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Changes in Rainfall and Temperature and Its Impact on Crop Production in Moyamba District, Southern Sierra Leone

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Abstract : Rainfall and temperature are the important variables which are often used to trace climate variability and change. A perception study and analysis of climatic data were conducted to assess the changes in rainfall and temperature and their impact on crop production in Moyamba district, Sierra Leone. For the perception study, 400 farmers were randomly selected from farmer-based organizations (FBOs) in 4 chiefdoms, and 30 agricultural extension workers (AWEs) in the Moyamba district were purposely selected as respondents. Descriptive statistics and Kendall's test of concordance was used to analyze the data collected from the farmers and AEWs. Data for the analysis of variability and trends of rainfall and temperature from 1991 to 2020 were obtained from the Sierra Leone Meteorological Agency and Njala University and grouped into monthly, seasonal and annual time series. Regression analysis was used to determine the statistical values and trend lines for the seasonal and annual time series data. The Mann-Kendall test and Sen's Slope Estimator were used to analyze the trends' significance and magnitude, respectively. The results of both studies show evidence of climate change in the Moyamba district. A substantial number of farmers and AEWs perceived a decrease in the annual rainfall amount, length of the rainy season, a late start and end of the rainy season, an increase in the temperature during the day and night, and a shortened harmattan period over the last 30 years. Analysis of the meteorological data shows evidence of variability in the seasonal and annual distribution of rainfall and temperature, a decreasing and non-significant trend in the rainy season and annual rainfall, and an increasing and significant trend in seasonal and annual temperature from 1991 to 2020. However, the observed changes in rainfall and temperature by the farmers and AEWs partially agree with the results of the analyzed meteorological data. The majority of the farmers perceived that; adverse weather conditions have negatively affected crop production in the district. Droughts, high temperatures, and irregular rainfall are the three major adverse weather events that farmers perceived to have contributed to a substantial loss in the yields of the major crops cultivated in the district. In response to the negative effects of adverse weather events, a substantial number of farmers take no action due to their lack of knowledge and technical or financial capacity to implement climate-sensitive agricultural (CSA) practices. Even though few farmers are practising some CSA practices in their farms, there is an urgent need to build the capacity of farmers and AEWs to adapt to and mitigate the negative impacts of climate change. The most priority support needed by farmers is the provision of climate-resilient crop varieties, whilst the AEWs need training on CSA practices.

Keywords : climate change, crop productivity, farmer's perception, rainfall, temperature, Sierra Leone
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