Soil Carbon Stocks and Mineralization Along a Tropical Catena in Ghana: Biogeochemical Controls and Kinetic Modelling

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1. INTRODUCTION

- Soil stores more carbon than the atmosphere and vegetation combined [1, 2]
- High temperature and rainfall conditions in tropical regions results in rapid carbon turnover [3]
- Topography strongly influences carbon dynamics in soils.
- Paucity of information for soils on catenas in Ghana.

RESEARCH GAP AND OBJECTIVES

How do hillslope positions and soil biogeochemical properties control carbon storage and the release of CO_2 in tropical agroecosystems?

- Quantify SOC stocks (0-100 cm) along a tropical catena.
- Evaluate CO_2 evolution unamended & litter-amended conditions.
- Model CO_2 evolved to predict which soil loses more carbon.
- Identify key biogeochemical properties controlling carbon dynamics.

2. METHODOLOGY

Field Sampling

ACKNOWLEDGEMENTS

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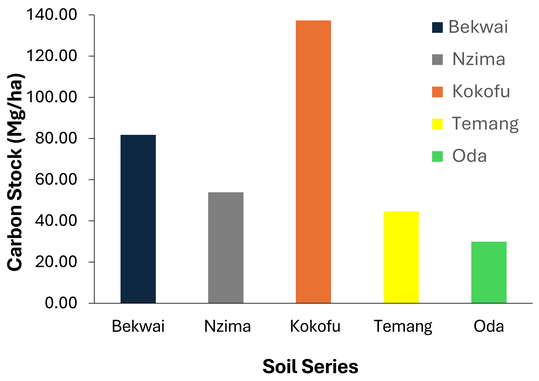
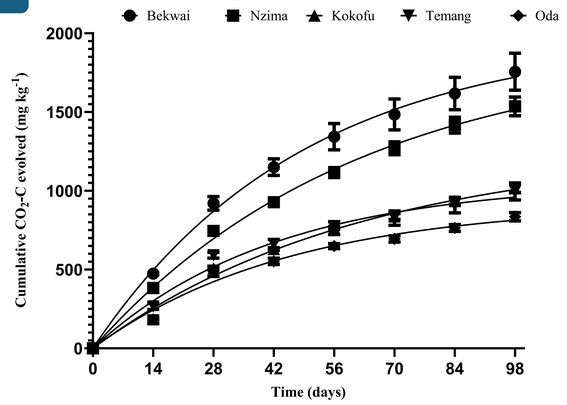
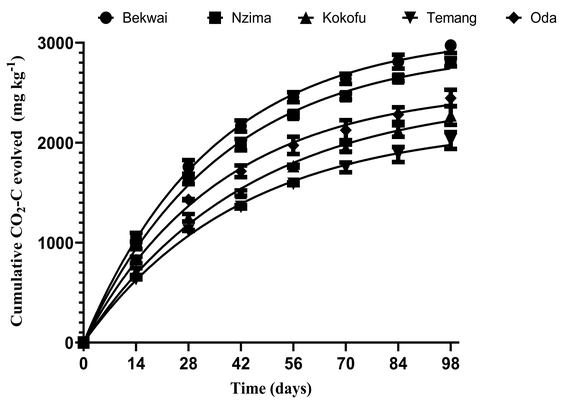
3. RESULTS







4. DISCOVERIES

- Topography strongly influences carbon stock and mineralization.
- Kokofu series (lower slope) stored the highest carbon.
- Litter amendment significantly accelerated CO_2 release.
- Soil texture, bulk density, and organic matter quality, controlled carbon turnover.
- First-order kinetics effectively described SOC mineralization.

5. CONCLUSION

- SOC stock & mineralization varied significantly along the catena.
- Soil biogeochemical properties and topography control carbon dynamics.
- Catena-specific management can enhance carbon sequestration and soil fertility.
- This research supports climate change mitigation in tropical agroecosystems.

LET'S CONNECT!

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6. CONTRIBUTIONS TO SDGs

Sustainable soil management for a resilient planet and food security.

7. REFERENCE

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