Earthworm Density and Soil Property Relationships in the Pacific Northwest Region

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Examine the relationship between earthworm density and soil properties.

Understand how climate change can impact earthworm distribution.
Earthworms are important for:
- Soil aeration
- Soil nutrient cycling
- Building soil structure
- Contributing to microbial activity

Earthworm population and activity can be indicative of soil characteristics and climate change
Silt soils are more ideal than sandy soils for earthworms

Neutral pH is ideal
- Earthworms can tolerate soil pH 5-8

Reduced tillage generally favors higher earthworm populations
- Lower disturbances
- Reduces physical injury
- Lowers susceptibility to predation
Methods

Lab methods:
- Soil texture determination (Hydrometer method)
- Soil pH (1:1)

Statistical Methods:
- Spearman Rank-Order Correlation
Particle Size Analysis (PSA)
Research Questions

- How does soil texture and pH relate to earthworm density across agro-ecological zones?

- What are the differences in agro-ecological zone earthworm density, and soil properties?
Earthworm Density vs. % Sand

\[ P = 0.2041 \]

\[ \ln(\text{Density individuals m}^{-2}) \]

\[ \% \text{ Sand} \]
Earthworm Density vs. %Silt

P = 0.4550
Earthworm Density vs. % Clay

\[ P = 0.1862 \]
Earthworm Density vs. pH

Ln(Density individuals m\(^{-2}\)) vs. Soil pH (1:1)

P = 0.2369
Soil Texture by Zone

- **Sand**
  - Annual: b
  - Transition: b
  - Crop–Fallow: a
  - Irrigated: a

- **Silt**
  - Annual: a
  - Transition: a
  - Crop–Fallow: a
  - Irrigated: b

- **Clay**
  - Annual: a
  - Transition: b
  - Crop–Fallow: b
  - Irrigated: b
pH by Zone

- **Annual**: pH ab
- **Transition**: pH b
- **Crop-Fallow**: pH a
- **Irrigated**: pH a
Conclusion

- Significant differences between zones for soil texture and pH.
- No correlation between earthworm density with soil properties.
- Other factors such as tillage, cropping systems, and climate can have greater impacts on earthworm density than soil texture and pH.
Ethical Considerations

- Sampling earthworm populations causes some ethical considerations
  - Taking earthworms from environment and euthanizing for species identification.
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Questions?