

Extreme weather phenomena are here to stay. The world can no longer ignore the massive current crisis of carbon overload in the atmosphere. While clean energy technology is the mankind's quest so that the emission of carboneous gases can be minimized, major breakthrough is not in the sight. There was a furore over successful nuclear fusion experiment conducted by the Lawrence Livermore National Laboratory (LLNL) wherein the energy produced was greater than input energy, and net energy gain. But, the energy required for driving such fusion process is too large and this entails obtaining energy from other carbon sources.

Apart from technological innovation, societies have to become more aware about the way to decarbonize consumption. Academic community has this solemn task to suggest doable action plan to decarbonize our living habits. Michelle Li, founder of the organization Clever Carbon, is votary of such kind of approach. She has been using big platforms like the UN to promote carbon footprint literacy to accelerate the reduction of greenhouse gas emissions, reach net-zero targets faster, and create scalable technologies and solutions.

Li further exhorts to introduce Carbon literacy. Current concentration of carbon dioxide in our atmosphere is currently 420ppm. If we surpass 450ppm we will surpass the 1.5 C goal, agreed by the global community to prevent planetary disaster. W. Cline(2008) estimates long term effect of climate change on global agriculture in 2080s. Atmospheric carbon concentration might reach 753 ppm by 2085 compared to 406 ppm in 2016 and this could entail increase in temperature by +4.4 °C - +5 °C. As per the IMF, in such grim situation, agricultural productivity in India might decline by -27% to -49%.

She explains her point poignantly. The carbon footprint of a vegetarian meal is on average 600g, a serving of chicken has 1300g of carbon footprint, and a serving of beef has 7,700 g. Clearly, vegetarian food has lower carbon footprint than the non-vegetarian meal. The land use per gram of protein from different food sources is quite startling. While for one gram of protein from beef/ mutton, 1.02 square metre of land is required, this figure for a single gram of protein from pork reduces to 0.13 square metre. The figure for egg is 0.05 square metre per gram of protein, but from pulses, it is minimum at only 0.01 square metre. Pulses and millets are most land-use effective food source for protein availability.

The livestock industry needs to be regulated as a prelude to carbon literacy. This industry, taking together meat and dairy product, causes as much climate pollution as the entire transportation industries world-wide. To grow cattle, grazing lands are required. The rainforests are being cut down for green pastures. Recent incidences in Brazil whereby the then government allowed cutting down the rainforests for cattle industry inspite of massive global protest, is a reminder. A report estimates that between August 1, 2018, and July 31, 2021, more than 34,000 square km of forest disappeared from the Brazilian Amazon. On one hand cattle industry and cattle laundering is causing loss of forest, while on the other hand cattle themselves add to the problem of climate pollution. Then, the cattle burp out methane. Its dung release nitrous oxide. The calculations suggest that a kilogram of beef produces 63

times more climate pollution than a kilogram of wheat. For, pork and chicken, the figure is eight and six times, respectively.

India has 18 % of world's livestock and nearly 30 % of global cattle population. Bovine population in India has grown from 198.70 million in 1951 to 305 million in last agriculture census. Bovine population in India would need 305 million hectare of grazing land for proper upkeep of bovines, which is more than 90% of India's total geographical area. The deterioration of Indian pastures, grasslands and other grazing lands has been ascribed to the large bovine population, free grazing practices, lack of appropriate management.

But, it is a positive thing to learn that much of protein supply in India is plant based. This is remarkable contribution in fighting climate change. Recently, rice-pulse(dal-chawal) has been introduced as staple food during the flight journeys. This can help shed inhibition in promoting consumption of simple vegetarian food as healthy and carbon-conscious diet.

In the current issue of the Journal of Indian Research, we are publishing a long paper on longer duree temperature variation in Delhi by Dr Priyanka Puri. Though, she finds that there is slight decrease in maximum temperature, but extreme variations have increased phenomenally. The research community ought to come up with new measures to combat this dread of climate change, else dream of sustainable growth and equitable distribution of resources would remain a distant mirage!

– **Niraj Kumar**
Honorary Editor-in-chief