

'Soil health is degraded in most regions of India'

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NEW DELHI: Extractive farm practices such as higher use of chemicals and burning of crop residues are degrading Indian soil and jeopardizing the health of its citizens, says Rattan Lal, soil scientist, and winner of the 2020 World Food Prize. According to Lal, who is currently the director of Carbon Management and Sequestration Center at The Ohio State University, India needs to formulate a national soil protection policy and pay farmers for ecosystem services. Edited excerpts from an interview:

What are the determinants of healthy soil?

Soil is a living entity. It is full of life. The weight of living organisms in a healthy soil is about 5 ton per hectare. The activity and species diversity of soil biota are responsible for numerous essential ecosystem services. Soil organic matter content is an indicator of soil health, and it is about 2.5% to 3.0 % by weight in the root zone (top 20 cm). Land misuse and soil mismanagement can adversely affect soil health and undermine ecosystem services. Extractive farming practices such as in-field burning of crop residues (common in north-west India), removal of crop residues, excessive tillage, flood based irrigation, and indiscriminate use of chemicals can degrade soil health. Soil organic matter content in most cropland soils of north western India and elsewhere is often less than 0.5%. This leads to low and stagnating crop yields.

So, what practices must farmers follow to restore soil health?

The dos are residue mulching, no-till farming, growing a cover crop or forage, managed grazing, using compost and bio-fertilizers, drip sub-fertigation, agro-forestry, integration of crops with trees and livestock, recycling of all bio-waste on land, and observing the Law of Return, that is, replace everything one way or another what is removed from land. The don'ts are no burning of residues, no removal of top soil for brick making, no flood irrigation, no excessive or imbalanced use of chemicals, no puddling and flooding of rice fields.

Can the process of soil restoration lead to lower yields?

Some of the improved management practices that I mentioned above may not produce as much yield during the first few seasons of transition as conventional practices. Thus, farmers must be compensated through payments for ecosystem services, which could be around ₹1200 per acre per year. We must also have a national soil protection policy. Prime agricultural land must be demarcated and protected against urbanization and other non-agricultural uses. There must be Rights-of-Soil or Rights-of-Nature.

You grew up in Punjab during the early years of green revolution. Are we paying a price for adopting intensive agriculture?

In Punjab, Haryana, and Western Uttar Pradesh soils are degraded and depleted. Soil organic matter content is as low as 0.1%. Brick making has decapitated the fertile top soil. Flooding has caused water-logging and salinity in some parts. Excessive, indiscriminate and inappropriate use of chemicals (fertilizers and pesticides) have polluted surface and ground waters. In-field burning of residues in October-November pollutes the air. Pyramids of grains are left under plastic sheets to rot. These practices must be stopped. Soil, water, and land must be respected and used properly. It

is important to follow the dictum that 'health of soil, plants, animals, people and the environment is one and indivisible'. Once soil health is degraded, as is the case in most regions of India, the health and well-being of people is also in jeopardy. These trends must be reversed.

Can healthy soils mitigate the impacts of climate change?

Under natural conditions (forest, savanna, prairies, wetlands), soils are the largest reservoir of carbon (both organic and inorganic). Soil erosion and degradation makes soils a source of greenhouse gases (carbon dioxide, methane, nitrous oxide). Methane (from rice paddies, cattle and biomass burning) is 21 times more potent in causing global warming than carbon dioxide, and nitrous oxide (from fertilizers, bio mass burning) is 310 times more potent. Accelerated soil erosion by water and wind removes soil organic matter and leads to emission of carbon dioxide, methane and nitrous oxide into the atmosphere.

In contrast, adoption of erosion control and better agriculture practices can remove carbon-dioxide and methane from the atmosphere. Sustainable management of soil and agriculture are a solution to global warming .India is signatory to achieving Land Degradation Neutrality by 2030. Adopting sustainable agriculture practices can help India meet its commitments.

The Covid-19 pandemic has reinforced the demand for safe food by consumers. Can this be an opportunity for pushing sustainable farm practices?

Covid-19 has aggravated the problem of food and nutritional insecurity in India and elsewhere by disruption of the food production and supply chain. Contamination of water and pollution of air aggravates human health problems. We must strengthen local food production systems and enhance their resilience. Agriculture must be nutrition-sensitive. Food must be nutritious, enriched in protein and other micro nutrients. Our ancient Vedic culture states that "When food is right, medicine is of no need; when food is wrong, medicine is of no use." And right food comes from crops grown on a healthy soil in a clean environment.

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