Bracing to Feed a Populous Warm World: Towards Nudging Plants to Produce more

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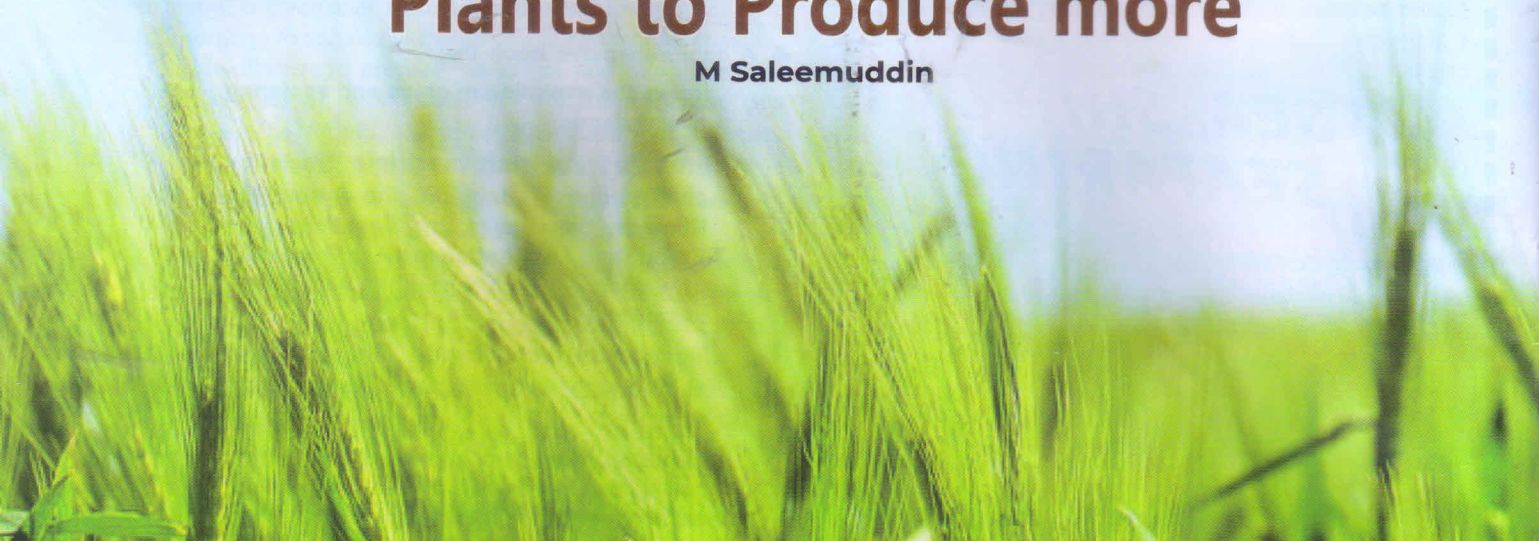

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THE global human population, which currently stands at around 8 billion, is projected to reach 9.7 billion by the year 2050. This implies that the land that provides enough food to feed 27 people in 2010, will need to support 43 people in 2050. With little possibility of increasing the arable land on the one hand and unrelenting global warming on the other, breakthroughs in agriculture are needed to prevent impending mass starvation.

Atmospheric CO_2, derived from the burning of fossil fuels, is the principal contributor to global warming because it acts as a greenhouse gas. About one-third of the world's greenhouse gas emissions currently come from human food systems. Atmospheric CO_2 levels have been rising alarmingly in recent years. Global warming causes draughts and negatively affects the growth and productivity of crops while promoting the proliferation of plant pests/diseases. Most countries of the world are signatories to the Paris Climate Agreement held in 2015 to keep the rise in global temperature to less than 1.5°C above preindustrial level till the year 2050 by cutting down fossil fuel burning. We, unfortunately, are already on the cusp of the crucial 1.5°C threshold and according to the UN's World Meteorological Organization, the year 2024 is on track to be the world's warmest year on record.

Traditional agricultural practices have sustained human populations for over 12,000 years, but they are the driving causes of climate change, deforestation, and soil erosion. The green revolution of the twentieth century provided remarkable food security to developing countries by introducing improved cultivars with high yield potential and agro-technological recommendations entailing generous use of minerals, fertilizers, and pesticides, together with the development of irrigation systems, among other practices. We are now grappling with long-term negative effects of the progress, including environmental chemicalisation, water pollution, loss of soil diversity and soil degradation.