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Changes at the Aerial Biomass Accumulation of Rangeland Grassland and Tropical Pastures in Response to Edafic Humidity

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Abstract

Climate is crucially influencing grasslands' productivity. The aim of this work was to understand the relationship between the aerial biomass accumulation (ABA) with seasonal rainfall and edafic humidity of an acuic argiudol soil. We studied this relationship on, i) a tall grass rangeland dominated by *Sorghastrum setosum* (SA), (ii) *Andropogon lateralis* (AL); and on the two most used pastures by farmers, iii) *Setaria sphacellata* var. *Sericea* cv Narok (SN); and iv) *Digitaria eriantha* (DE). Every 28 days under closure conditions the following measurement were made, ABA (DM kg ha $^{-1}$) at ground level in cages of 1 m^2 (four in each rangeland and pasture); monthly precipitation (LM-mm); and gravimetric humidity (HG g g^{-1}) up to 20 cm depth. In both cases; no relationship was observed between HG and ABA when analysed annually (R^2 = 0.0173) or seasonally (summer R^2 = 0.0541, spring R^2 = 0.0011, fall R^2= 0.0137 and winter R^2 = 0.0028). At SN a positive relationship was found at fall (R^2= 0.4605) and spring (R^2 = 0.5209); and at DE in summer (R^2 = 0.3977) and fall (R^2 = 0.5672). The HG explains 52 % and the 56 % in SA and DE respectively at these seasons. At all the tropical pastures and rangeland studied and from 2008 until 2013 the soils were at permanent wilting point only at the summer of 2011/2012 and at the summer 2008/2009 for SN. The rest of the time the soil was always between ready available water or it was saturated. The latter may explain the low relationship among both variables. Therefore HG cannot explain rangeland ABA, and explains only partially the ABA for the tropical pastures during the growing seasons.

Keywords: Available soil moisture, climate change, dry weight

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