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REVIEW ARTICLE

Climate change and agriculture-mitigation and adaptations through agronomic practices

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SUMMARY : The Intergovernmental Panel on Climate Change (IPCC) has projected that the global mean surface temperature will rise by 2.0-4.5^{0}C by 2100 due to increase in carbon dioxide concentration in the atmosphere. Climatic variability is also projected to increase, leading to uncertain onset of rainfall and more frequent extreme weather events. Global warming is projected to have significant impacts on conditions affecting agriculture, including temperature, precipitation and glacial run-off. These conditions determine the carrying capacity of the biosphere to produce enough food for the human population and domesticated animals. Climate change is likely to have a significant impact on agriculture. In general, the faster is the climate changes, the greater will be the risk of damage. According to the IPCC, potential global food production is projected to increase with local average temperatures rising over a range of 1–3^{0}C, but projected to decrease over this level. Agronomic studies suggested that extensive warming could cause significant reduction in crop yields. Food security is unlikely to be threatened at the global level, but some regions are likely to experience food shortages and hunger. Water resources will be affected as precipitation and evaporation patterns change around the world. In the changing climatic scenarios, there is a need to reinvent the research strategies *i.e.* adaptations of resource conservation technologies, judicious use of available water resources, enhance value-added weather management services and also to moderate the stresses due to biotic and abiotic factors to mitigate the deleterious effects of climate change.

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In the recent past, human activities all over the world have exploited the natural resources to meet their needs including a disturbed ecosystem with dangerous signals of continuous global warming and climate change. In the recent past, it has become a burning issue in every part of the globe to access the climate change behaviour using past records and to predict the future expected global changes. The Inter-Governmental Panel on Climate Change (IPCC, 2007) projected an increase in global average temperature between 0.1 and 0.3^{0}C per decade. This can be compared with observed values of about 0.2^{0}C per decade, strengthening in near term projections (Iglesias, 2005). For the Indian regions, the IPCC projected 0.5 to 1.2^{0}C rise in temperature by 2020, 0.88 to 3.16^{0}C by 2050 and 1.56 to 5.44^{0}C by 2080, depending on the future development scenario. Continued green house gas emissions at or above the current rate would cause further warming by 21st century. The global atmospheric concentration of CO_2 has increased from a pre-industrial value of about 280 ppm to 387 ppm in 2010. Such impacts are more likely on fragile ecosystems like arid regions, where hot environment, low and erratic rainfall conditions prevail and the crops are sensitive to soil water (Rao and Saxton, 1995). The PRECIS 9 providing regional climate for impact studies model for India arid region predicted for an increase in annual rainfall by 10-15 per cent in the eastern fringe and 20-40 per cent in the south, but the North West will experience up to 30 per cent reduction in the rainfall. The PRECIS model for India also showed