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Measuring and simulating maize (*Zea mays* L.) yield responses to reduced tillage and mulching under semi-arid conditions

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ABSTRACT

Rainfed smallholder agriculture in semi-arid environments of sub-Saharan Africa faces many challenges. Productivity of the smallholder agricultural systems has been on the decline in recent years. Conservation agriculture practices have a potential of steering the smallholder agricultural systems of sub-Saharan Africa to greater and more sustainable levels. This study was designed to calibrate the APSIM model so that it could be used as a tool for understanding the long term impact of conservation agriculture techniques (mulching, tine ripping and planting basins) on the productivity of smallholder systems under semi-arid conditions. The APSIM model predicted reasonably well the seasonal and mulching effects on maize production on sand and clay soils. Under these semi-arid conditions the use of 10 kg.N.ha⁻¹ is preferable under both conventional and basin tillage systems. Planting basins offer a better chance of getting maize grain yield than the conventional system in southern Zimbabwe at N quantities ranging from 0 kg.ha⁻¹ to 52 kg.ha⁻¹. This modelling exercise suggested that smallholder farmers are still prone to complete crop failure in some years despite the use of available conservation agriculture systems.

KEYWORDS

Nitrogen-Modelling-Planting Basins-Semi Arid-Variable Rainfall-Zimbabwe

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