Mesocosm Analysis

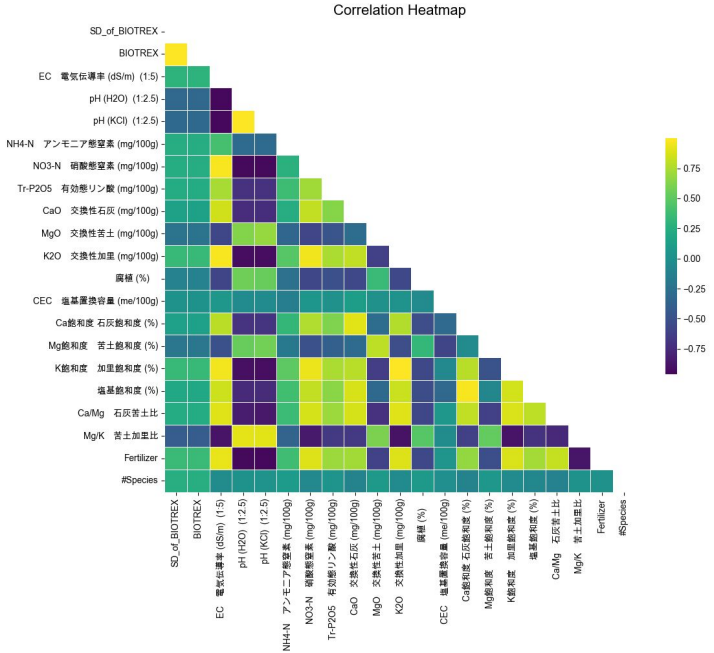
- Metabolome data
- Soil data
- 3D data

- Metagenome data

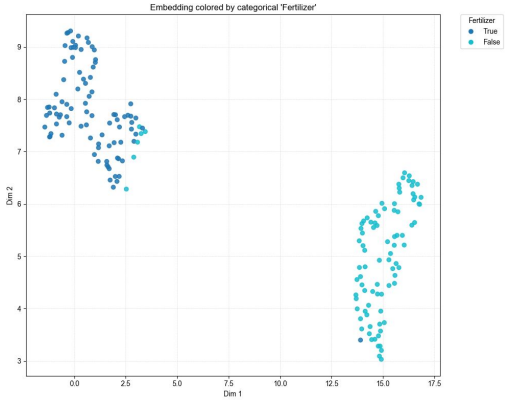
Objective

- Find the impact of species diversity on soil richness ?
- Detect which species affect the soil richness ?
- If there is a soil feature really affected by the diversity ?
- What species are very important for BIOTREX ?

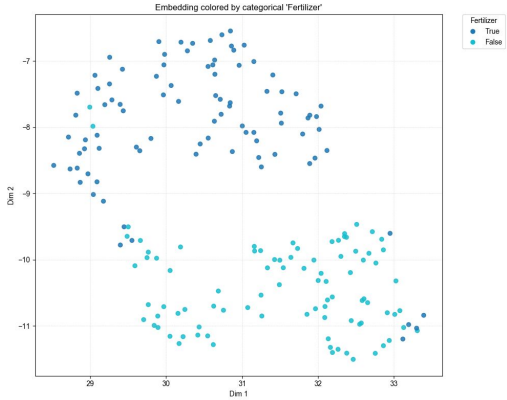
Correlation analysis (1/2)



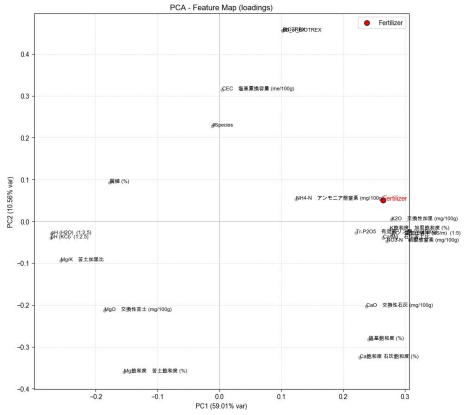
Soil data are of course clearly influenced by the presence or not of Fertilizer

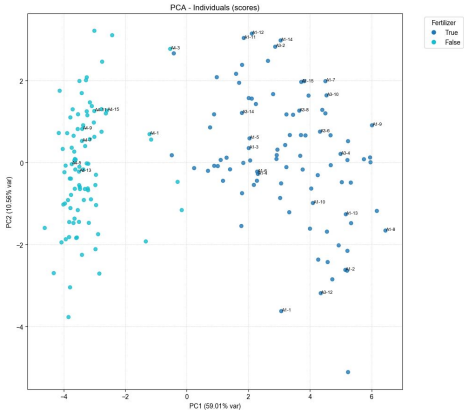


UMAP representation of Soil data



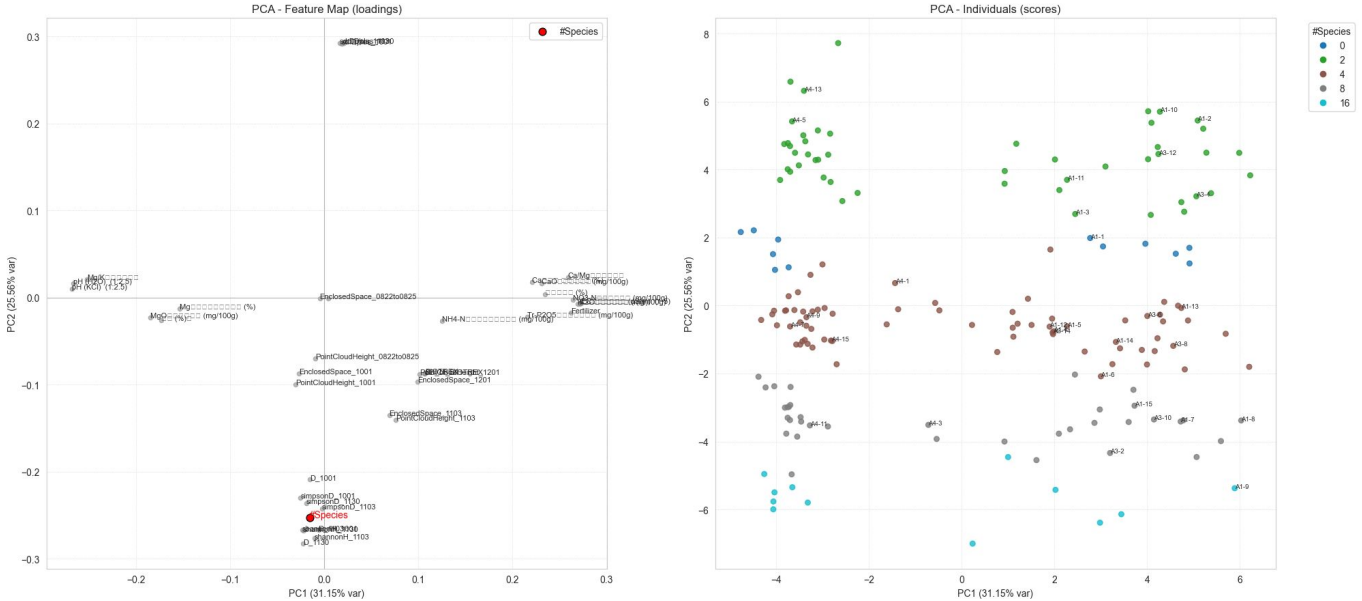
UMAP representation of Metabolome data





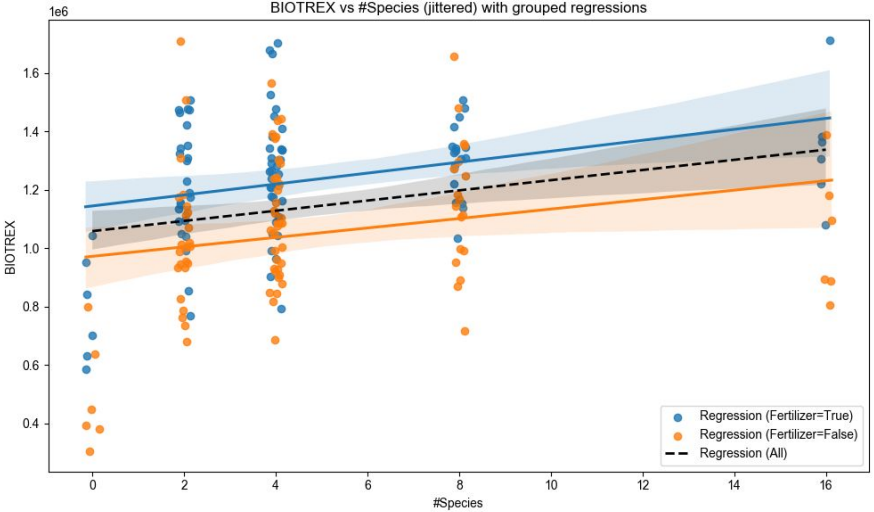
PCA plot of Soil data

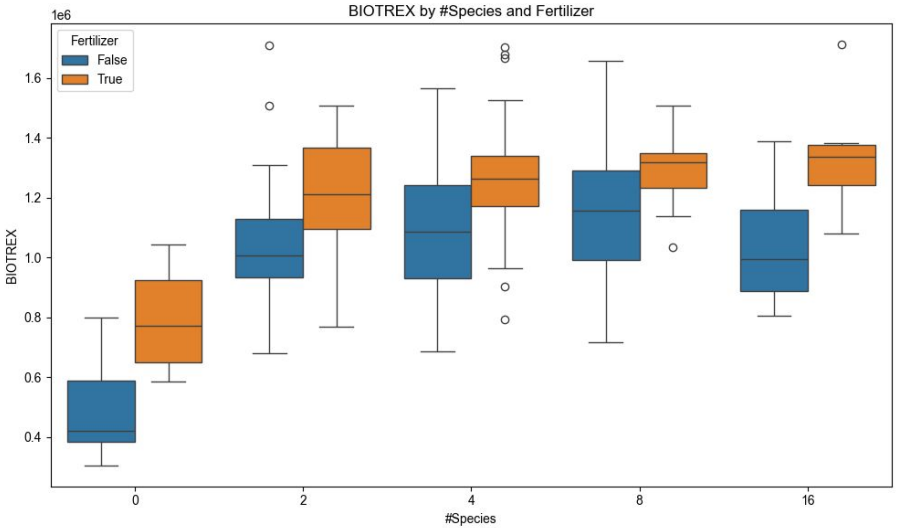
Correlation analysis (2/2)



PCA plot for Soil data and 3D features

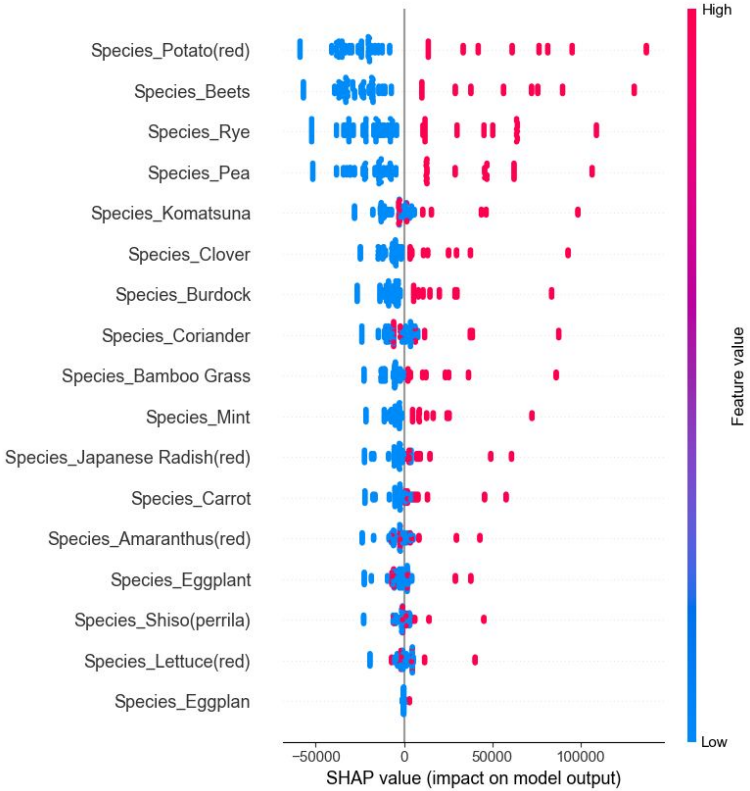
Influence of the number of Species for the soil richness



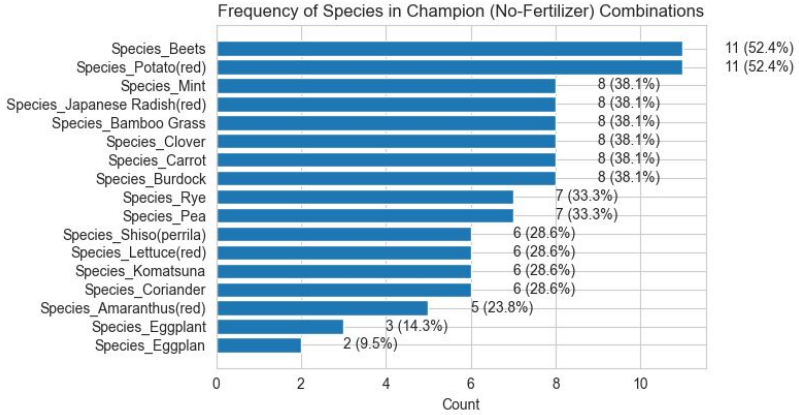


The soil is richer without mono-culture. Yet we have a reduction of richness with too much species.

Most influential species for Soil richness



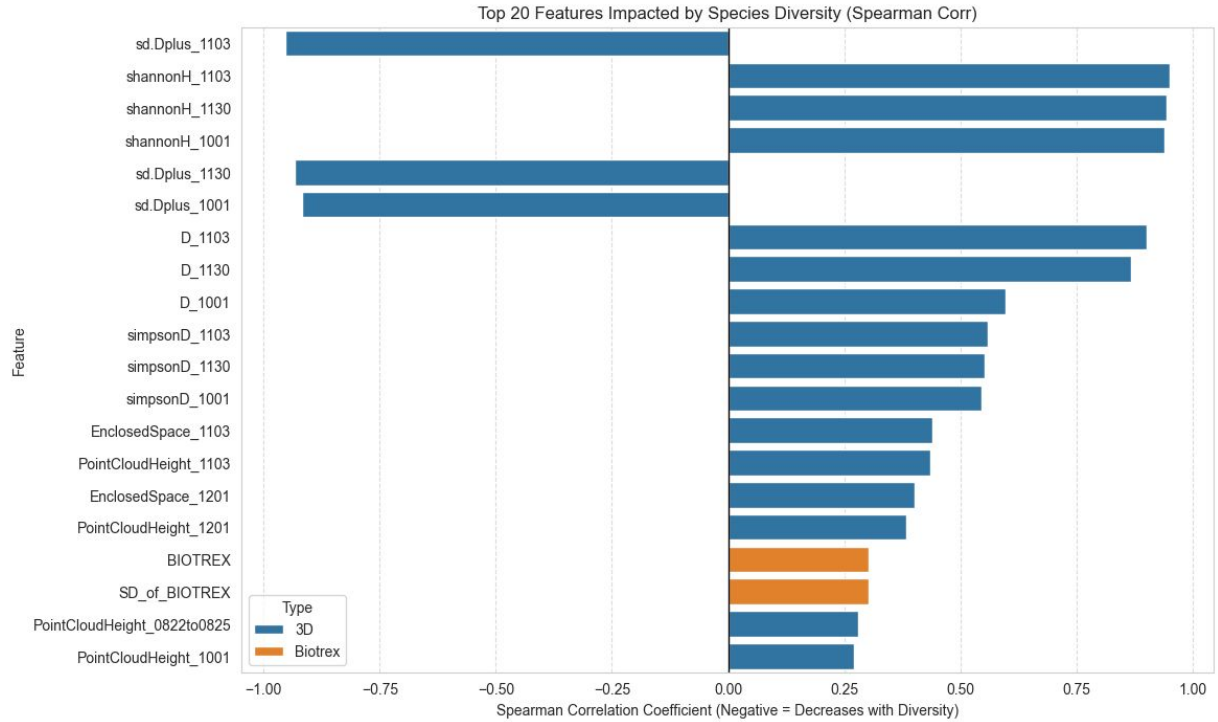
most impactful species for both Fertilizer group



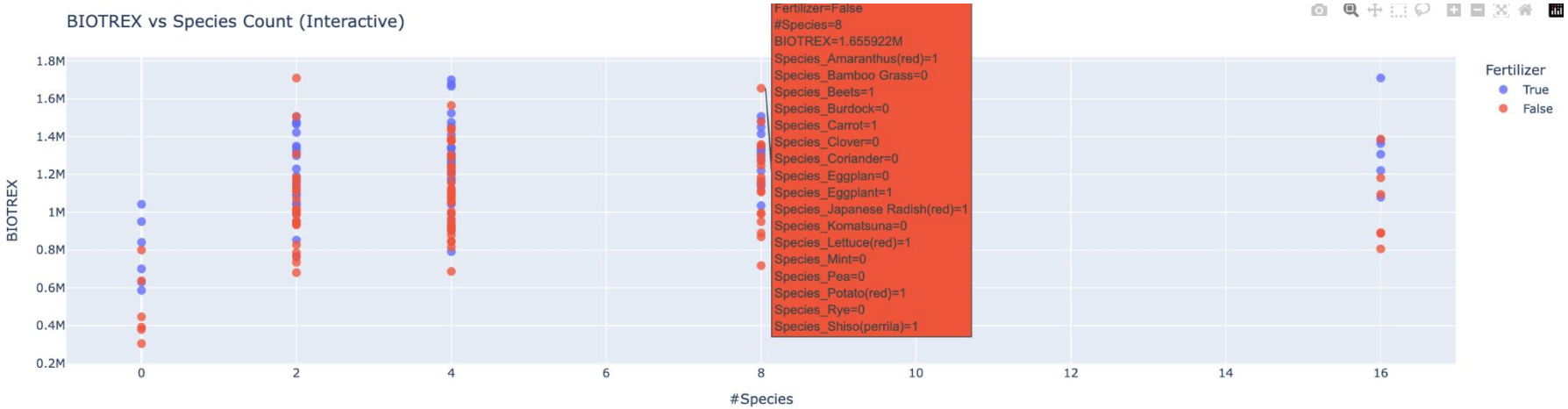
Appearance frequency of species in non-fertilize fields, for fields with soil richer than the mean

- Best crops : beets and potato
- Rye and pea utility drop without fertilizer

Features impacted by species diversity



Crop Mixing that achieved the best soil richness

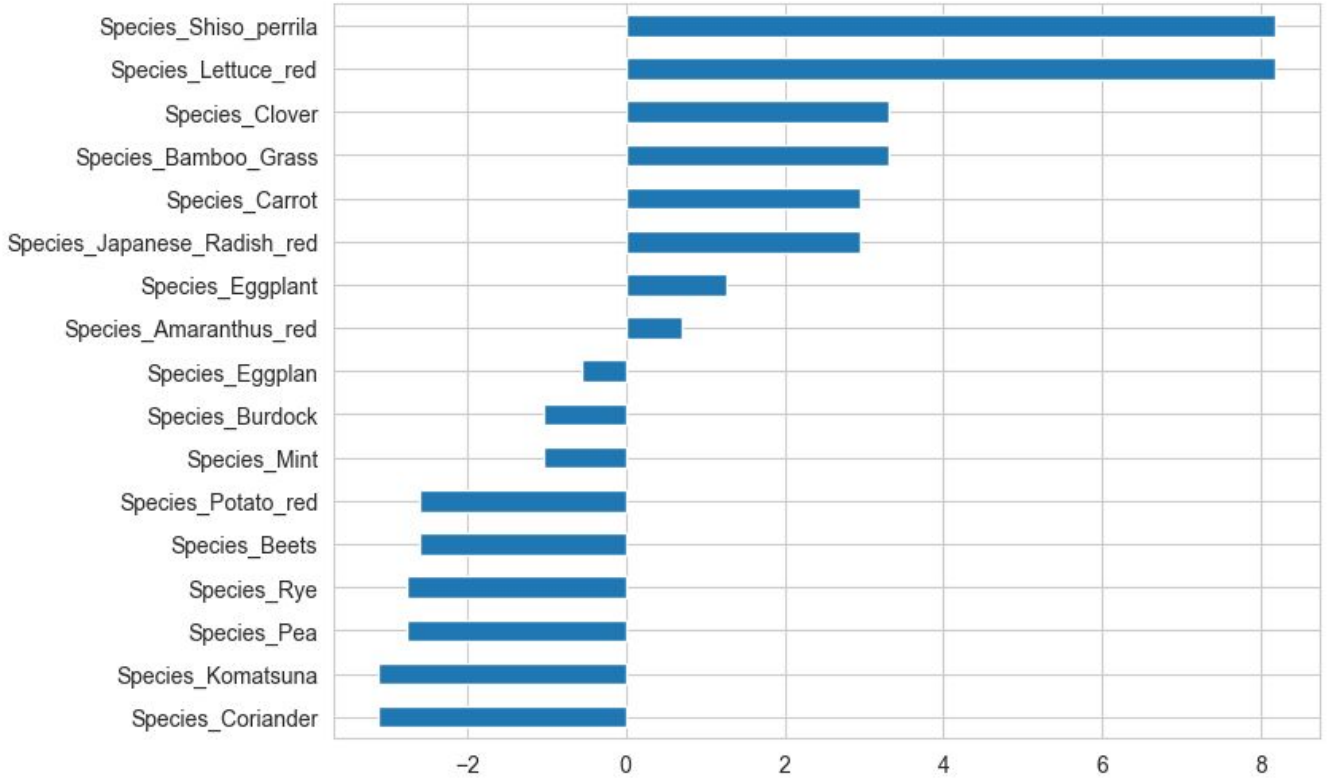


Do plant species structure microbial diversity?

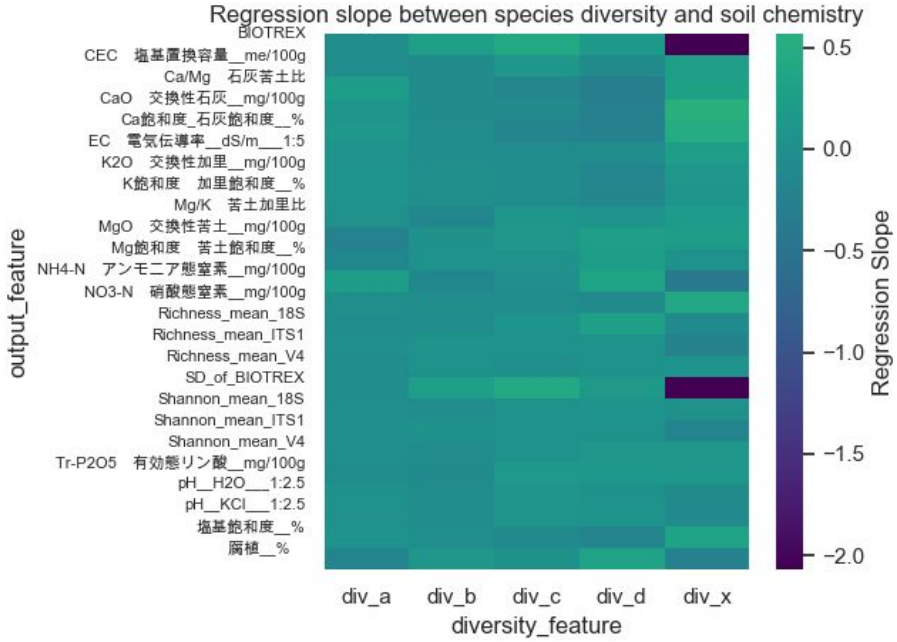
- Linear Mixed Model
- Species as fixed effect

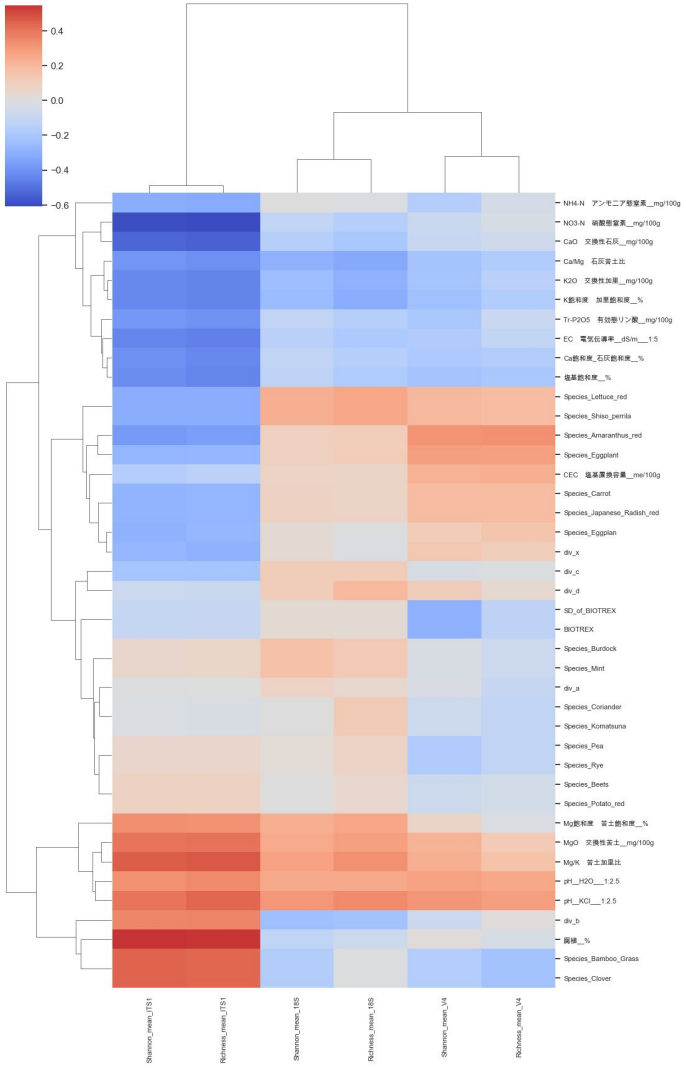
Positive coefficients → species that **increase microbial diversity**

Negative → suppressive species



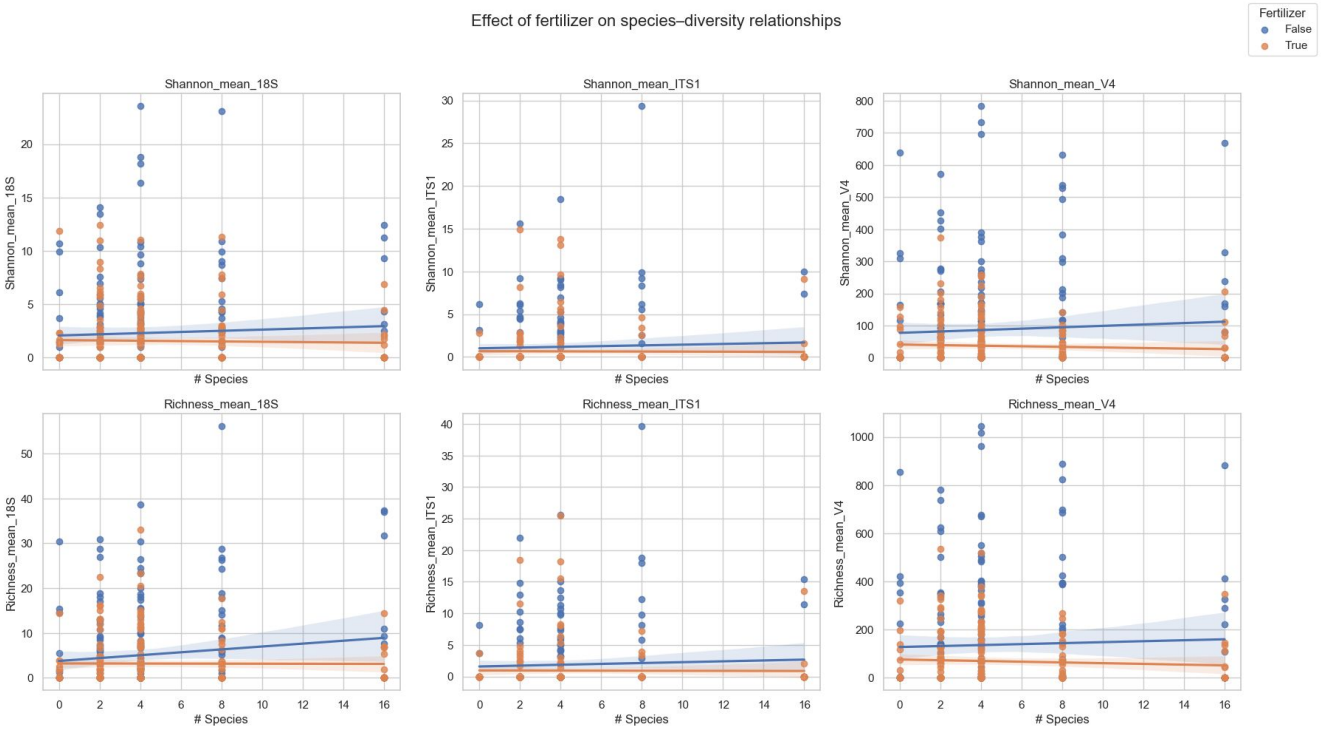
How is soil chemistry / metabolome correlated with microbial and species diversity?





Linear correlation between the BIOTREX and the lack of species, with the addition of species there is an augmentation of BIOTREX index.
Positive correlation between the group “4 species” (group b) and the primer ITS1

Specie diversity vs metagenome



All diversity index improve with addition of species for non-fertilized environments

Which soil features are mainly affected by diversity, RF + GLM Feature Importance