Perennial cover crop mixtures for the sustainable grape production: its effect on the beneficial arthropods, pests and pathogens

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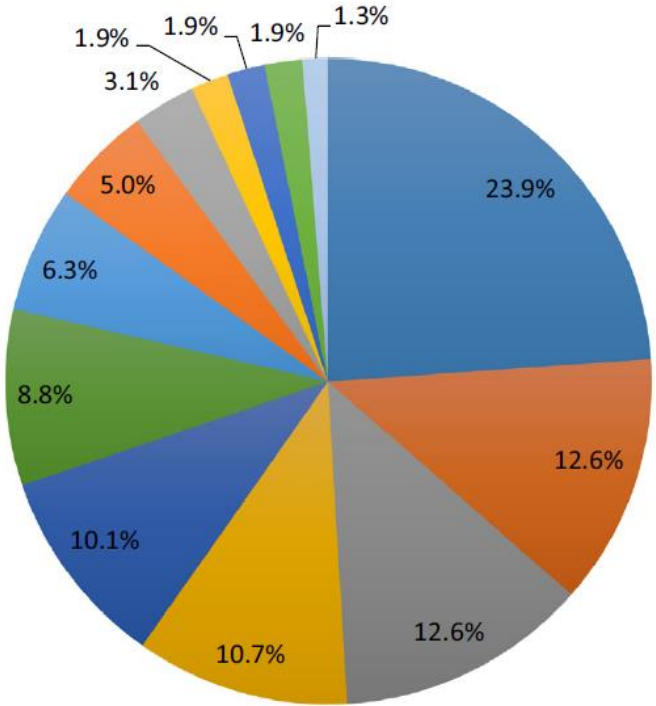
Life VineAdapt

Possible drivers behind the ”worldwide insect decline”



- intensive agriculture
- pesticides
- ecological traits
- urbanisation
- fertilisers
- deforestation
- wetlands/rivers alteration
- warming
- other pollutants
- pathogens
- fires
- introduced species
- genetic

Together ~62 %

Worldwide decline of the entomofauna: A review of its drivers
Sánchez-Bayo et Wyckhuys 2019:
https://doi.org/10.1016/j.biocon.2019.01.020

High-input intensive agriculture vs. Agroecological agriculture

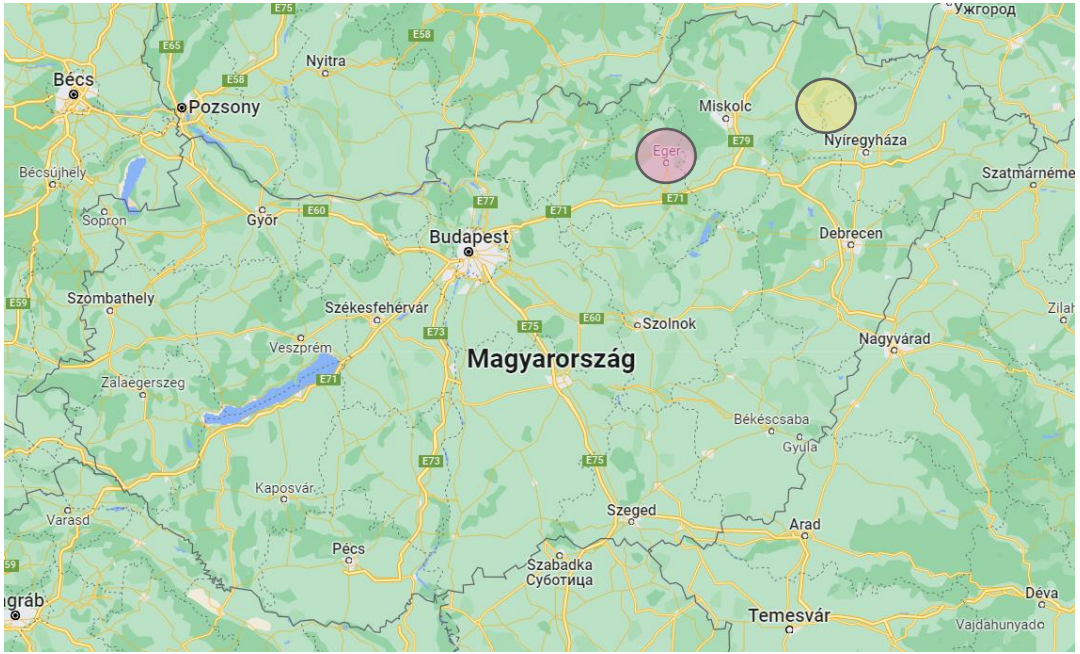
IPCC WG2 2022 Climate Change 2022 - Impacts, Adaptation and Vulnerability - Cross-Chapter Boxes and Cross-Working Group Boxes

Figure Cross-Working Group Box BIOECONOMY.1 | Left: High-input intensive agriculture, aiming for high yields of a few crop species, with large fields and no semi-natural habitats. Right: Agroecological agriculture, supplying a range of ecosystem services, relying on biodiversity and crop and animal diversity instead of external inputs, and integrating plant and animal production, with smaller fields and presence of semi-natural habitats. Credit: Jacques Baudry (left); Valérie Viaud (right), published in van der Werf et al. (2020).

In 2020, we started a new set of studies in 6 vineyards

„Living labs”

Vineyards	Disznókő Szőlőbirtok
	Gróf Degenfeld Szőlőbirtok
	Tokaj-Hétszőlő Birtok
	Eszterházy Károly Egyetem Tanborászat
	Hegyi-Kaló Pincészet
	Soováry Bence szőlőtermelő



Experimental design

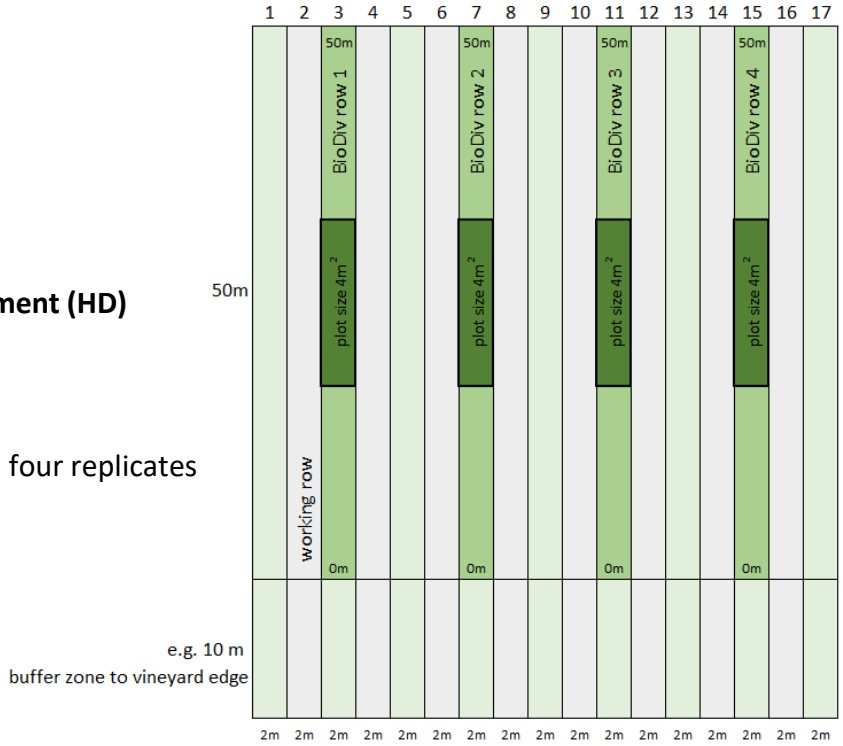
Two different cover crop mixtures were sown in four replicates:

-ÖMKi mixture containing 6 species → **Low Diversity treatment (LD)**

-A new diverse mixture containing 19 species → **High Diversity treatment (HD)**

(figure shows the experimental design)

And **control** rows (containing spontaneous vegetation) everywhere in four replicates



5 July 2023, Eger, HD mixture

Samplings regarding the arthropods and pathogens

Sweep net samples

-Five times per season (May, June, July, August, September)

***Scaphoideus titanus* survey**

-One time per season (July)

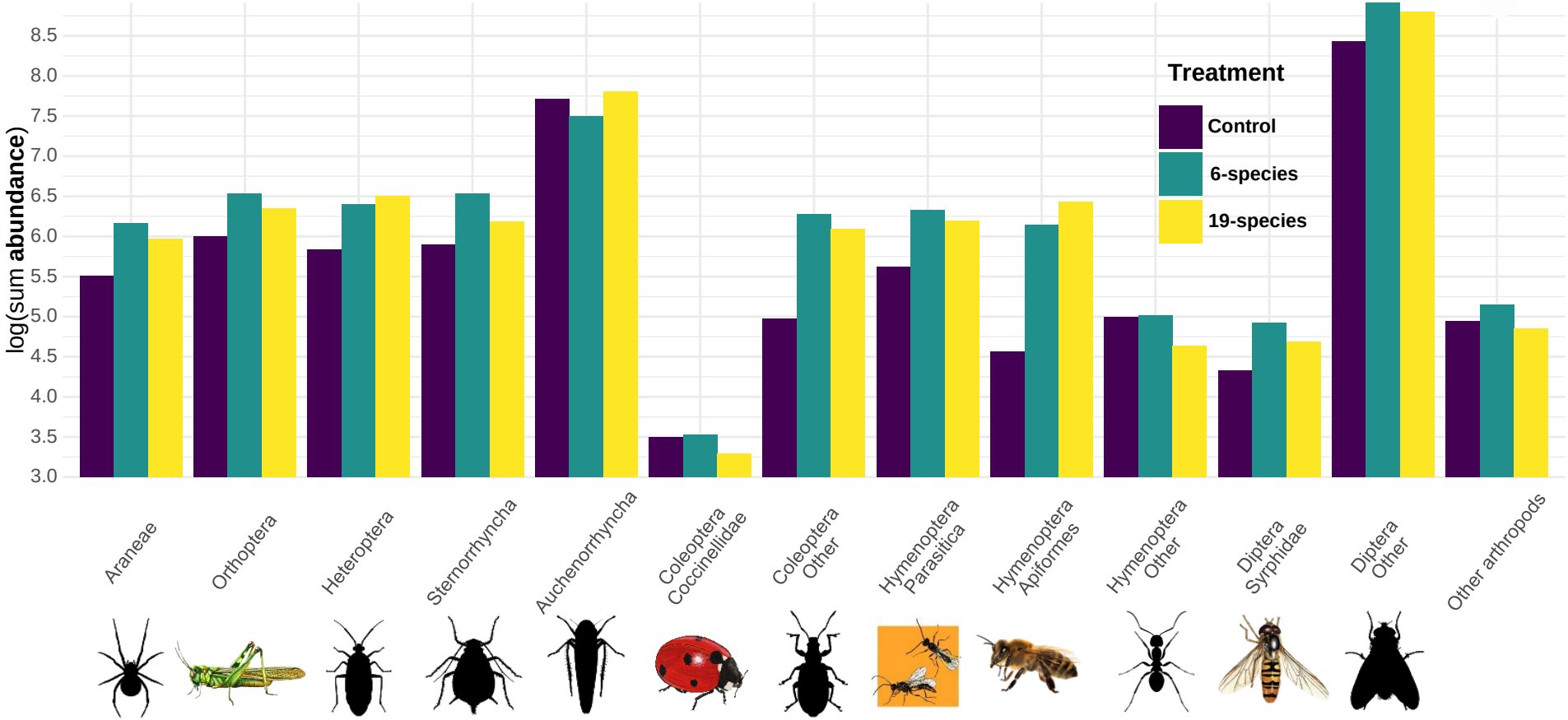
-Examining 75 random leaves/transect

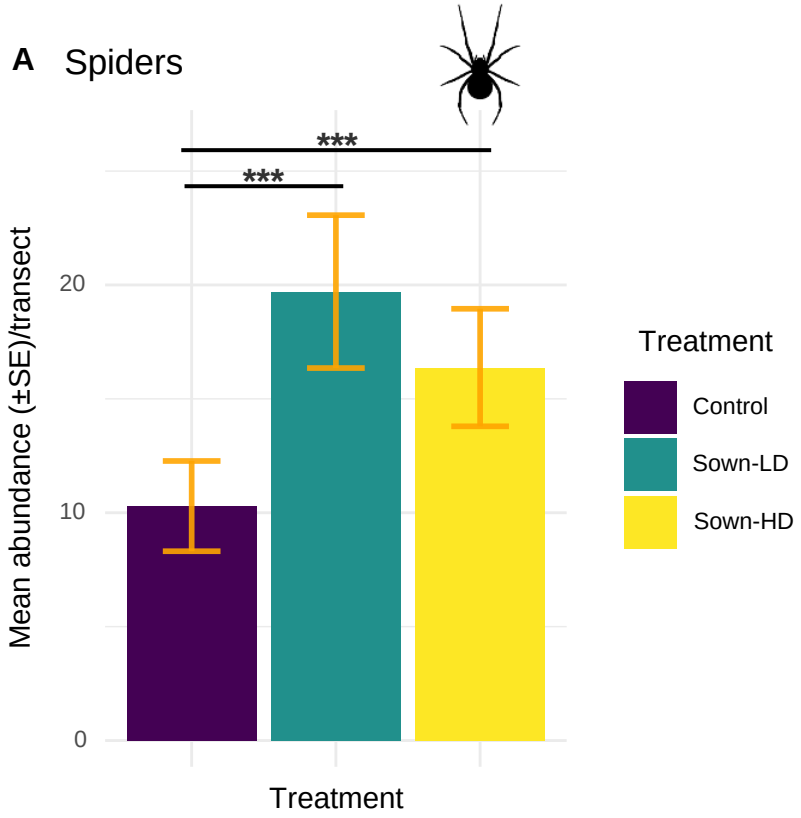
Assessing the incidence of the main pathogens

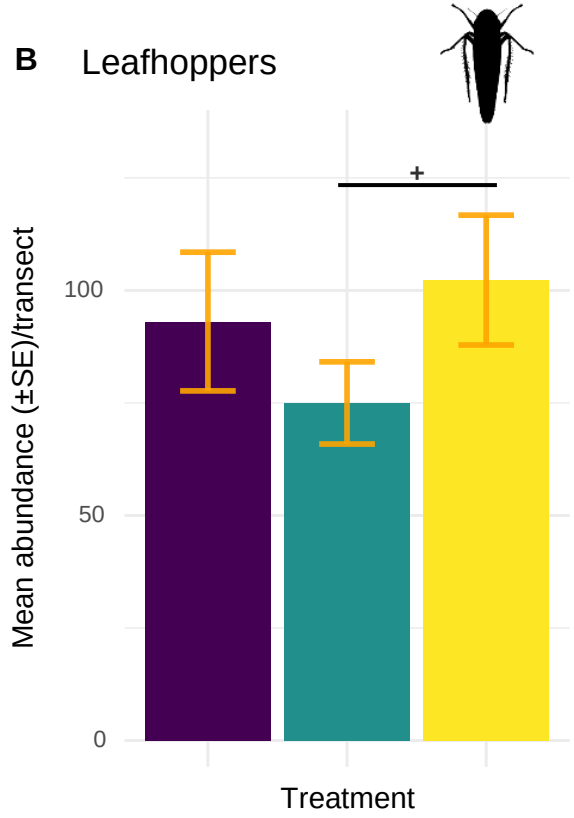
-Two time per season (August, September)

-Examining 100 random leaves/transect

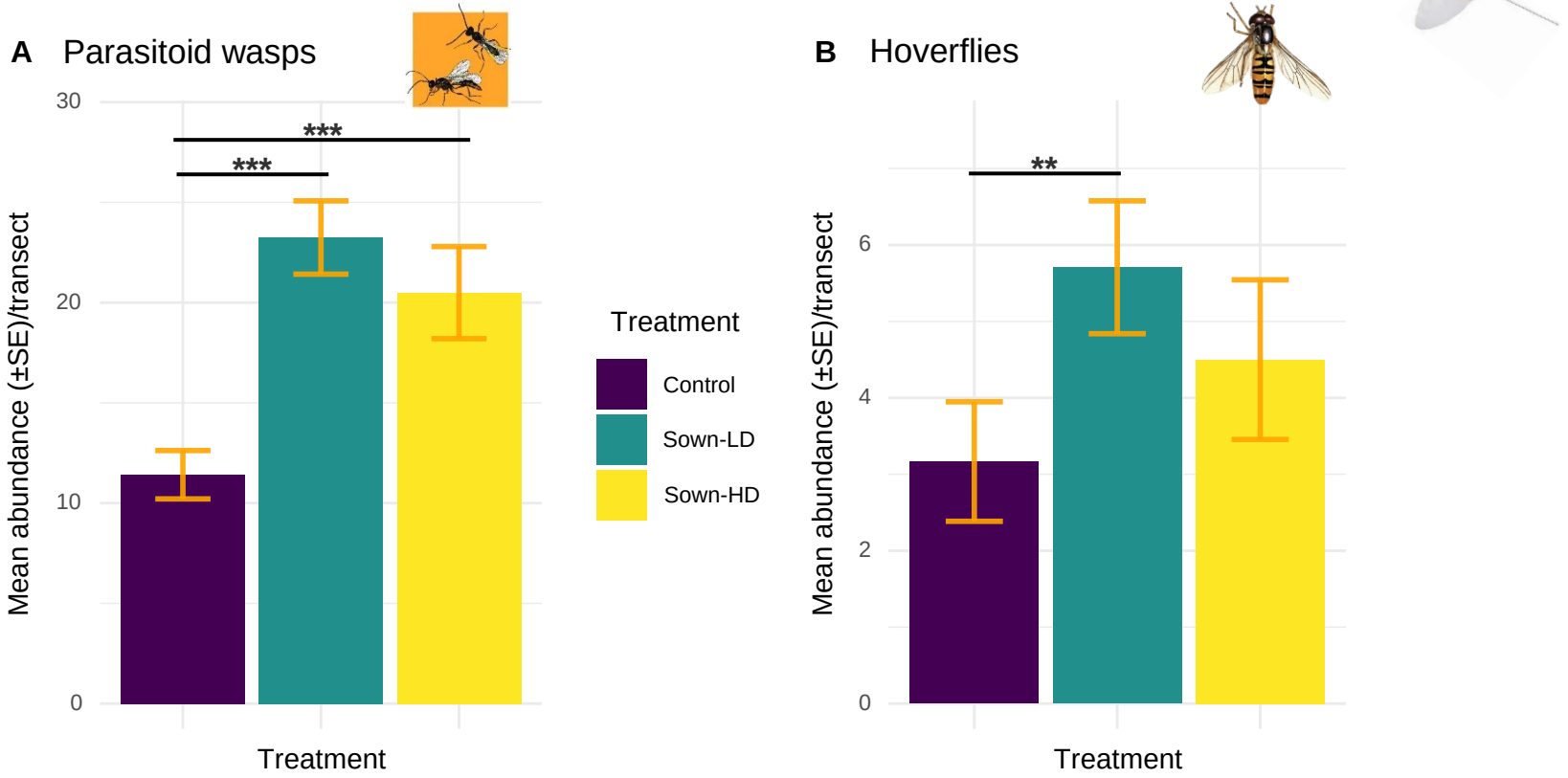
The abundance of the different arthropod groups in the sweep net sample (2023; N = 43160)



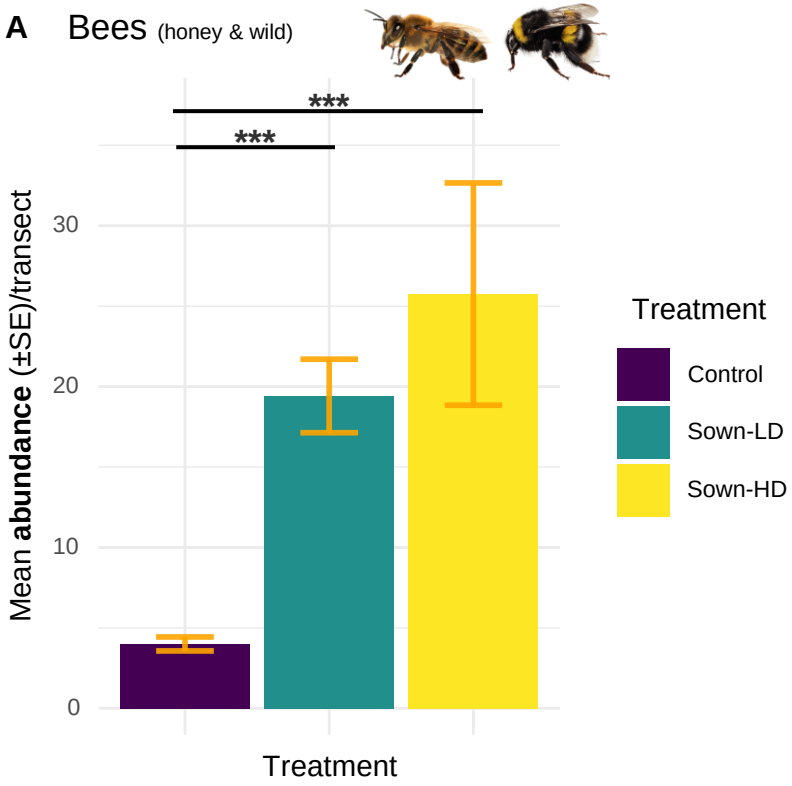


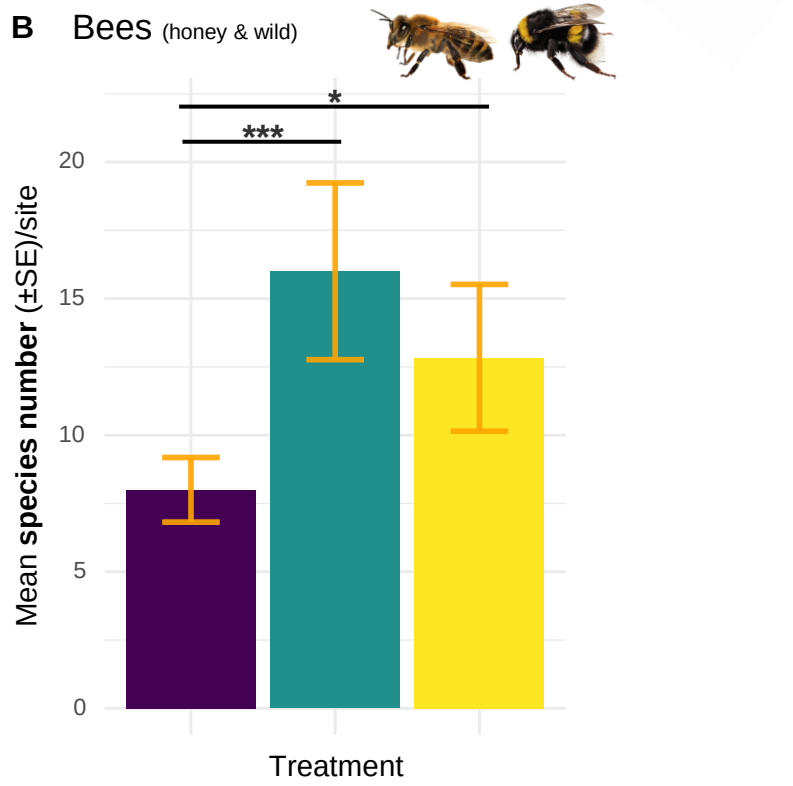


Based on sweep net samples collected in 2023; + = *P*<0,1; * = *P*<0,001**

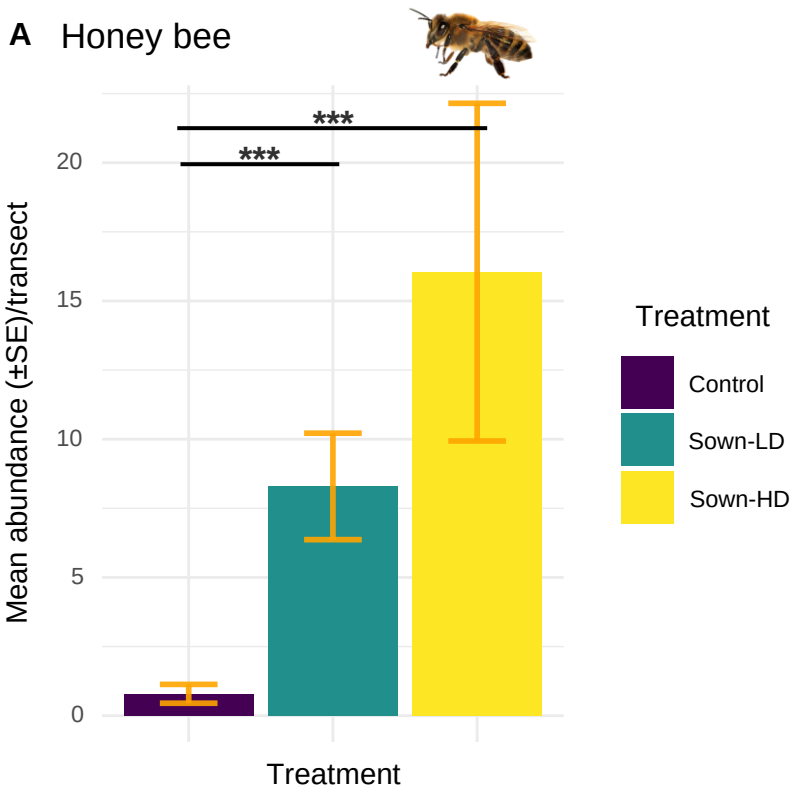


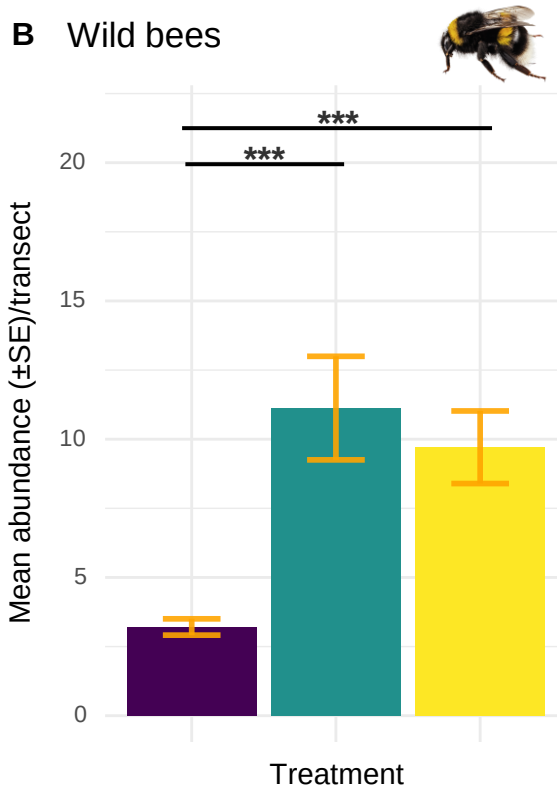
Based on sweep net samples collected in 2023; ** = *P*<0,01; * = *P*<0,001**



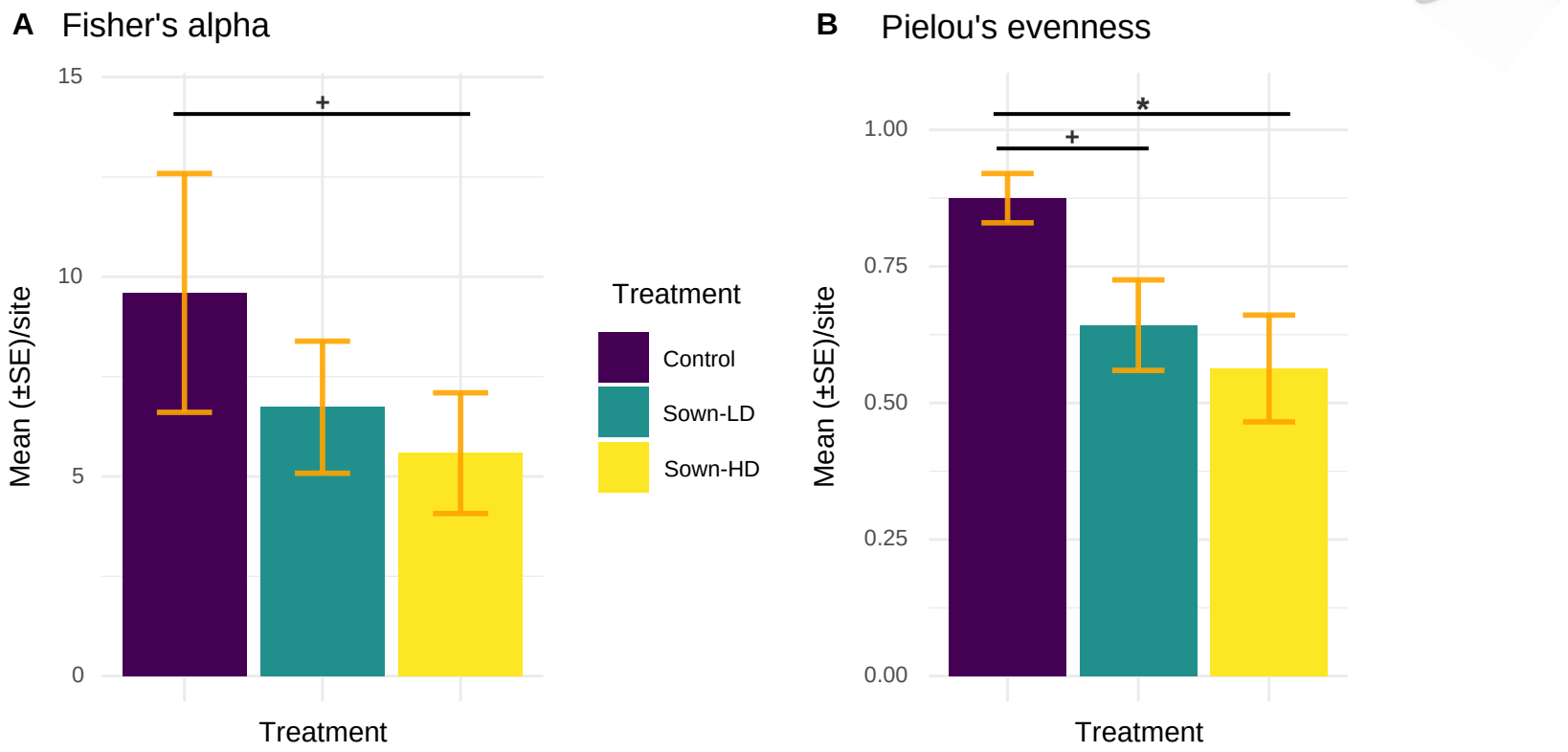


Based on sweep net samples collected in 2023; * = *P*<0,05; ** = *P*<0,01; * = *P*<0,001**



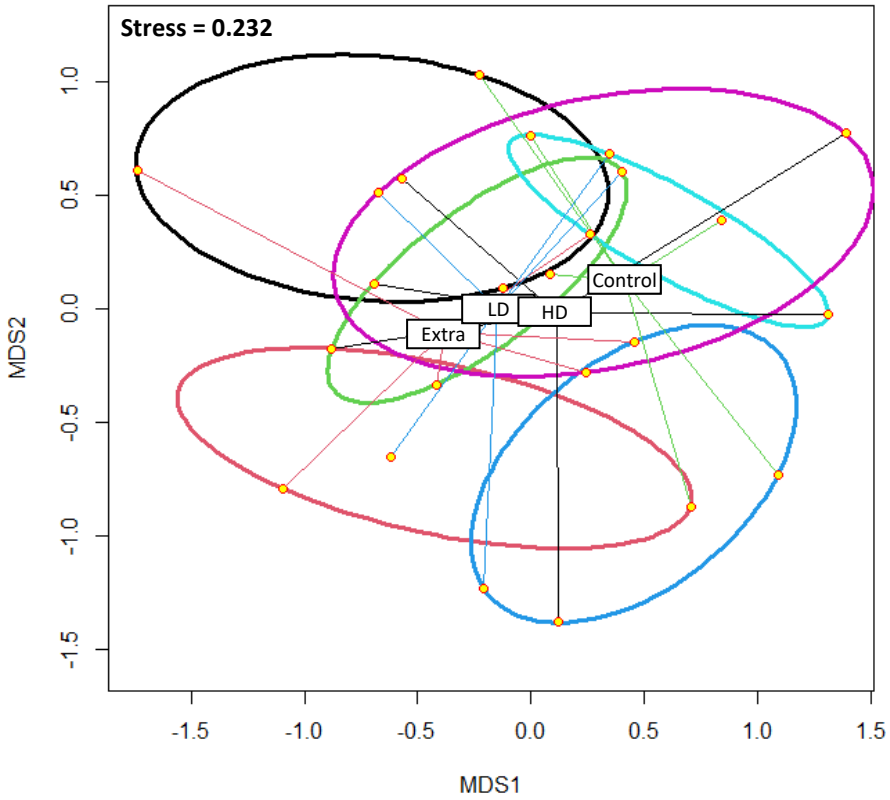


Based on sweep net samples collected in 2023; * = *P*<0,001**

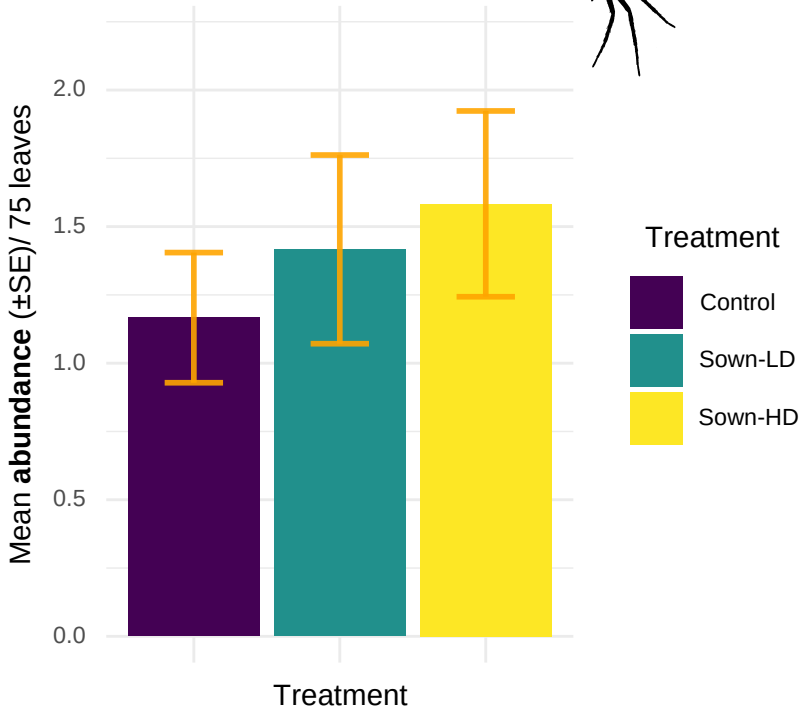


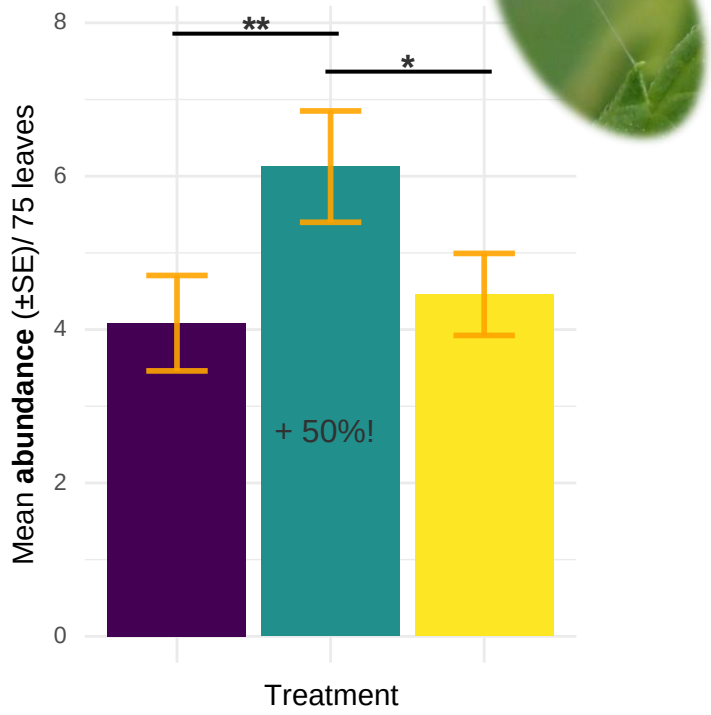
Based on sweep net samples collected in 2023; + = *P*<0,1; * = *P*<0,05

The structure of the bee assemblages



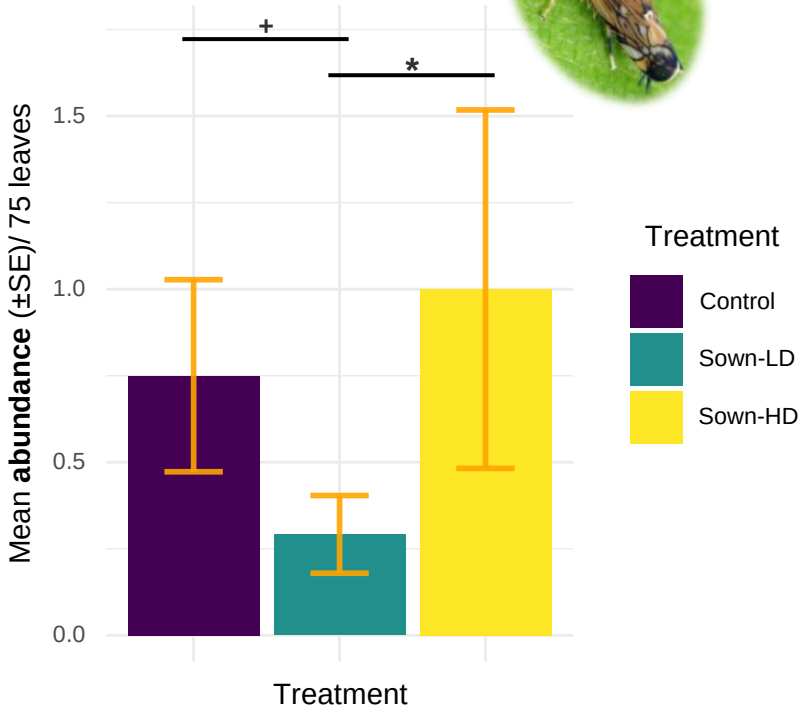
Based on sweep net samples collected in 2023



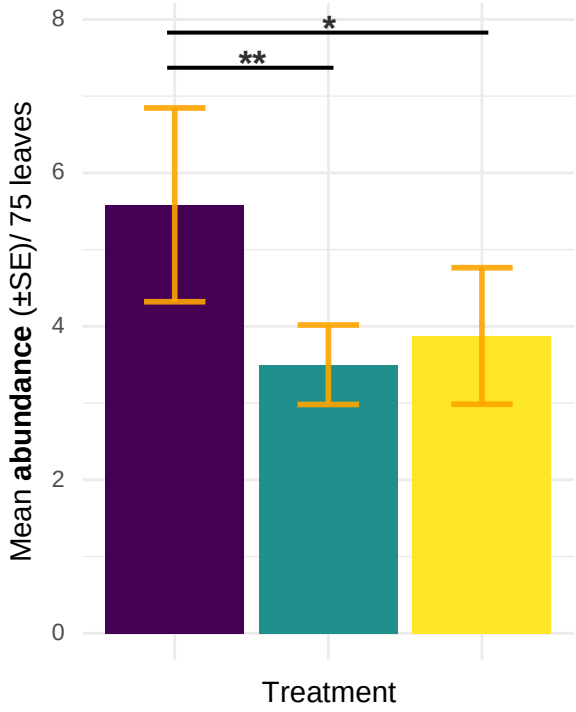


Based on the assessment conducted in July, 2023; * = *P*<0,05; ** = *P*<0,01

A *S. titanus* (all instars)

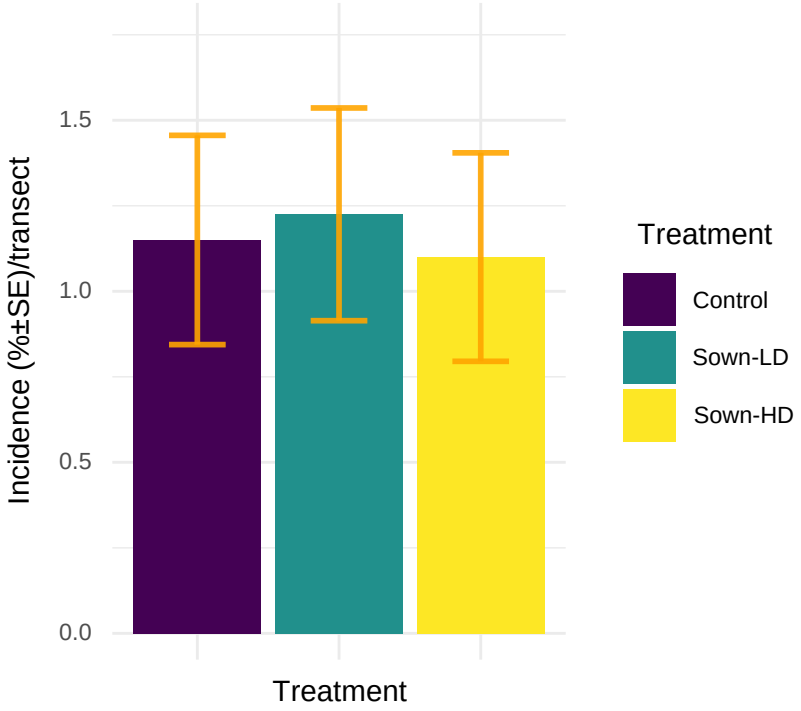


B Other leafhoppers (all instars)

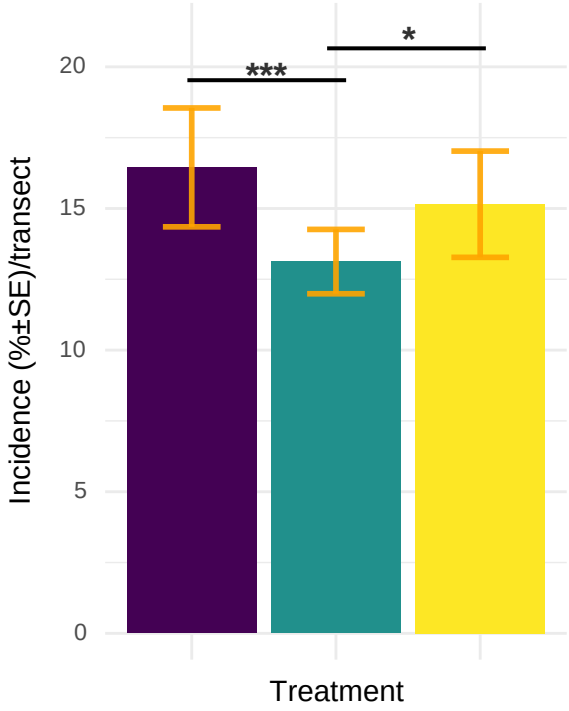


Based on the assessment conducted in July, 2023; + = *P*<0,1; * = *P*<0,05; ** = *P*<0,01

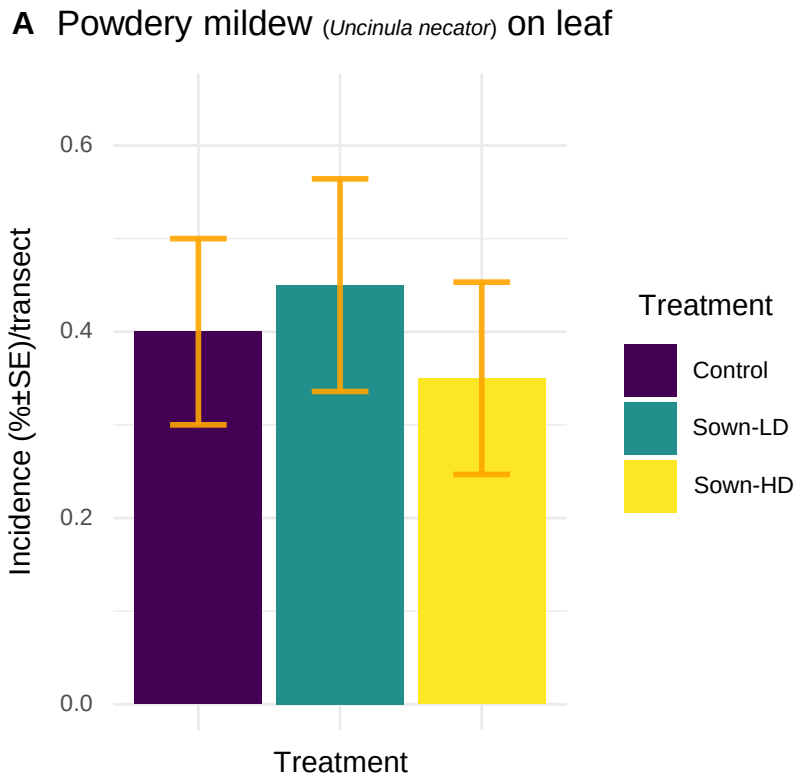
A Grape black rot (*Guignardia bidwellii*) on leaf

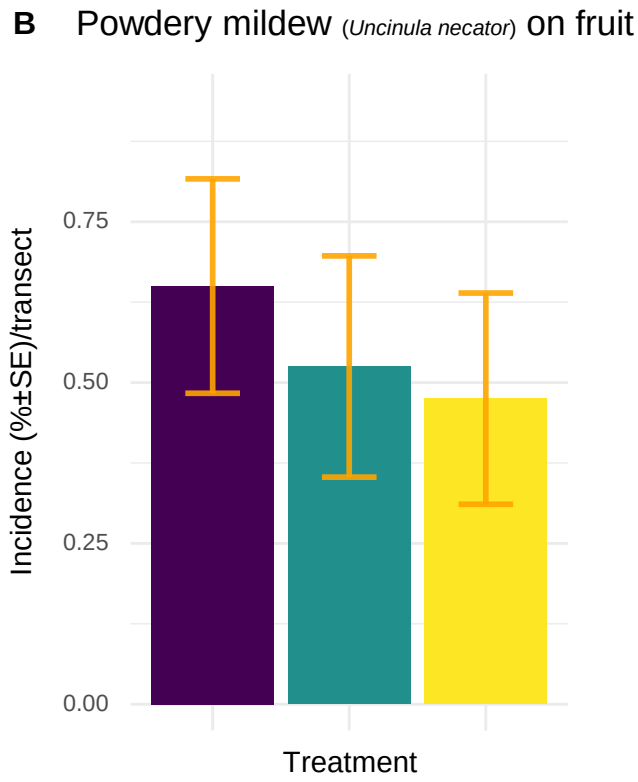


B Downy mildew (*Plasmopara viticola*) on leaf



Based on the assessment conducted in Aug and Sept, 2023; * = *P*<0,05; * = *P*<0,001**





Based on the assessment conducted in Aug and Sept, 2023

Conclusions

Compared with the spontaneous vegetation cover **ÖMKi mixture** (containing 6 species) and the new mixture (containing 19 species) **effectively increased the abundance of predaceous arthropods and pollinators** in the interrow spaces.

Compared with the spontaneous vegetation cover **ÖMKi mixture** (containing 6 species) **effectively increased the abundance of lacewings on the grapevine's canopy.**

Intercropping does not increase the incidence of the main pathogens → no plant health risk!

LIFE19 cca/de/001224

Thank you for your attention!

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