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Agroscope

Biodiversity - Food resource quality and availability

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Bees at a crossroads: State of play - 30.09.2015

Role of bee nutrition in bee losses?

- **Agricultural landscapes are ‘green deserts’ for bees,**

Do they provide enough diet diversity?

e.g. Potts et al 2010

Still mostly an open question!

What do we know about bee nutrition?

- They completely depend on plants
- Wild bees can be specialists,

their survival depends on one plant species

or generalists, they can use several species

- Honey bees are generalists
- Wild bees do not fly far, honey bees have a large range

→ Impact on their environmental requirements

- Apart from the plant they visit, little knowledge on bee nutritional needs
- number of studies have recently increased for honeybees

What do we know about honey bee nutrition?

- **They completely depend on plants**

pollen → amino acids
→ vitamins
→ lipids
mixed with honey to form ‘bee bread’

a forager collects 15mg per trip,
>100,000 trips needed
→20kg per year per colony

What do we know about honey bee nutrition?

- **They completely depend on plants**

nectar → sugars
= source of energy

a forager collects 30mg per trip,
7,000,000 trips necessary
→ 120kg per year per colony

in summer a colony consumes 70kg nectar
50kg turned into 20kg honey for winter reserve

→ a colony needs access to large amounts of flowers to cover its needs

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Remark: the beekeeper cannot compensate before honey harvest, since this would adulterate honey

What do we know about honey bee nutrition?

- **They need large foraging areas to obtain these quantities**

They usually fly less than 1km, but can fly up to 6km

They have a very efficient recruiting system to optimally exploit found sources = dance

They are very good at choosing the best food source
Seeley 1987

What do we know about honey bee nutrition?

- **They need large foraging areas to obtain good quality food**
- **A diverse diet is necessary**

Affect the immune system / susceptibility to diseases

e.g. Degrandi-Hoffman and Chen 2015, Van Dooremalen et al 2013, Foley et al 2012, Alaux et al 2010

Effect of carbohydrate to protein ratio on physiology

e.g. Altaye et al 2010

→ Impact the plant choice in agro-environment schemes

Challenges to improve honey bee nutrition?

- **We do not know yet how to give them the best!**

Honeybees do not fly to the closest field!

e.g. *Couvillon et al. 2014*: chose natural reserves over agro-environment scheme plots!

Challenges to improve honey bee nutrition?

- **We do not know yet how to give them the best!**

Honeybees do not fly to the closest field!

e.g. *Couvillon et al. 2014*: chose natural reserves over agro-environment scheme plots!

e.g. *Pettis et al. 2014*: bees collected more from weeds and wild flowers than from the nearby experimental plots

→ We need to better understand their foraging ecology
→ Better adjust environmental management

Progress made during the last years

- Switzerland:

Introduction of a flower strip in the agro-environment schemes, designed for honey bees, not adapted for wild bees

efficiency unknown

Scientific follow up desired to improve strip composition

= real life experiment

- USA: presidential initiative to preserve habitats

- …

New or remaining challenges

Research

Better understand the nutritional needs of wild and managed bees

Better understand their foraging ecology

Policy making

Plan agro-environment schemes based on available / future data

And

Allow for testing the efficiency of those already implemented and if necessary improve their cost to befit ratio

Thank you for your attention

Agroscope good food, healthy environment