

Climate Change and Potato Production in Contrasting South African Agro-ecosystems

1. Effects on Land and Water Use Efficiencies
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Abstract

Explorations of the impact of climate change on potential potato yields were obtained by downscaling the projections of six different coupled climate models to high spatial resolution over southern Africa. The simulations of daily maximum and minimum temperatures, precipitation, wind speed, and solar radiation were used as input to run the crop growth model LINTUL-Potato. Pixels representative for potato growing areas were selected for four globally occurring agro-ecosystems: rainy and dry winter and summer crops. The simulated inter-annual variability is much greater for rainfall than for temperature. Reference evapotranspiration and radiation are projected to hardly decline over the 90-year period, whilst temperatures are projected to rise significantly by about 1.9 °C. From literature, it was found that radiation use efficiency of potato increased with elevated CO₂ concentrations by almost 0.002 gMJ⁻¹ppm⁻¹. This ratio was used to calculate the CO₂ effect on yields between 1960 and 2050, when CO₂ concentration increases from 315 to 550 ppm.