

Abstract

This study investigated the role of moisture in the successful rehabilitation of denuded patches in semi-arid lands of Kenya and the primary productivity of three perennial rangelands grasses namely *Cenchrus ciliaris* (African foxtail), *Enteropogon macrostachyus* (Bush rye) and *Eragrostis superba* (Maasai love grass) at three phenological stages (early growth, elongation and reproduction) as pure stands and two-grass mixtures. The grasses were sown on either rainfed (Sites 1 and 2) or simulated rainfall conditions (site 3). Site preparation in all the 3 sites involved mechanical bush clearing, use of fire and creation of micro-catchments using an ox-drawn plough. Soils in site 3 were sandy clay loams and those in sites 1 and 2 were sandy clays. There was total failure in establishment sites 1 and 2 under natural rainfall. Site 3 had good germination and subsequent establishment. These results were attributed to the moisture conditions in the three sites. There was a significant difference ($p < 0.05$) in primary production of the three grasses at the different phenological stages. *Cenchrus ciliaris* was the most productive among the three grasses at the reproduction stage. *Eragrostis superba* and *Enteropogon macrostachyus* were ranked second and third respectively. *Enteropogon macrostachyus* was more prolific at the early growth stages. Results from this study strongly suggest that moisture is the most important ecological factor necessary for successful rehabilitation of denuded patches in semi-arid environments of Kenya and that differences in primary production among the three grass species can be attributed to their growth, morphological and physiological characteristics and competitive advantage.