CABBI
CENTER FOR ADVANCED BIOENERGY AND BIOPRODUCTS INNOVATION

What Regulates Decomposition in Agroecosystems? Insights from Reading the Tea Leaves

Background/Objective

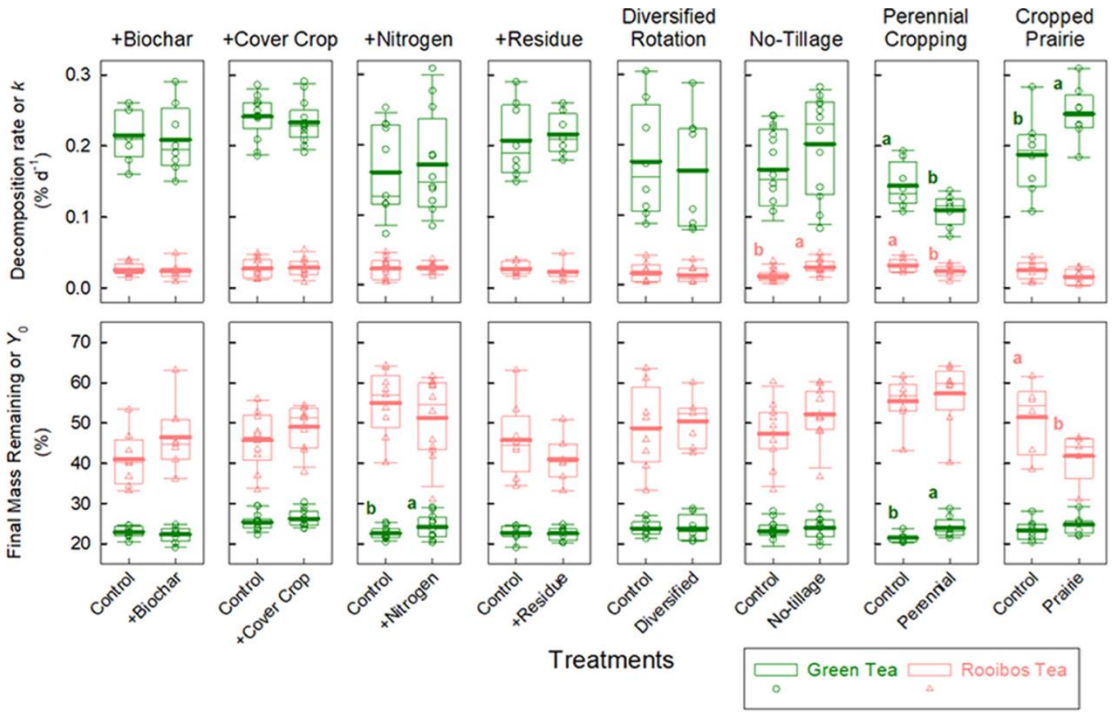
Litter decomposition is an important process contributing to nutrient recycling and soil organic matter formation. However, the impact of local factors regulating decomposition, especially in agroecosystems, remains poorly understood. We used tea bags as a proxy for plant litter in a decomposition study to improve understanding of decomposition regulation across varying agricultural management practices.

Approach

756 green and rooibos tea bags, C:N of 12.8 and 50.1 respectively, were buried in 109 plots from several long-term experiments including Long-term Assessment of Miscanthus Productivity and Sustainability (LAMPS). Decomposition rate and extent were measured, as well as >60 soil properties that would regulate decomposition. We used random forest regression model (RFR) to predict decomposition.

Results

Nitrogen (N) fertilizer increased mass remaining of green tea. Miscanthus decreased green and rooibos tea decomposition rate, but increased extent of green tea decomposition. In the RFR models, soil temperature and soil health score were strongest predictors of green tea decomposition, while soil texture and nutrient availability were the best predictors for rooibos tea decomposition.



Impact of management on green and rooibos tea decomposition rate (k), and final mass remaining (Y_0).

Significance/Impacts

We identified local factors influencing litter decomposition, including soil particle size, microbial biomass nitrogen, crop yield, bioavailable nutrients, and management practices. These findings expand our basic knowledge of what regulates decomposition in agroecosystems; and validate an accessible option for farmers to measure changes in soil biological activity following a management intervention.

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