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Earthworm density regarding altitude, soil parental material, and soil chemical properties in coffee-based agroforestry in Beaumont and Pestel

Jephthé Samuel GUERVIL[1] (j.guervil@avsf.org), Wesly JEUNE[2], Sardou Jean Denis[1], Raphael MARICHAL[3]

[1]Agronomes et Vétérinaires Sans Frontières (AVSF), Haiti, [2]Agronomes et Vétérinaires Sans Frontières (AVSF), Enseignant-chercheur UNIQ, [3]CIRAD, Montpellier, France

Introduction

- There is limited research on bioindicators in Haiti, particularly earthworms.
- Limited understanding exists concerning agroforestry systems, particularly soil biodiversity
- Highly valued in Haiti, coffee is predominantly cultivated in the coffee-favorable zones of Pestel and Beaumont in the southwest of Haiti.
- The activity and abundance of macro-organisms play a crucial role in ensuring the success of coffee-based agroforestry production.

Materials/Methods

- Earthworm sampling was conducted using the TSBF method, collecting specimens from litter and two different depths in each monolith (0-10 cm and 10-20 cm).
- Soil chemical analysis was performed at the A&L Great Lakes Laboratories (USA, Indiana). Statistical tests (ANOVA, Pearson's correlation) explored earthworms abundance vs. soil chemistry
- Parent material identification relied on ArcGIS 10.4.1 software, utilizing Haiti's geological layers as the primary dataset

Conclusion/Perspectives

- In coffee agroforestry plots, earthworm abundance is influenced by plot altitude and soil chemical properties.
- Beaumont seems to be more favorable to coffee production.
- Study shows earthworms prefer neutral pH soil, low Zn and Mn

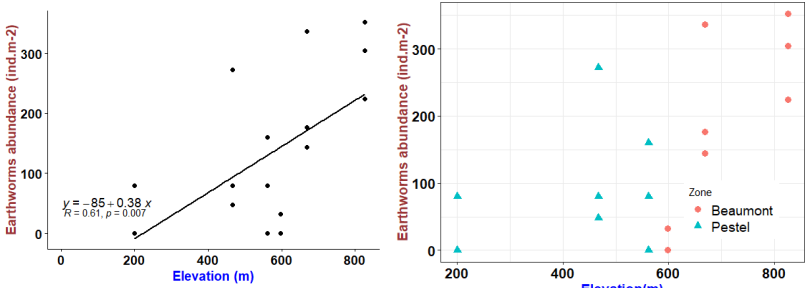

Figure 1: Correlation between altitude and Earthworm abundance

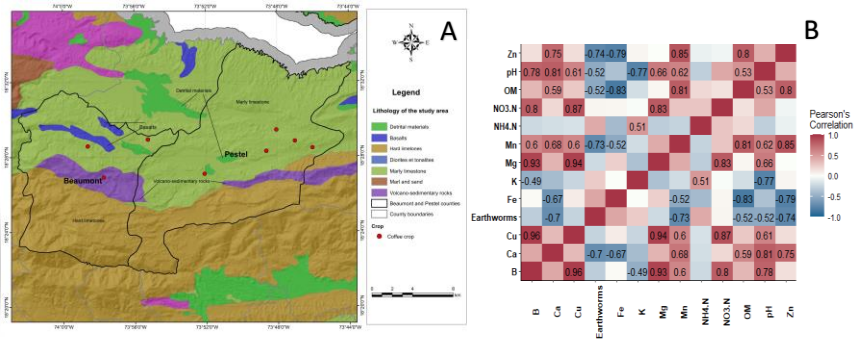

Figure 2: (A) Parental material classification for Beaumont and Pestel translated in English, (B) Correlation heatmap between earthworms density and soil chemical properties

Results/Discussion

- Beaumont exhibited higher earthworm abundance, linked to significant altitude difference from Pestel. Probably due to increased soil moisture at higher altitudes.
- Earthworm abundance was negatively correlated with zinc, Mn, pH, and exchangeable calcium as shown in the correlation heatmap (Figure 2)
- On average, the zinc, calcium, and manganese levels in the coffee plots in Beaumont were observed to be comparatively lower than those found in Pestel
- The preponderance of coffee plots is cultivated on parent materials characterized by marl and marly limestone compositions.
- Coffee plots of different parent material types showed no significant difference in earthworm abundance

References:

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