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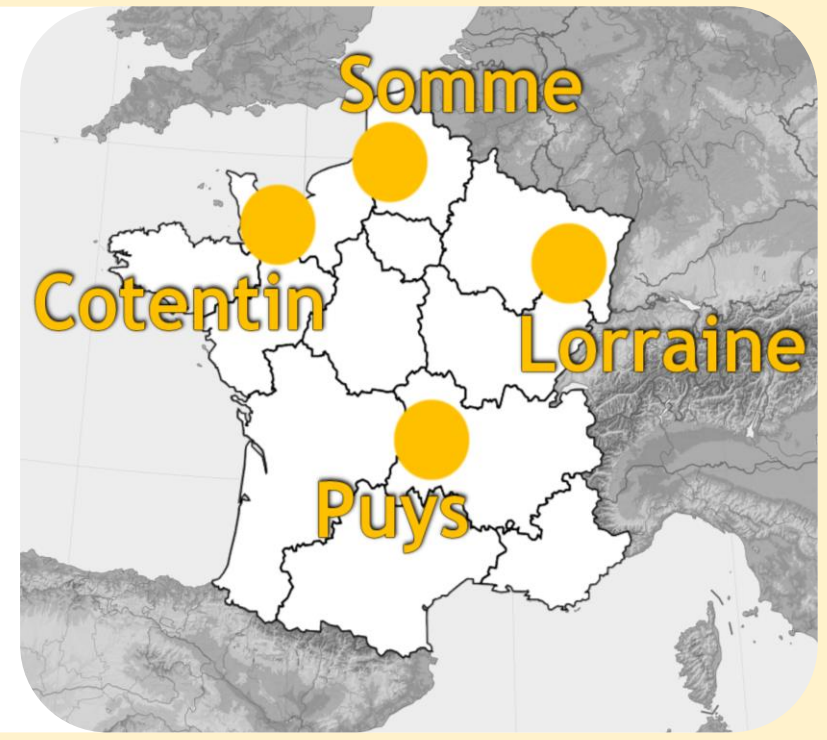
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How much is pollinator diversity and abundance related to floral traits in various grassland habitats?

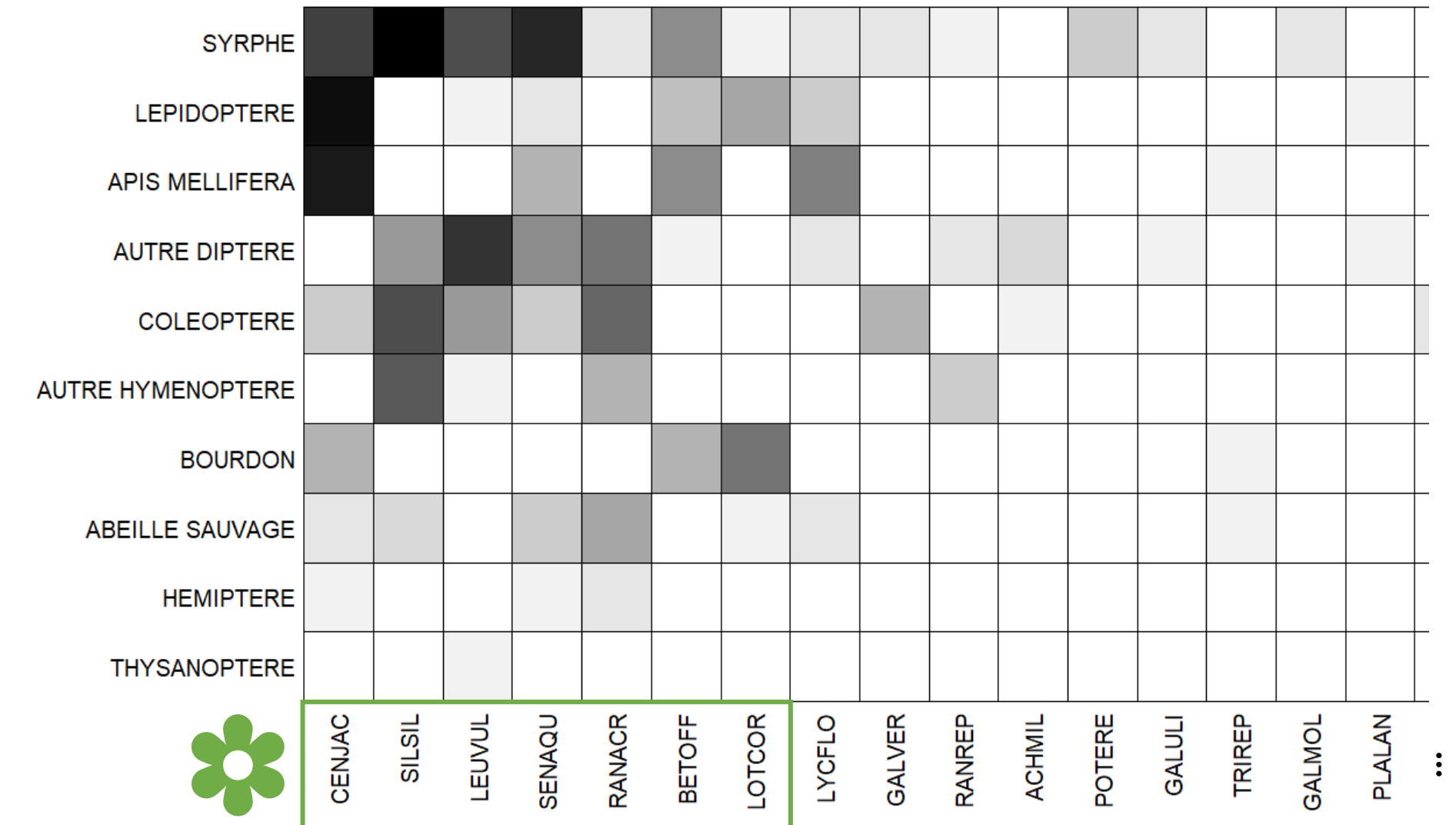
Benjamin Allard¹, Anne Bonis¹, Lucas Baliteau², Mathilde Baude³, Méghan Boulembert⁴, Olivier Chabrier⁴, Alban Langlois⁵, Servane Lemauviel-Lavenant⁶, Sarah Lemetayer⁵, Nadia Michel⁵, Jean-François Odoux⁶, Antoine Tardif⁴, Alice Michelot-Antalik⁵

Pollination represents an important ecosystem service for plant reproduction, biodiversity conservation and human nutrition. However, insect populations have been declining for the last decades. The Polliflor project aims to achieve a functional characterization of agropastoral habitats for pollinator communities. The study was conducted on 4 regions with contrasted grassland habitats (*mesophilic, mountain and chalk grasslands, marshlands*), mown or grazed. Captures with a sweep net and identification of foraging pollinators were carried out from May to September 2020 ($n = 2615$ pollinators). For each pollinator, the species of the plant foraged was determined, as well as the measurement of plant traits: height, floral area, and nectariferous tube depth, to characterize floral resources at community level.



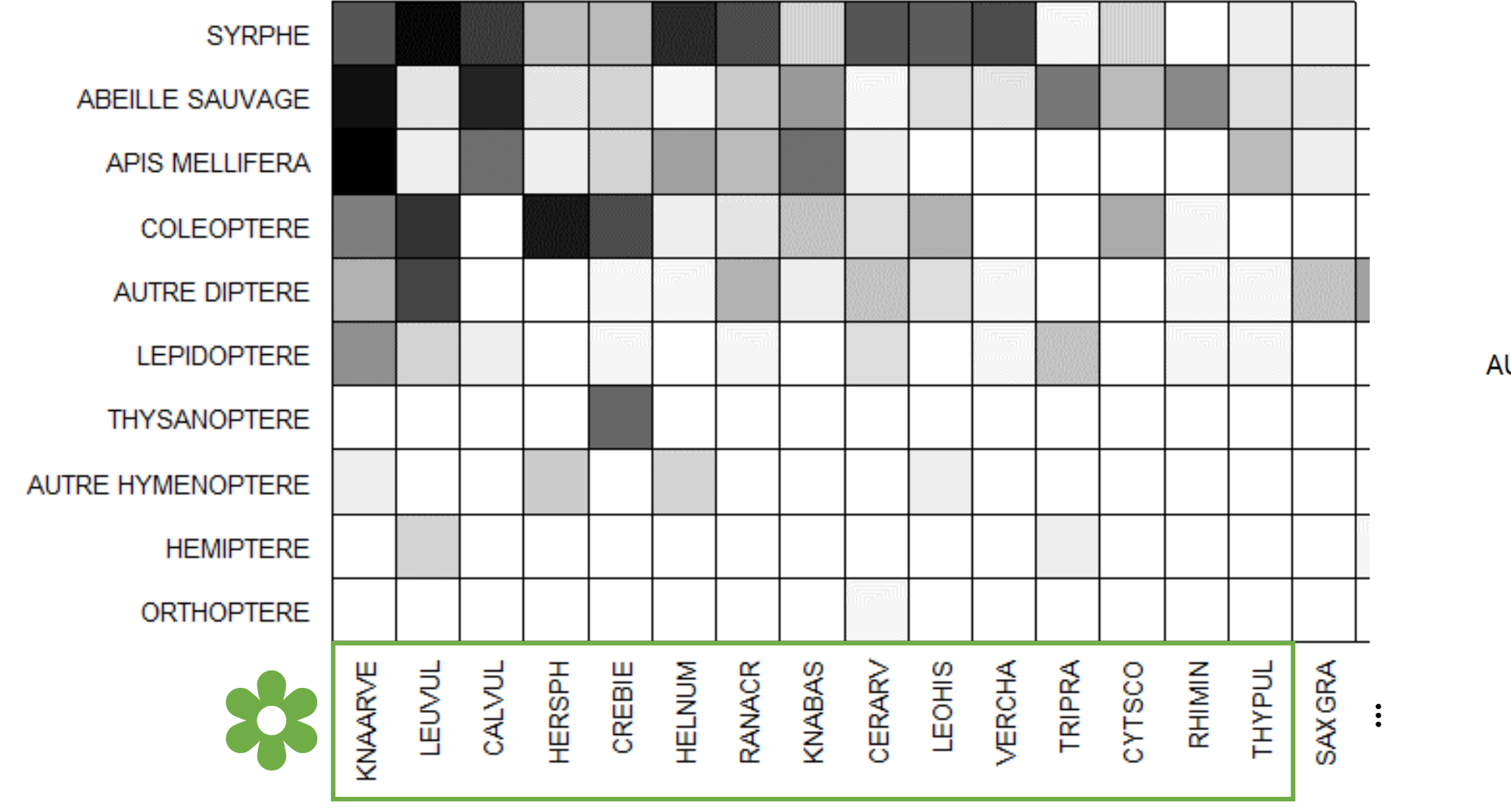
Lorraine: Mesophilic grasslands

$n = 521$, $n = 25$, Field dates: May & June, mown, Alt: 219 → 255 m



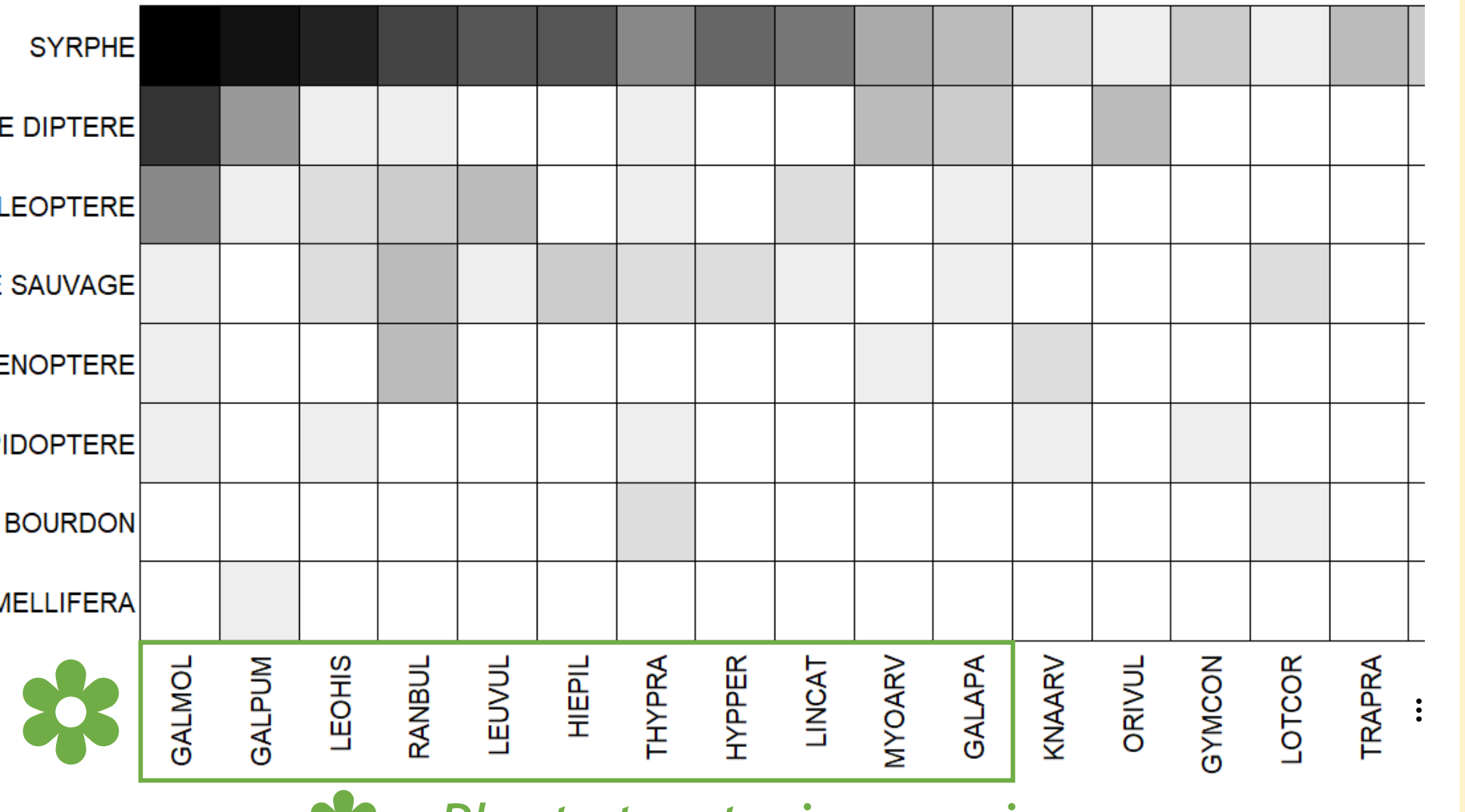
Puys: Mountain grasslands

$n = 1382$, $n = 49$, Field dates: May to Sept., mown & grazed, Alt: 800 → 1245 m



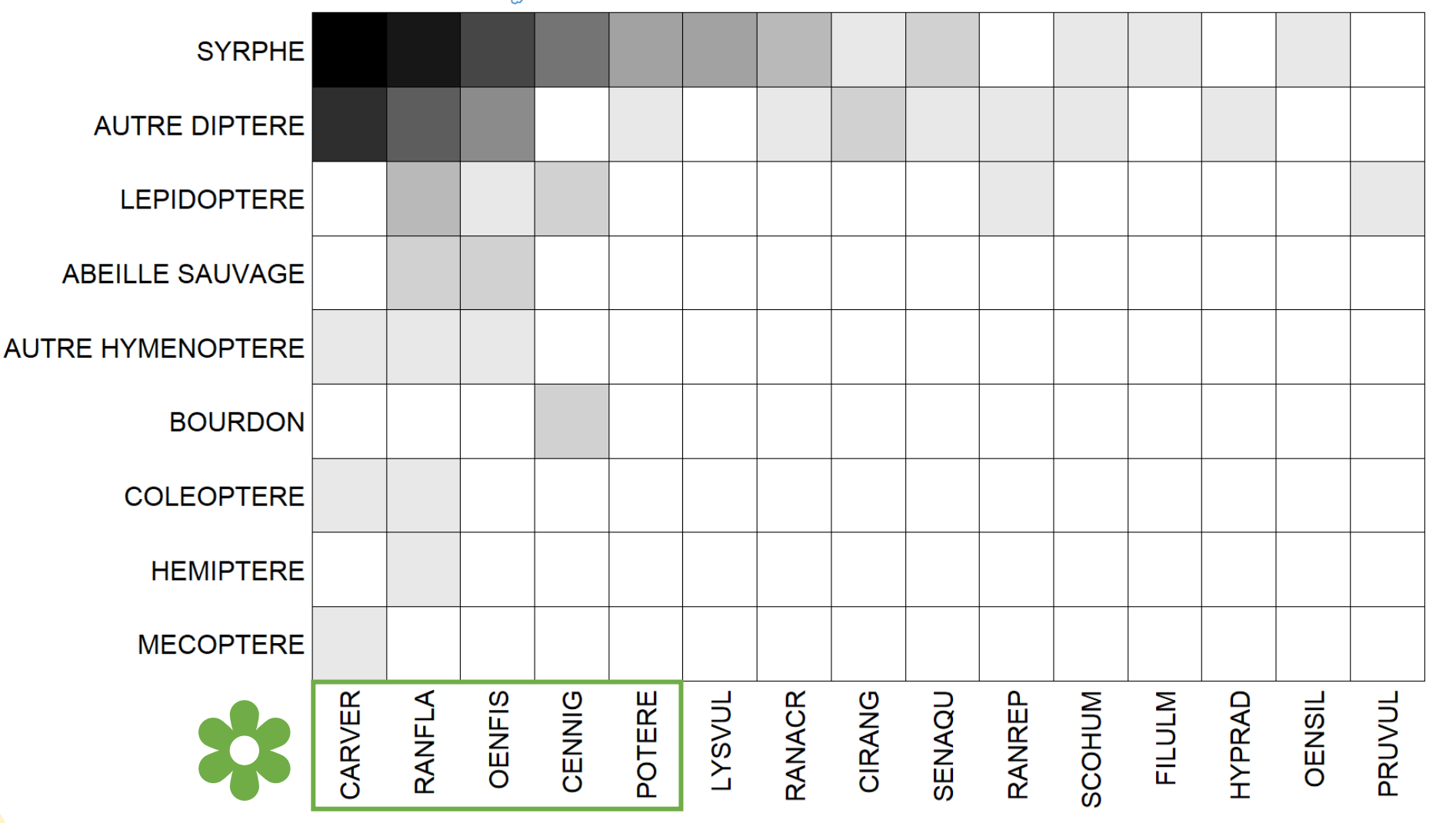
Somme: Chalk grasslands

$n = 446$, $n = 26$, Field dates: June & July, grazed, Alt: 29 → 42 m



Cotentin: Marshlands

$n = 266$, $n = 15$, Field dates: June & July, mown, Alt: 1.4 → 2.5 m

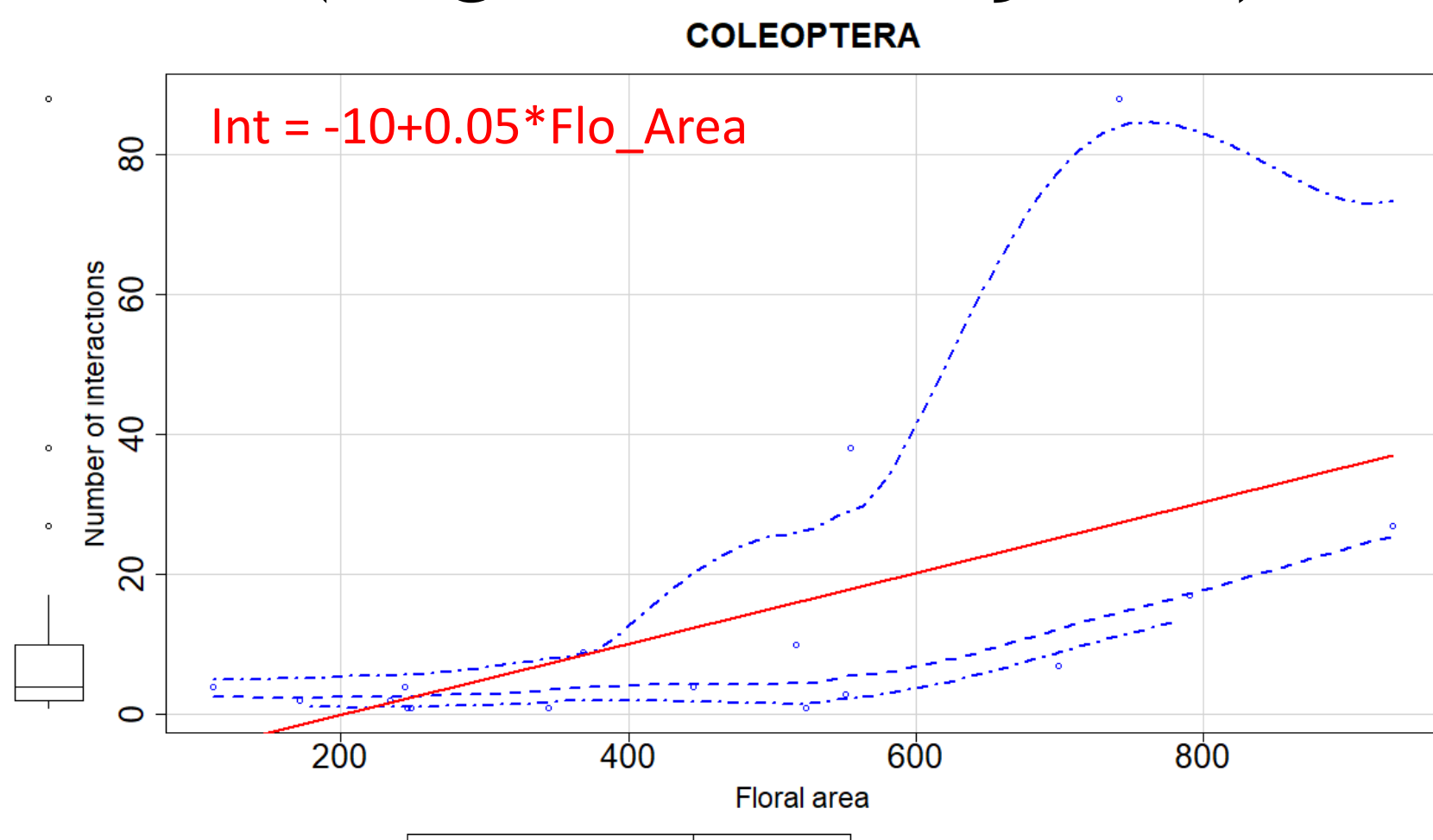


- Plant structuring species in plant-pollinator network change from a habitat to another
- Plant structuring flowers are mostly open with free (or base welded) petals and sepals = easy access for pollinators (short and long proboscis)
- Hoverflies (*syrphe*) is the taxa with most plant-interactions (40% of interactions)

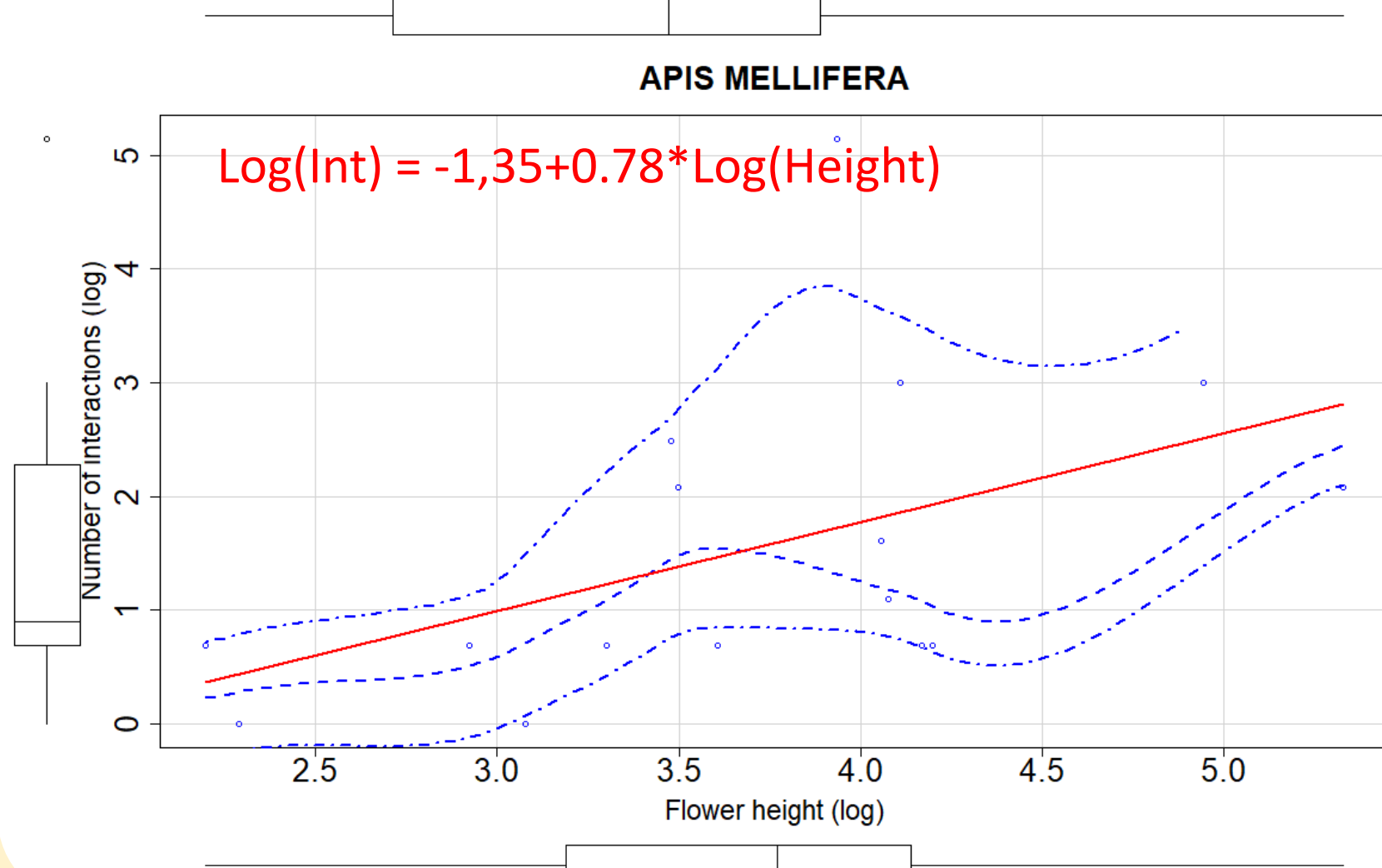
Grasslands	Connectance	Web asymmetry	Links per taxa	Weighted nestedness	Specialisation asymmetry	Shannon diversity
Mesophilic	28%	-0.43	2.00	0.47	0.02	3.52
Mountain	29%	-0.66	2.37	0.57	0.17	3.78
Chalk	32%	-0.53	1.94	0.75	0.25	3.16
Marshland	27%	-0.25	1.54	0.87	0.19	2.54

Floral traits analysis for mountain grasslands:

We analyzed the values of floral traits of visited plants. We compared the mean floral trait value with the number of plant-pollinator interactions. Only 2 floral traits are significantly correlated with the number of interactions for 2 pollinator taxa (*bugs and honey bee*)



Rho = 0.52 *
Coleoptera are mostly observed in interaction with high floral area plant species



Rho = 0.63 *
Honey bees interact mostly with tall plant species: height promote honey bee attraction?

The effect of floral traits on flower visits vary among pollinator taxa at plant community level

Spearman Rho	Wild bees	Honey bee	Bumblebees	Other flies	Coleoptera	Lepidoptera	Other taxa	ALL taxa
Height (mean)	NS	-0.71 *	NS	NS	NS	NS	NS	NS
Floral area (mean)	0.52 *	NS	NS	0.64 *	0.54 •	0.50 •	NS	NS
Nectariferous tube depth	NS	NS	NS	-0.74 **	NS	NS	NS	NS
Floral screen (% floral cover)	NS	NS	NS	0.94 ***	0.60 •	NS	NS	0.42 •
Total number of flowers	0.55 *	NS	0.49 •	0.61 *	NS	0.51 •	NS	0.57 *

P-value signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ; 'NS' Non signif.

- Floral traits change for each taxa: 3 floral traits are significantly correlated with interactions for 6 pollinator taxa. Only floral screen has a significant effect on all taxa
- The number of flowers on grassland community promote flower visits for 4 pollinators taxa



Plant structuring species are key for the conservation of pollinator diversity in grassland habitats. The management and maintenance of these plants (*mostly open flowers*) and high floral cover in grassland communities seems to be beneficial in keeping a diversity and abundance of pollinators. The Polliflor project shows the functional differences of grassland communities and the relationships of pollinators with them. It will provide avenues for better management of these habitats for the conservation of pollinators in semi-natural habitats such as grasslands, which are very important in the functioning of agricultural landscapes. To go further, functional plant diversity must be considered in order to maintain specific interactions at the level of pollinator species.

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