

Preface

Despite lingering uncertainties over the years, the climate change is globally viewed as an alarming threat to our sustainable development. That is why the print and electronic media are flooded with news of evils of climate change in different parts of the world. Dispelling the earlier doubts, the fourth assessment report of IPCC (2007) established a clear link between global warming and growing human activities. Although global warming is not a new phenomenon, it has been in place, since the life began on the planet Earth. Presence of greenhouse gases, like CO₂, CH₄, N₂O and water vapor etc., provided essential warmth for years for our survival on the Earth by maintaining a salubrious temperature of +15°C. This could be possible because these gases trap outgoing terrestrial radiations into the space and hence warm the Earth's surface.

Since the dawn of the industrial evolution of the mid-18th century, human activities have contributed significantly to rising concentrations of greenhouse gases in the atmosphere. Over the period of 1750–2000, CO₂ atmospheric concentration has increased by 31%, CH₄ by 151% and N₂O by 17%. Besides, other man-made greenhouse gases like HFCs, PFC and SF₆ were also pushed into the atmosphere to further enhance the global warming process. Continued abundance of GHGs in the Earth's atmosphere due to accelerated anthropogenic activities perturbed the thermostatic balance of Earth and pushed the surface temperature by 0.6°C in the 20th century and is predicted to further increase the temperature in the range of 2.4–6.4°C by the end of 21st century in the high scenario as per report of IPCC (2007). This may have adverse impact on the agricultural productivity globally. Agriculture is highly sensitive to climate variability and weather extremes, such as droughts, floods and severe storms. Rising tropospheric O₃ level, enhanced UV-B level due to depletion of stratospheric ozone layer, inundation of coastal areas due to thermal expansion of sea water and glacier melting are several concomitant factors which would also affect farm productivity at large. However, rising CO₂ in the atmosphere is reported to benefit crop production through enhanced photosynthesis rate in C₃ crops, provided water and nutrient supplies are not limiting.

Climate risk in the Asia/Pacific region may be ameliorated through two complementary strategies: adaptation and GHG mitigation. Adaptation options may include introduction of late maturing crop varieties or species, switching cropping sequences, sowing earlier, adjusting time of operations etc. A victim of climate

change, agriculture can be also a potential source for one-fifth of anthropogenic emission of non-CO₂ greenhouse gases like CH₄ and N₂O and contributes 20% to Earth's enhanced radiative forcing. The emission of these gases can be attenuated by adopting new farming technologies. Mitigation of specially N₂O fluxes may also enhance N-use efficiency of the crop plants, leading to higher yields on one hand and on the other; it may check ground water contamination with nitrate. If such efforts are made on a global scale, they will at least postpone the danger of climate change for the time being.

The present edition was envisaged to compile the latest findings of researches carried out by the experts on the different aspects of climate change in relation to agriculture, both as source and victim. In this endeavor, I got overwhelming response of the scientists around the world and they contributed their articles enthusiastically for this volume. Hence, I feel pleasure in extending heart-felt thanks to all the authors. I would express my special gratitude to Dr. M.A.K. Khalil who not only contributed but also helped in reviewing of some chapters.

In addition, I would like to appreciate the multi-pronged services rendered by my own research scholars and staff, mainly Ms Sadhna Tiwari, Mrs. Babita Kumari, Mrs Ragini Singh, Dr. Larisha Tyagi and Sushil Kumar. Without their relentless efforts, this task could have not been completed as envisaged. Besides, Mr Dilip Chakraborty deserves special appreciation for his efforts and computer skills to put manuscript in the book format.

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