Earthworm density regarding altitude, soil parental material, and soil chemical properties in coffeebased agroforestry in Beaumont and Pestel

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Rationale:

Beaumont and Pestel regions in South-West Haiti show high coffee cultivation potential. A study examined earthworm abundance as an indicator of coffee production, considering altitude, soil parent material, and chemical properties. Earthworms enhance soil porosity through litter decomposition, positively impacting coffee tree growth. There is a potential correlation between coffee bean weight and earthworm biomass. The study emphasizes the influence of environmental factors on earthworm abundance in Beaumont and Pestel.

Methods:

Earthworm sampling was conducted using the TSBF method, collecting specimens at litter and two depths in each monolith (0-10 cm and 10-20 cm). Significance analyses (ANOVA, Tukey's posthoc) and correlation tests explored the relationship between earthworms and soil chemical properties. Parent material identification relied on ArcGIS 10.4.1 software, utilizing Haiti's geological layers as the primary dataset.

Results:

Elevation positively correlated with earthworm abundance (r=0.61, P=0.00698), attributed to increased soil moisture at higher altitudes. Beaumont exhibited higher earthworm abundance, linked to significant altitude difference from Pestel. Negative correlations existed between earthworm abundance and soil pH (r=-0.52, P=0.02) and exchangeable calcium (r=-0.70, P=0.001). Negative correlations were also observed between Zn (r=-0.74, P=0.0004) and Mn (r=-0.73, P=0.0007) micronutrients with earthworm abundance. Coffee plots of different parent material types showed no significant difference in earthworm abundance. Pearson's chi-squared test (p=0.21) indicated dependency between parent material type and zone.

Conclusion & Perspectives:

Limited research on bioindicators, particularly earthworms, in Haiti, necessitates further investigation. Considering the significance of earthworms for soil quality, comprehensive studies are imperative. This study reveals variations in earthworm populations based on altitude and soil chemical properties in two coffee-growing regions.

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