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“Development on the margin”

## Effects of Bush Clearing, Prescribed Fire, and Grazing on Herbaceous Vegetation in Savannas of Southern Ethiopia

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### Abstract

The dynamics of bush encroachment worldwide has often been implicated for the loss of herbaceous vegetation in savannah ecosystems, and is associated with a decline in forage production. Various management prescriptions have been considered in order to restore herbaceous vegetation and improve forage production. This study was designed to evaluate effects of combinations of different treatment factors including hand clearing, prescribed fire and grazing compared to the control treatments on responses of herbaceous vegetation variables in the savannas of southern Ethiopia. Field experiment was conducted on two ranch sites at different locations and altitude ranges over a period of 2 years between November 2003 and June 2005. The study consisted of five treatments: (1) the control treatment (CC+CF+CG-T1); (2) Hand clearing + prescribed fire + no grazing (C+F+CG-T2); (3) Hand clearing + prescribed fire + grazing (C+F+G-T3); (4) no clearing + no fire + grazing (CC+CF+G-T4); (5) no clearing + fire + grazing (CC+F+G-T5); and (6) Hand clearing + no fire + no grazing (C+CF+CG-T6). The ungrazed treatments were fenced and protected from grazing, while grazed treatment plots were unfenced and open to grazing.

Hand clearing and prescribed fire with no grazing (T2) resulted in significant increases in herbaceous biomass, density, basal cover of perennial grasses, species richness and diversity, particularly during the second phase of the post-treatment effects. Herbaceous vegetation variables were increased during the second phase of post-treatment effects with all treatments (exception being biomass, density and basal cover with T4 and T1). Generally, our results showed a significant increase in terms of herbaceous biomass and basal cover with T2 and T5 during the second phase of post-treatment. A similar level of response was recorded for herbaceous density with T3, while more species richness and diversity were recorded with T4 and T6. This finding suggests that fire treatment with grazing adversely affected herbaceous vegetation, specifically biomass, density and basal cover soon after treatment. Thus, following fire treatment, exclusion of grazers from burned areas is required to provide herbaceous vegetation the opportunity to restore.

**Keywords:** Grazing, hand clearing, herbaceous vegetation, prescribed fire, southern Ethiopia