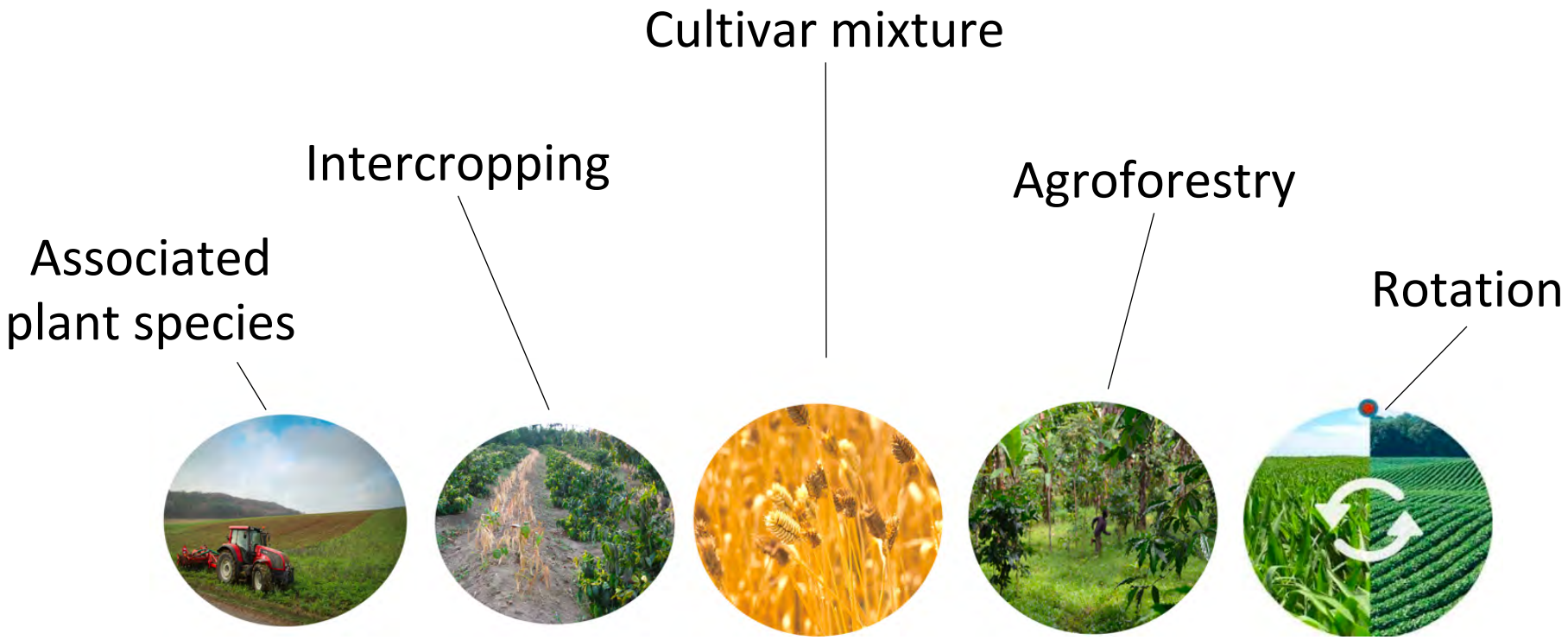
Effect of crop diversification strategies at the global scale

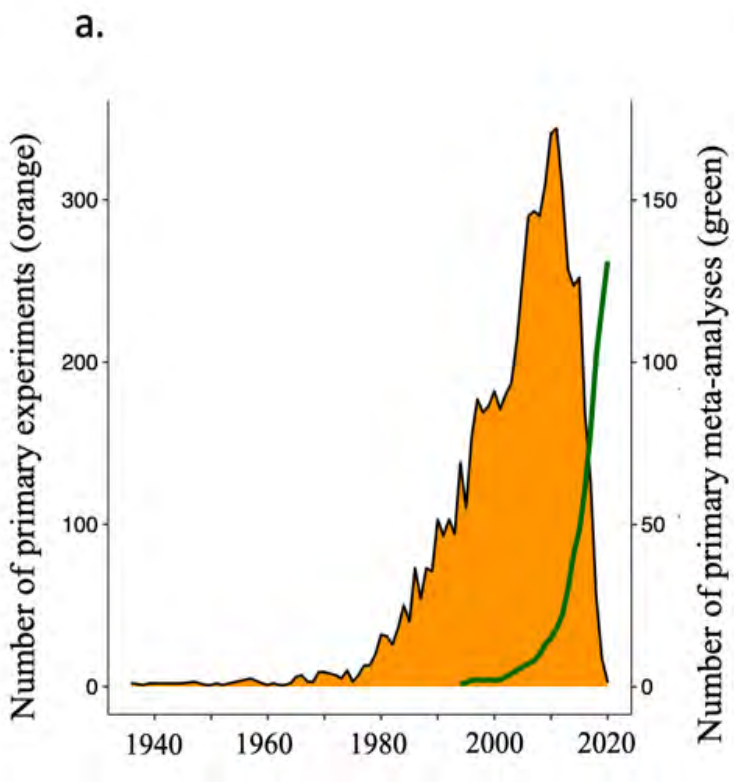
Numerous strategies of crop diversification

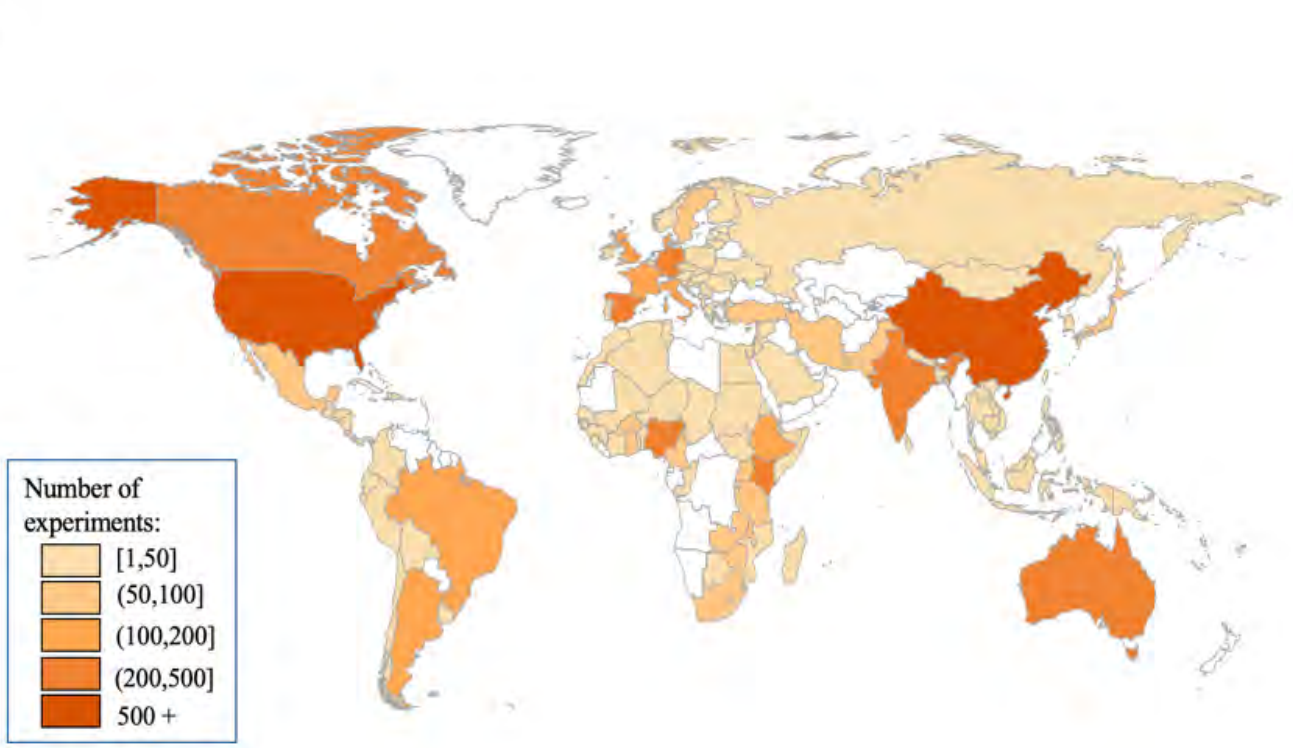
Include a wide range of practices aiming at incorporating (crop) diversity across multiple spatial and/or temporal scales (Redliech et al., 2018)



Many studies available

Over 35,000 experimental results have been published on crop diversification between January 1990 and May 2020 in agronomy peer-reviewed journals





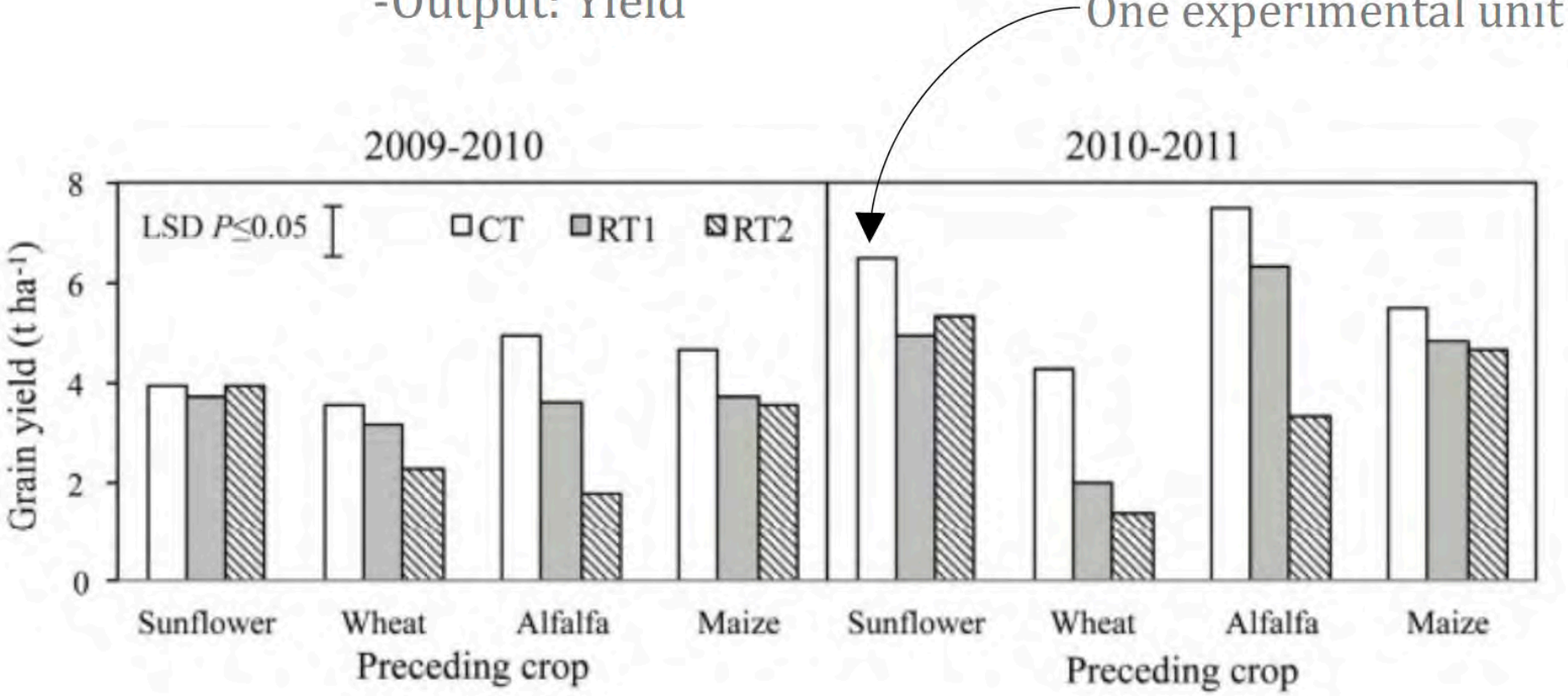
A difficulty in generalising from experimental results

◆ Example of individual experiments

-Strategie: Rotation

-Region: Italy

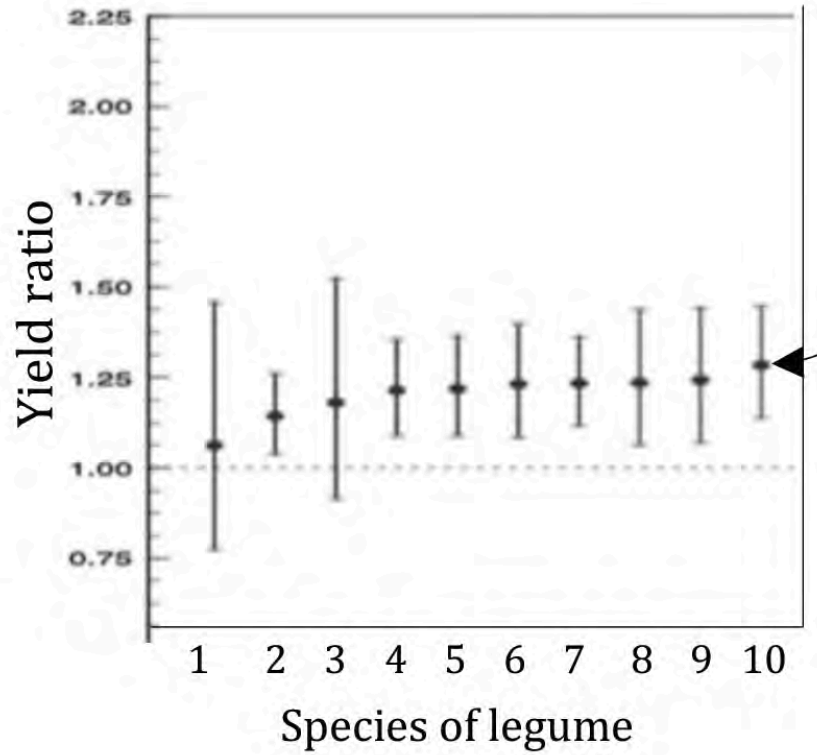
-Output: Yield



Synthesis of experimental results: meta-analyses

Example of MA : Cernay and *al*, 2017

$$\text{Yield ratio} = \frac{\text{Yield of cereals cultivated after cereals}}{\text{Yield of cereals cultivated after legumes}}$$



Mean of all individual studies
(for legume #10)

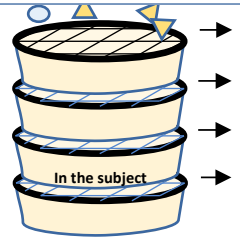
95% Confidence intervals

- What are the quantitative effects of crop diversification on biodiversity and ecosystem services?

- What are the knowledge gaps?

1. Identification of the studies

2. Selection of the studies



Excluded duplicated studies

Excluded studies not related to crop diversification

Excluded studies that are not meta-analyses

Quantification: ratio

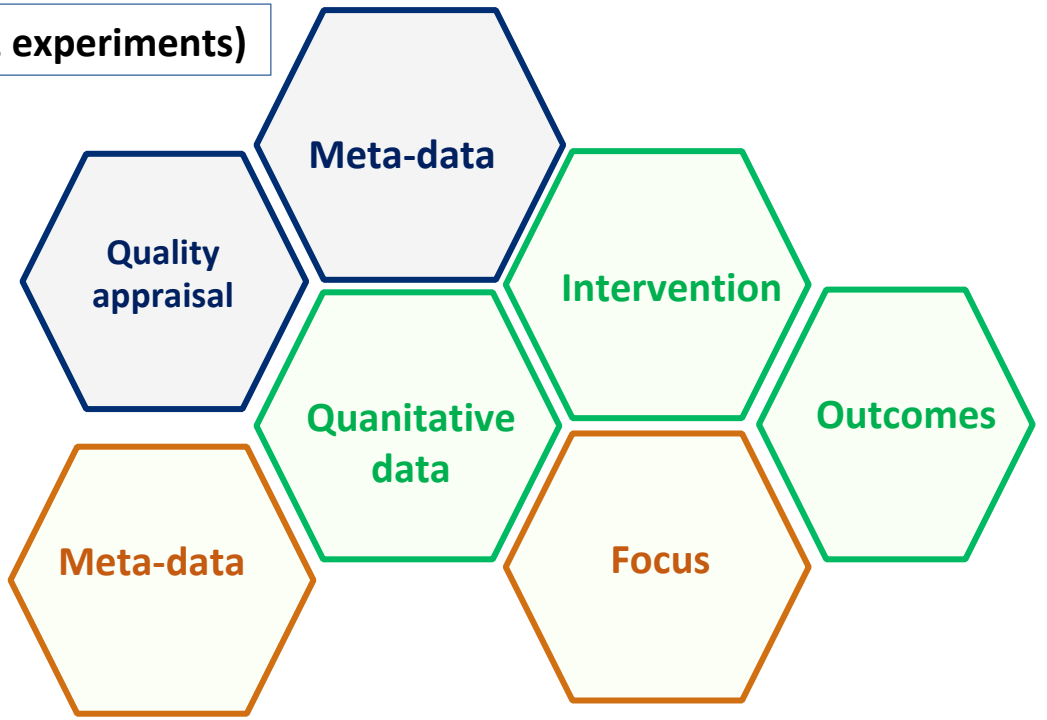
95 meta-analyses (5262 experiments)

3. Characterization ....

Of the meta-analyses

Of the effect-sizes

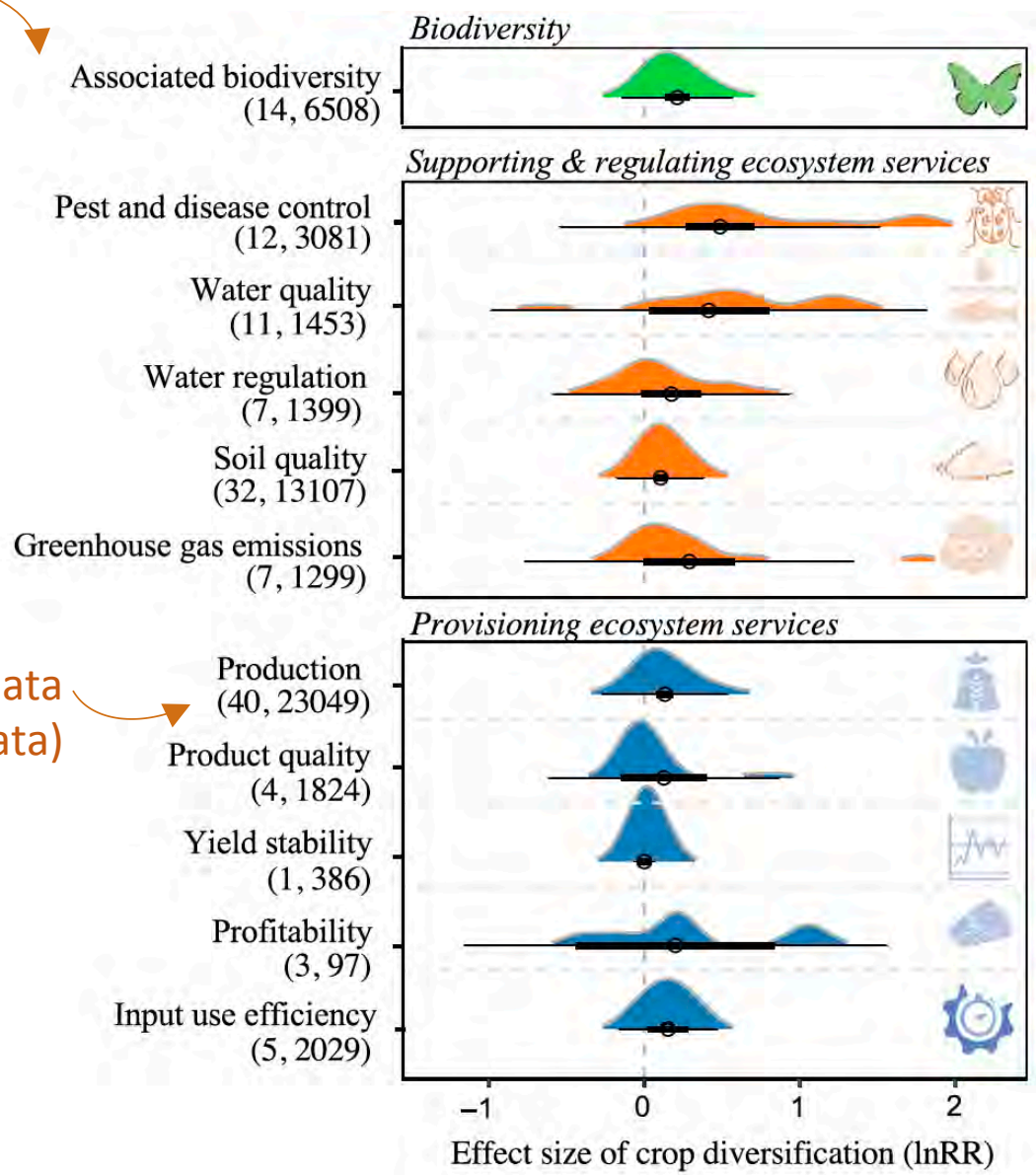
Of the primary studies



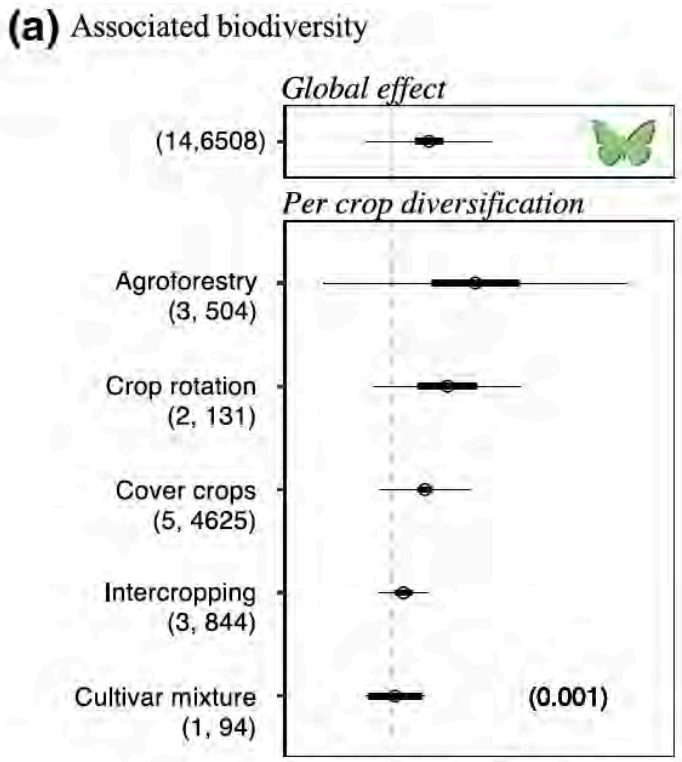
Positive, but variable effects of crop diversifiction

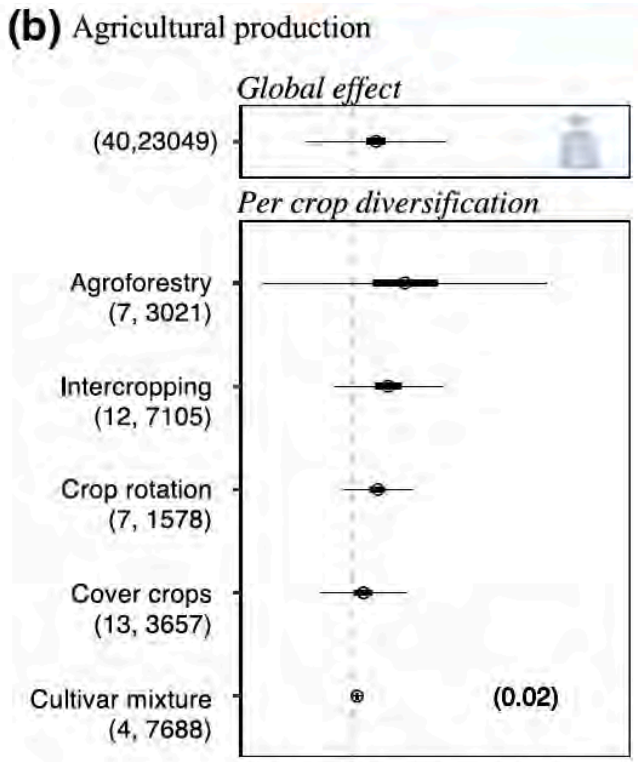
Ecosystem services

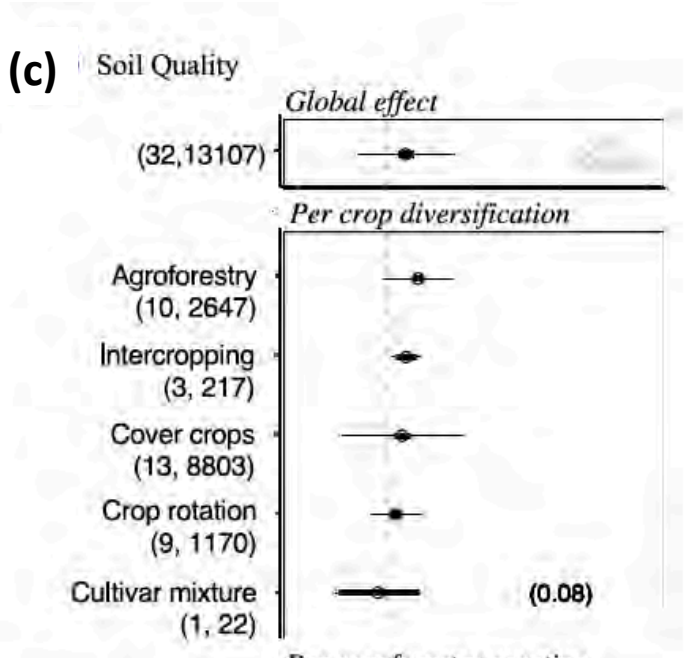
Number of data
(#meta-analyses, # paired-data)



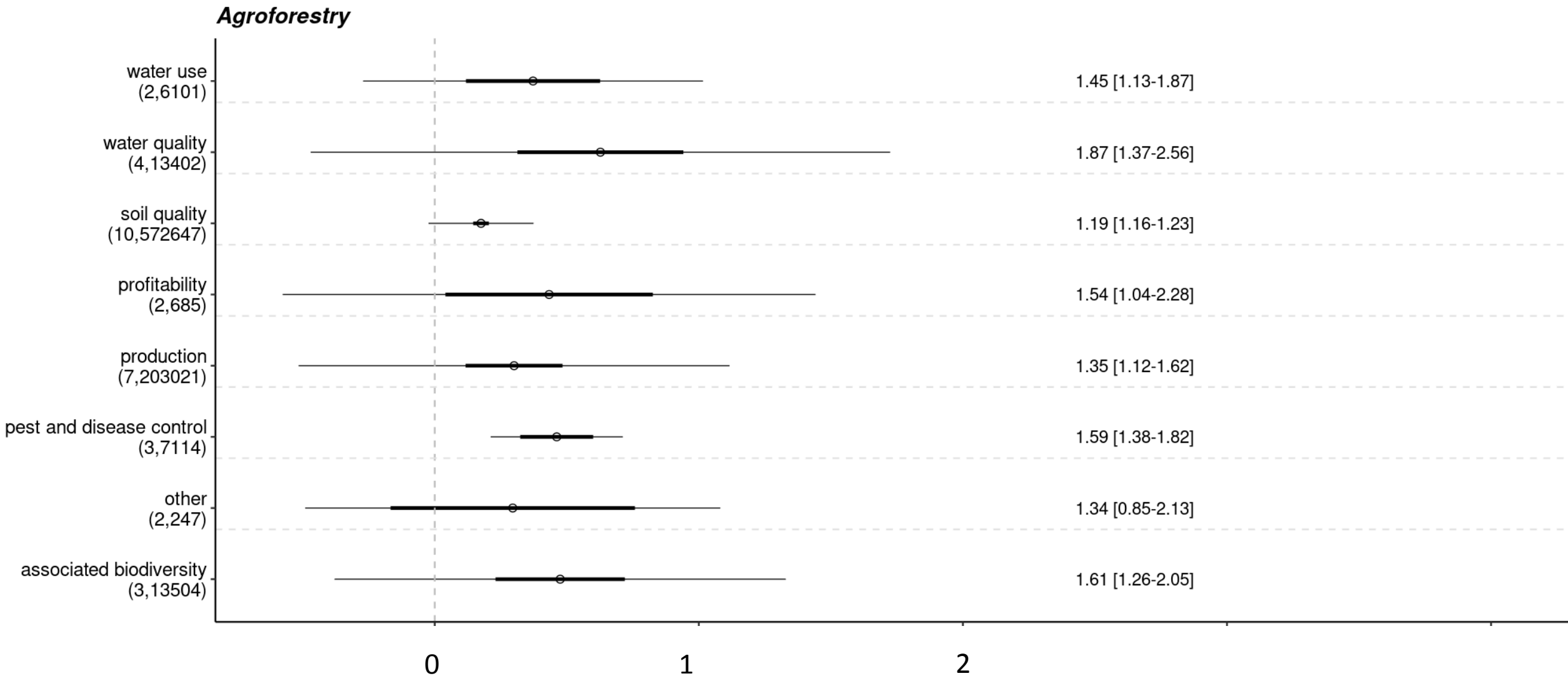
Agroforestry: a promising strategy? (1)



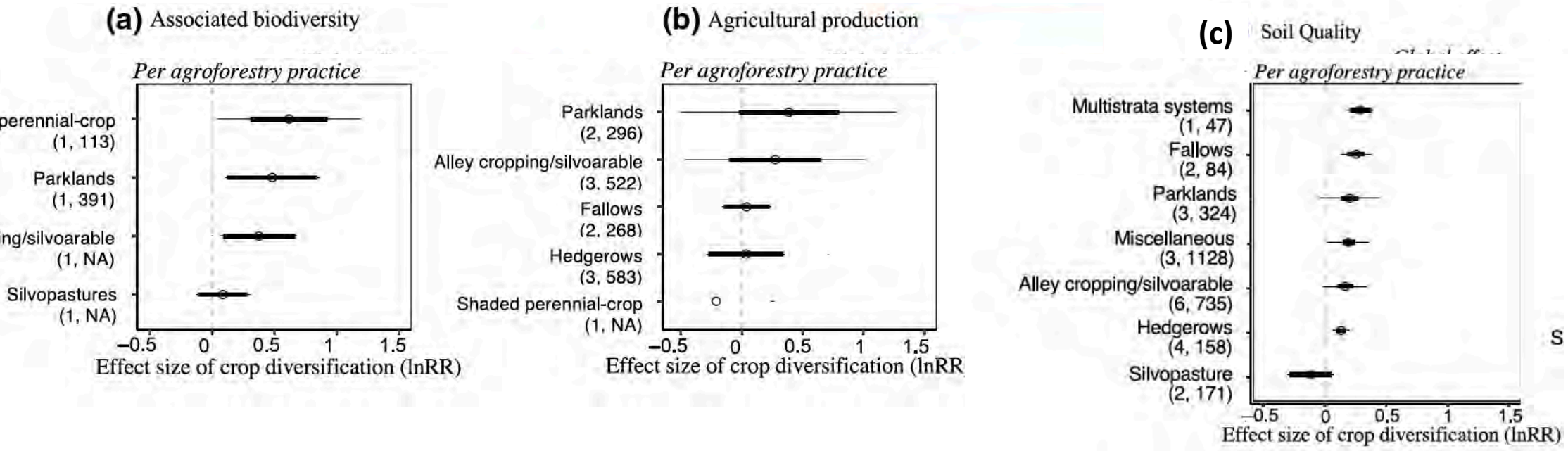




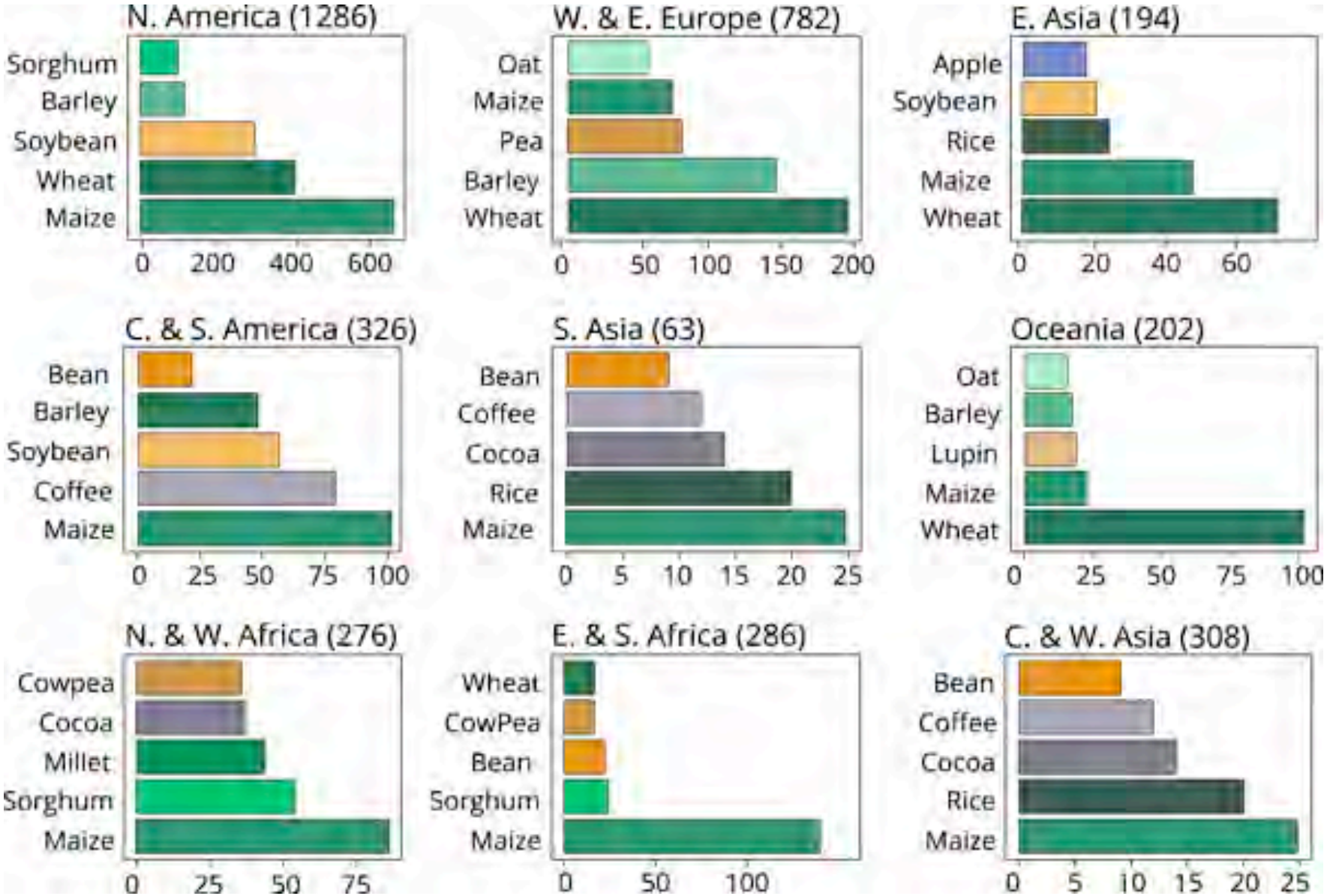
Agroforestry: a promising strategy? (2)



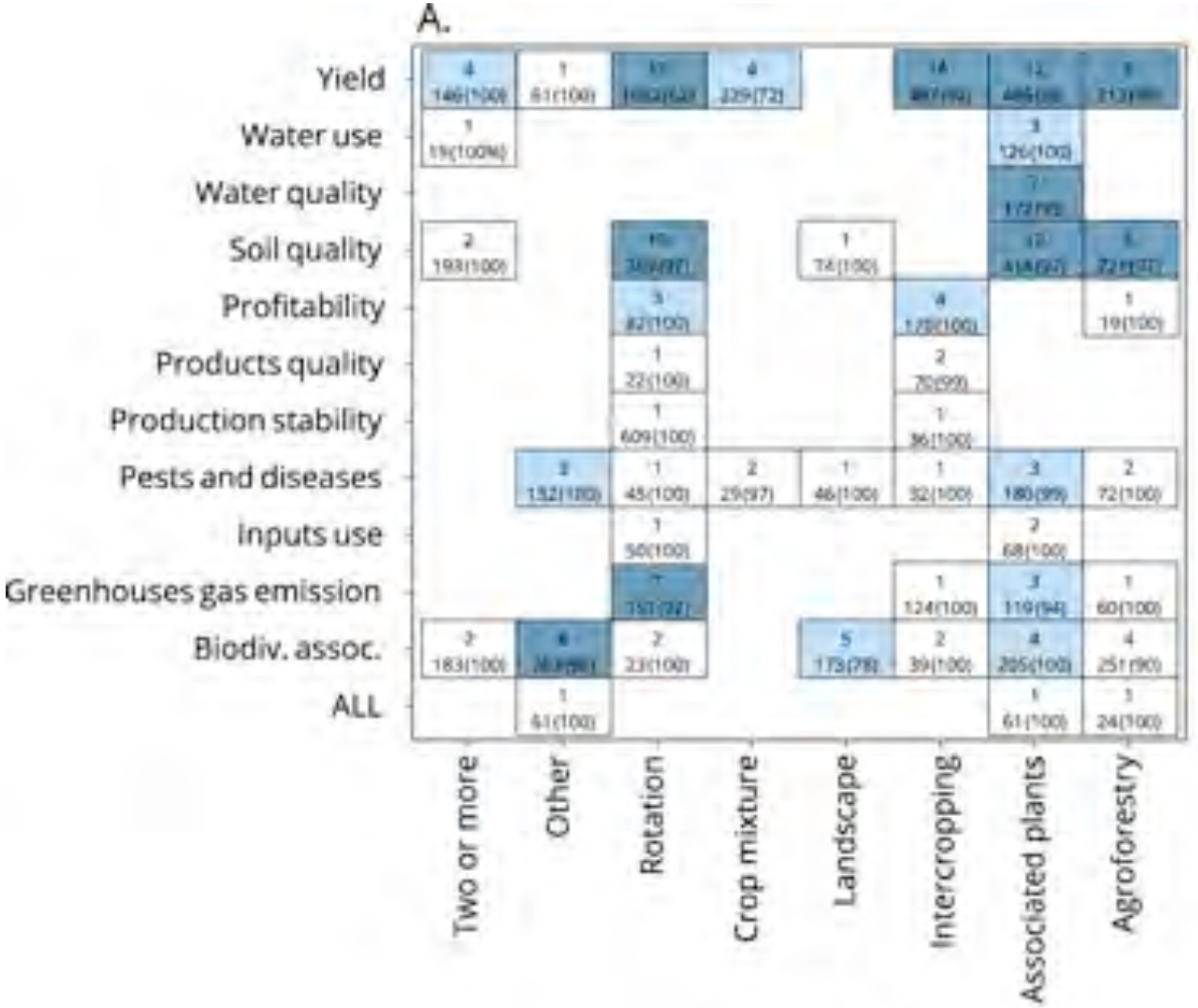
Agroforestry: a promising strategy? (3)



On which crops are these diversification strategies based?



Still numerous knowledge gaps



Detailled results

Beillouin, D., Ben-Ari, T., Makowski D. 2019. A dataset of meta-analyses on crop diversification at the global scale. *Data in Brief* 24, 103898.

Beillouin, D., Ben-Ari, T., Makowski D. 2019. Evidence map of crop diversification strategies at the global scale. *Environmental Research Letters*, in press. DOI: 10.1088/1748-9326/ab4449

Beillouin, D., Ben-Ari, T., Malezieux, E., Seufert, V. and Makowski, D., 2020. Benefits of crop diversification for biodiversity and ecosystem services. Global Change Biology.

https://cropdiversification.shinyapps.io/Crop_diversification_2020/

https://www.youtube.com/watch?v=QBR8tvfPa-E&t=1987s&ab_channel=CIREDUMR8568