

1 September 2019

PLoS ONE Editorial Office

Dear Editor-in-Chief Heber,

We are submitting the original manuscript “Root production in a subtropical pasture is mediated by cultivar and defoliation severity” for consideration in PLoS ONE.

Despite the global significance of grazing lands and their soil organic carbon stocks, the direct impacts of grazing on root production are poorly resolved, especially in subtropical pasture systems, which remain understudied. Moreover, we do not understand how genotypic variations within pastures mediate the effects of grazing on root production, and more generally on root/shoot allocation ratios. Altogether, these knowledge gaps hinder our ability to predict root production in subtropical pasture, and thus to optimize management for soil carbon sequestration, given the central importance of root system inputs to soil organic matter formation. In this study, we quantified the effects of season-long defoliation treatments on both shoot and root production across four cultivars of a widely-planted pasture grass species (*Paspalum notatum* Fluegge) in a common garden setting in South Florida, USA. We found that infrequently applied (4 week) severe defoliation (to 5 cm) substantially enhanced shoot production for all cultivars, while severe defoliation reduced root production across cultivars, regardless of frequency. Overall, cultivars varied substantially in root production across the range of defoliation treatments in our study. However, there was no significant relationship between shoot and root production.

In the big picture, our study highlights several important insights. First, severe defoliation/grazing is likely the key to desirable compensatory aboveground growth responses in pasture, yet may lead to tradeoffs in the form of reduced root system production. Second, reliance on aboveground growth or leaf area as a proxy for predicting/estimating root system development is not likely to work. Finally, variations among cultivars in root production suggest latitude for plant breeders to incorporate root system traits as breeding targets in order to enhance the provisioning of ecosystem services associated with higher soil organic matter.

Sincerely,

Chris H. Wilson, Lynn E. Sollenberger, Joao Vendramini, and S. Luke Flory