

For a post-Covid-19 India, the need for postmodern agriculture



Much has been depleted through careless stewardship of natural resources. Sustainability is key. The agriculture sector will require scientific innovations to feed a growing population. The challenge is to get the best blend of continuity and change for finding our way towards the new normal. The postmodern back-to-the-future scenario for agriculture will continue to be scientifically propelled.

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The pandemic may have been a black swan event for most, but not for the discerning. David Quammen, author of the book *Spillover: Animal Infections and the Next Human Pandemic*, has cautioned: “We disrupt ecosystems, and we shake viruses loose from their natural hosts. When that happens, they need a new host. Often, we are it.”

Covid-19 underscored the inter-connectedness of human, animal and ecological health. Overexploitation of natural resources, deforestation and unsustainable intensification of agriculture are environmental drivers of zoonotic diseases. More deadly outbreaks are predicted unless destruction of wildlife habitats and loss of biodiversity is reversed.

The postmodern approach to agriculture is premised on sustainability. This contrasts with half-a-century and more of modern agriculture, based on science-driven technologies and symbolised by the Green Revolution, which is now viewed as a double-edged sword. In tripling foodgrain production, nitrogenous fertiliser use went up 10-fold in India, with increasing application of agrochemicals and growing dependence on fossil fuel energy; 18% of greenhouse gas emissions in the country are from agriculture.

Bedevelled by rapidly receding groundwater aquifers and 35% land degradation, our soil organic matter content is among the lowest in Asia. Monocultures of wheat and rice are displacing the diversity of traditional farming systems. Genetic homogeneity has been detrimental to nutrition while enhancing vulnerability to biotic and abiotic stresses.

The postmodern back-to-the-future scenario for agriculture will continue to be scientifically propelled. Biotechnology, nanotechnology, Artificial Intelligence, remote sensing, communication technology and such frontier disciplines will promote resource-efficiency. Management at the level of agricultural landscapes and watersheds will be increasingly relevant. The multifunctional character of agriculture with its economic, environmental and social dimensions is already coming to the centre-stage.

Sustainable agriculture (SA) counters monocultural production models. Indeed, its essence is embedded in the heralding of the Second Green Revolution or Evergreen Revolution. There are various farming

systems today for enhancing agricultural output with less land, water and energy. Their techniques enhance productivity while restoring soil fertility, replenishing water quality, improving biodiversity and maintaining inter-generational equity. The National Mission on Sustainable Agriculture is one of the eight missions of the National Action Plan on Climate Change.

As Covid-19 hopefully ebbs, the period coincides with the United Nations (UN) Ecosystem Restoration Decade of 2021-2030 for embracing transformative changes towards a green recovery that nurtures resilient production and consumption systems. Some noteworthy SA initiatives in India include the following elements.

One, agroforestry's 25 million hectares of tree-based farming systems provide fruit, fodder, fuel, fibre and timber while enriching the ecology through nutrient recycling, carbon storage, biodiversity preservation, soil and water conservation. It boosts farmer-resilience by enhancing incomes, nutrition and insurance against crop failure.

Two, conservation agriculture is practised in about two million hectares, primarily in India's wheat-rice region. It addresses low efficiency use of water, nutrients and energy. Its practices include zero tillage, laser levelling, crop sequencing, precision irrigation, use of stress-tolerant and climate-resilient varieties, and retention of crop residues as opposed to burning. Adoption of conservation agriculture in rainfed areas is yet to take off.

Three, Zero-Budget Natural Farming (ZBNF) has a back-to-the-basics approach where chemical-free farming with leguminous intercrops uses traditional in situ botanical extracts and livestock wastes to improve soil fertility and crop productivity while controlling cultivation costs. Andhra Pradesh leads with a target of incentivising six million farmers to adopt this on eight million hectares by 2024. ZBNF's science is under experimentation by the Indian Council of Agricultural Research.

Four, organic farming is being practised in only 2% of the net cultivated area. The National Programme for Organic Production accounts for 70% of coverage. Despite the Paramparagat Krishi Vikas Yojana started in 2015, progress in organic farming has been slow. Sikkim was declared an organic state in 2016.

Five, Systems of Rice Intensification (SRI) exemplifies more from less. It uses the biological and genetic potential in plants and soil, and is known to increase rice yields by 20-50% with 25-50% reduction in water use, 30-40% fewer agrochemicals and 80-90% less seed. The National Food Security Mission had visualised five million hectares under SRI. Broad estimates put SRI coverage at half a million hectares.

Other SA practices include climate-smart agriculture, permaculture, regenerative agriculture, biodynamic cultivation, vertical farming and hydroponics, though on a small scale.

Several SA programmes and practices being implemented by central and state governments, development banks, non-governmental organisations, private sector and agri-entrepreneurial start-ups have been ongoing for nearly two decades. But a 2021 report by the Council of Energy, Environment and Water found that less than 4% farmers have adopted SA practices.

There appears to be no recent holistic evaluation of SA by public agencies such as the National Sample Survey Organisation or by the Development Monitoring and Evaluation Office of NITI Aayog. Clearly, well-intentioned policies and missions by themselves do not necessarily translate into large-scale and rapid adoption at the ground level.

What needs to be done now is first, a holistic assessment of various SA programmes and practices and their adoption by farmers; second, constructing a framework for a better understanding of SA's multifunctional nature in different agroclimatic zones; third, developing templates to measure progress of SA by factoring in considerations of both productivity and environmental costs and benefits; and, finally, designing a regime of mandates and deliverables to be rigorously monitored in the short- and long-term.

Postmodern agriculture is needed in post-Covid times to save and replenish resources. Much has been depleted through careless stewardship of natural resources. Sustainability is key. The agriculture sector will require scientific innovations to feed a growing population. The challenge is to get the best blend of continuity and change for finding our way towards the new normal.

Courtesy: Dr. Rita Sharma, former Secretary, Ministry of Rural Development, former Secretary, National Advisory Council, and former Board Member of the World Agroforestry Centre and International Rice Research Institute