Evaluation of the enzymatic activity and diversity of soil microorganism in Andean temperate forest degradation gradient

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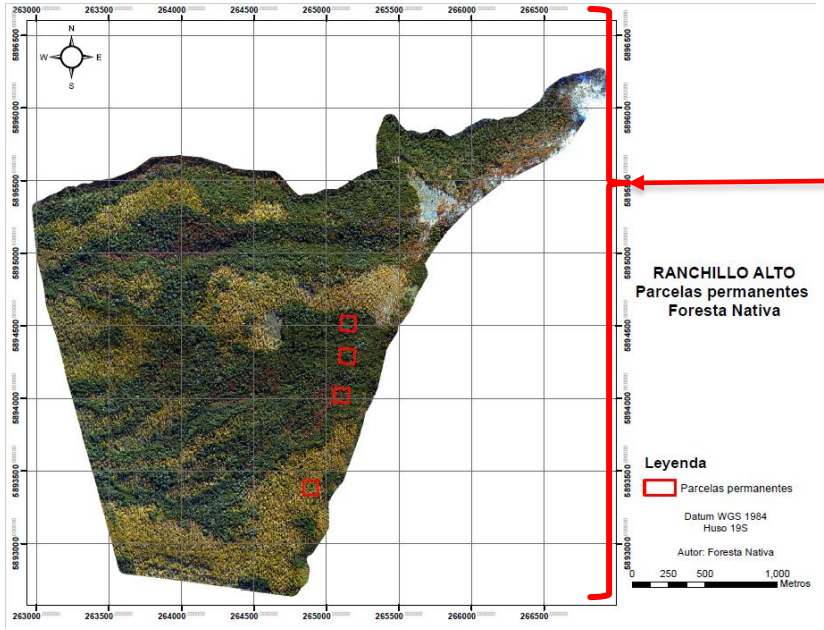
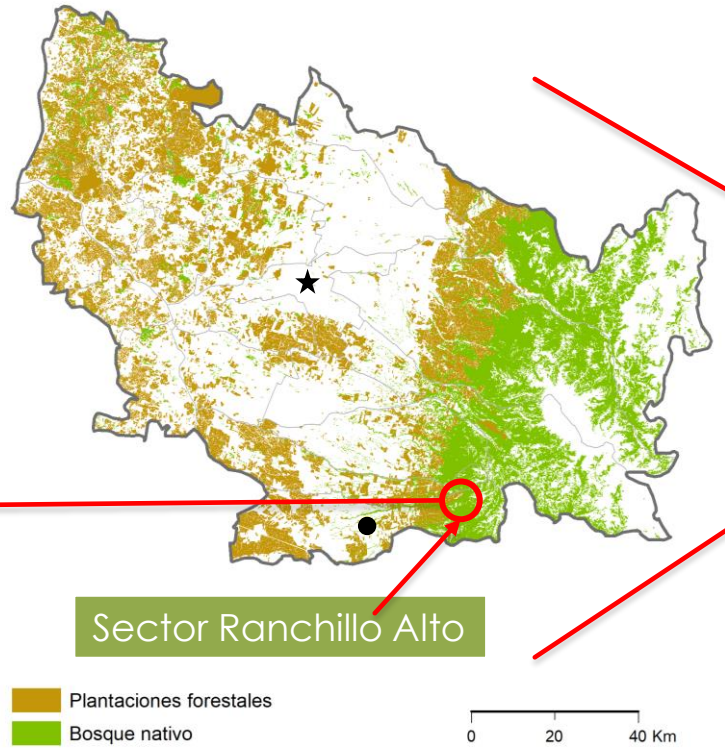
Site description

- Predio Fiscal Ranchillo Alto, Yungay, XVI Región de Ñuble
- 635ha superficie
- Biological corridor "Nevados de Chillan – Laguna del Laja"
- Tipo Forestal Roble-Raulí-Coigüe (RO-RA-CO)
- Degradation type: Logging and overgrazzing
- MAT: 15°C
- MAP: 2.250mm



XVI Región de Ñuble, Chile



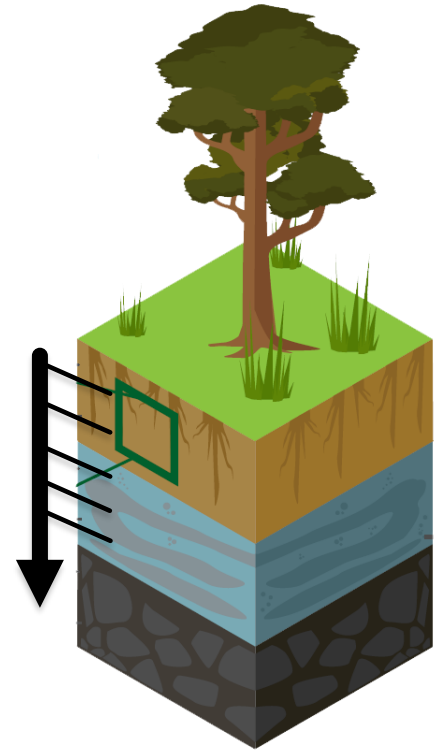
INFOR. 2017.

Materials and Methods
Soil Sampling

Soil prospection → Auger + Soil Pit

Degradation gradient transec of Andean Temperate Forest

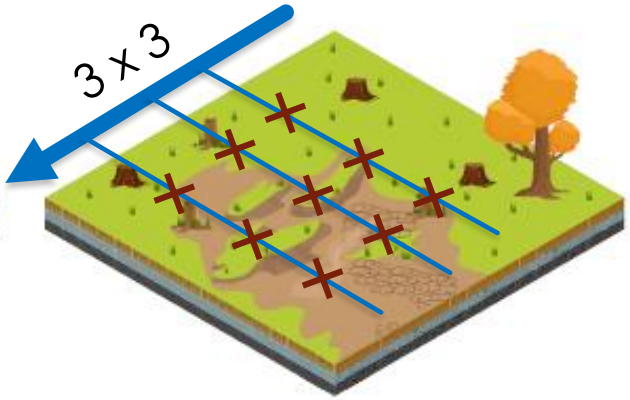
− Permanent plots of 1ha ✚



LOW DEGRADATION

MEDIUM DEGRADATION

HIGH DEGRADATION



DEGRADED SITE (PRAIRIE)

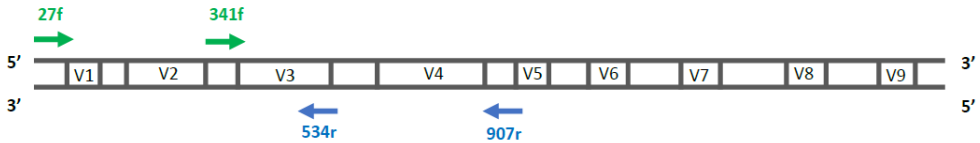
Objective 1: Evaluate the diversity of soil microorganisms in an Andean temperate forest degradation gradient.

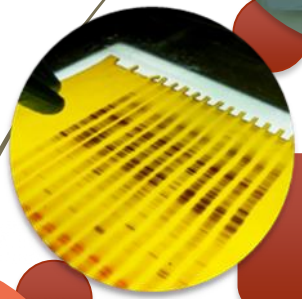
Sloil DNA Extraction (PowerSoil® DNA Isolation Kit)

- 0,25g Suelo <2mm

Nested-PCR

- **Bacteria 16S rRNA** → set1 primer: 341f – 907r
  set2 primer: 341fGC – 534r
- **Fungi ITS region**





Screening (DGGE)

- 65V x 16Hrs
- Dg: 38-65%
- 7,5% Bis/Acrilamide

Sequencing and bioinformatic analysis

The R Project + DADA2

- Bacteria Silva Library
- Fungi UNITY Library

Muyzer *et al.* 1995; Raskin *et al.* 1995; Boon *et al.* 2002; Callahan B. J. *et. al*. 2016. Massimo *et al.* 2008; Takashi y Yuji 2011.

Materials and Methods

Objective 2: Evaluate the functions of soil microorganisms in an Andean temperate forest degradation gradient.

Soil

Soil enzymatic activity

- β – Glucosidase (**BG**)
- Cellobiohydrolase (**CBH**)
- Polyphenol Oxidase (**PPO**)

C

- Glycine Aminopeptidase (**GAP**)
- β – N – Acetylglucosaminidase (**NAG**)
- Leucine Aminopeptidase (**LAP**)

N

- Acid Phosphatase(**AP**)

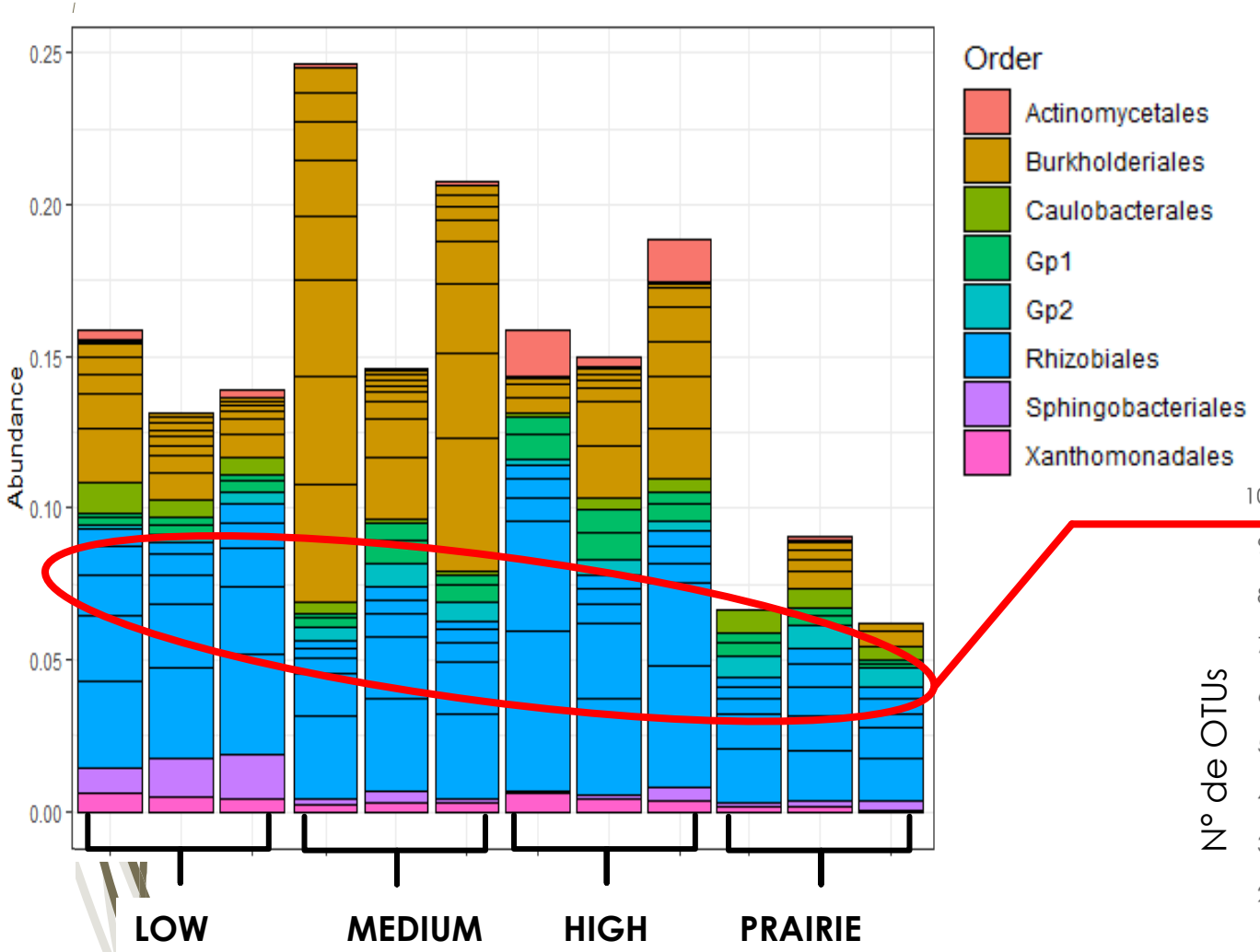
P

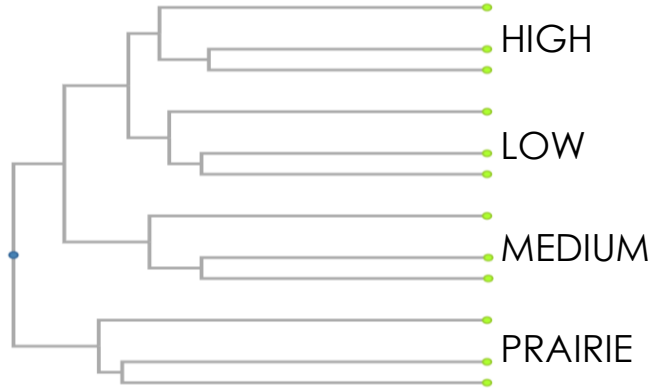
Soil Nutrients

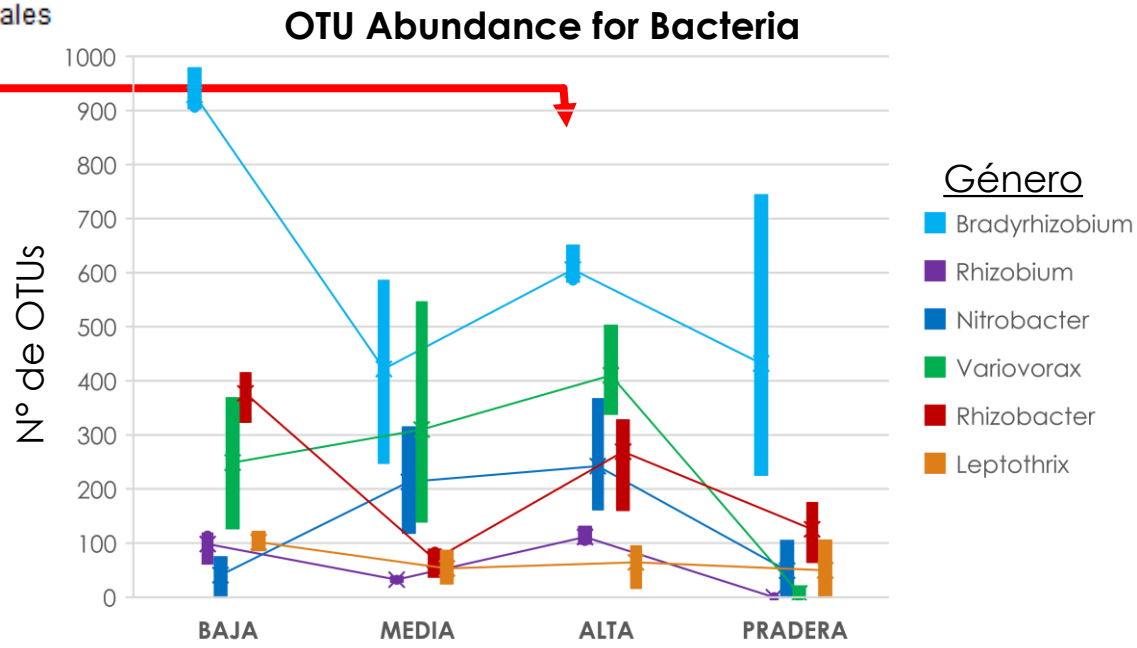
Ct - Nt - Pi - Po -Pt

Allison Lab Protocol: Fluorimetric and Oxidative Enzyme Assays. (2012), Gaby J. C. y Buckley D. H. (2012), Mirza B. *et. al.* (2014), Sadsawka et. al. (2006).

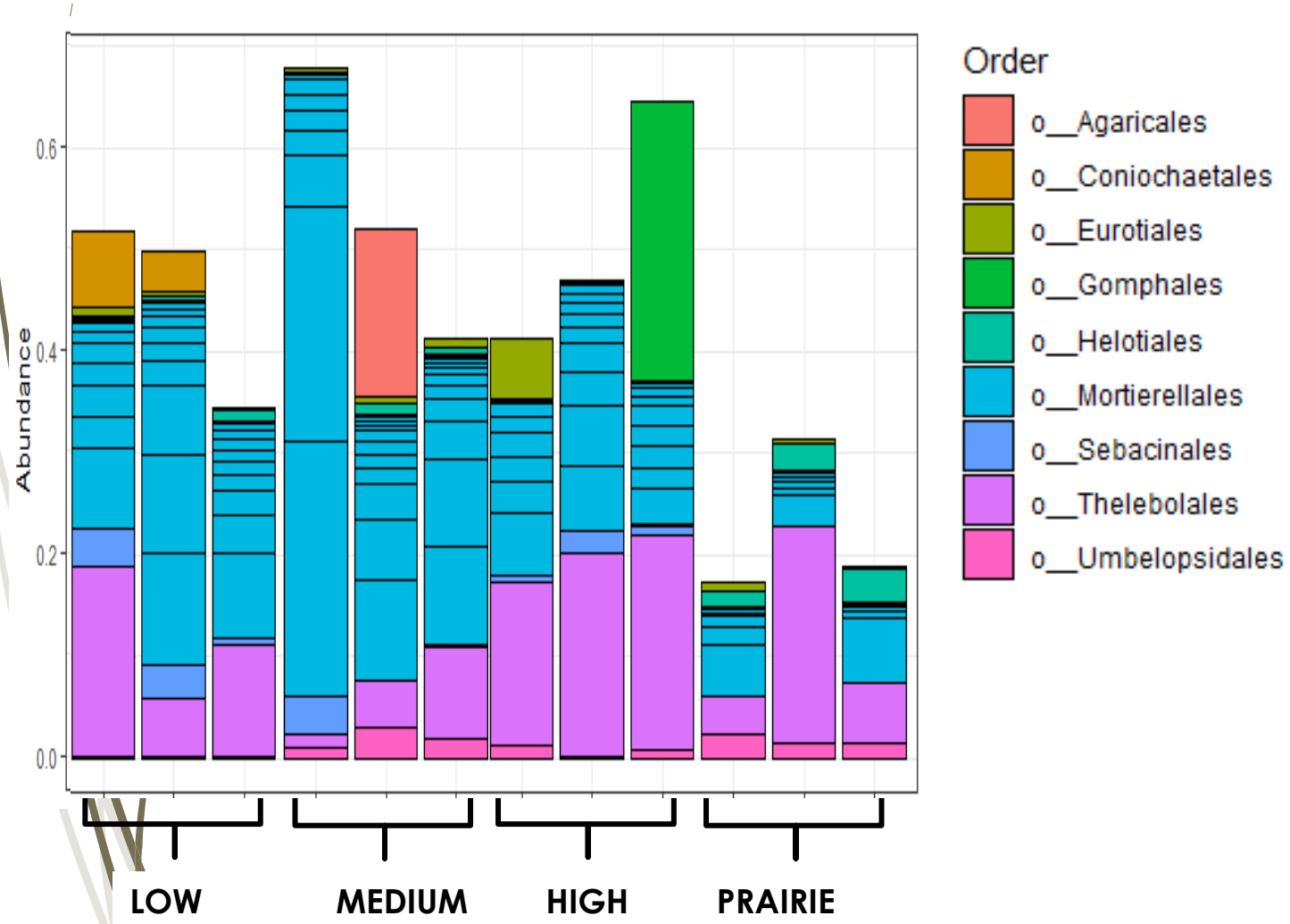
Results – Soil Bacteria Diversity

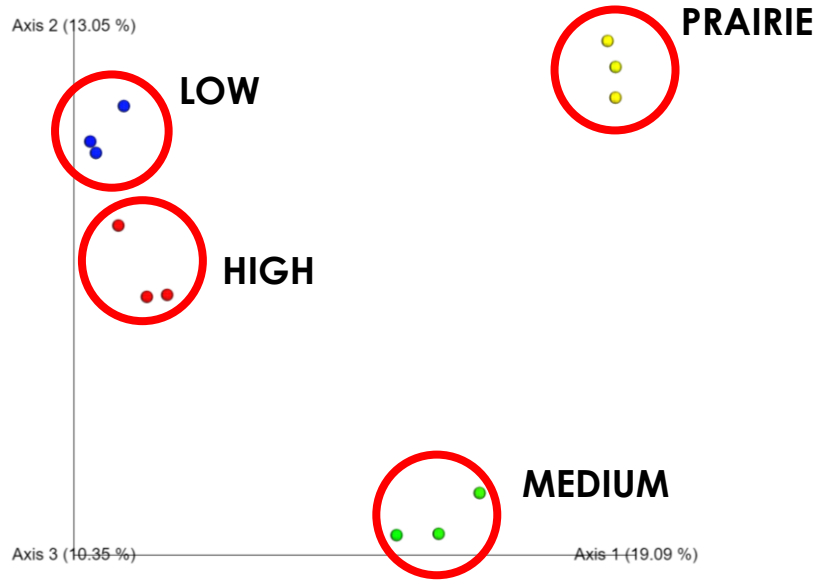


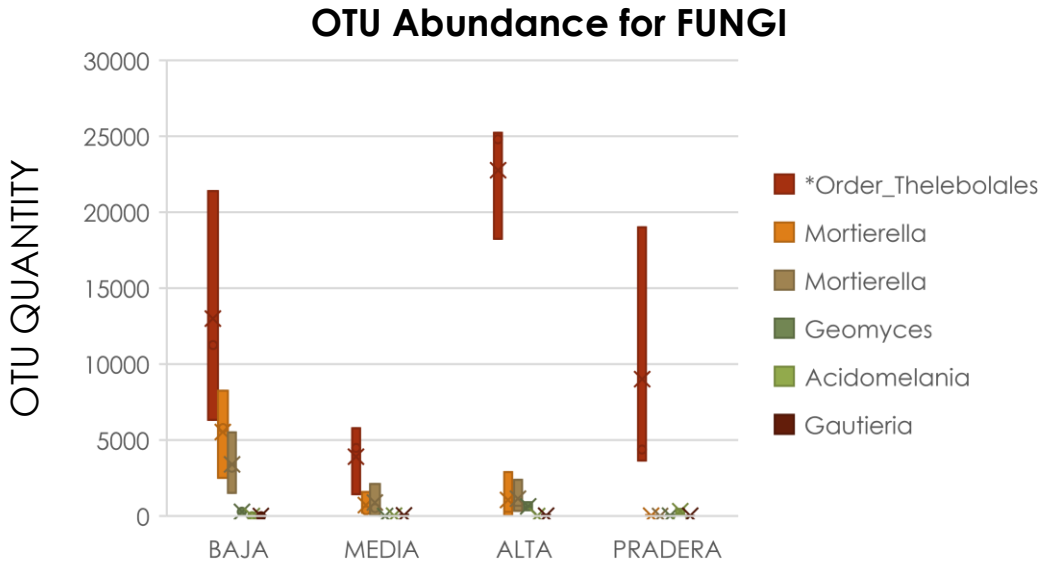




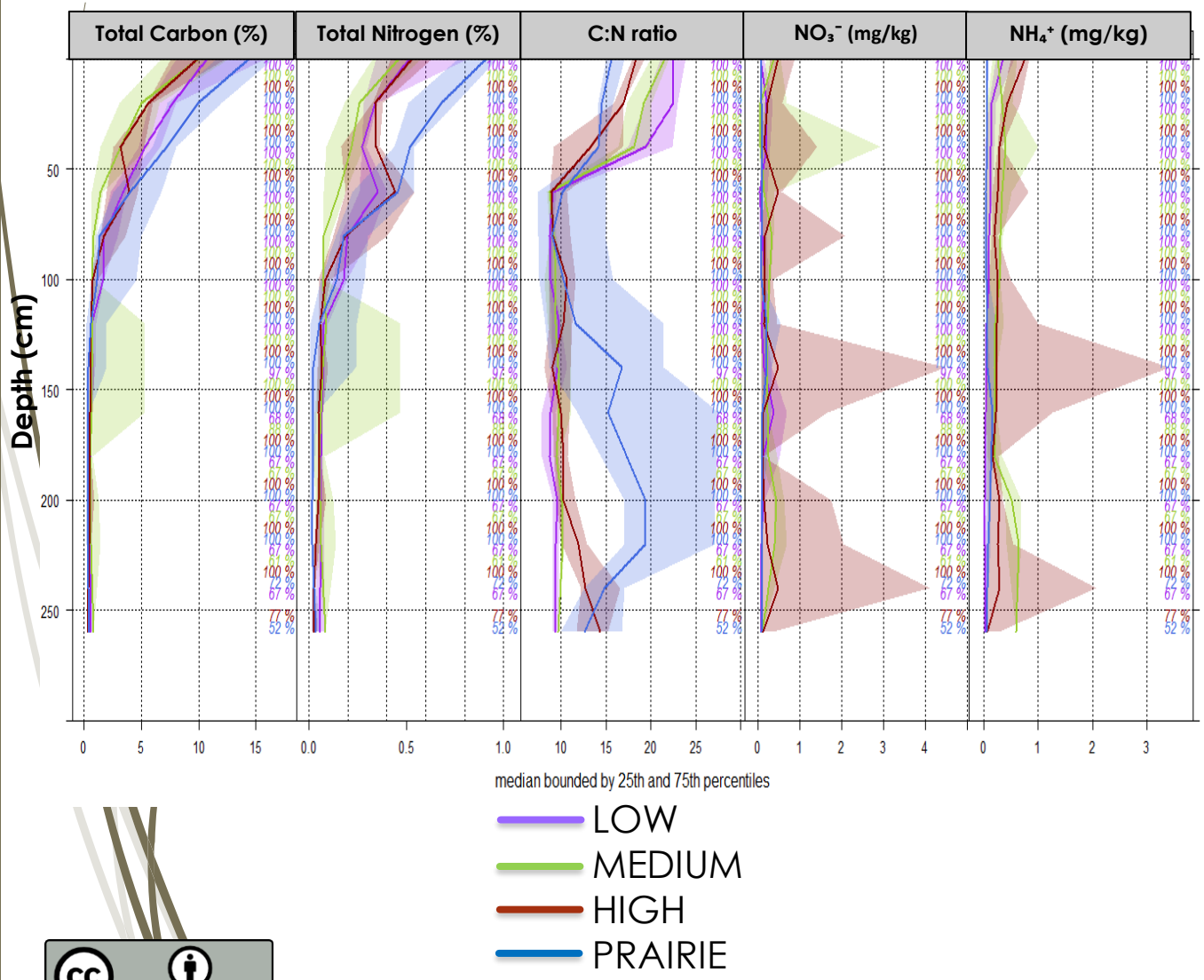
Results – Fungi Diversity

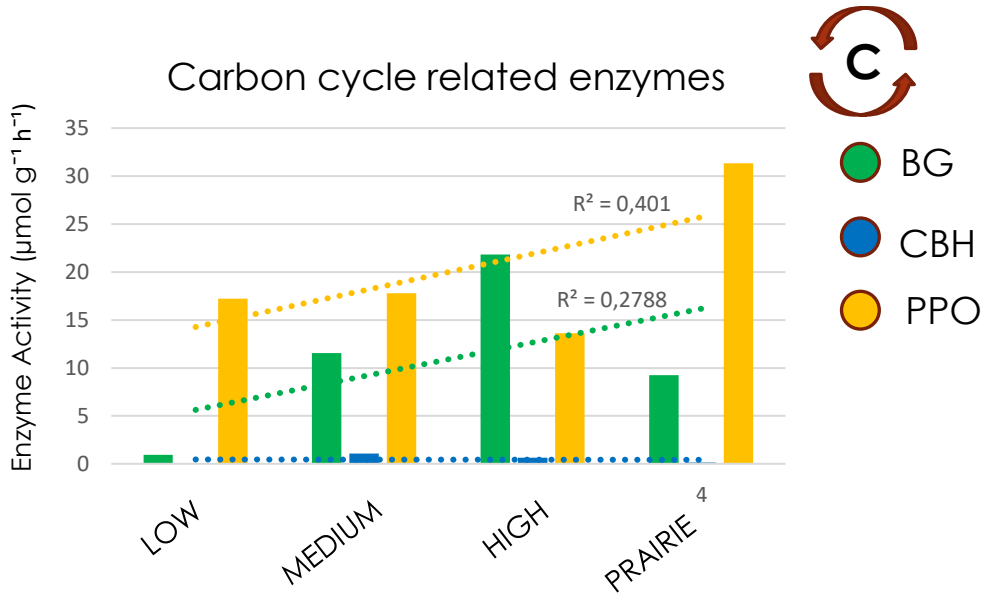


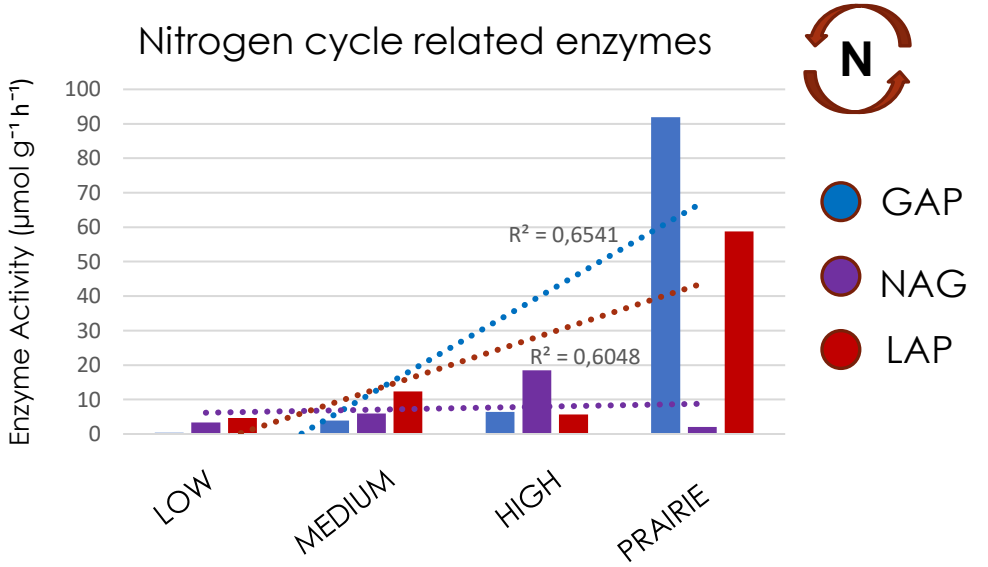




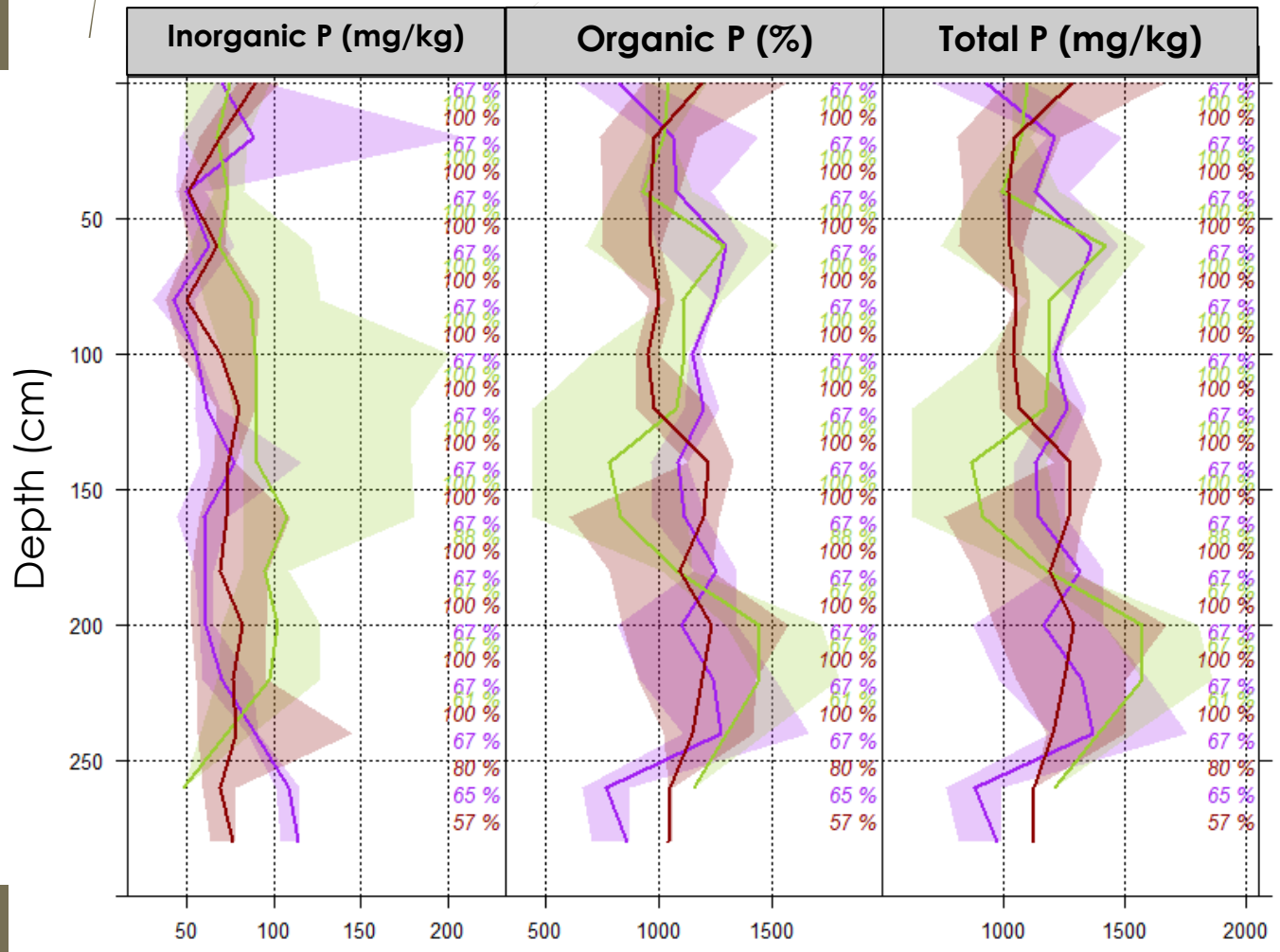
Changes in Carbon and Nitrogen dinamics







Changes in Phosphorus dinamycs



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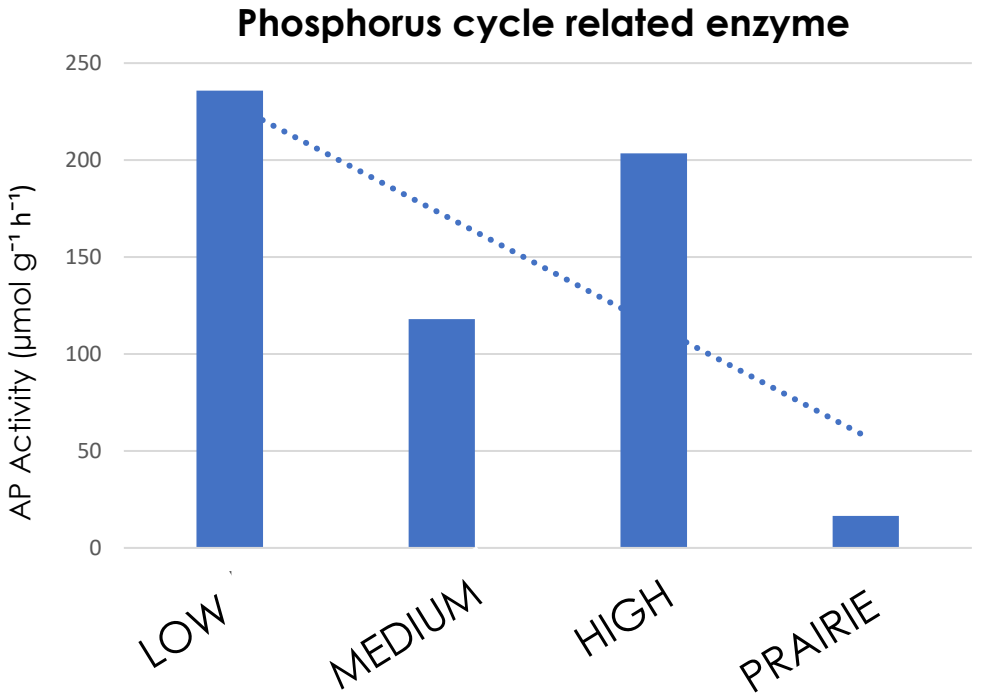

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