Characterisation of rainfall at a semi-arid ecotope in the Limpopo Province (South Africa) and its implications for sustainable crop production

Jestinos Mzezewa[1]*, Titus Misi[2] and Leon D van Rensburg[3]

[1] Department of Soil Science, University of Venda, P/Bag X5050,Thohoyandou 0950 South Africa

[2] Department of Statistics, University of Venda, P/Bag X5050, Thohoyandou 0950, South Africa

[3] Department of Crop, Soil and Climate Sciences, University of the Free State, PO Box 339, Bloemfontein 9300, South Africa

Abstract

Detailed knowledge of rainfall regime is an important prerequisite for agricultural planning. Despite the importance of rain-fed agriculture to food security in the semi-arid regions of South Africa, studies to understand the spatial and temporal variability of rainfall are not widely documented. Twenty-three years (1983 to 2005) of rainfall data were analysed in order to study the basic statistical rainfall characteristics at the University of Venda ecotope. Annual and monthly rainfall was fitted to theoretical probability distributions. The Anderson-Darling goodness-of-fit test was used to evaluate best fit models. Probability of receiving annual and monthly rainfall was predicted using the appropriate probability distribution functions. The chance of experiencing dry spells of different durations was determined. Cumulative frequency analysis of daily rainfall amounts and depths was characterized. It was found that the distribution of daily rainfall was highly skewed with high frequency of occurrence of low-rainfall events. The distribution of daily rainfall depths was also highly skewed, a comparatively small proportion of rainy days supplying a high proportion of the rainfall.

Keywords: dry spells, ecotope, Limpopo, semi-arid, temporal rainfall analysis