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Preliminary results on plant Farmland papers

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Preliminary results on plant Farmland paper

Audrey Alignier, INRA SAD-Paysage



A brief summary of previsional papers using plant data

Paper 1: How landscape composition and configuration influence plant diversity at the field scale ?

- Same general hypotheses on landscape metrics as the joint paper

- Focusing on landscape composition :

Which crops are delivering most of the plant diversity (or species richness)?

Can we increase plant diversity by increasing the number of crops?

- Focusing on landscape configuration :

Are responses between field centre and field margin different ?

Paper 2: How landscape composition and configuration influence plant functional groups at the crop scale ?

Focus on species composition and functional groups

Can be enhanced certain functional group by sowing a certain crop?

What crop can we plant to enhance rare/damaging weeds ?

A brief summary of previsional papers using plant data

Paper 1: How landscape composition and configuration influence plant diversity at the field scale ?

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Which crops are delivering most of the plants?

Can we increase plant diversity by increasing crop diversity?

- Focusing on landscape configuration :

Are responses to landscape configuration different?

and field margin different ?

for crop composition and configuration influence plant diversity at the crop scale ?

Focus on species composition and functional groups

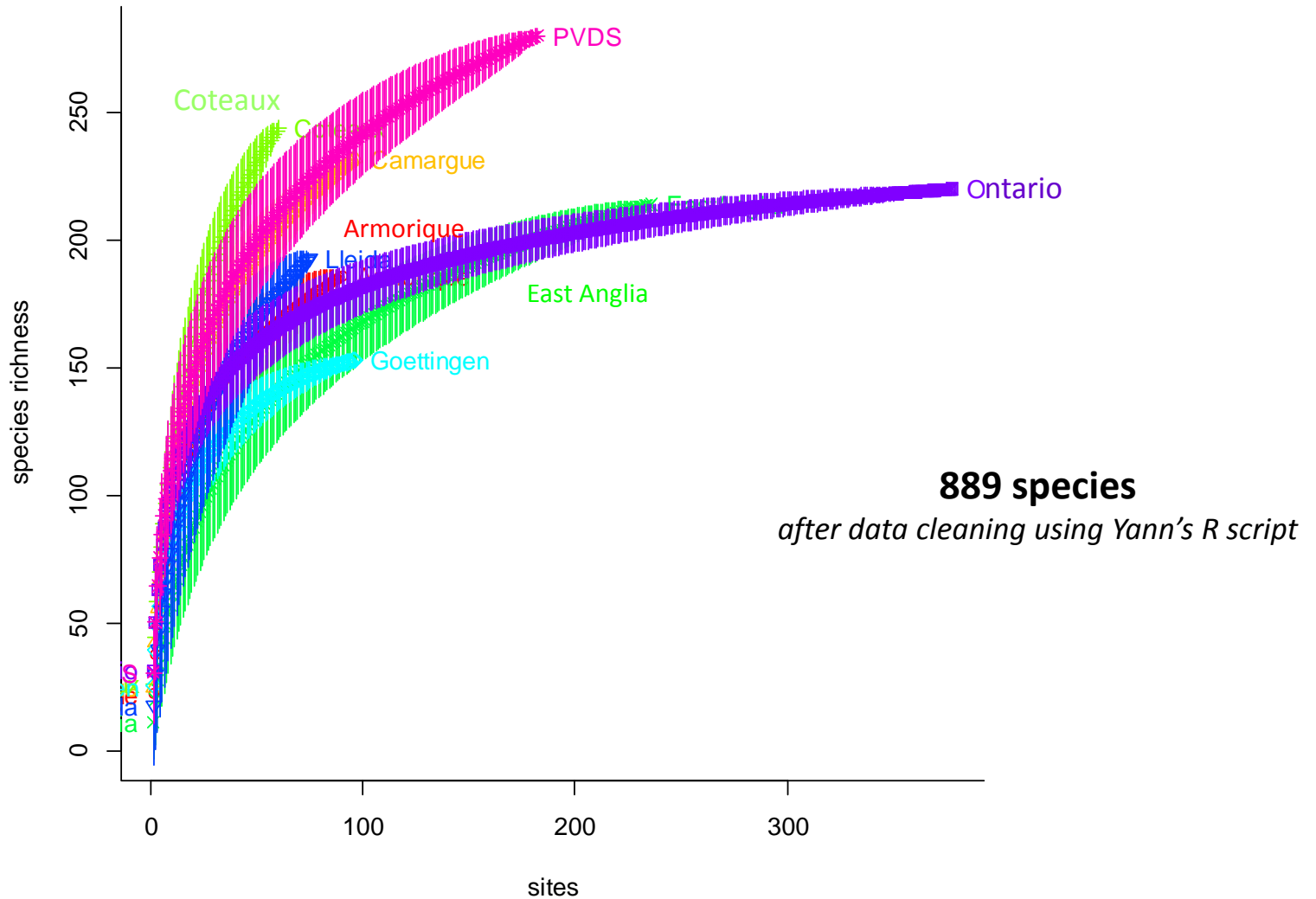
Can be enhanced certain functional group by sowing a certain crop?

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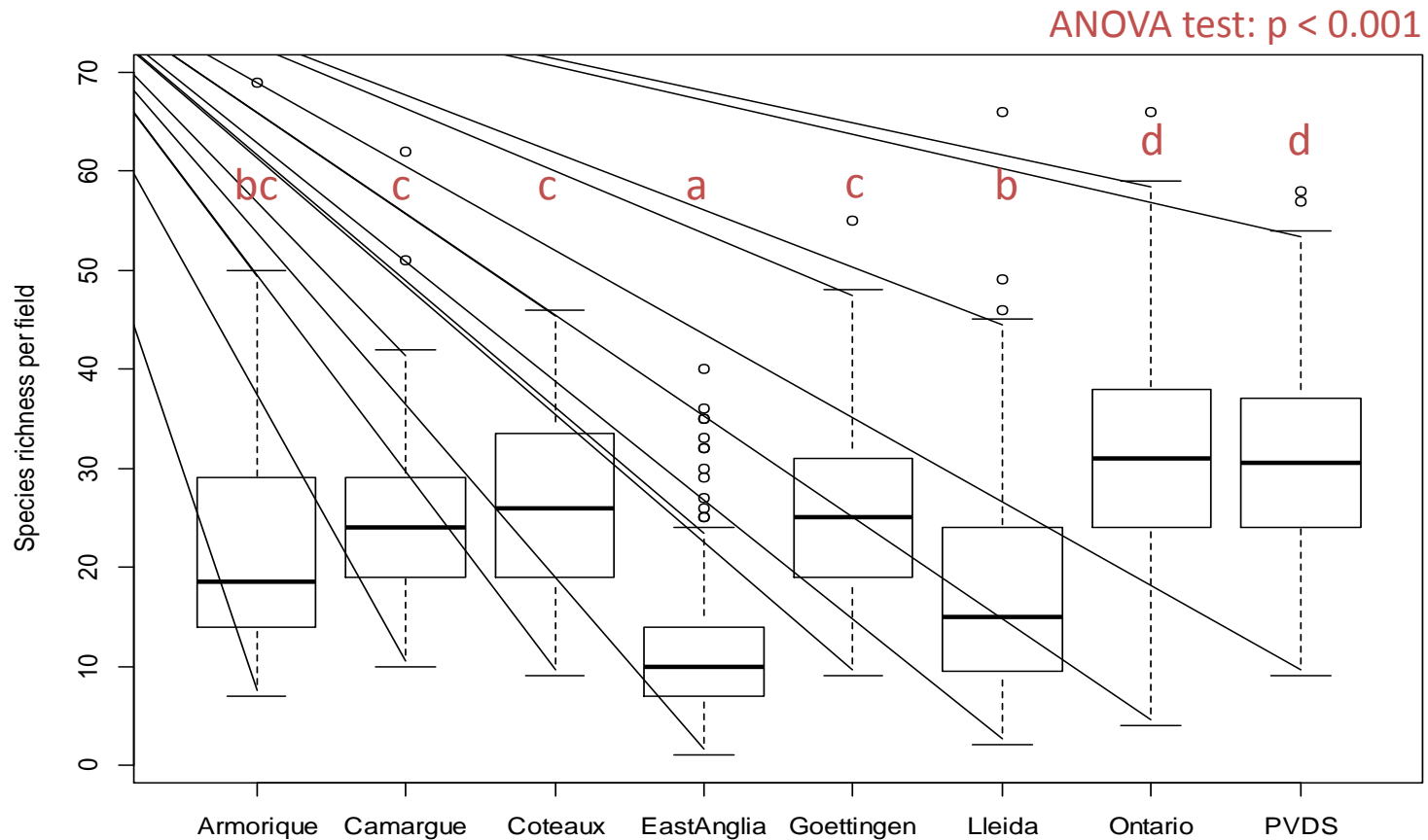
+ Peter's paper on pollinators and insect-pollinated plants
+ Nicolas's paper on grass multifunctionality

Paper 1 – Species accumulation curves per region

Using « 2013 » data:

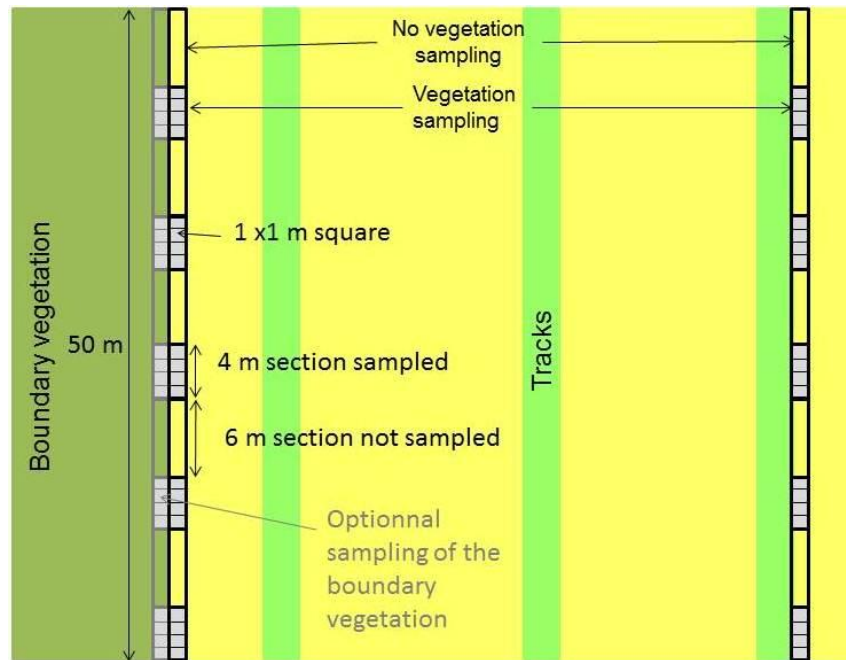


Paper 1 – Species richness per field



Note that all plant species from all crop types were included in analyses.

Paper 1 – Sampling design and sampling unit



To test the effect of landscape metrics on species diversity → Sampling unit: the field

To investigate the contribution of crop diversity to species diversity → Sampling unit: the field

To test differences in species diversity response between field border and field centre → Sampling unit: the transect

Paper 1 – Response variables

Partitioning diversity:

	at the FIELD scale	at the TRANSECT scale
Gamma	Total species richness	Total species richness
Alpha	Mean species richness (=averaging species richness over the two transects per field)	-
Beta	Gamma - Alpha	-

Paper 1 – Response variables

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Alpha	Mean species richness (=averaging species richness over the two transects per field)	-
Beta	Gamma - Alpha	-
Beta_JAC	Jaccard index (=differences in species composition between the two transects per field)	

Paper 1 – Methods and results

i) To test the effect of landscape metrics on species diversity

- Use of simple linear models as:

Response variable \sim Crop_SDHI + Crop_TBL + Crop type + Region +
Crop_SDHI:Region + Crop_TBL:Region + Crop_SDHI:Crop + Crop_TBL:Crop

	Gamma	Alpha	Beta	Beta_JAC
Crop_SDHI	-	-	ns	ns
Crop_TBL	ns	ns	-	-

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- Testing the robustness of models by adding 'non crop cover' and 'woody boundary':



Same results

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- Testing the robustness of models by adding ‘non crop cover’ and ‘woody boundary’ :

 **Same results**

- Adding random effects in more complex models (LMMs) as:

Response variable \sim Crop_SHDI + Crop_TBL + Crop type + Region + non crop cover +
woody boundary + Crop_SHDI:Region + Crop_TBL:Region + (1 | Landscape) + (1 | Year)

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	Gamma	Alpha	Beta	Beta_JAC
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More diverse landscapes have less diversity:

...more resistant to weed invasion ?

... less habitats for specialist plants ?

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	Gamma	Alpha	Beta	Beta_JAC
Crop_SDHI	+	+	+	ns
Crop_TBL	ns	ns	ns	-

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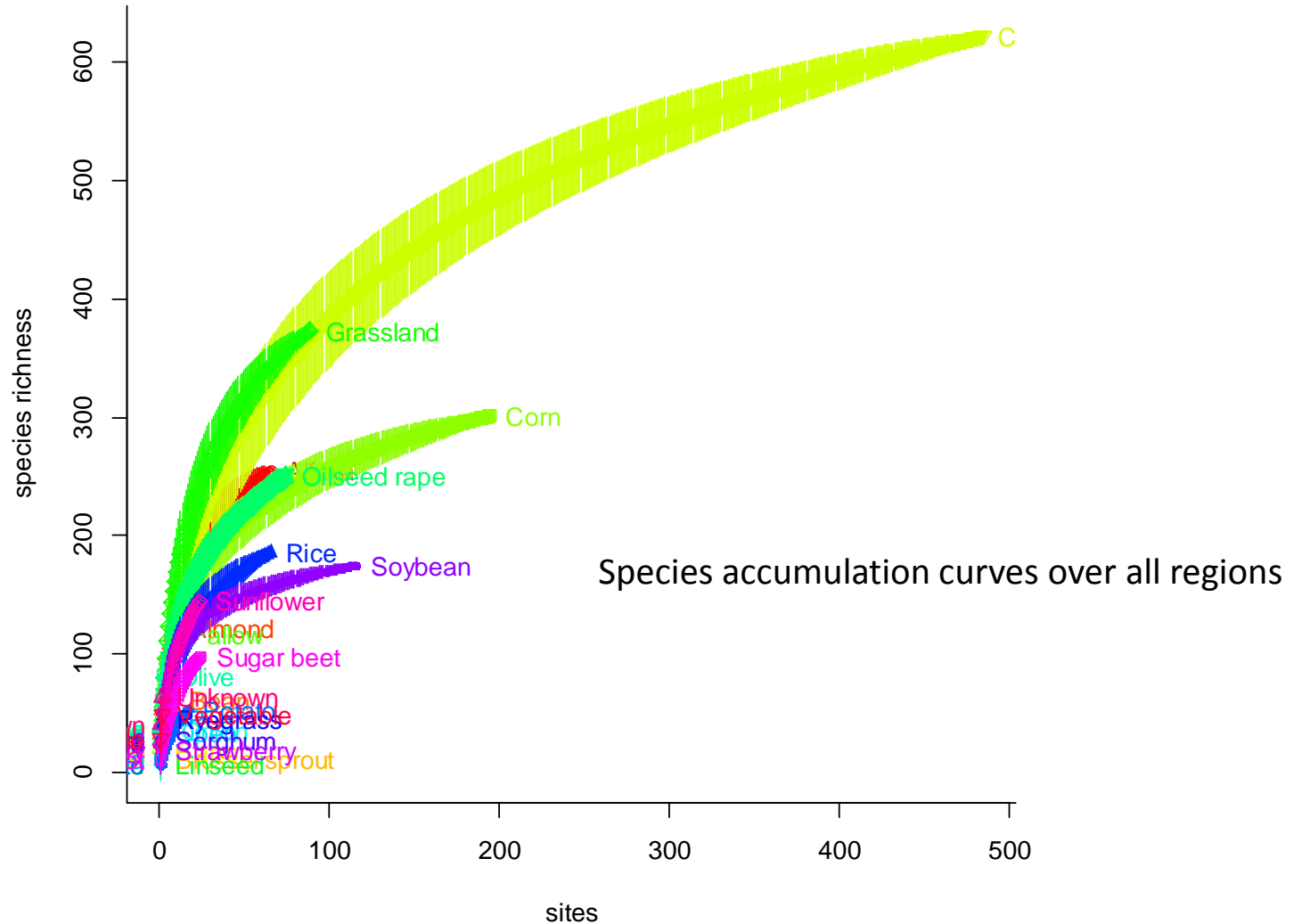
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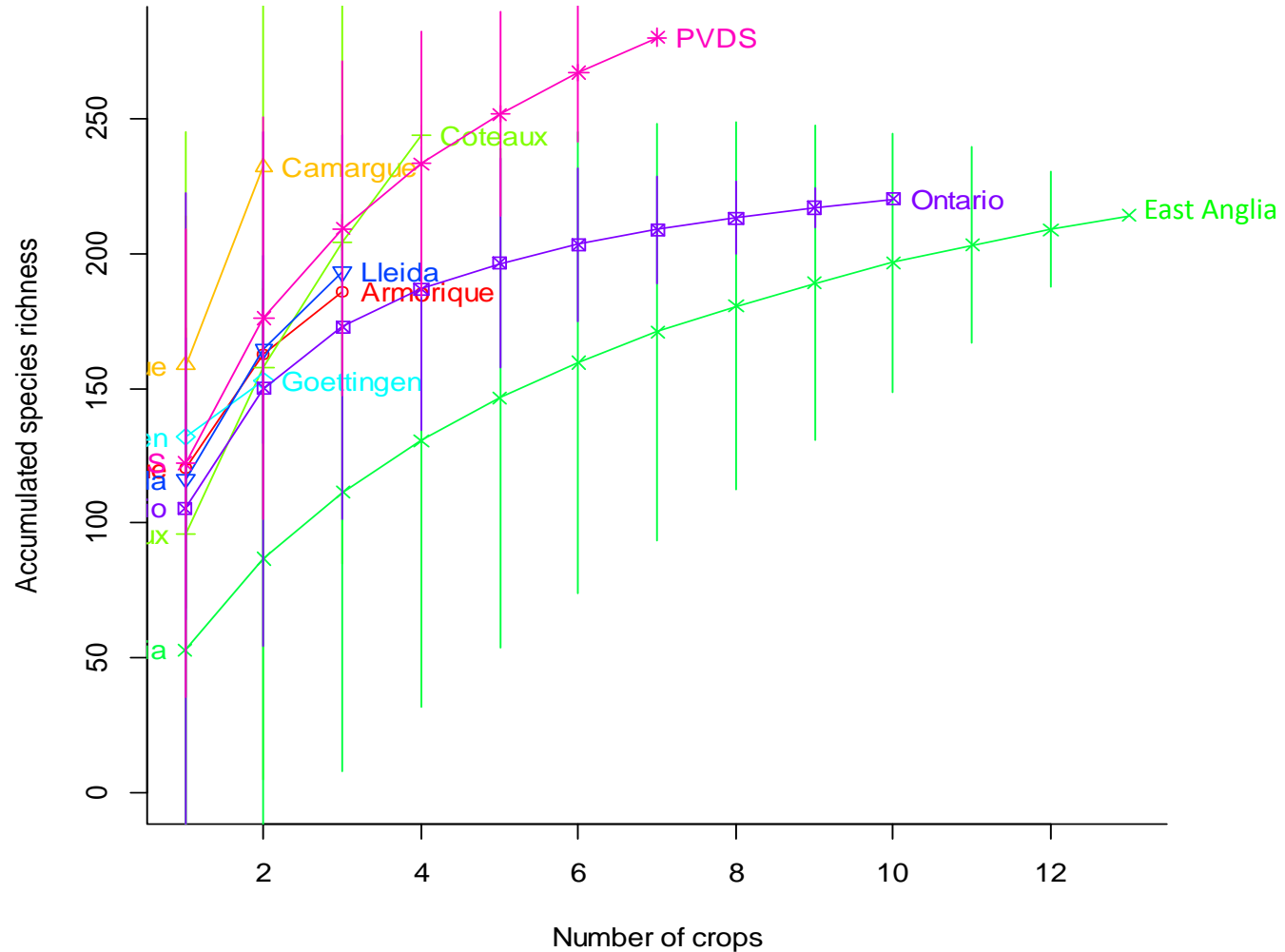
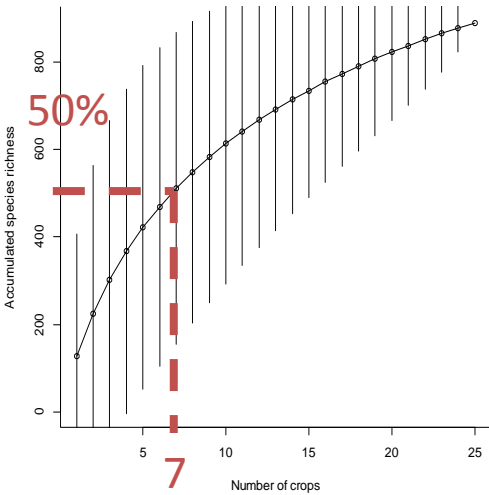
Paper 1 – Methods and results

ii) To investigate the contribution of crop diversity to species diversity



Paper 1 – Methods and results

ii) To investigate the contribution of crop diversity to species diversity



Paper 1 – Methods and results

iii) To test differences in species diversity response between field border and field centre

Use of mixed effect models (LMMs) as:

Response variable \sim Crop_SHDI + Crop_TBL + Crop type + Region + non crop cover + woody boundary + Crop_SHDI:Region + Crop_TBL:Region + (1 | Landscape) + (1 | Year)

	Gamma field border	Gamma field centre
	Total species richness per transect « field border »	Total species richness per transect « field centre »
Crop_SDHI	-	ns
Crop_TBL	ns	ns

Include region as random effect in mixed effect models : TO DO

Paper 1 – Perspectives

- **Grouping crop types and work at the ‘crop type’ scale**

Some crops appear only in few regions *e.g.* almonds

Avoid singleton in models; may help to elucidate the strong regional effect

Proposals:

- 1) arable crops, 2) perennial non woody crops, 3) perennial woody crops ... etc
- 1) winter cereals, 2) summer cereals, 3) grasslands, 4) orchards, ... etc

- **Differentiating species diversity between field border and field centre**

Separate data from field border and field centre as they experienced different disturbance level

- **Going further in landscape structure characterization**

Deepen the effect of landscape composition/configuration by including % grasslands, % hedges, etc.

- **Separating flora into functional groups**

Separate annual from perennial plant species

Categorize species as rare, harmful, ... etc