# Comparative Soil Organic Carbon Dynamics In Tropical And Subtropical Grassland Ecosystems

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## INTRODUCTION

- Grassland ecosystems play significant role in mitigating the climate change by sequestering atmospheric $CO_2$.
- One fifth of the total terrestrial C is stored in their root zone as soil organic carbon.
- Grasslands, thus greatly help in curtailing the pace and magnitude of global warming and climate change.
- However, because of overgrazing, and conversion to crop lands, these grasslands are fast becoming a source instead of sink of C.
- Carbon stored in the root zone improves soil health, and facilitates storage of moisture in the soil profile

## MATERIAL and METHOD

We conducted an analysis of literature to compare the influence of management, grazing intensity, grass species, plant diversity, and temperature on carbon sequestration and structural constitution in the grasslands, Savannas and pastures in tropics and subtropics.

Published data was collected from research articles specifically representing regions like: Imprata grasslands of NE India, Bundelkand grasslands of Central India, Western Garhwal region of Himalaya, India. Leymus chinesis grasslands of N China, Southern grasslands of China, Neo-tropical Savannas of Brazil, Cerrado wet grasslands of Brazil, and Peruvian tropical Mountain grass lands.

Data on the effect of elevated temperatures on the biomass production were used as reported by Buhmann et al. (2016).

## RESULTA AND DISCUSSION

- In *Imperata* grasslands of Northeast India, a third of total C captured annually is lost though $CO_2$ emissions.
- In the absence of intensified grazing and burning, these grasslands exhibit significantly high capacity to store SOC stocks.
- Southern grasslands of China inherently have a weak C sink.
- With the introduction of high yielding grass species and with liberal use of chemical fertilizers, grazing land intensification has been found to rather promote SOC sequestration.
- With change of C3 to C4 grass species, the grazer effects rather shift from negative to positive even under decreasing precipitation conditions.
- Grasslands have been shown to be comparatively more resilient to changes in climate than forests.
- Carbon storage in the soils can be as high as 200% in highest diversity treatment, and 70% greater than monoculture treatment.
- Annual storage rates averaged at 88% for 0-60 cm profile, concentration was, however, much higher in the upper 0-30 cm layer.
- Dramatic increase in C storage with increase in biodiversity after 24 years of growth is shown in Fig.1. Soil C sequestration was positively related to above-ground- and root- biomass (Fig.1).

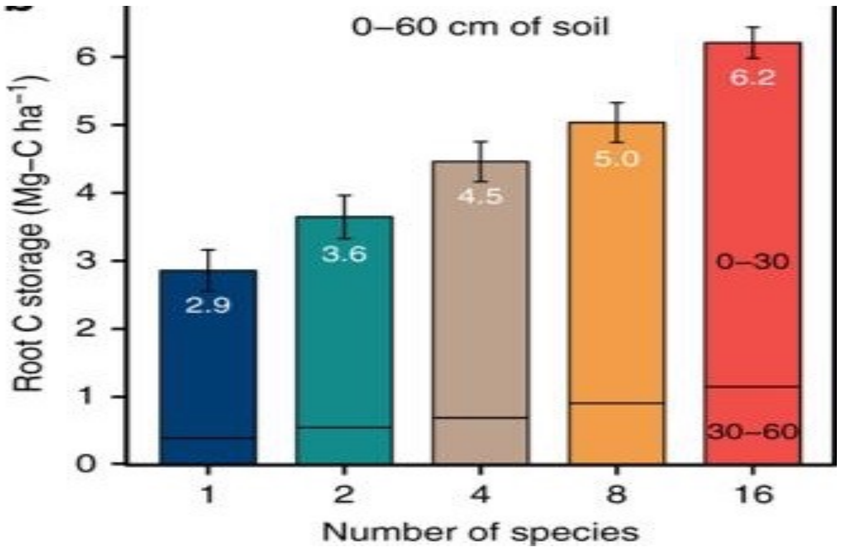


Fig.1. Total root carbon storage in upper 60 cm of soil (Numbers in white indicate mean total root carbon storage and error bars indicate standard errors, after 24 years growth. (Yang et al. 2019).

## CONCLUSION

Poor management and overgrazing in the tropics and subtropics is fast degrading these grasslands. Constant intensive grazing, by decreasing net primary productivity may result in altogether loss of large-leaved grass species giving way to dominance of less palatable narrow-leaved grass species.

Plant diversity or plant community composition plays an important role in C storage in grasslands. However, in tropical and subtropical regions, grasslands are likely to suffer maximum loss in biodiversity with rise in climate temperature.

## REFERENCES

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