Organic farmers' reality to manage functional agrobio diversity in European organic apple orchards

Sarah Fernique, Servane Penvern, Aurélie Cardona, Erica Ahrenfeldt, Delphine Grébeau, Laurent Jamar, Silvia Matray, Laura Ozolina-Pole, Baiba Ralle, Lene Sigsgaard, et al.

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University of Hohenheim

Farmers' reality to manage functional agrobiodiversity in organic apple orchards

Results of an European survey

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Problematic

- *There is a gap of knowledge between agroecological principles and practical on-farm applications…*

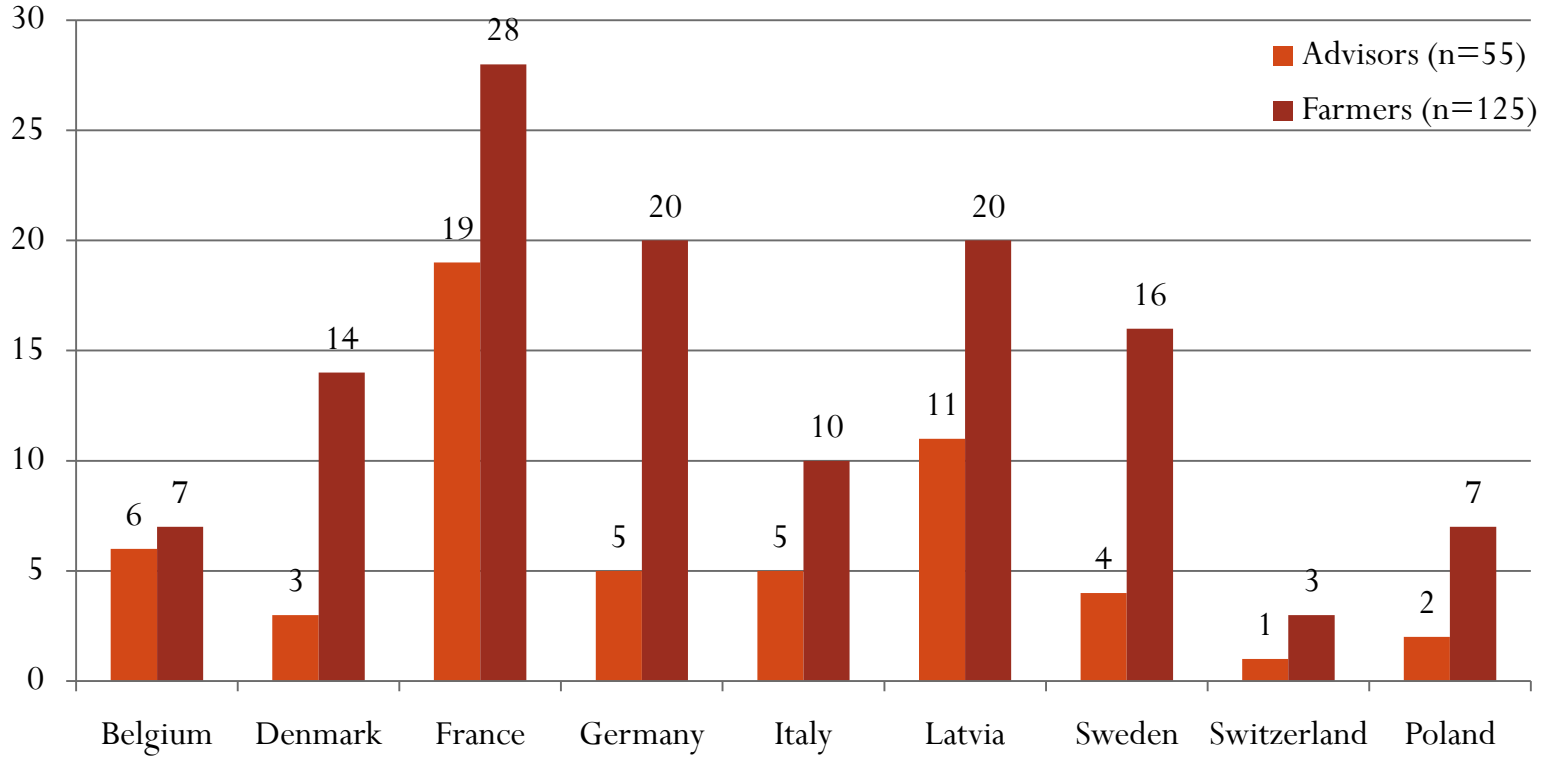
→How farmers perceive and manage functional agro-biodiversity (FAB) in Europe ?

→ What techniques are currently implemented by farmers to improve it in apple orchards ?

→ What are the benefits and limitations of these FAB-techniques implementation according to farmers?

Material and methods

- Structured interviews performed in two steps in 9 countries:
  - An advisor questionnaire (n=55) and a farmer one (n=125)
  - Either by face-to-face or by phone

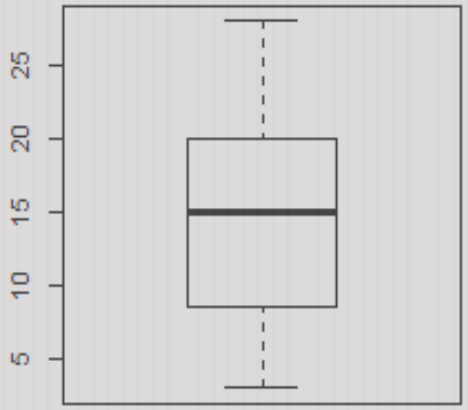


- Sample construction to get the broadest vision:
  - Various degrees of experience and conviction about FAB
  - Various sources of contact
  - Various farming systems…

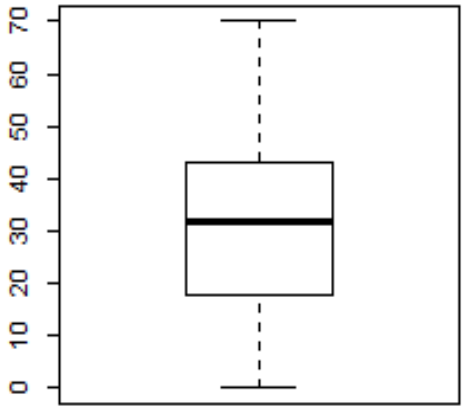
Data analyzed:
Advisors : n=53
Farmers n=118

A high diversity of contexts

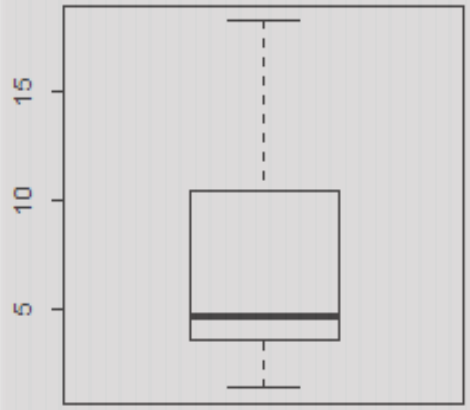
Sample description : National means variabilities



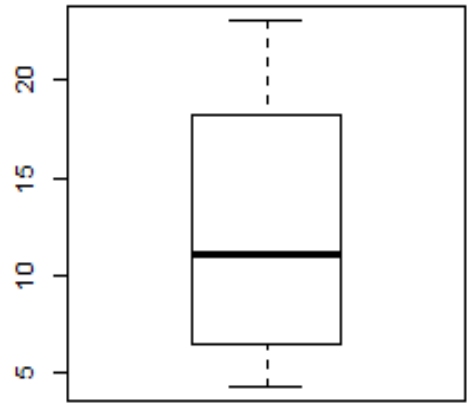
Farmers interviewed
Average number per country



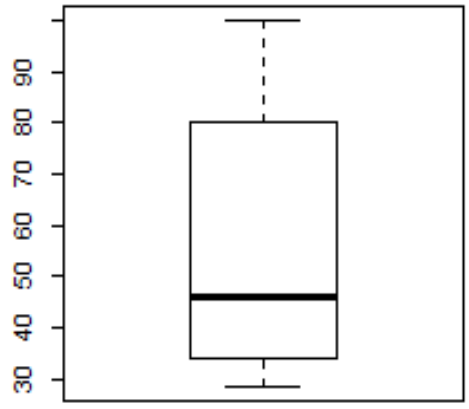
Specialization degree
Proportion of farm specialized in pome fruit (%)



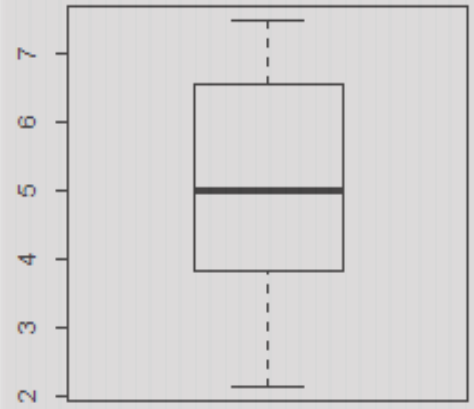
Orchard surface
Average surface of farmers apple orchard (in ha)



Experience in OF
Average number of years since conversion



Advise–frequency
Proportion of farmers with a frequent monitoring (≥3/year)



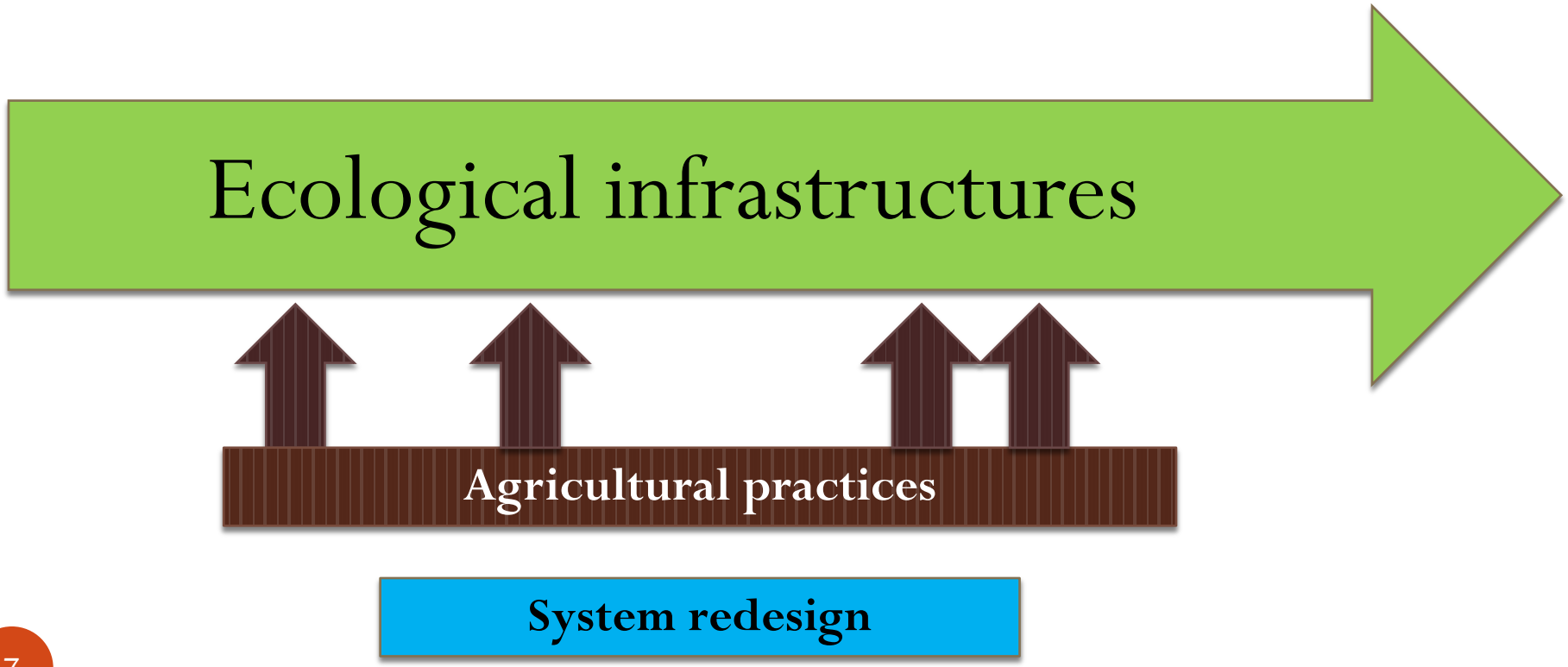
FAB-tk experience
Average number of FAB-techniques mentioned by farmers

Results

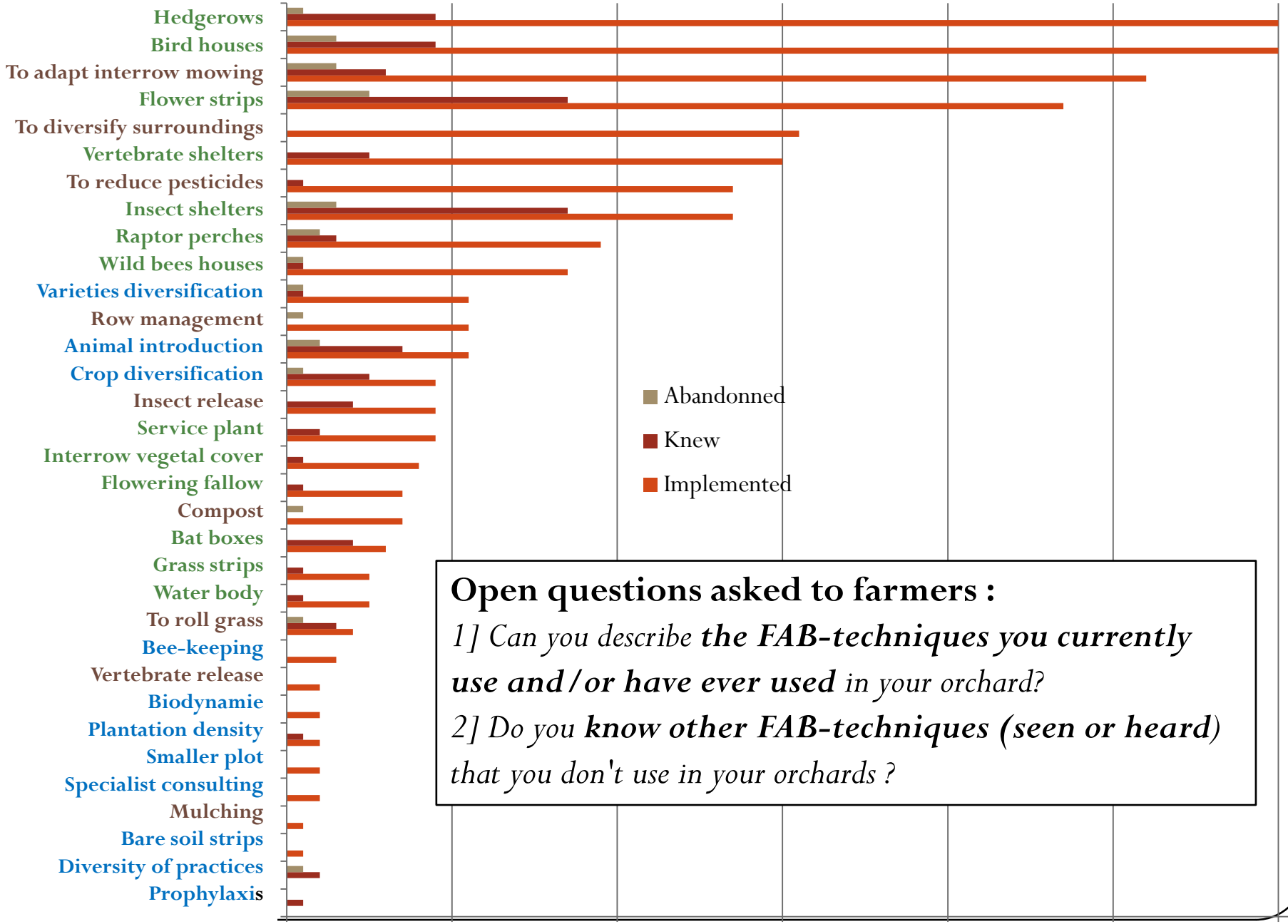
1. FAB-Techniques description and between-countries variability
2. FAB-Techniques main targets (beneficials and pest)
3. FAB-Techniques assessement by farmers

FAB-Techniques description

- FAB-Techniques described belong to 3 categories
  - **Ecological infrastructures** : long-term implementation
  - **Agricultural practices** : adaptable from a season to another
  - **System redesign :** deeper interactions with the production system



34 FAB-Techniques **mentioned** by farmers



Open questions asked to farmers :

1] Can you describe ***the FAB-techniques you currently use and/or have ever used*** *in your orchard?*

2] Do you ***know other FAB-techniques (seen or heard)*** *that you don't use in your orchards ?*

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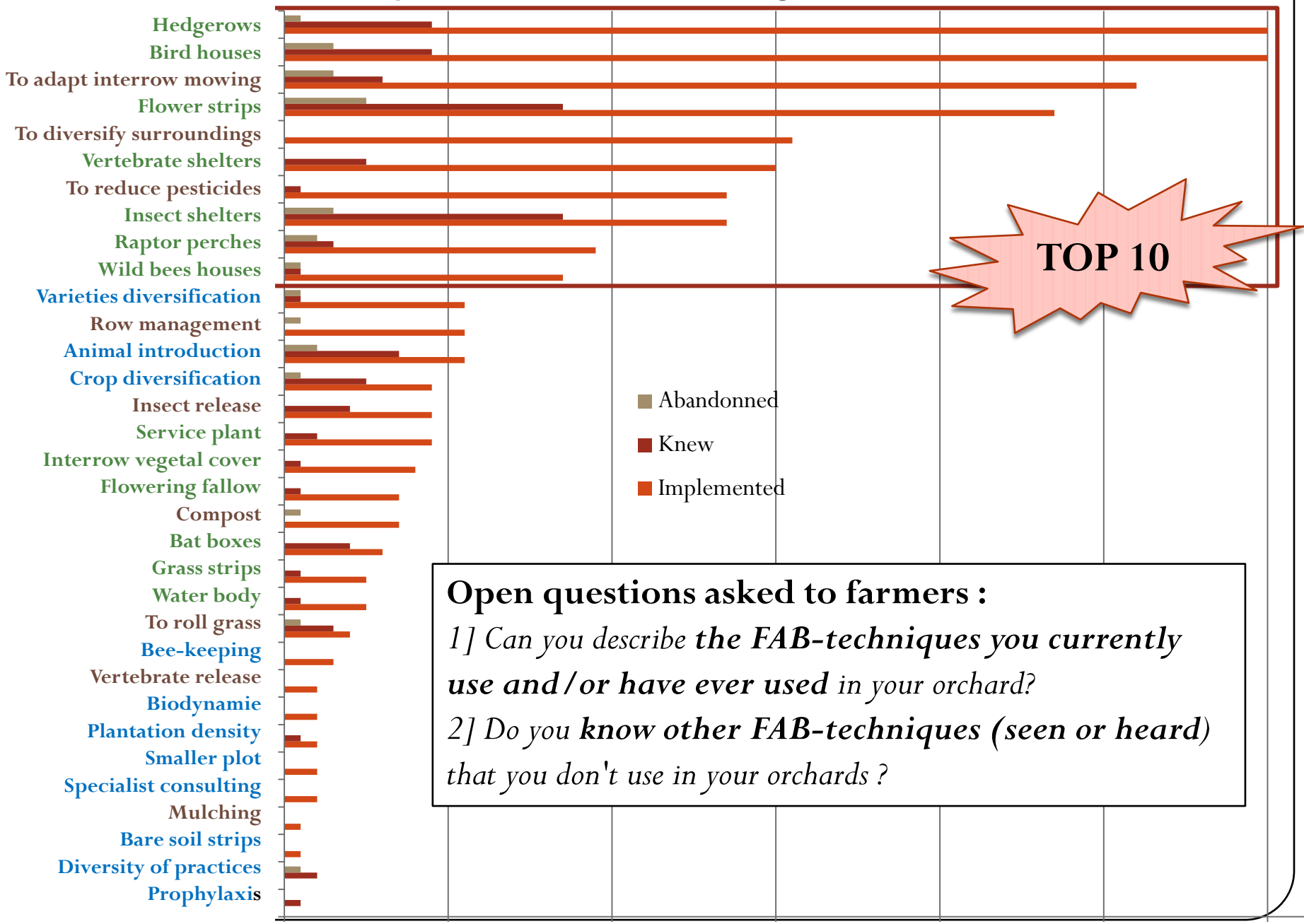

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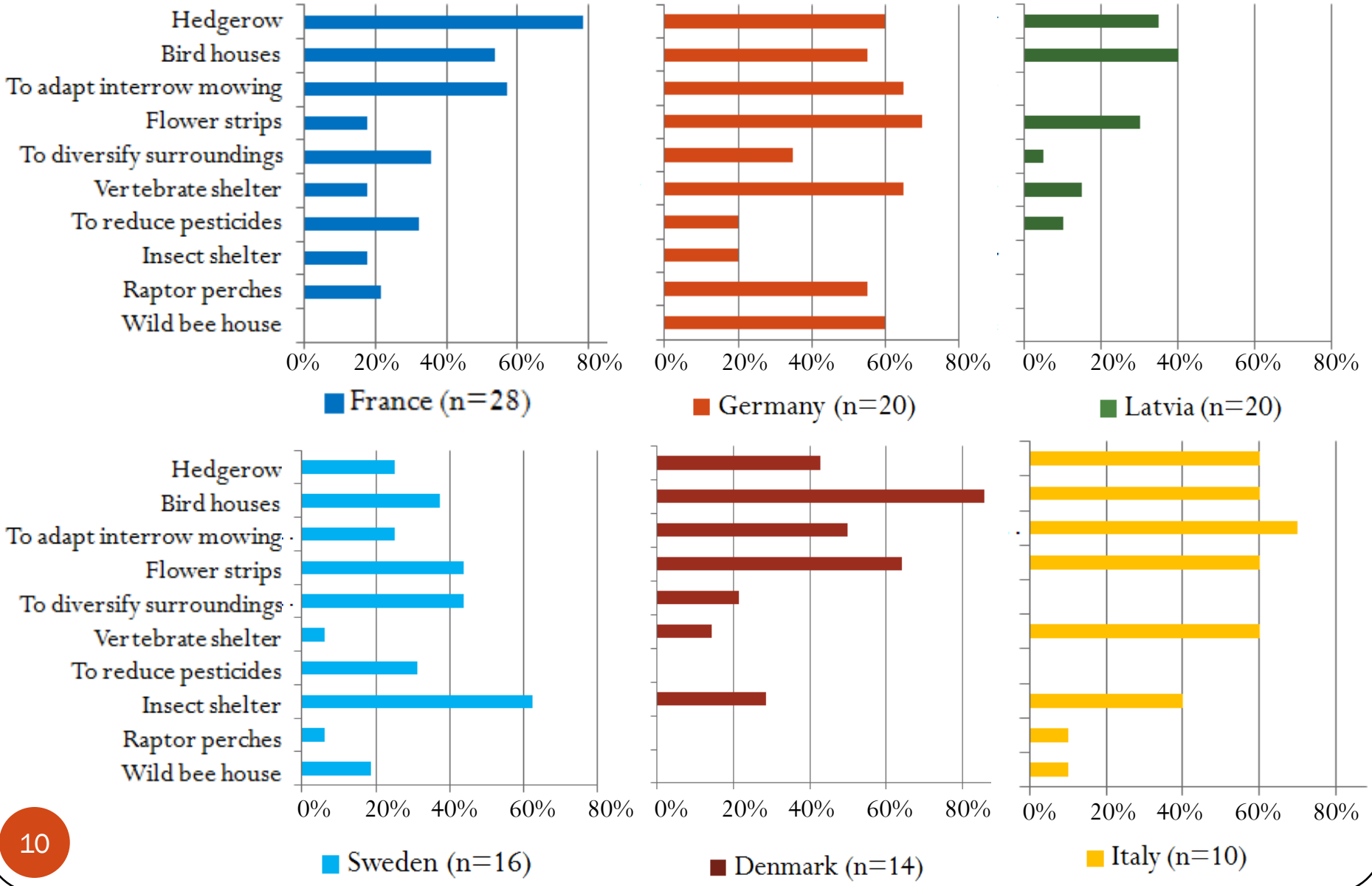
Unequal distribution among countries (TOP 10)

% of farmers interviewed who say they implement each technique



Why such differences ?

- Different natural and socio-technical contexts ?
  - Existing infrastructure, cultural and traditional heritage (LV, FR…)
  - Different national and regional regulation (DE, DK…)
  - Higher communication about one technique (DK, FR…)
  - Insufficient knowledge and skepticism about effectiveness (PL, LV…)
  - "Fashion trend" for some techniques (DK, FR,…)
  - Very common techniques not mentioned but used (SE, DK…)
  - Etc…

→ No conclusion, but our methodology opens hypothesis for further perspectives…

- Other objectives than FAB targeted ?
- The interview bias : 9 different interviewers and languages…

Why such differences ?

Variability of FAB-techniques implementation *ex : Flower strips*

- Different conception within farmers… and even within researcher !
- Can vary in term of :
  - Location in the orchard
  - Spontaneous wild flowers VS sown mix of seeds
  - Choice of species
  - Management strategy
  - Objectives targeted : pest regulation, pollination, nitrogen input…
  - …

FAB-techniques targets (1)

***Why** do you use (or have used) each one ?*

Various FAB-Techniques

Lepidopteran
e.g. C. Pomonella

Aphids
e.g. D. Plantaginea
Mites
P. ulmi

Voles

Mollusks
Slugs, snails

Disease

Weeds

FAB-techniques targets (1)

***Why** do you use (or have used) each one ?*

Various FAB-Techniques

Arthropods natural enemies

Mammals

Birds

Reptiles/amphibians

Wild and sown vegetation
Grass, flowers, shr ubs and trees

Domestic animals

Lepidopteran
e.g. C. Pomonella

Aphids
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FAB-techniques targets (1)

Why do you use (or have used) each one ?

Pest regulation

Various FAB-Techniques

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Mites
P. ulmi

Voles

Mollusks
Slugs, snails

Disease

Weeds

FAB-techniques targets (2)

***Why** do you use (or have used) each one ?*

Various FAB-Techniques

- **Arthropods natural enemies**
- **Mammals**
- **Birds**
- **Reptiles and amphibians**
- **Domestic animals**

Wild and sown vegetation
Grass, flowers, shrubs and trees

FAB-techniques targets (2)

***Why** do you use (or have used) each one ?*

Various FAB-Techniques

- **Arthropods natural enemies**
- **Mammals**
- **Birds**
- **Reptiles and amphibians**
- **Domestic animals**

Pollination

Pollinators

Wild and sown vegetation
Grass, flowers, shrubs and trees

FAB-techniques targets (2)

Why do you use (or have used) each one ?

Various FAB-Techniques

Overall biodiversity

Wild and sown vegetation
Grass, flowers, shrubs and trees

Arthropods natural enemies

Mammals

Birds

Reptiles and amphibians

Domestic animals

Pollination

Pollinators

Other organisms

FAB-techniques targets (2)

***Why** do you use (or have used) each one ?*

Cultivated plants
Fruit and nut trees

Production

Various FAB-Techniques

Overall biodiversity

Arthropods natural enemies

Mammals

Birds

Reptiles and amphibians

Domestic animals

Pollination

Pollinators

Other organisms

Wild and sown vegetation
Grass, flowers, shrubs and trees

Mechanical protection

+ Various functions…

FAB-Techniques assessment

Ranking according to criteria given by the interviewer

Among all these FAB-techniques you know, which one is 1] **the most effective /**
2] the easiest to implement / 3] **the most innovative** in your opinion ? And why ?

Rank	Most efficient	Easiest to implement	Most innovative
1	No answer (n=51)	No answer (n=30)	No answer (n=47)
2	Flower strips (n=13)	To adapt interrow mowing (n=27)	Flower strips (n=12)
3	Hedgerows (n=12)	Bird houses (n=13)	Insect shelter (n=11)
4	To reduce pesticide (n=12)	Hedgerows (n=12)	Animal introduction (n=11)
5	To adapt interrow mowing (n=7)	Flower strips (n=8)	To adapt interrow mowing (n=6)

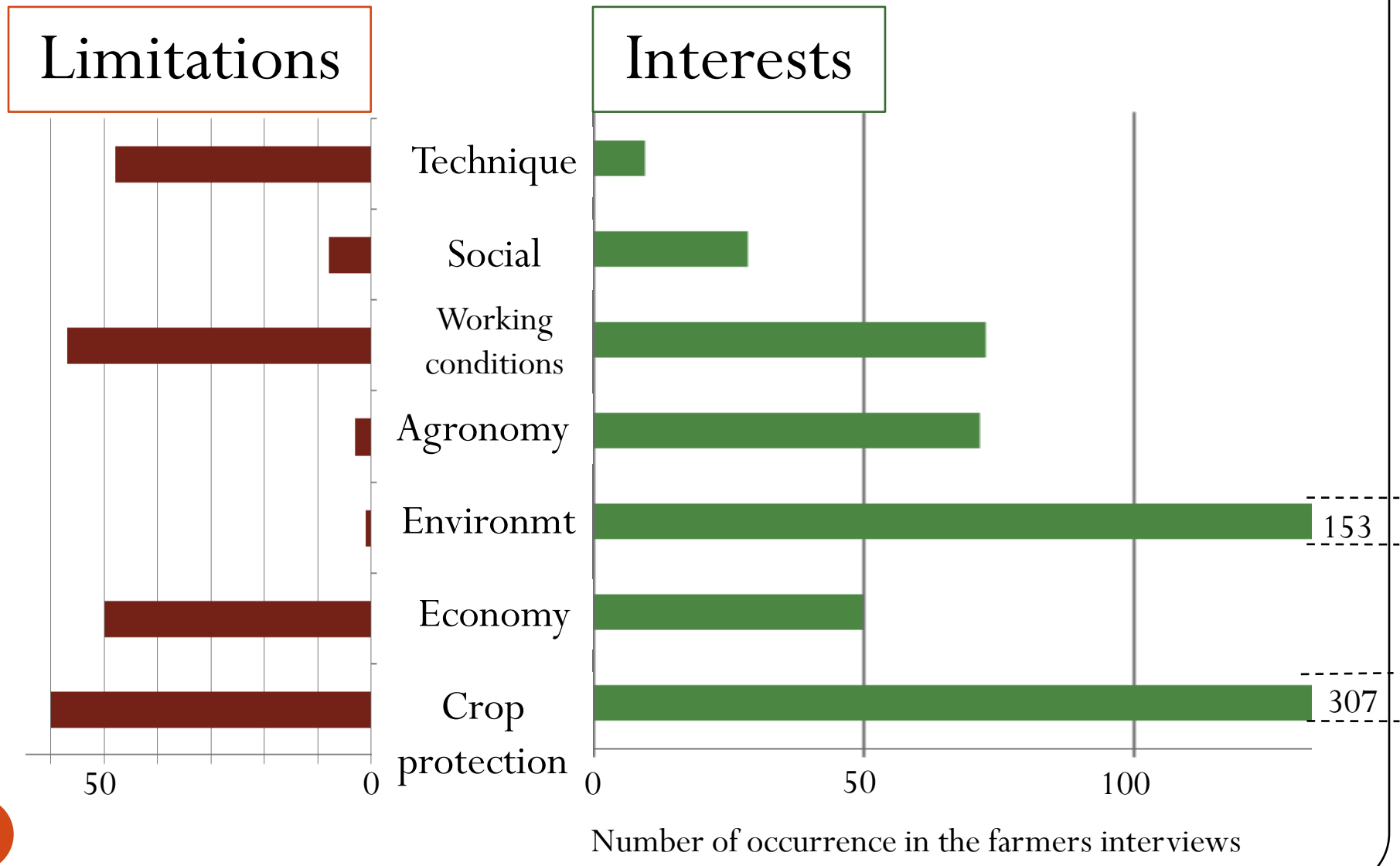
- The amount of "no answer"
  - Lack of easy-to-use monitoring tools (EcoOrchard WP2)
  - Combination is more relevant than a single technique
  - Other criteria used for assessment

FAB-Techniques assessment

Criteria	Negative (limitations)	Positive (interests)
Crop protection	Pest disease and/or weeds increase, Voles and rodents increase	Weed management, Reduce pest and disease, Attract natural enemies
Economy	Reduce production, Space consuming, high-cost	Secondary production, Energy saving, Fruit quality, Time gain
Environment	Reduce biodiversity	Overall biodiversity, Landscape quality, Water quality, Reduce pollution, Pollinator enhancement
Agronomy	Competition	Pesticide drift and wind protection, Soil quality, Nitrogen supply,
Working conditions	Time consuming, hard to apply and/or maintain	Aesthetic, Less workload, Harmony, Personal pleasure and philosophy
Technique	Incompatible with nets or other techniques, Spraying restriction, Ineffective	Locally adapted, easy to implement, effective
Social	Mentality, Risk increase, Visual bad effect,	Image, Communication,, Work diversification, Patrimony

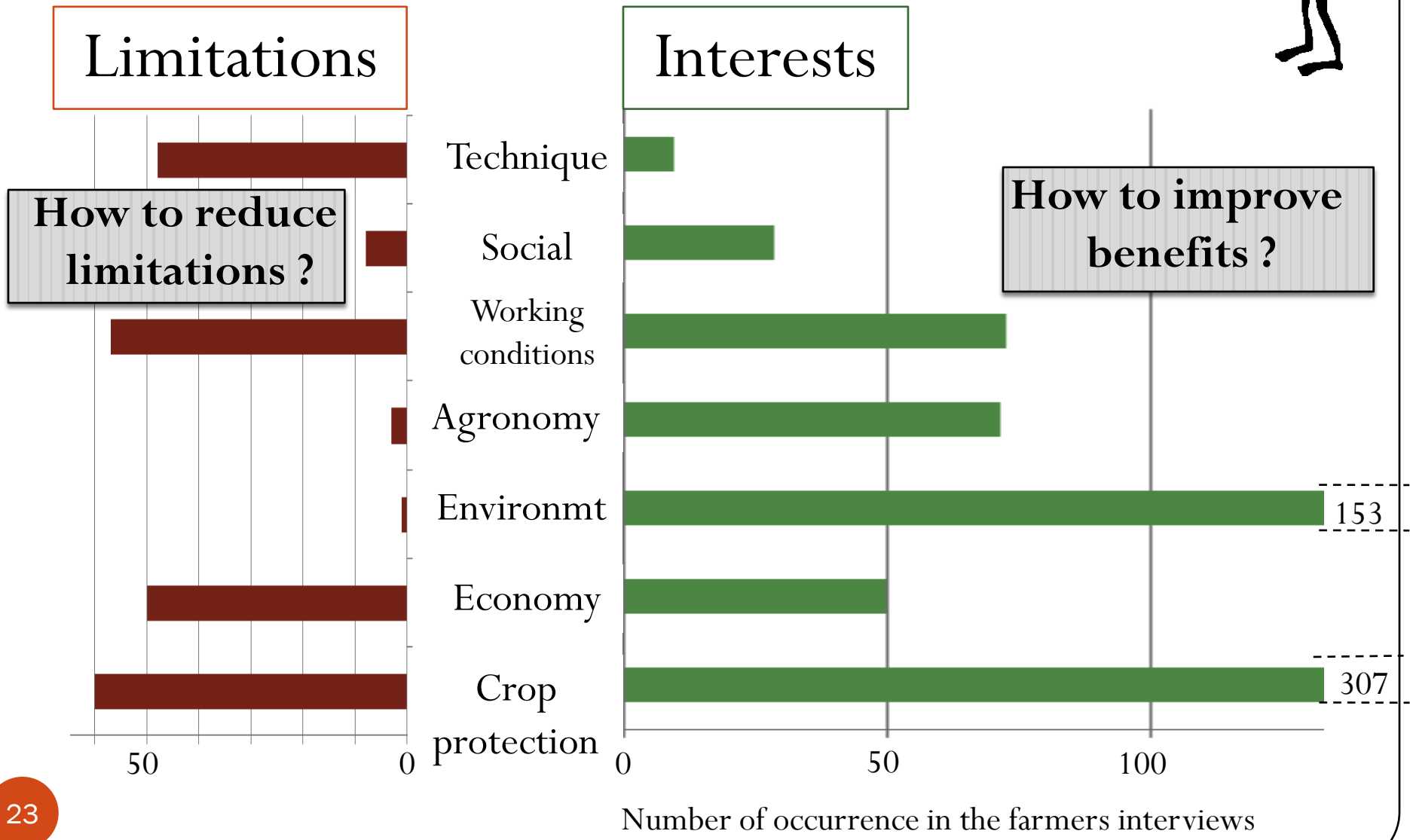
FAB-Techniques assessment

Based on the Pros and Cons mentioned for each technique



FAB-Techniques assessment

Based on the Pros and Cons mentioned for each technique

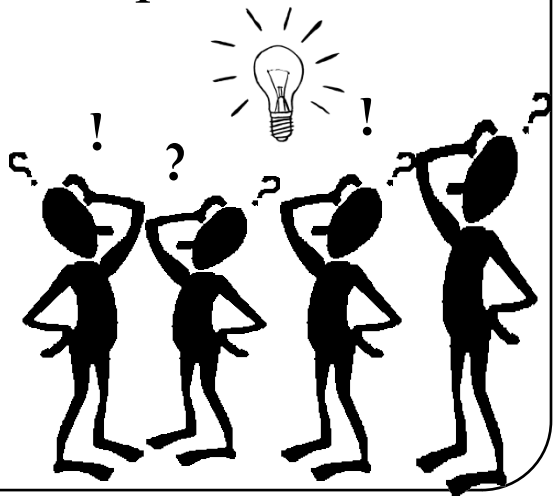


Perspectives for the oncoming Workshop

- Presentation of FAB-Techniques with their Pros and Cons mentioned by European farmers → 5 technical sheets provided based on information collected in the interviews

⇒To discuss, evaluate and complete the information we've collected with your expertise : how to overcome limitations and improve benefits ?

⇒To discuss how to disseminate it to farmers and help FAB-techniques adoption and management



This afternoon : 17h35-19h10

Thanks for your attention…

…and waiting for meeting you at our workshop for further discussions !

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