

Weed Vegetation in a Slash-and-burn Experimental Plot in Eastern Province, Zambia, and the Germination Characteristics of Two Dominant Grass Weed Species

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Abstract

A weed vegetation survey was carried out in April 2009 in the experimental station in the Eastern Province of Zambia where a plateau-type miombo forest had been turned into a series of slash-and-burn fields. The whole plot included subplots that were reclaimed in 2007 and 2008, i.e. the subplots were in the second and first year of cropping, respectively, at the time of the survey (the 2008/09 growing season). The sites where cut forest trees were piled and burnt were marked out in each subplot and analyzed separately. All plots were planted to maize at a uniform density of 1 hill m⁻².

A 1 m × 1 m quadrat was placed on one each maize hill, which was offset by 1 m from the maize hill used for the measurement of maize growth and yield to avoid any experimental interference, yet enabling spatial correlation analyses between maize yield and weed biomass in the future. The plant height and coverage of each species in the quadrat were visually scored and then the whole weed biomass in the quadrat was harvested, separated into herbaceous and woody components, dried in paper bags under sunlight for one week and weighed. The multiplied dominance value (MDV), which is the product of plant height and coverage of each species, was used to describe and analyze the species composition of the weed vegetation.

The weed biomass was significantly higher in the plots in the second year of reclamation than those in the first year. The weed biomass was markedly lower in burnt areas even in the second year. The most dominant weed species was *Diplorhynchus condylocarpon* (a resprouting species) in the first year and *Melinis repens* in the second year. The plots that were cropped in the first year and were returned to fallow in the second year accommodated three times the weed biomass per area of continuously cropped plots. Detrended correspondence analysis identified *Cyperus* sp., *Acalypha* sp. and *Hyparrhenia filipendula* as remnants of the miombo undergrowth, while *M. repens*, *Bidens schimperii* and *Hyparrhenia anamesa* were characterized as agrestals.

The seeds of the two most dominant grass weeds, *H. anamesa* and *M. repens*, were collected and subjected to germination tests after storage under several different conditions. Seeds of *H. anamesa* had a primary dormancy, which was broken by 199 days of dry storage or by seven days of dry heat treatment at 60°C. *M. repens* seeds did not have a primary dormancy but showed a weak light requirement for germination.