Priming effect caused by root litter varies with root order
22 July 2021, by Zhang Nannan

Plant litter can influence soil organic carbon dynamics via the priming effect, which is defined as changes in soil organic carbon decomposition rates due to increases in microbial growth and activities responding to plant carbon input. Current understanding of priming effect induced by plant litter is overwhelmingly from studies with leaf litter addition, little is known about how root litter decomposes and subsequently the priming effect occurs until now.

Researchers from the Institute of Applied Ecology of the Chinese Academy of Sciences investigated the priming effect during decomposition of woody root litter, and underlying mechanisms. They selected mature trees of Chinese fir, fine roots of them were classified based on the order framework.

An incubation study was conducted where roots of each order were added to soils, and root litter chemistry and decomposition, soil organic carbon decomposition, microbial community composition and enzyme activities were measured.

Results showed that differences in decomposition rates of woody fine root litter were mainly associated with root tissue chemistry such as non-structural carbon and tannin. The priming effect shifted from negative to positive at the reduced decomposition stage, and was higher for higher order roots than lower order roots. This could be attributed to higher fungi to bacteria ratios and enzyme activities for high order roots compared to lower order roots.

"This is the first study showing that the priming effect varied with root order," said Prof. Wang Peng, corresponding author of the study, "future efforts should account for root order-specific effects on soil organic carbon decomposition."

Relevant results have been published in Soil Biology and Biochemistry, titled "Priming effect varies with root order: A case of Cunninghamia lanceolata."


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