



## Climate change and agriculture

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The climate change is directly or indirectly attributed to human activity that alters the composition of the global atmosphere which further leads to altering the abiotic conditions that influence biological systems, such as agriculture (Varadan *et al.*, 2015). Biological responses to climate change depend on a number of factors, including the rate, magnitude, character of the change, ecological sensitivity and adaptive capacity to environmental changes. The combinations of these factors are affecting all levels of agricultural diversity and productivity (Walther, 2010).

**Significance of climate change :** The IPCC has concluded that the global atmosphere is warming, noting that the average global surface temperature has increased approximately by 1°C over the past century and is likely to rise by another 1.4 to 5.8°C over the next century (IPCC, 5<sup>th</sup> AR) and for that the major culprits are GHGs, notably CO<sub>2</sub> (63%), CH<sub>4</sub> (24%), N<sub>2</sub>O (10%) and so on. Atmospheric CO<sub>2</sub> concentration has crossed 400 ppm, methane concentration increased from 800 to 1800 ppb and nitrous oxide concentration also raised from 270 to 320 ppb (IPCC 5<sup>th</sup> AR). Out of total methane emission from rice field, approximately 80-90 per cent emitted from *Aerenchyma*, from ebullition process 5-10 per cent and rest (5-10%) emitted in the process of diffusion (Bahl, 2015). These are accumulating to unprecedented levels in the atmosphere as a result of the profligate burning of fossil fuels, industrial processes, intensive farming activities and changing land use for a long time.

**Indian scenario :** As India's climate already very dynamic in nature, small changes in climate can affect many of the crops grown throughout the India. Rising in sea level affects agricultural crops in two major ways:

saltwater intrusion and loss of coastal land due to inundation (Ramteke *et al.*, 2015). However, climate change is most likely to affect agricultural crops and production through changes in rainfall pattern-intensity, heat-cold waves, snow fall etc. India's food-grain production recorded a decline of 3 per cent in 2014-15 as compare to the highest ever food-grain production of 265.5 MT in 2013-14 (TIN, 2016). This decline has occurred due to erratic rainfall conditions during monsoon season in 2014.

**Mitigation strategies :** Climate change is projected to reduce renewable surface water and groundwater resources significantly in most dry subtropical regions. This will intensify competition for water. In contrast, water resources are projected to increase at high latitudes due to ice-sheet melting through global warming (CPCB (2010). Where poor soil is not a limiting factor, physiological and structural crop responses to elevated atmospheric CO<sub>2</sub> concentration (CO<sub>2</sub> fertilization) might partly cancel out the adverse effects of climate change (Varadan and Pramod, 2015). Adaptation strategies can help and minimize negative impacts, however costs of



adaptation and mitigation are unknown but likely to be high, hence here we need proper research and policy support (Jilani *et al.*, 2015).

This article mainly focused on climate change and its impact on agriculture along with mitigation and adaptation strategies to minimize the adverse impacts of climate change on agriculture.

### References :

Bahl, P.N. (2015). Climate change and pulses: Approaches to

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