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"Solidarity in a competing world — fair use of resources"

# Crops and Cropping Strategies to Maintain Food Security under Changing Weather Conditions in Papua New Guinea

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**Abstract**

Papua New Guinea's climate varies considerably from year to year due to the effect of the El Niño-Southern Oscillation (ENSO). This cyclic variation leads to two extreme climatic conditions; the El Niño and La Niña. El Niño can lead to severe drought conditions and La Niña is associated with excessive rainfall causing flooding, water logging and erosion of food gardens. El Niño conditions occur approximately every 10 to 15 years resulting in reduction of almost 75 % of mean annual precipitation. Thus, important tuber crops such as sweet potato, yam and taro which provides almost 80 % of food energy for PNG's population, produce low yields and/or even fail to yield, leaving affected communities food insecure. Currently, there is lack of information on soil available water capacity for PNG soil types and crop water requirement (ETc) under different climatic extremes, which would form the basis for recommendations on suitable crop management practices. This study addressed the lack of availability of weather data in PNG and investigated potential impacts of ENSO events and future climate change on crop production through generation of past, current and future climatic scenarios, determination of soil moisture retention characteristic curves, and calculation of ETc for the main staple crops across different agro-ecological zones in PNG based on generated climatic scenarios. The tools and methods used for meteorological data generation and climate scenario development were evaluated for their applicability in the PNG context. The used tools for simulation of climatic and weather data clearly show that not all give accurate results. Results highly depend on the quality of downscaled climatic data based on selected emission scenarios of CSIRO-Mk3.6.0 GCM model, high topographic variations between interpolated data points and the type of tools used. Results showed that ETc for all food crops may increase in the future due to rising temperature; however this effect might be compensated through increased annual rainfall and cloud cover. Dry spells, droughts and changing weather patterns will make it necessary for farmers to adjust their cropping calendars and apply improved farming technologies to adapt to the changing conditions according to local soil water storage capacities and agro-ecological zones.

**Keywords:** Climate change, crop water requirement, soil water storage capacity

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