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Management Options to Control Weeds in Smallholder Maize Farms in Western Kenya

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Abstract

Field studies were conducted in Kakamega, western Kenya, during short rains of 2008 and long rains of 2009 to investigate weeds in maize smallholdings on a Nitisol, Alfisol and Ultisol soil types. Major taxonomic groups, life history and leaf morphology were described and species field coverage determined. Similarity between species of the three soil types was tested using Jaccard's index. Rapid appraisal surveys were conducted with farmers to assess economically important weeds (species that reduce yields and are difficult to control by farmers). An associate field experiment was set up at Kenya Agricultural Research Institute (KARI) Kakamega with five management options (Farmer practice, clean weeding, zero-tillage, zero-tillage+cover crop and green manure) to assess the efficacy of these options to control weeds in maize. Across the three soil types, 55 weed species (in 51 genera and 21 families) were identified. About 84% of these species were broadleaved, 12% grasses and 4% were sedges. *Cynodon nlemfuensis* had highest field coverage in the Alfisol while *Galinsoga parviflora* and *Bidens pilosa* both occupied much of the fields in the Nitisol and Ultisol. Soil attributes influenced species diversity, which was confirmed by Jaccard's similarity index of 0.50, 0.58 and 0.62 for Nitisol vs Alfisol, Alfisol vs Ultisol and Nitisol vs Ultisol, respectively. The most economically important species were *Cynodon nlemfuensis*, *Commelina benghalensis*, *Oxalis anthelmintica*, *Kyllinga bulbosa* and *Leonotis nepetifolia* largely because of their abundance, aggressiveness and persistence in the fields beyond seasonality. A negative and highly significant relationship ($p < 0.0002$, $r^2=0.54$, $y=13.65-0.006x$) was observed between weed and maize biomass production. Zero-tillage+cover crop was more effective in reducing weed biomass by 920 to 1200 kg ha⁻¹ and thus could be an alternative management option for weed control in maize smallholdings in western Kenya.

Keywords: Alfisol, economically important weeds, Jaccard's index, Nitisol, rapid appraisal survey, Ultisol, weeds