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Full Length Research Paper

Tillage system and genotype effects on rainfed maize (*Zea mays L.*) productivity in semi-arid Zimbabwe

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Abstract

Maize is the staple crop that is grown under rainfed conditions by smallholder farmers in most of Sub-Saharan Africa. A study was conducted during the 2002/3 and 2003/4 cropping seasons at a semi-arid site in South-east Zimbabwe to determine the response of five maize genotypes to four tillage systems (hand holing out, no till, inter-row furrow, tied ridge) under rainfed conditions. The trial was set up in a randomised split-plot design with tillage system as the main plot factor and maize genotype as the sub-plot factor. Grain yield, grain moisture content at harvest, total above ground biomass yield, days to flowering and maturity were highly affected ($p < 0.001$) by genotype. Tillage systems significantly affected ($p < 0.05$) number of days to physiological maturity, total above ground biomass yield

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and final stand count but not at harvest. The tillage furrow system significantly ($p < 0.001$) delayed emergence in the 2003/4 season compared to other tillage systems. Tillage and genotype interactions had a significant ($p < 0.05$) effect on yield, final stand count and number of cobs per plot. Hybrids had better ($p \leq 0.001$) biomass partitioning into grain and higher ($p \leq 0.001$) rainfall use efficiency than open-pollinated genotypes. The results of this study showed that maize genotypes grown on tillage systems that concentrate moisture (ridge/furrow systems) perform better than those on flat systems depending on the quality of the rainfall season. By selecting adapted genotypes grain yields can be increased without much additional investment in tillage systems.

Key words: Tillage, hybrid, open-pollinated, yield, rainfall use efficiency, cropping season.

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