

Changes in soil microbial metabolic activity during long-term forest restoration on the central Loess Plateau, China

Yulin Liu¹, Xinzhang Song², Kaibo Wang³, * Zhirui⁴, Yingjie Pan¹, Jiwei Li¹, Xuying Hai⁵, Lingbo Dong⁵, ZP Shangguan¹, and Lei Deng¹

¹Chinese Academy of Sciences and Ministry of Water Resources Institute of Soil and Water Conservation

²Zhejiang A and F University

³Chinese Academy of Sciences Institute of Earth Environment

⁴Lianjiabian Forest Farm Ziwuling Forest Administration Heshui Gansu 745000 China

⁵Northwest Agriculture and Forestry University

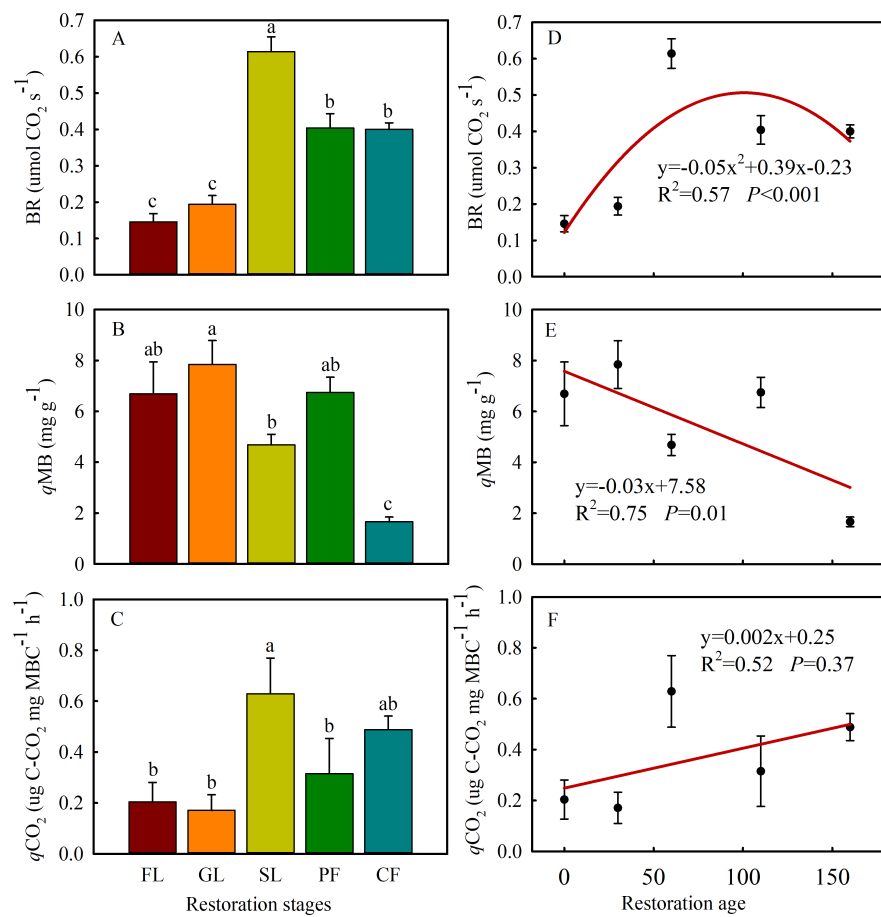
March 11, 2022

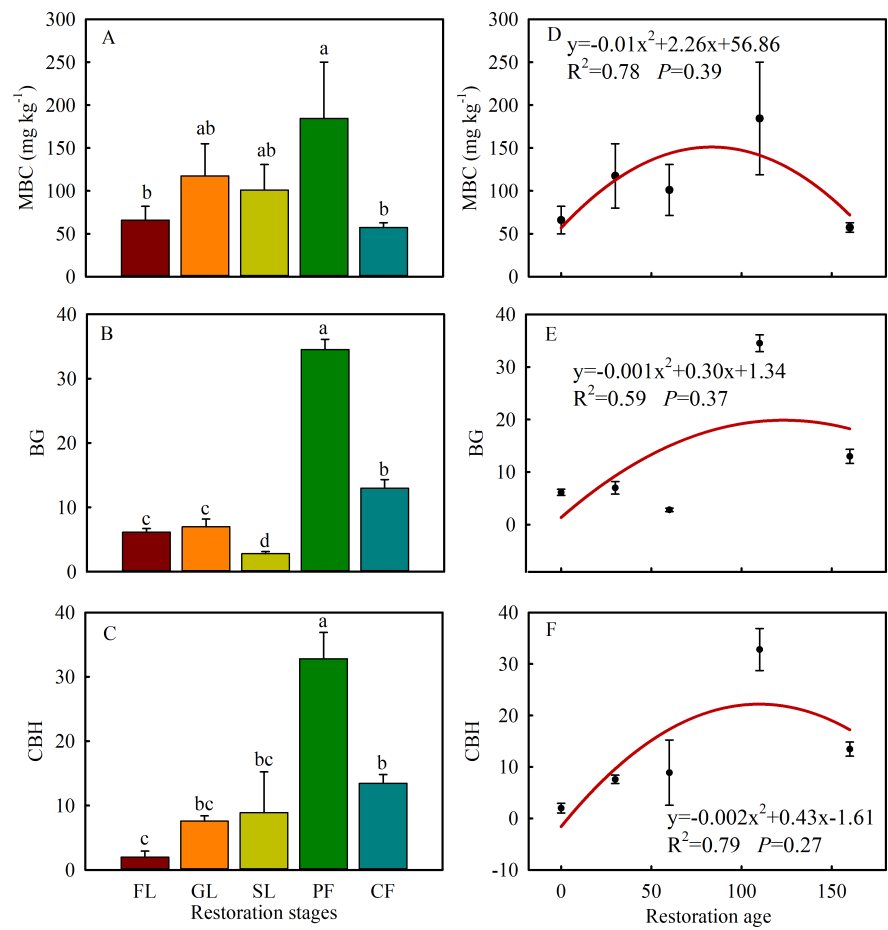
Abstract

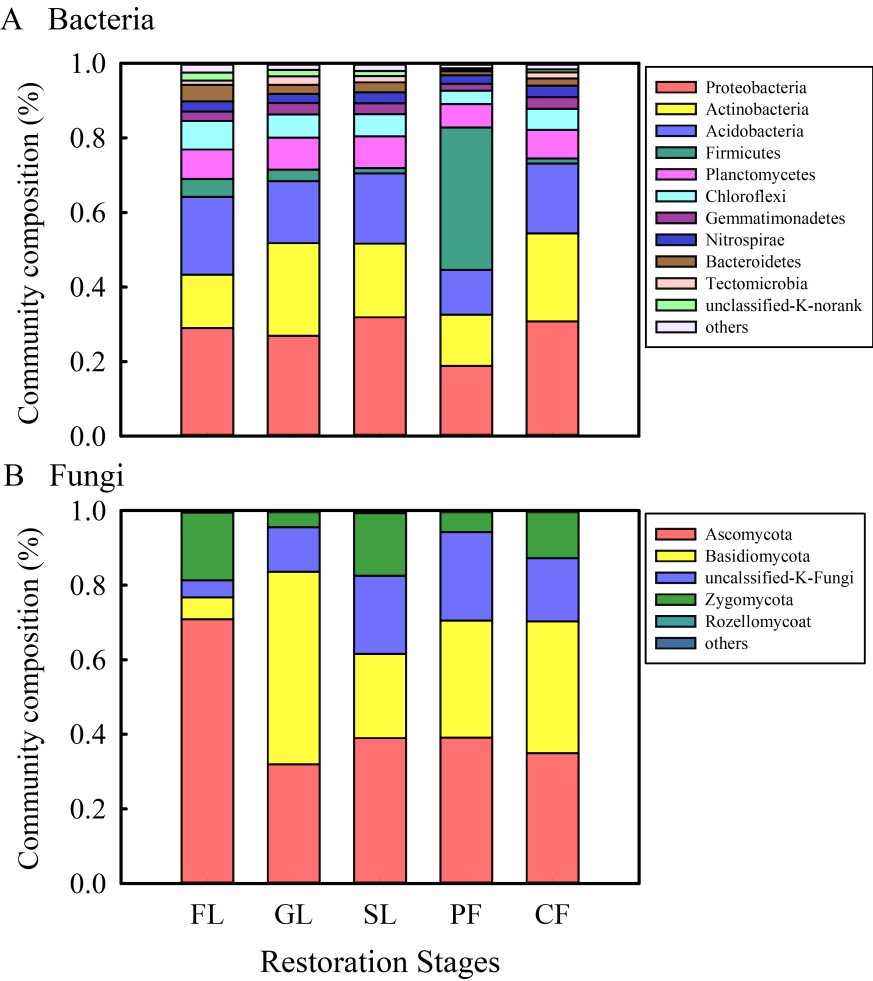
Secondary forest restoration can alter terrestrial ecosystem processes and potentially impact subsurface carbon dynamics. However, the effects of long-term forest restoration on the soil microbial metabolic activity remain unclear. So, the aim of this study was to explore the response of soil microbial metabolism to forest restoration. Among them, the soil basal respiration (BR), microbial quotient (q_{MB}), and metabolic quotient (q_{CO_2}) were studied. This study investigated a natural vegetation restoration sequence approximately ~160 years after farmland abandonment on the central Loess Plateau, China, corresponding to five vegetation restoration stages including farmland, grassland, shrubland, pioneer forests, and climax forests. The results showed that BR and q_{CO_2} were increased following forest restoration, whereas q_{MB} showed the opposite trend. Forest restoration also increased the activities of β -1,4-glucosidase and β -D-cellobiosidase. Restoration age, litter traits such as nitrogen, cellulose and lignin decomposition rates, dissolved organic carbon contents, fungi and bacteria composition were also important indicators affecting microbial metabolic activities. Long-term forest restoration can change soil microbial community structure, reduce carbon mineralization efficiency, improve soil microbial carbon utilization efficiency, and promote soil organic carbon accumulation.

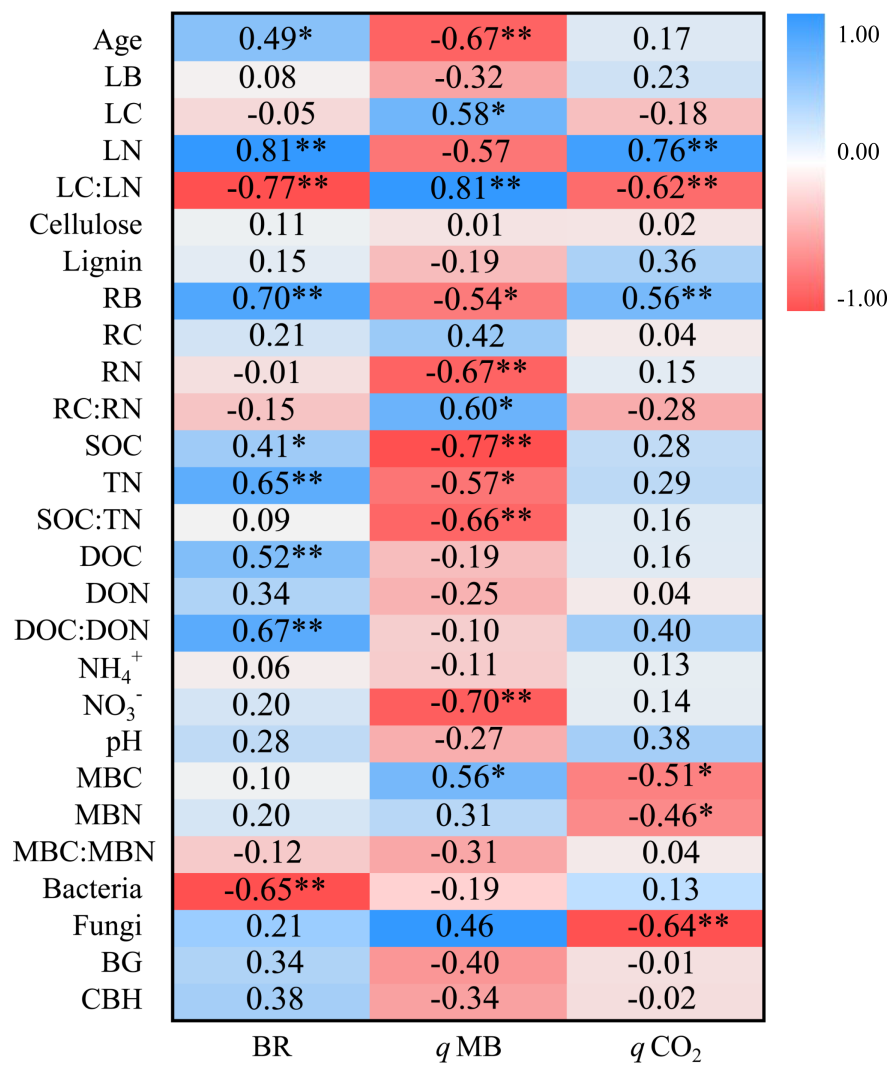
Hosted file

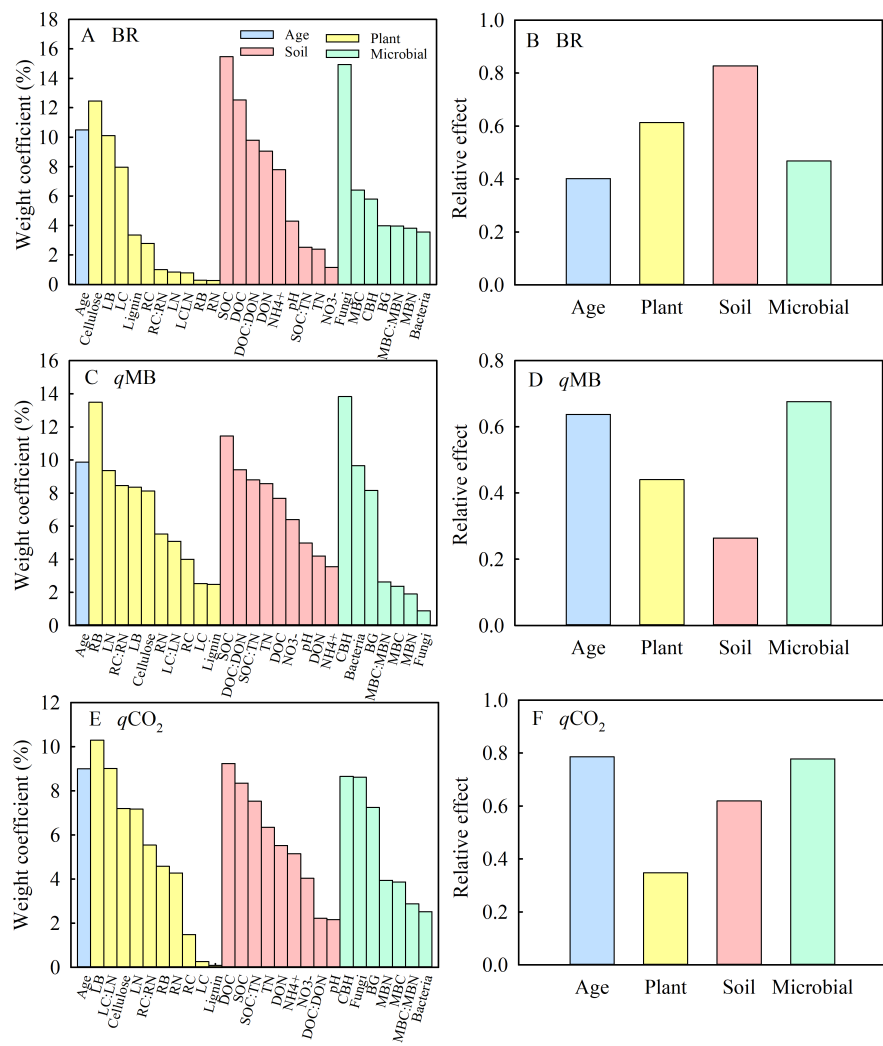
Manuscript.docx available at <https://authorea.com/users/464789/articles/559547-changes-in-soil-microbial-metabolic-activity-during-long-term-forest-restoration-on-the-central-loess-plateau-china>

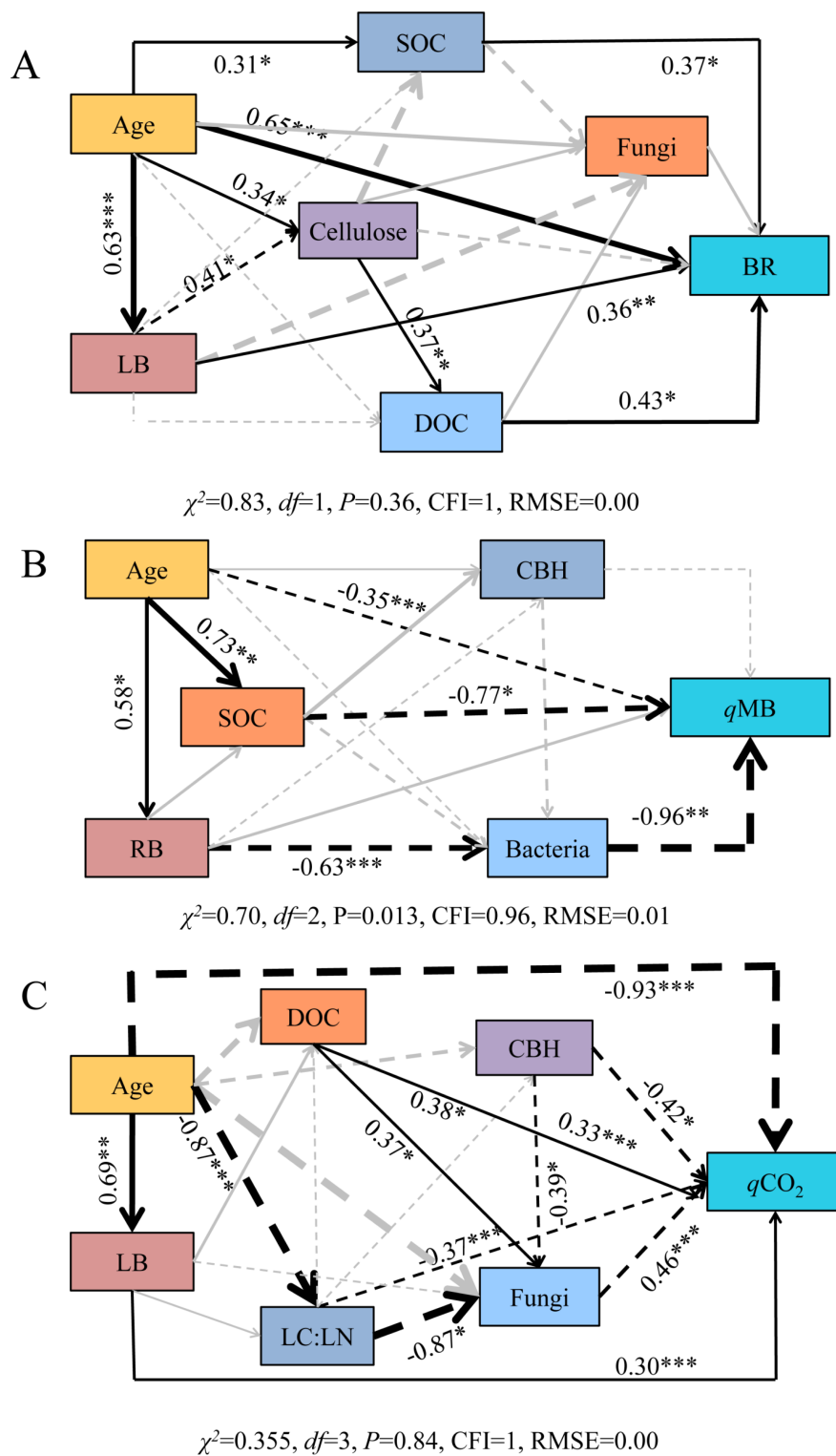


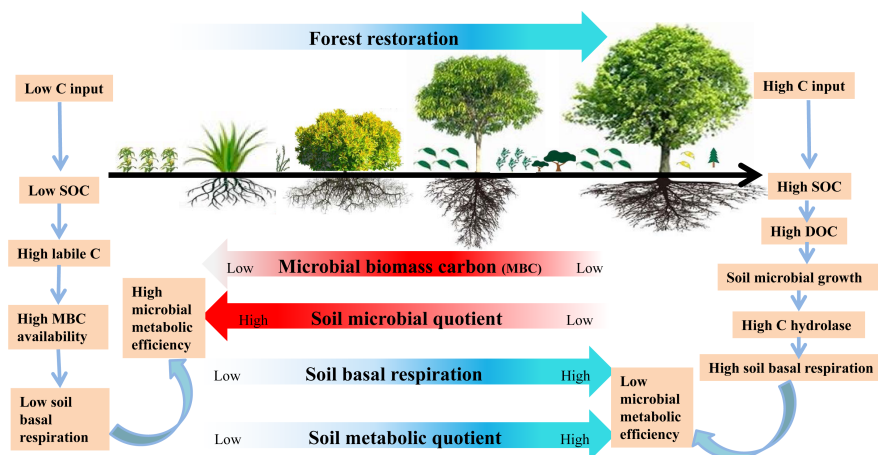












Hosted file

Tables.docx available at <https://authorea.com/users/464789/articles/559547-changes-in-soil-microbial-metabolic-activity-during-long-term-forest-restoration-on-the-central-loess-plateau-china>