11th SAGA Biennial Technical Meeting and Exhibition
Swaziland, 16 - 18 September 2009, page 611

The Proposed Use of Seasonal Forecasts to Improve Maize Production in the Free State

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ABSTRACT

Climate variability is one of the major causes of instability in crop production, especially in semi-arid regions where high variability of rainfall results in uncertainty of water availability for rainfed farming. Improvement of rainfall predictions at a 1-3months lead-time can give a benefit in South Africa due to the high contribution from the agricultural economy. If rainfall predictions are available in time, strategic management decisions can be adjusted to reduce impacts and take advantage of favourable conditions. However, this has not been applied to maize in the Free State. The aim is to use the long-term climate data in a locally tested crop simulation model (Agricultural Production Systems Simulator Model (APSIM)) to generate a range of maize yields. The study area is quaternary catchments along Modder-Riet rivers using different arable soils. APSIM will predict maize yield under various management strategies (fertilizer applications, plant density, planting dates, cultivar types, etc) to identify optimal yields. These outputs will be assessed with two 3-month rainfall forecast periods for the maize growing season (6 possible combinations). The comparative advantage of maize production using seasonal rainfall forecasts will be evaluated against standard practices. This information could be incorporated into a decision support system based on the financial benefit of maize production using the seasonal rainfall forecast each year as an input. The success of the crop yield forecasting application strongly depends on the crop simulation model's ability to quantify the influence of weather, soil and management conditions on crop yield. Wise utilization of the seasonal rainfall-crop model information by farmers, agribusiness and policy makers could contribute substantially towards achieving sustainability in crop production.

Key words: Climate variability; crop production; rainfed farming; maize yields; crop model.