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Abstract

Worldwide, open grass areas of savannah ecosystems are being transformed into shrubland. This woody plant encroachment is likely a result of factors such as rainfall, fire and secondary dispersal by ungulate herbivory. However, few experiments have been conducted to disentangle and quantify the role of these factors for seed germination in savannahs. We assessed in situ germination success of Vachellia drepanolobium seeds under simulated rainfall variability patterns, fire treatments and dung experiments in Maswa Game Reserve, Tanzania. Fire reduced seed germination by more than 13%, whereas germination in buffalo and elephant dung increased by 1% and 3% respectively. Additionally, intermediate simulated rainfall was more beneficial for seedling emergence success than large, infrequent simulated rainfall amounts, while shoot growth was twice as high under frequent and intermediate simulated rainfall treatments than under large infrequent simulated rainfall. Our results provide insights that bush fires, drought stress, and large rainfall events can suppress V. drepanolobium seedling emergence and growth. Hence, bush encroachment may be linked to management practices such as fire regimes and climatic conditions, i.e., frequent low rainfall conditions. Our results can help predict future patterns of encroachment under varying rainfall and fire events.