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THE EFFECTS OF *MACROTERMES* TERMITE SPECIES AND MOUNDS ON THE FUNCTIONAL DIVERSITY OF GRASSES IN A SAVANNA ECOSYSTEM

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Abstract

Macrotermes termite species and mounds are an important source of spatial heterogeneity at small scales in many parts of the world, especially within savanna landscapes, that can significantly influence ecosystem composition and processes. These nutrient rich locales have a profound effect on savanna soil parameters which influence plant functional traits and diversity especially in woody species. However, the effects of these mounds on the functional diversity of grass species in savanna ecosystems has hardly been studied. The current study investigated how *Macrotermes* mounds affect the functional diversity, productivity and assemblage of grasses in a savanna ecosystem in central Zimbabwe. To determine this, grass species data was collected from 20 paired mound-matrix plots of corresponding sizes in the protected area. The mounds were randomly selected and spaced at least 100 meters apart. On each plot soil and grass sampling was carried out. The grass species and soil data from mounds and savanna plots was compared using paired t-tests, with mounds having greater functional diversity and productivity of grasses than savanna plots, although soil nutrient concentrations showed no differences. There was a trend towards higher concentrations of soil nutrients on mounds, although mounds and savanna soils did not differ significantly in pH, nitrogen and phosphorus concentrations compared to savanna plots, with marginally lower concentrations of phosphorus and potassium on mounds than savanna plots. Grass species on mounds had significantly higher values of plant functional traits such as leaf carbon concentration, leaf nitrogen concentration and leaf phosphorus concentration than savanna plots. Likewise, community weighted means (CWMs) of plant functional traits values such as leaf area, specific leaf area, leaf dry matter content, stem specific density, number of nodes and inflorescence heights was greater on mounds than savanna plots. Although grass plant heights showed an increasing trend in savanna plots than on mounds, the difference was not significant. The plant functional traits linked to the CWM were used to calculate three Functional diversity (FD) indices (Functional richness (FRic), Functional evenness (FEve) and Functional divergence (FDiv)) using the FD package. No significant differences were observed between mounds and savanna plots for all three indices, although FD showed a higher trend towards FRic on mounds than on savanna plots. FEve showed a higher trend on savanna plots than on mounds and FDiv showed a negligible difference between mounds and savanna plots. Grass species assemblage compared using a one way analysis of similarity differed significantly between mounds and savanna plots with little overlap of species between mounds and savanna plots. Grass productivity was also higher on mounds than on savanna plots. Therefore, *Macrotermes* termite species and mounds in this savanna are an important part of the landscape which contribute to increased grass species composition and functional diversity, and consequently to savanna heterogeneity.