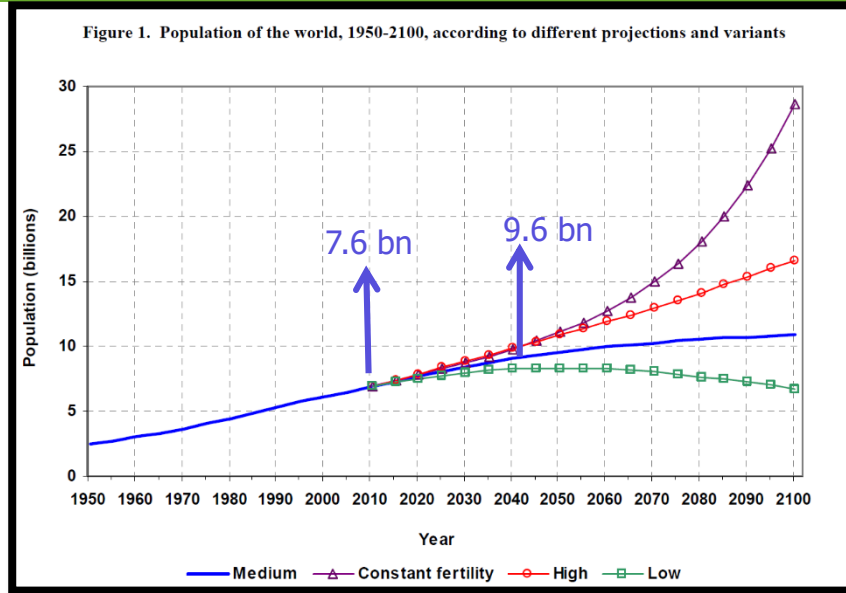
Positive Drivers

**Pathogens & Parasites**

**Afforestation**

**Invasive species**

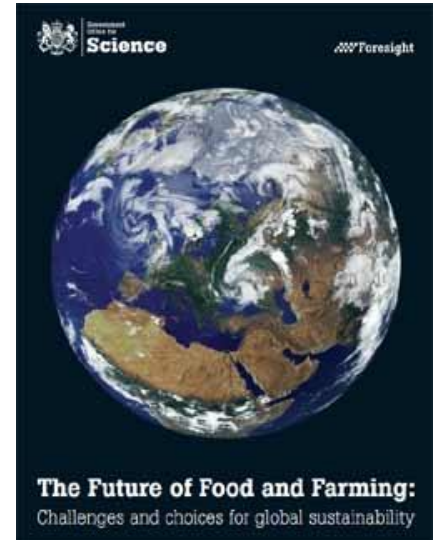
# Why do we need intensive agriculture?



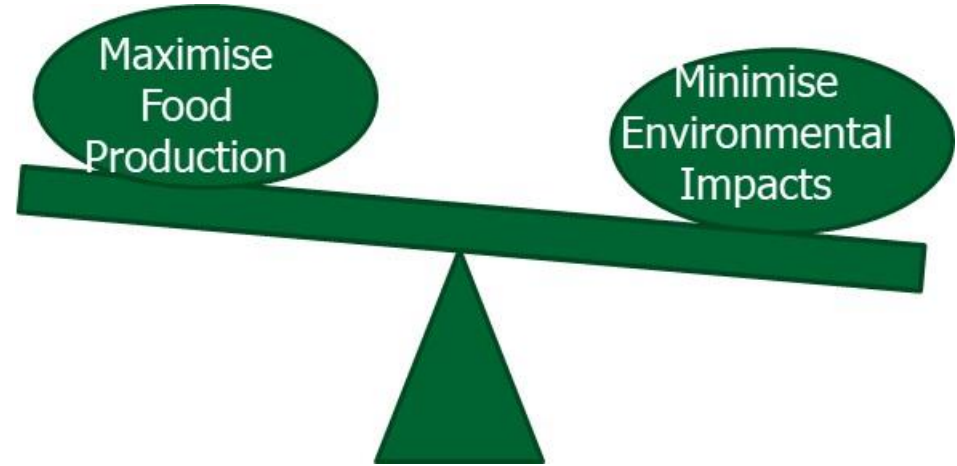
United Nations Department of Economic and Social Affairs: *World Population Prospects: the 2012 Revision*

## Population growth & diet shifts developing countries

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



# Need to get the balance right!





# Landscape Scale Approach

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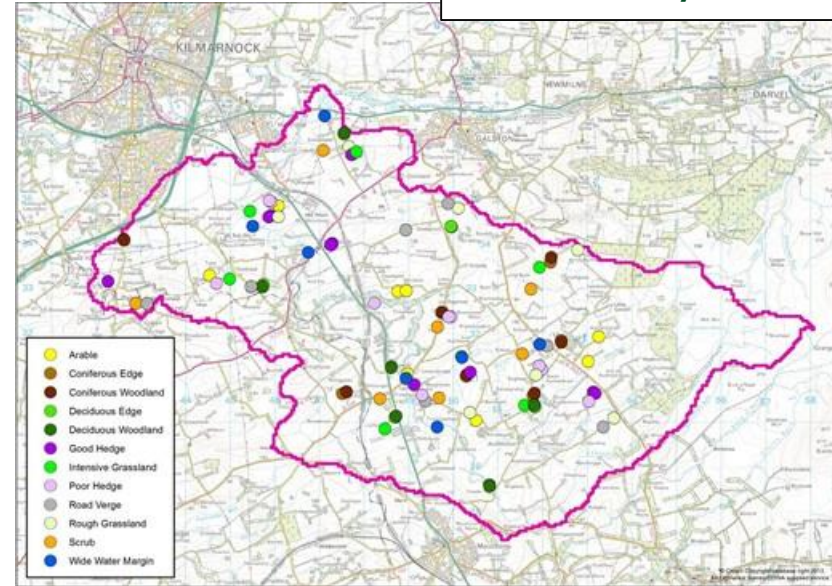
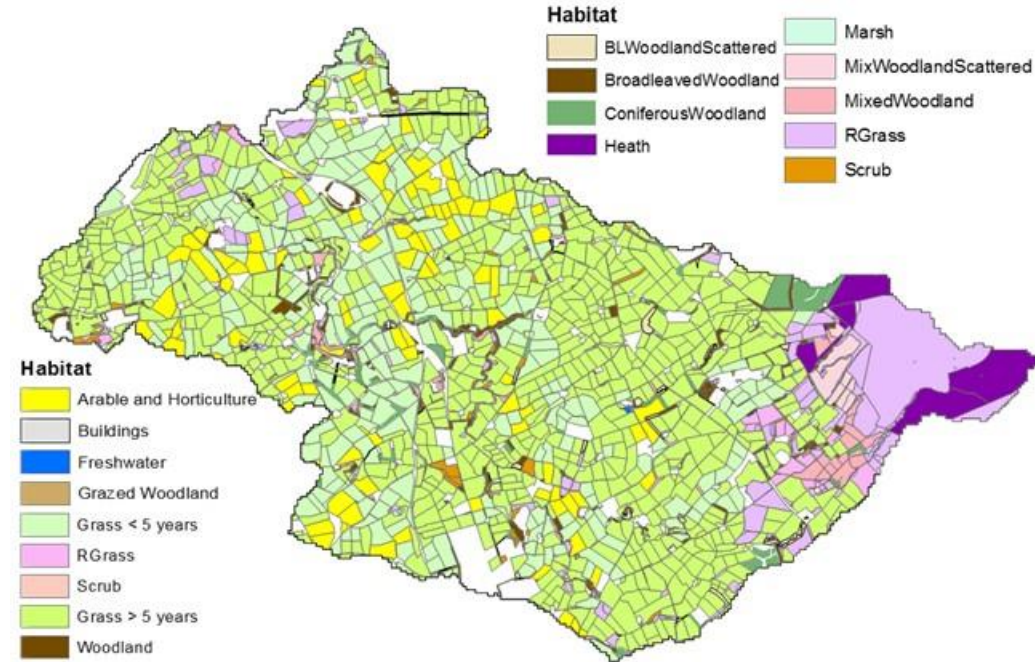
## Aims

- 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?

12 habitats either  
Dominant  
Important for  
biodiversity



Map produced by Dr Lorna Cole ©SRUC 2015

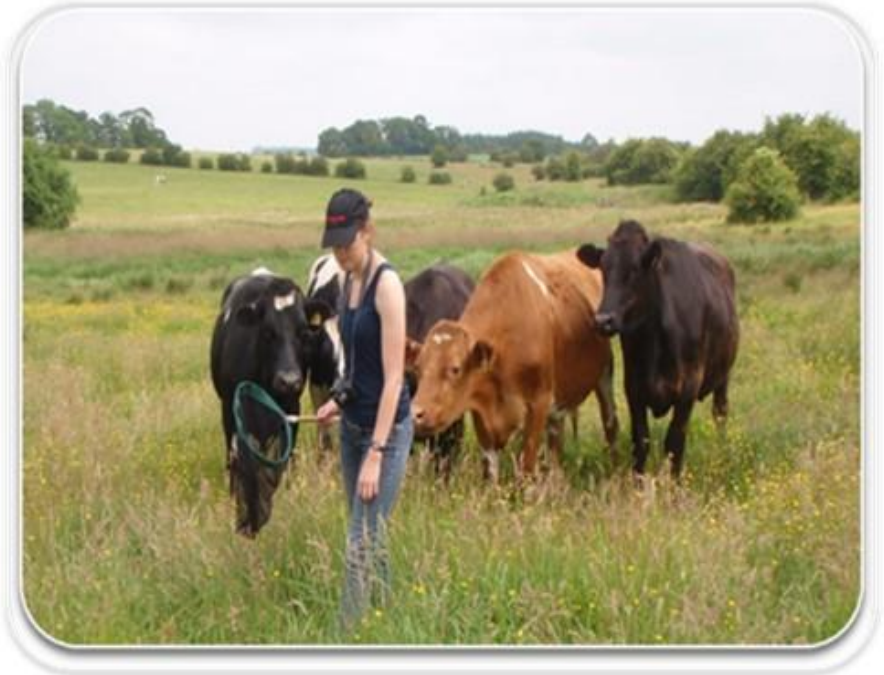
©Crown Copyright/database right 2016 Ordnance Survey/EDINA supplied service; *Contains, or is based on, information supplied* by the Forestry Commission; IACS land use data 2012 obtained by permission of Scottish Government Rural and Environment Science and Analytical Services

[Cole et al. 2017](#)

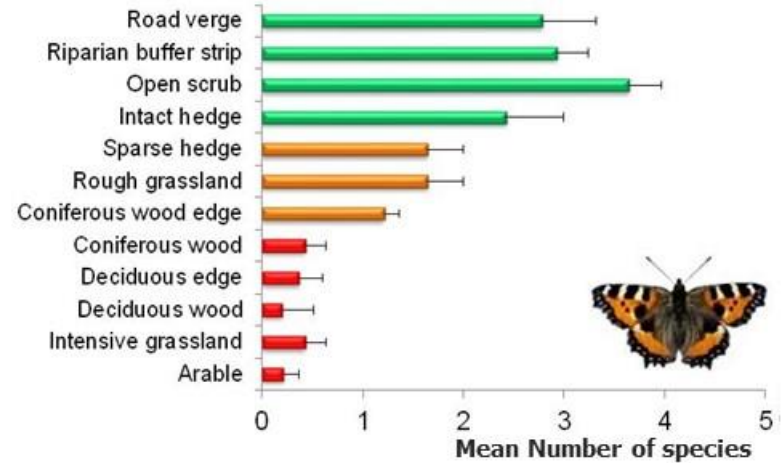
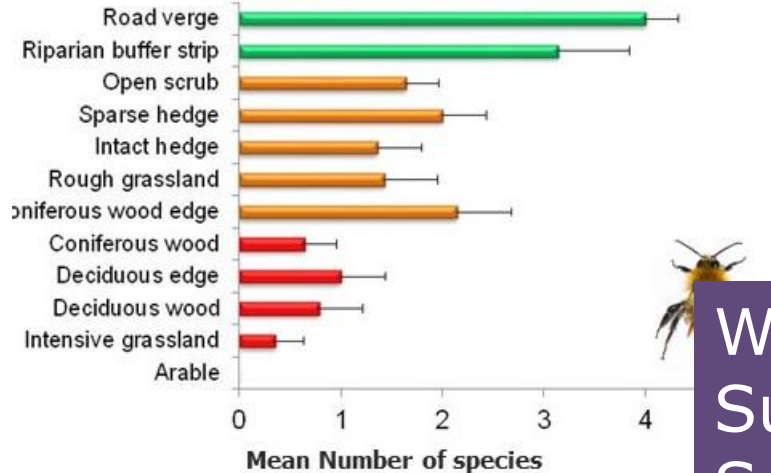
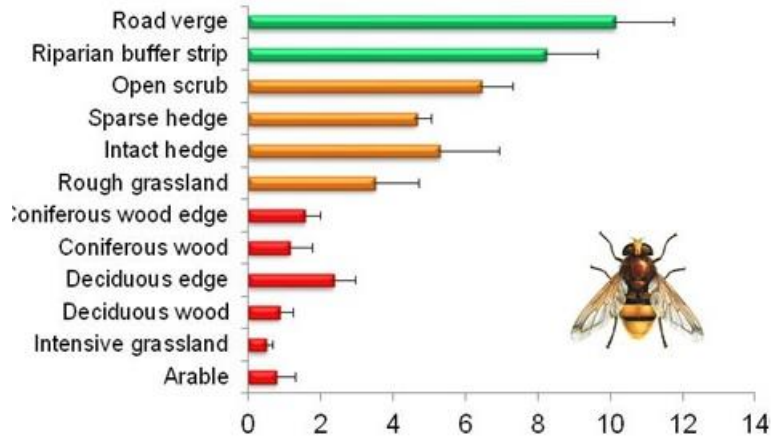


# Habitat utilisation

- Standardised transect walks
- June – September
- Bumblebees, hoverflies & butterflies

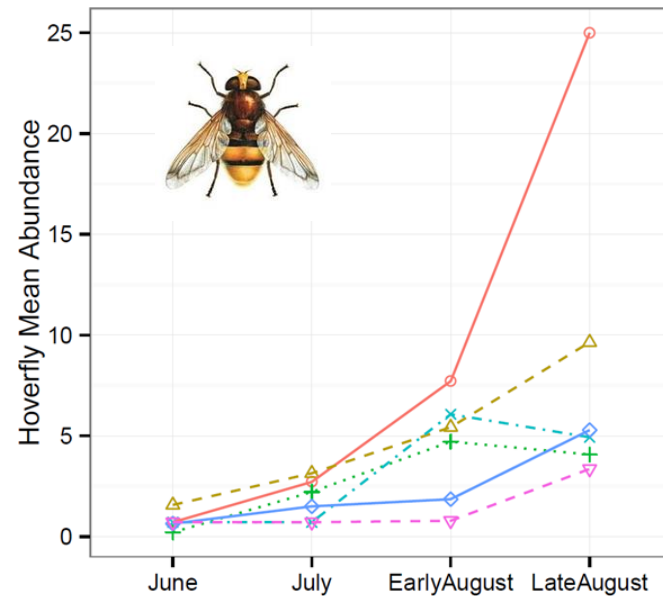
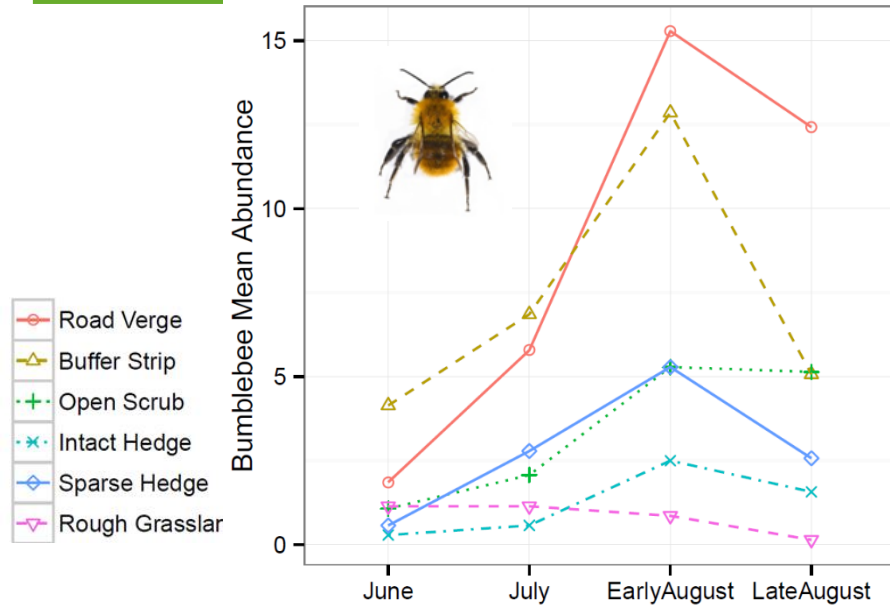


# Key results



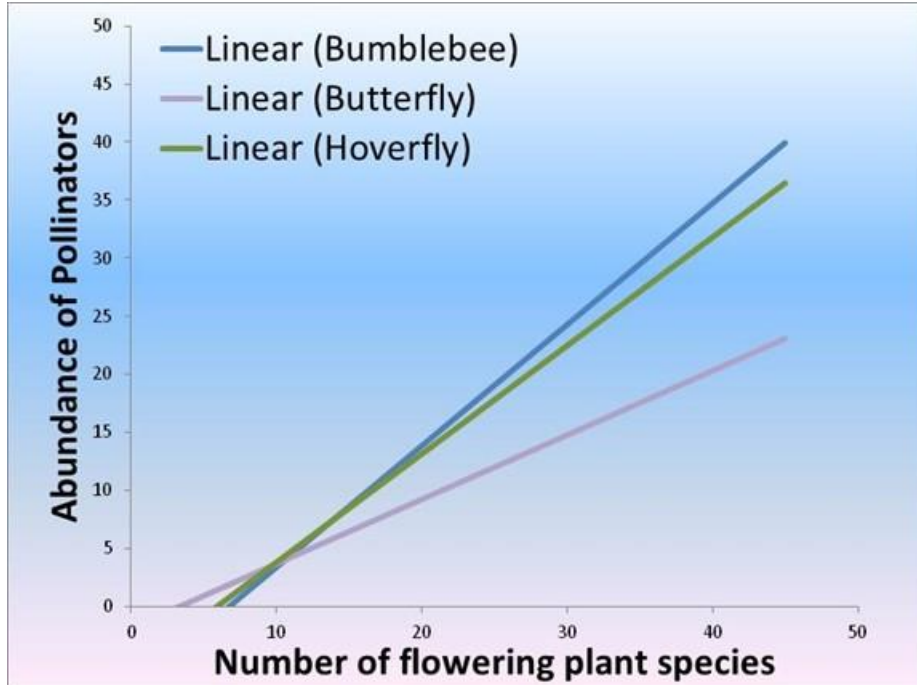
Woodlands undervalued  
Survey timing  
Survey methods

# 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

**Compulsory  
Greening**

**CAP 2014  
19 EFA options**

**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

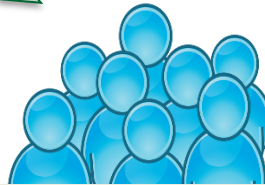


22 experts from 18 countries. scored EFAs under standard & pollinator-friendly management

Average score per region calculated

Experts revise scores based on group response & justify scores

**Final Scores Derived**



Northern Europe  
8 countries

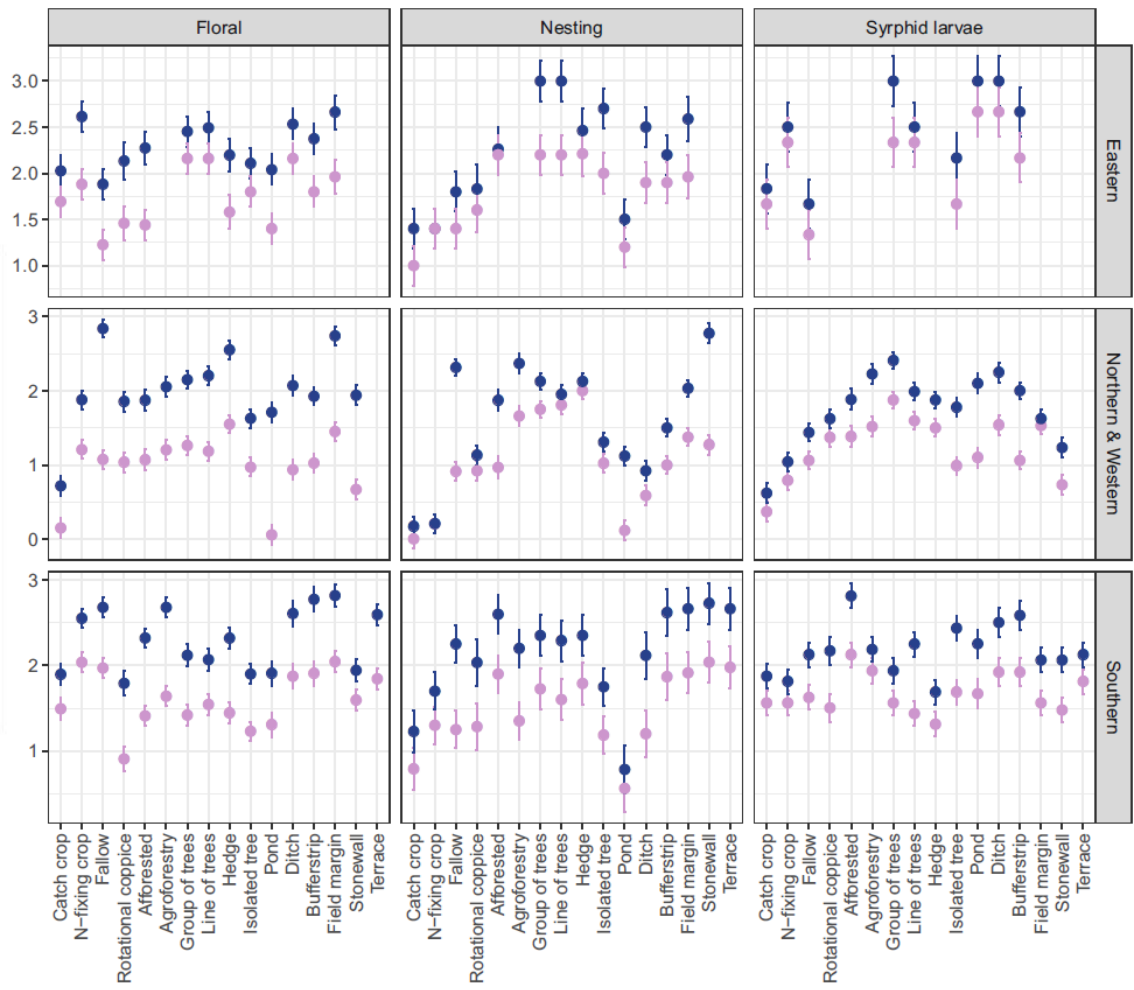
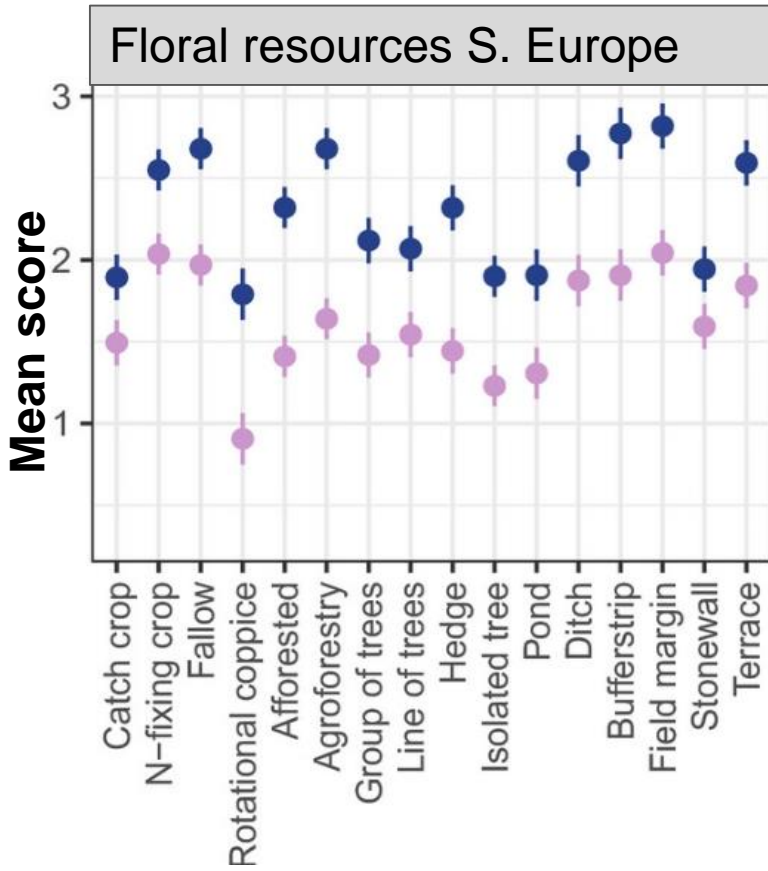


Southern Europe  
5 countries

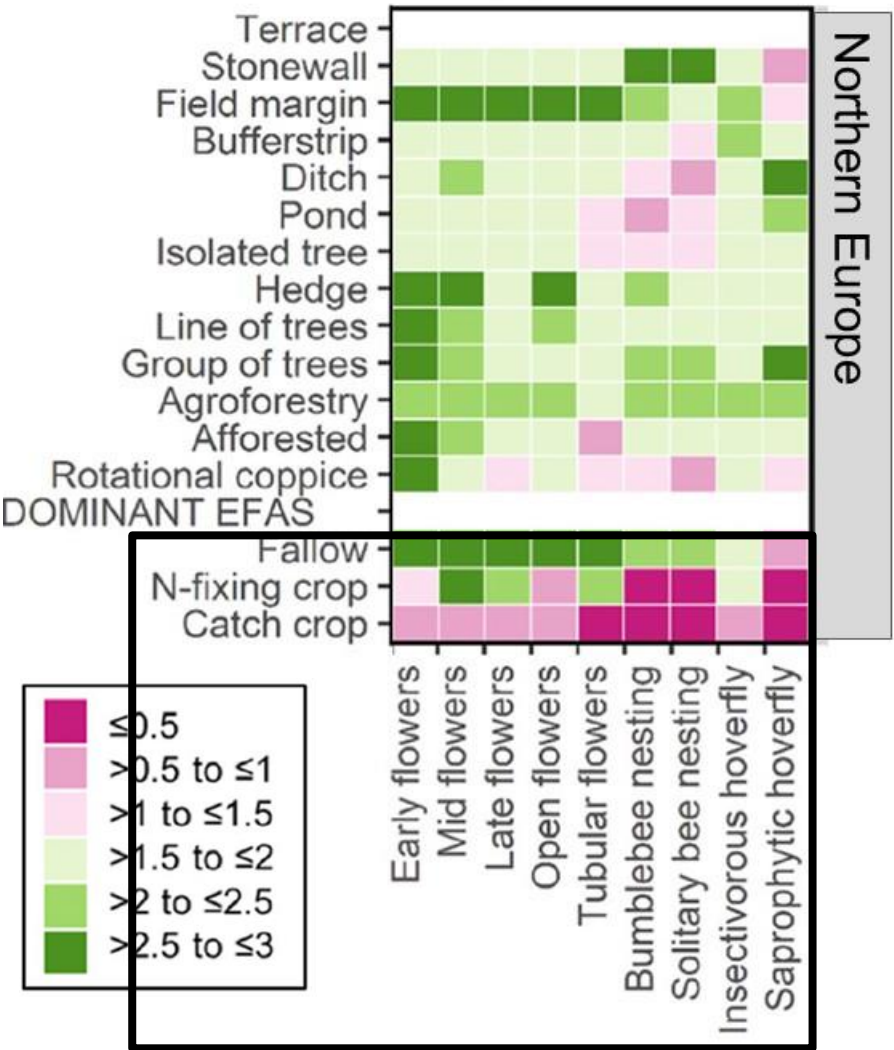


Eastern Europe  
5 countries

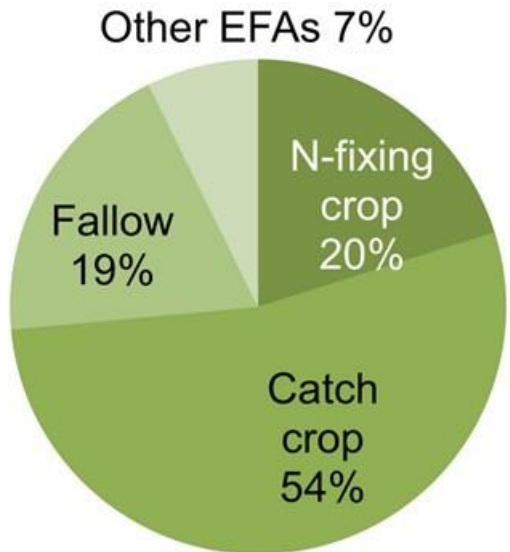
- Standard
- Pollinator friendly



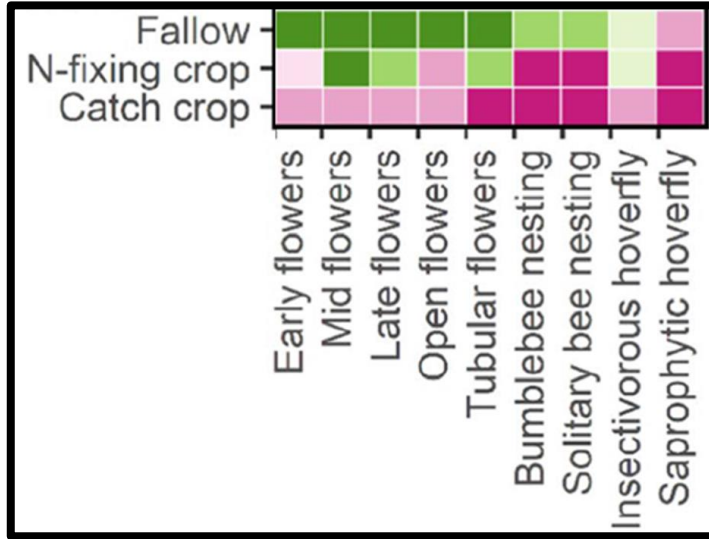
In NW Europe  
 Even under pollinator-  
 friendly management no  
 single habitat provided  
 all resources



Uptake  
 bias

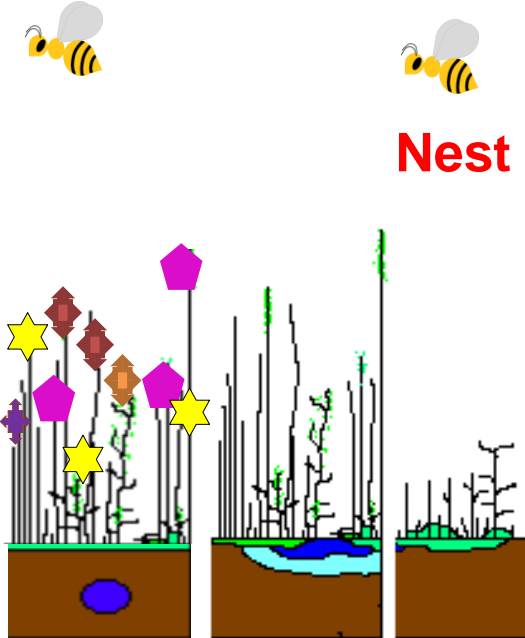


# Uptake



# Habitat use: Bumblebees

July/Aug

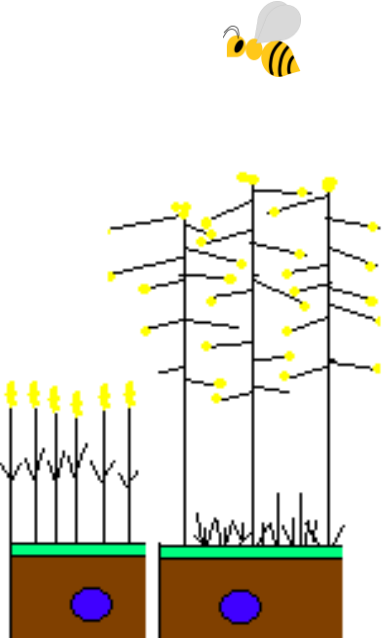


Nest

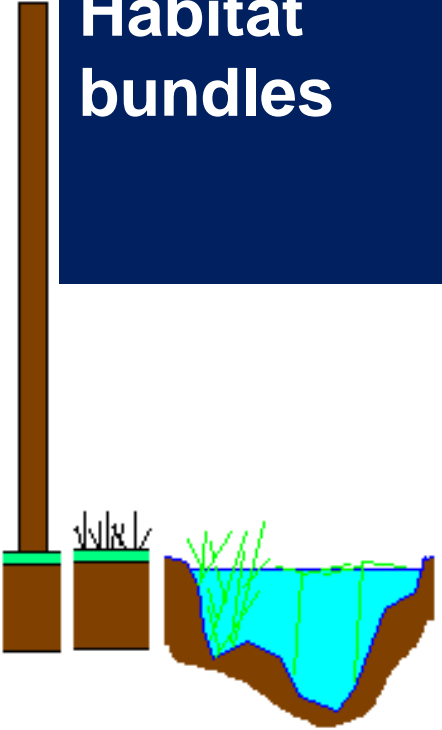
April



May



Habitat bundles



# 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

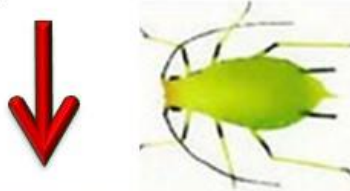


# Pressures on Farmers

Protection of Assets



Pests, weeds & diseases

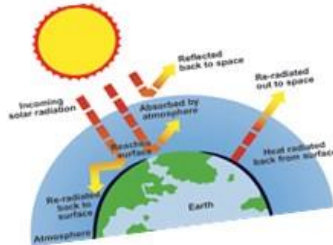


EU & Global Policy/legislation



Changes to AES, subsidies, chemicals

Climate change



Local, EU & Global Markets





# Thanks for your attention!



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Cole et al. (2020). A critical analysis of the potential for EU Common Agricultural Policy measures to support wild pollinators on farmland. *Journal of Applied Ecology*, 57: 681-694.

Cole et al. (2017). Exploring the interactions between resource availability and the utilisation of semi-natural habitats by insect pollinators in an intensive agricultural landscape. *Agriculture, Ecosystem & Environment*, 246 157-167

