

Evaluation of Corn Production Based on Different Climate Scenarios

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Abstract

Agriculture is the lifeblood of the economy in Ghana, employs about 42% of the population work force and accounts for 30% of the Gross Domestic Product (GDP). Corn (maize) is the major cereal crop grown as staple food under rain fed conditions, covers over 92% of the total agricultural area, and contributes 54% of the caloric intake. Issues of hunger and food insecurity for the entire nation are associated with corn scarcity and low production. The climate changes are expected to affect corn production in Ghana. This study evaluated variations of corn yields based on different climate conditions of rain-fed area in the Dangbe East District of Ghana. AquaCrop model has been used to simulate corn growing cycles in study area for this purpose. The main goal for this study was to predict yield of corn using selected climatic parameters from 1992 to 2013 using different climate scenarios. The Model was calibrated and validated using observed field data, and the simulated grain yields matched well with observed values for the season under production giving an R squared (R^2) of 0.93 and Nash-Sutcliffe Error (NSE) of 0.21. Study results showed that rainfall reduction in the range of -5% to -20% would reduce the yield from 1.315ton/ha to 0.421ton/ha (-21.3%) whereas increasing temperature from 1% to 7% would result in the maximum yield reduction of -20.6% (1.315 to 1.09 ton/ha.). On the other hand, increasing rainfall from 5-20% resulted in yield increment of 68% (1.315-2.209 ton/ha) and decreasing temperature produce 7% increase in yield (1.315 to 1.401ton/ha). These results provide useful information to adopt strategies by the Government of Ghana and farmers for improving national food security under climate change.

Keywords: Corn production, AquaCrop, Climate scenarios, Ghana

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