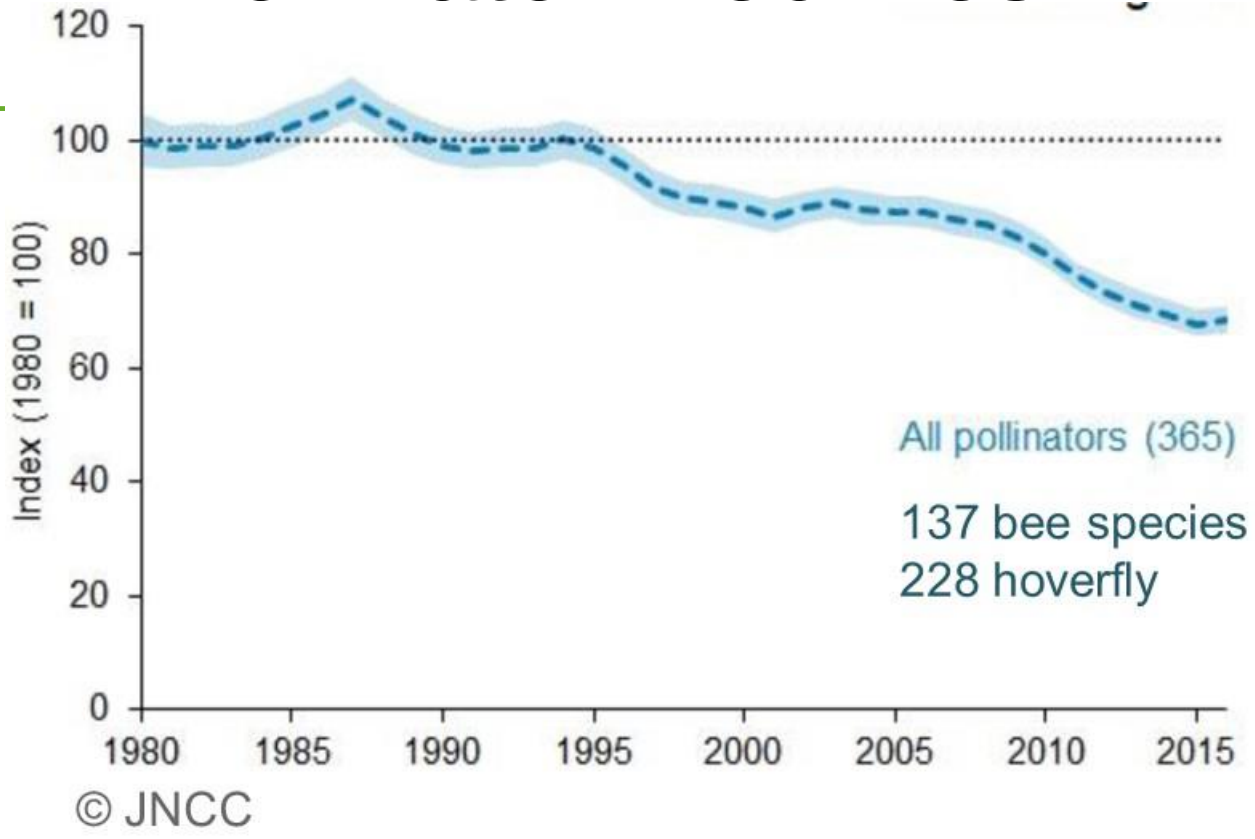
SUPPORTING POLLINATORS AGRI- ENVIRONMENTAL INTERVENTIONS

Dr Lorna Cole

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

Pollinator Declines




Saturday 02 December 2017

Business Money Comment Culture Travel Life

Science Earth Weather Health Royal

Night Sky Evolution Picture Galleries Science Video

ing dramatic effect on pollination

arming are having a damaging effect on the arch claims.

Science News

News » UK News » Science » Health » Richard Alleyne »

In Science News

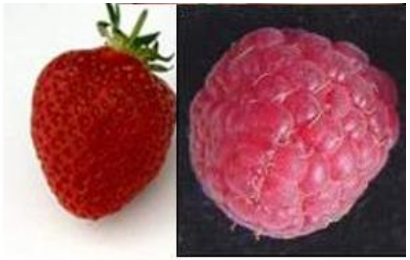
Total eclipse, in pictures

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

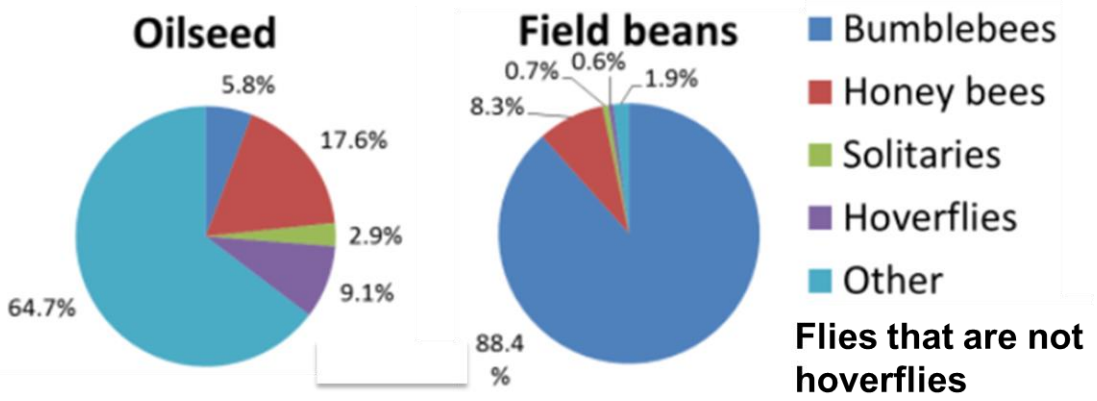
- Increase fruit set, quality and yield 75% crops worldwide (Klein *et al.* 2007)
- Valuation to UK agriculture **£600** Million/annum (Vanbergen *et al.* 2014)
- 85% of the world's flowering plants (Ollerton *et al.* 2011)

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



Stabilises Pollination

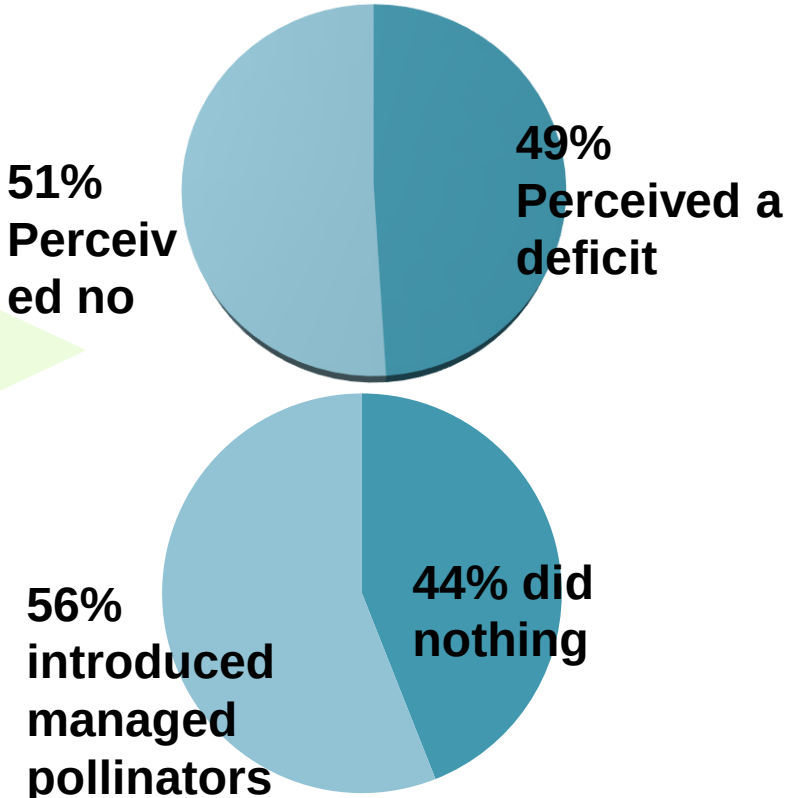
Adapted from Garratt et al. 2014 & Garratt et al 2013

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.

Pollination deficit



Breeze et al. 2019

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

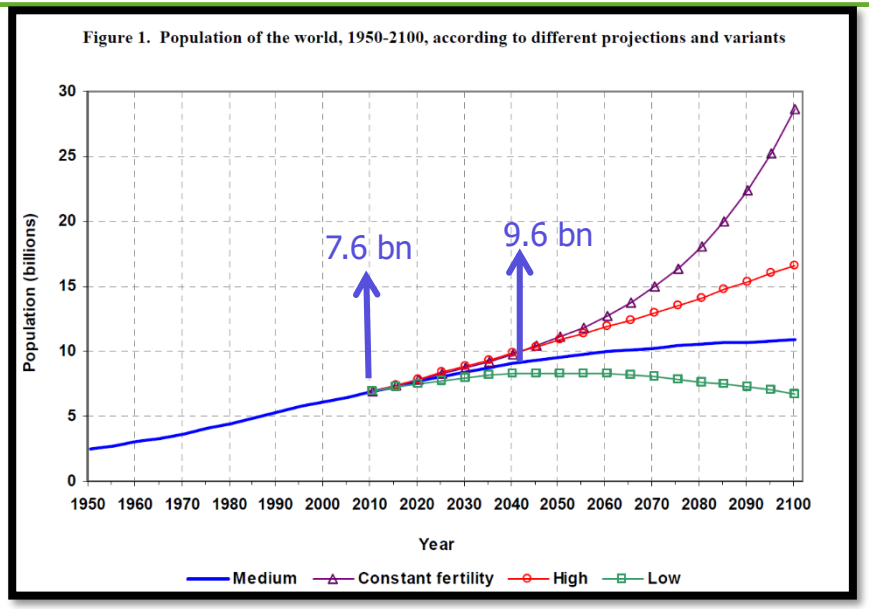
Positive Drivers

Pathogens & Parasites

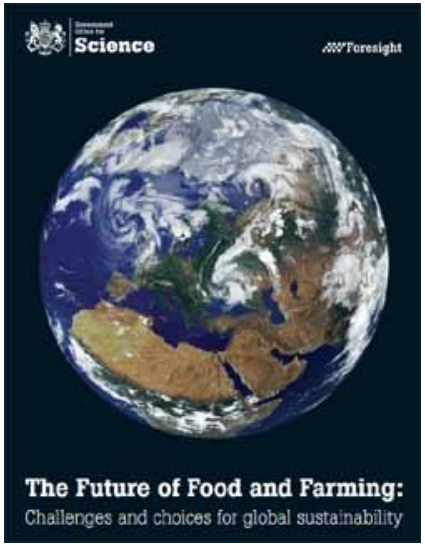
Afforestation

Invasive species

Why do we need intensive agriculture?



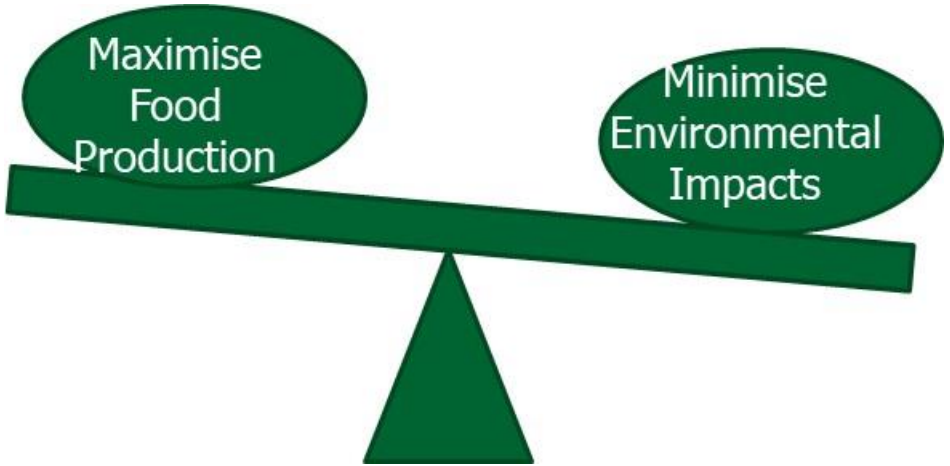
United Nations Department of Economic and Social Affairs: World Population Prospects: the 2012 Revision



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!



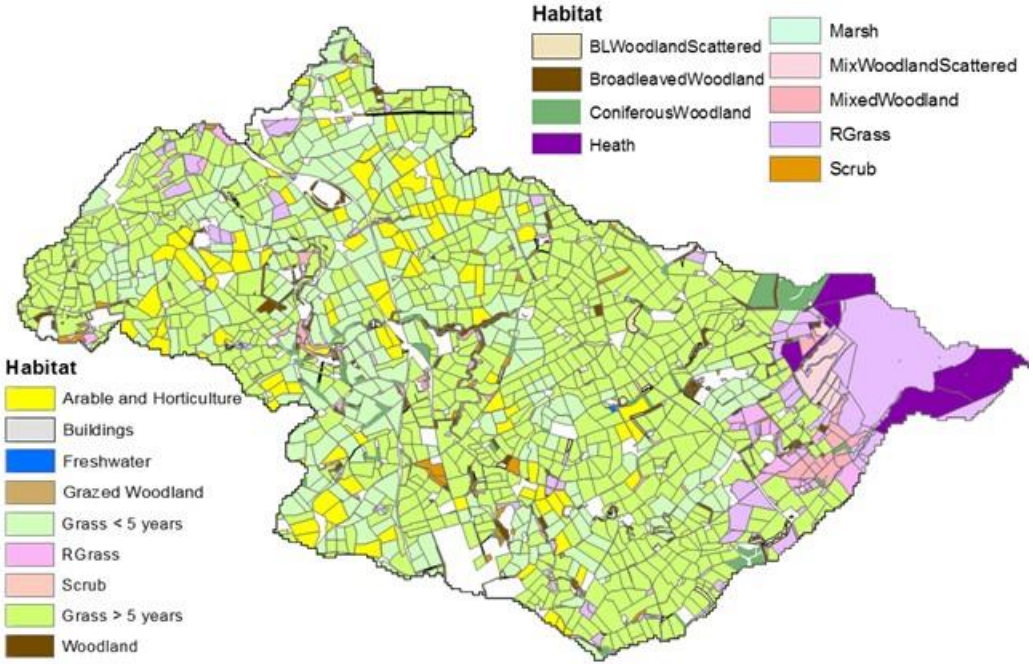
Landscape Scale Approach

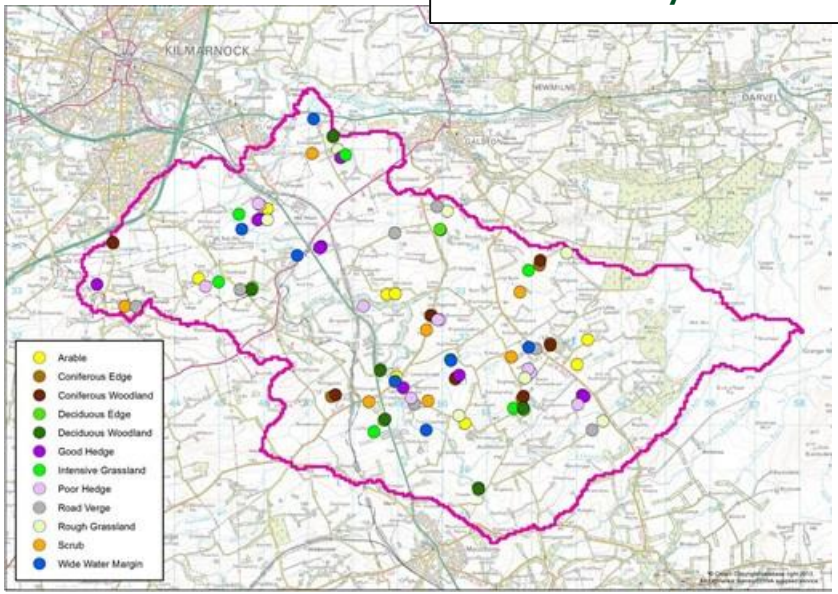
Aims

- 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





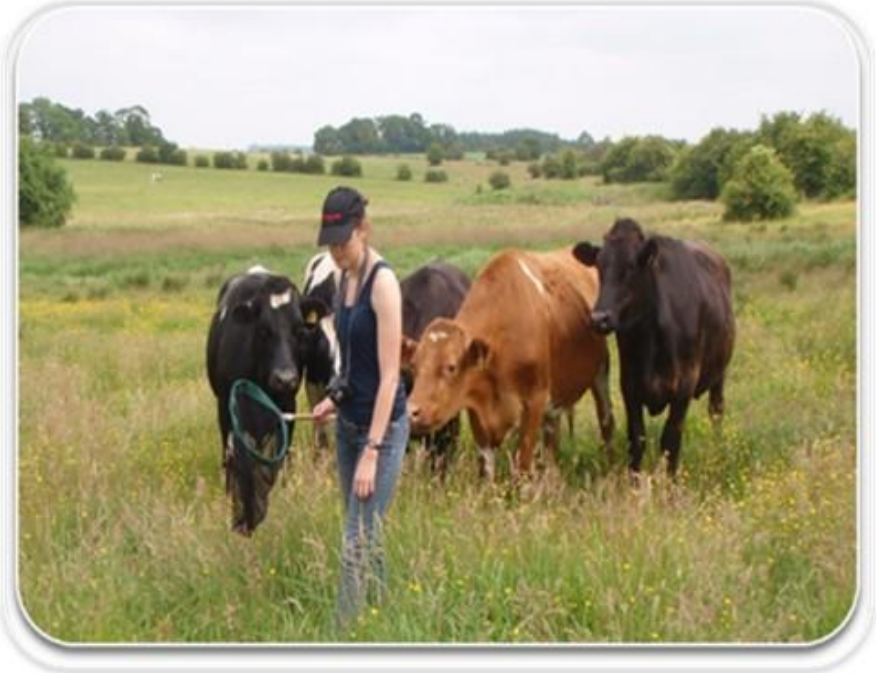
Map produced by Dr Lorna Cole ©SRUC 2015

Cole et al. 2017

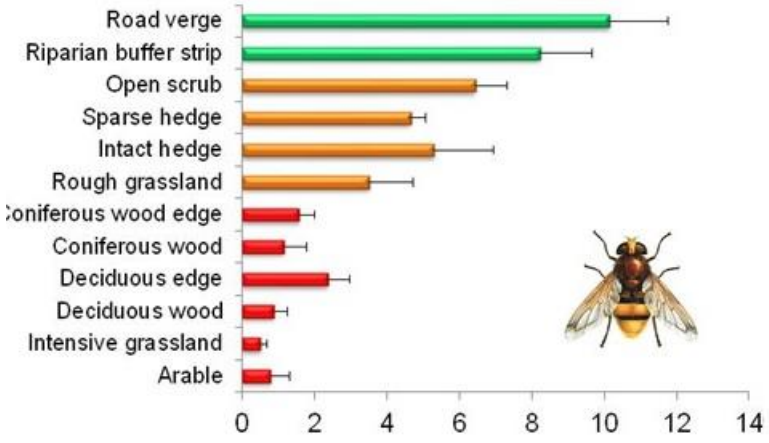

Imagery ©2020 Getmapping plc, Landsat / Copernicus, Maxar Technologies, Map data ©2020

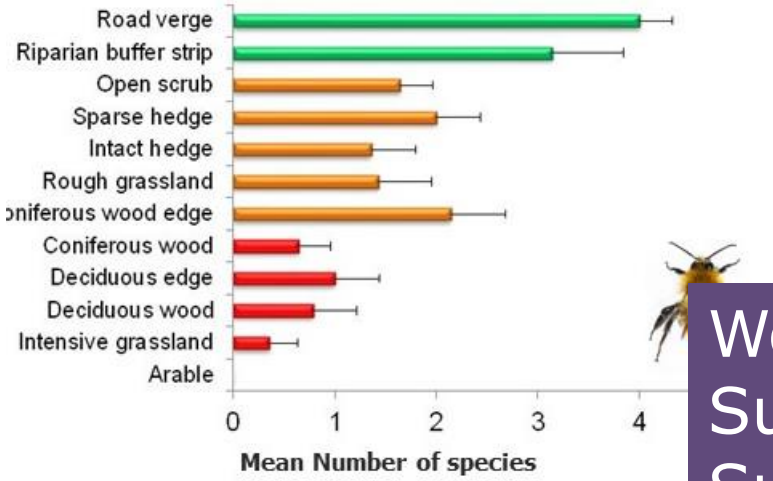
Habitat utilisation

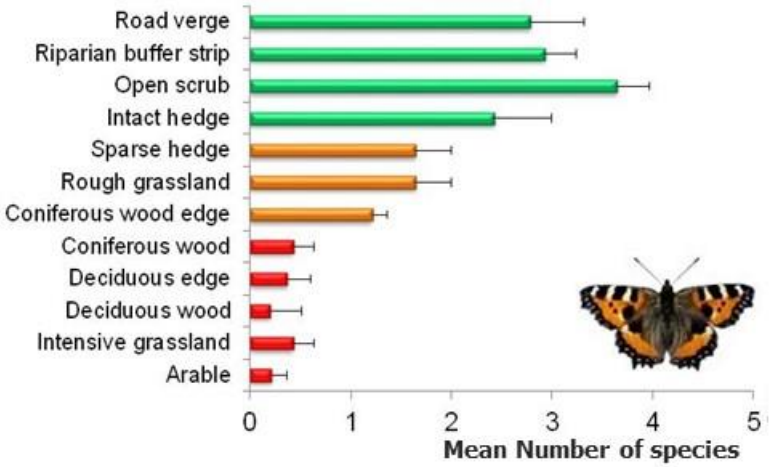
- Standardised transect walks
- June – September
- Bumblebees, hoverflies & butterflies



Key results

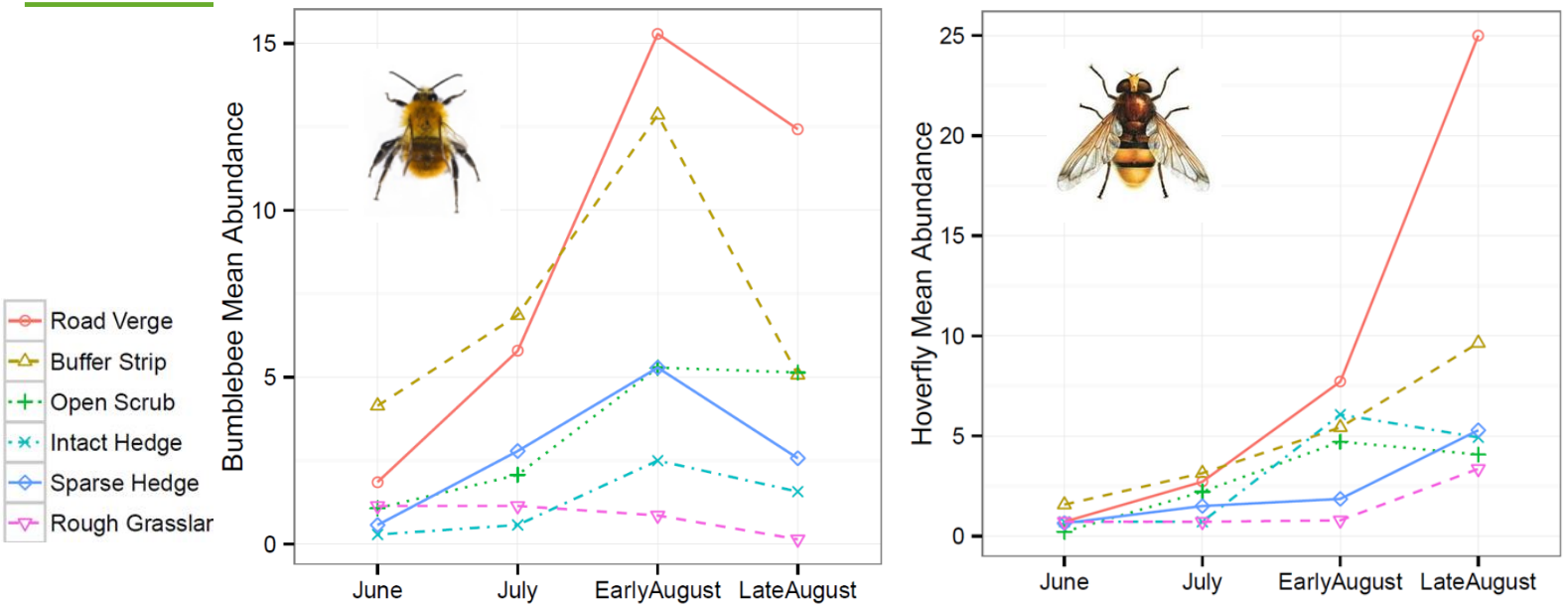






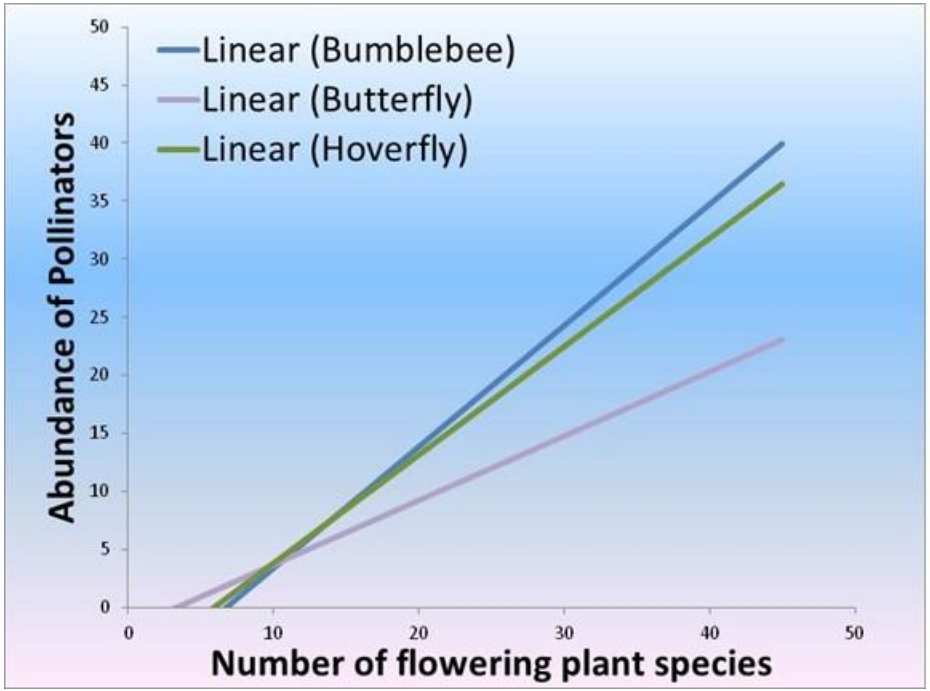
Woodlands undervalued
Survey timing
Survey methods

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

Compulsory Greening

CAP 2014
19 EFA options

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

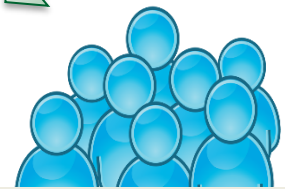
Delphi Technique

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

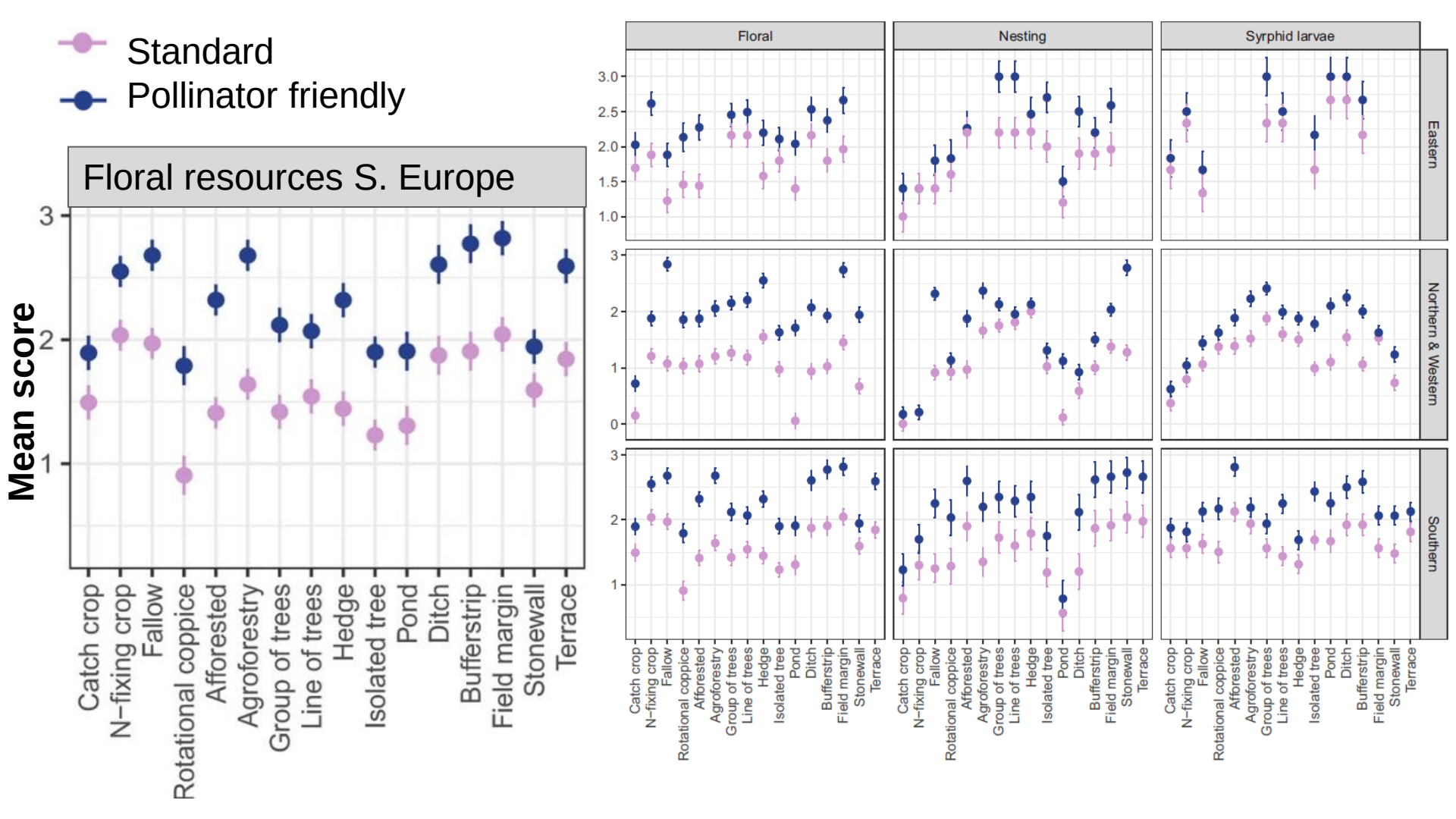
Final Scores Derived

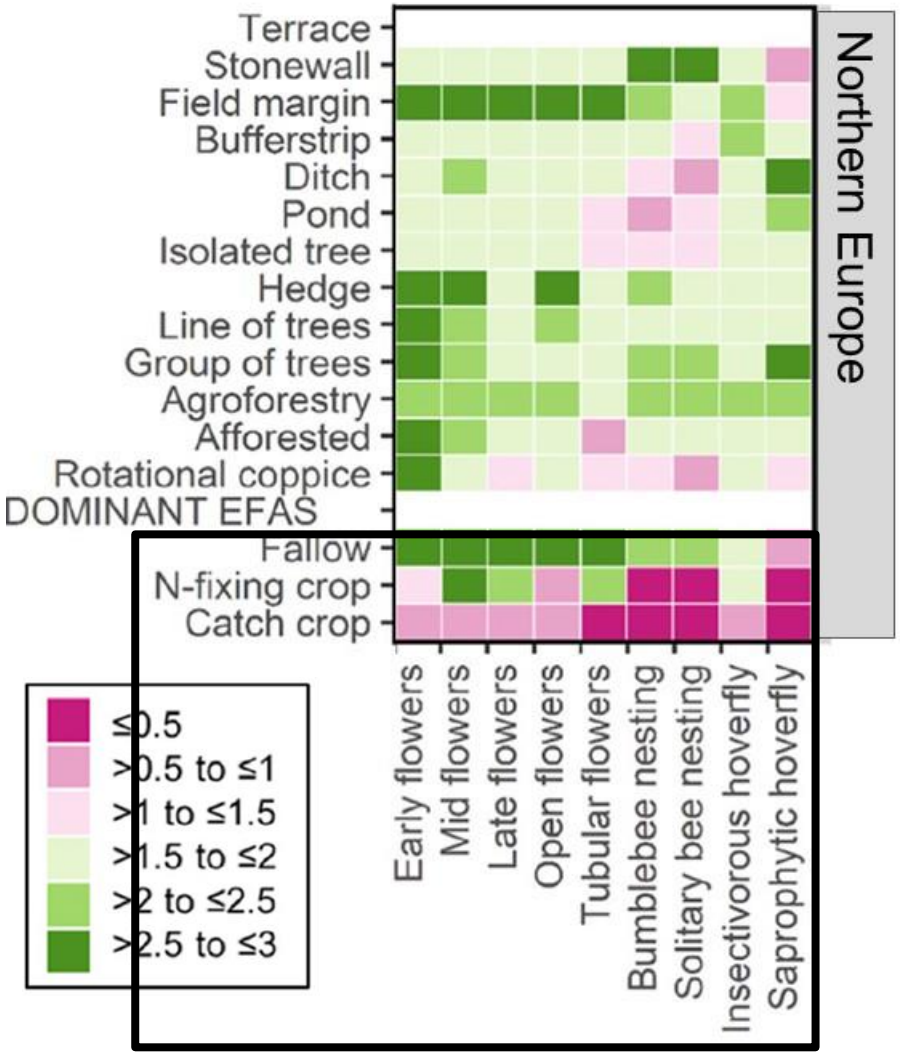


Northern Europe
8 countries

Southern Europe
5 countries

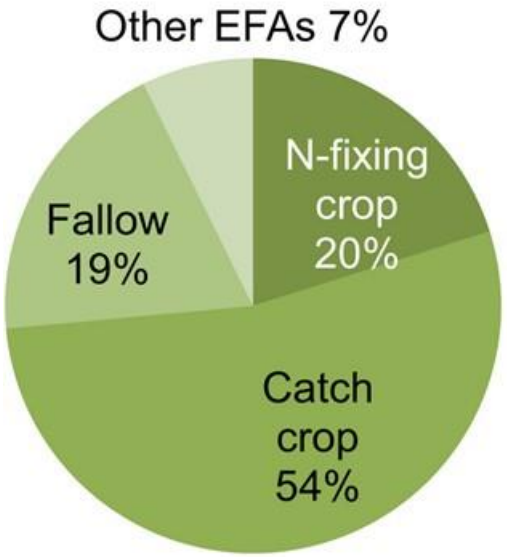
Eastern Europe
5 countries


Standard
Pollinator friendly
Floral resources S. Europe
Mean score
Catch crop
N−fixing crop
Fallow
Rotational coppice
Afforested
Agroforestry
Group of trees
Line of trees
Hedge
Isolated tree
Pond
Ditch
Bufferstrip
Field margin
Stonewall
Terrace
Floral
Nesting
Syrphid larvae
Eastern
Northern & Western
Southern

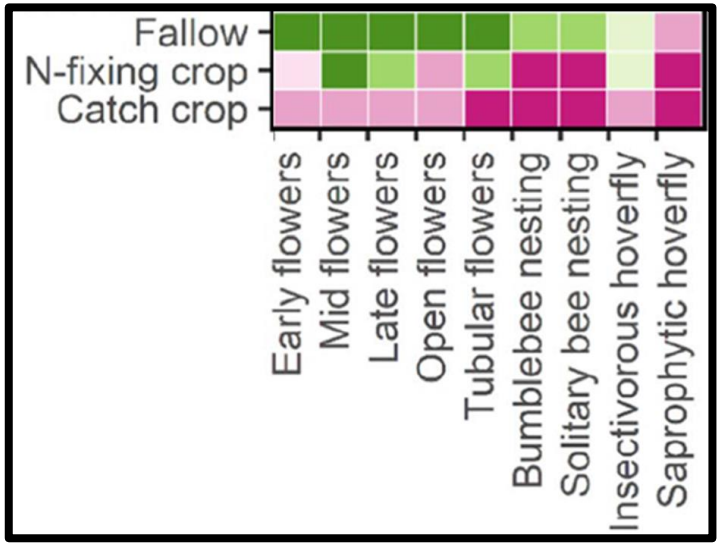


In NW Europe
Even under pollinator-friendly management no single habitat provided all resources

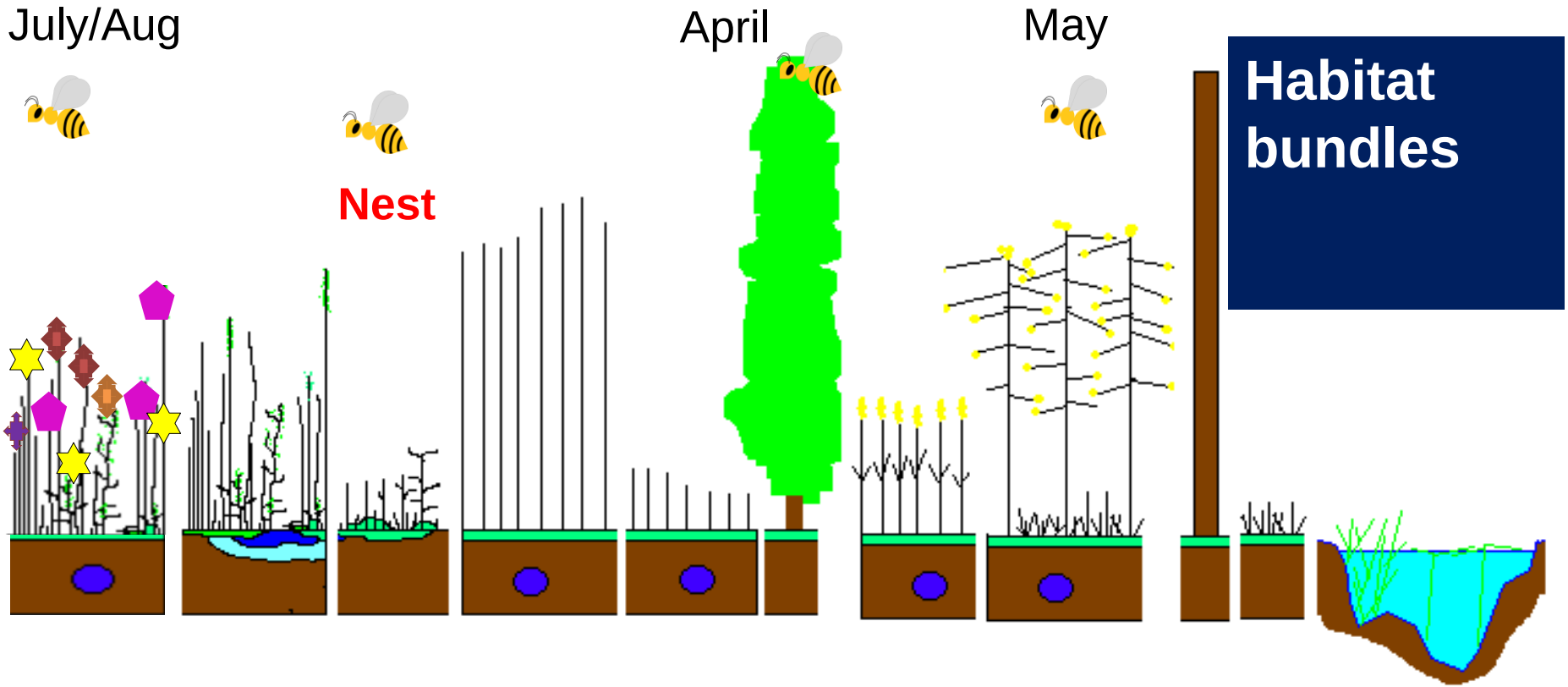
Uptake bias



Uptake


Fallow
N-fixing crop
Catch crop
Early flowers
Mid flowers
Late flowers
Open flowers
Tubular flowers
Bumblebee nesting
Solitary bee nesting
Insectivorous hoverfly
Saprophytic hoverfly

Habitat use: Bumblebees



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

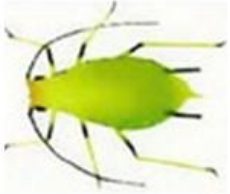
Enhance Landscape Diversity

- 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

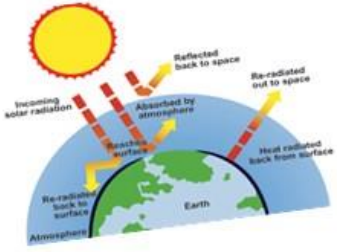
Protection of Assets

Pests, weeds & diseases



EU & Global Policy/legislation

Climate change



Local, EU & Global Markets

Changes to AES, subsidies, chemicals

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