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An autonomous Institution of Science and Technology Department
Govt. of Kerala

ICCS Webinar 3

One Month – One Theme Initiative
13th July 2022

Impact of Climate Change on Agriculture in Kerala

Speaker

Dr. U. Surendran
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Wednesday, 13th July 2022

3.00 p.m. – 4.30 p.m.

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Abstract of the Lecture

The agricultural scenario of the Kerala state is unique, characterized by diversity of crops and multiplicity of cropping situations. However, the low crop productivity associated with high production costs is a great concern in Kerala's agriculture. Additional stresses come from climate disruption, variability and change, resulting in impacts on water availability and temperature regimes over time and space. Best Management Practices (BMPs) available would be discussed in this lecture. To assess climate change related impacts on crop suitability and agro-ecologically attainable yield, the study applied the Agro Ecological Zonation (AEZ) methodology, which is jointly developed by Food and Agriculture Organization (FAO) and the International Institute for Applied Systems Analysis (IIASA). Range of scenarios for crop productivity for years 2041–2070 (2050s) and 2071–2100 (2080s) using the climatic condition based on four RCPs(2.6, 4.5, 6.0, and 8.5) adopted by the Intergovernmental Panel on Climate Change (IPCC) were generated using AEZ simulation modeling. Major crops grown in Kerala are coconut, arecanut, rubber, black pepper, coffee, tea, cardamom, paddy, tapioca, cashew and vegetables. The AEZ analysis for these crops showed that for ensemble mean of RCM outputs, under rain-fed conditions, yields of banana, arecanut, rubber, coffee, and black pepper show declines between 2.89 and 86.18 %. However, coconut and rice, under rain-fed conditions, show very minor increases of 3.17 and 0.99 % respectively. Under irrigated conditions, yields of coconut, arecanut, coffee, and black pepper show a decline between 3.83 and 86.18 %. However, if we look at all the models and different RCPs, results show that with few exceptions in most of the cases yields tend to decline with climate change.

In addition, the assessments for soil nutrient flow were carried out to evaluate the soil fertility status and nutrient budgeting of major crops/cropping systems at different spatial scales (plot, farm, and district level) using NUTMON-Toolbox. Results exhibited a trend of depletion of N and K from soil reserve, whereas, P was positive, indicating the need for carefully redefining N and K management strategies. These results suggest that there is an urgent need to return to water and nutrient efficient crops and assure best possible use of scarce water and precious soil nutrients resources. Drip fertigation was chosen as one of the BMPs and it was demonstrated across Kerala. Results from the project showed that the application of nutrients through drip fertigation improved the crop yield of all the demonstration plots and the increase in yield over control ranged from 13 to 317%. Drip fertigation resulted in improvement of water and nutrient use efficiency and maintenance of soil health. Benefit-Cost ratio (BC) of drip fertigation worked out under the project ranges from 2.05 to 3.50 for selected crops. Besides, strategies needs to be adopted for improving the water and nutrient use efficiency were also discussed. Investments in climate smart agriculture, micro-irrigation practices especially drip fertigation, improved water conservation practices, development and management of natural resources through watershed and afforestation activities, conservation of crop biodiversity, etc. needs to be given focus to improve the production from farms.