



Editorial

Innovative Green Technologies in Agriculture and Food Production & Processing



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Over the past three decades, I have realised that our current industrial food system is broken. It is responsible for 75% of the ecological destruction of soil, water, biodiversity, and for 50% of the Green House Gases contributing to climate change. Instead of providing health and nourishment, it has become a major source of disease, including cancer, cardiovascular diseases, hypertension, obesity, diabetes, and neurological problems. Both industrial food production and industrial food processing are putting a high burden on the planet's health and human health. We need to shift to truly green technologies that rejuvenate the earth's resources and improve people's well-being. This is a shift from industrial production and processing of food to ecological production and processing, also referred to as artisanal processing. It is a shift from mono-

cultures and uniformity to biodiversity, diversity of economies, and knowledge systems.

In 1984, I began studying the Green Revolution in Punjab as part of the UNU University programme on Peace and Global transformation. The Green Revolution is the misleading name given to a chemical-based agriculture model that was introduced to India in 1965. Following World War II, chemical companies and factories were searching desperately for new markets for synthetic fertilisers made in the explosives factories of the war. But indigenous varieties of crops rejected the artificial fertilisers, so plants were redesigned as dwarf varieties to allow them to take up – and become dependent upon – chemicals. By the mid-1960s, this new seed-chemical package was ready to be exported to countries



in the Global South under the label of the Green Revolution.

The false narrative perpetuated by the Green Revolution is essential to understanding the dominant narrative that has been created around food and agriculture. This narrative credits the Green Revolution with pulling India out of starvation, for which Normal Borlaug – the leading scientist on the project – was awarded the Nobel Peace Prize in 1970. But there was no starvation in India in 1965. Food prices had risen in cities due to a nationwide drought, and the country needed to import food grains. But under a policy to promote chemicals in agriculture, a condition was created by the U.S. government and the World Bank under which food grains would be sent to India by America only if it also imported seeds and chemicals.

There was a huge gap between the Green Revolution's narrative success and the realities in Punjab. Reduced to a land of rice and wheat, Punjab began producing less food and nutrition as a result of industrial agriculture. Once farmers in Punjab grew 41 varieties of wheat, 37 varieties of rice, 4 varieties of maize, 8 varieties of bajra, 16 varieties of sugarcane, 19 varieties of pulses, and 9 varieties of oilseeds. The majority of this diversity was destroyed. In the place of wheat grains with names like Sharbati, Darra, Lal Pissi and Malwa, which described the origins and quality of the crops, we find personality-less monocultures named HD 2329, PBW 343 and WH 524: crops infested with pests and diseases, requiring ever-higher doses of pesticides.

While the Green Revolution in Punjab has left behind decertified soils, depleted aquifers, disappearing biodiversity, indebted farmers, and a 'cancer train' that carries the victims of pesticide-related cancer to Rajasthan for free treatment, this non-sustainable model is being exported to the eastern states of India and to Africa. Bill Gates, with his billions of dollars, is blindly pushing chemicals and commercial seeds into Africa through the Alliance For The Green Revolution in Africa. In fact, all world aid routed through policies of the G8 countries is undemocratically imposing a failed model on Africa. Sadly, the true lessons from Punjab's Green Revolution were only learned by those who were destroyed in its wake.

Not only did industrial agriculture destroy biodiversity, and ecosystems, it also created new health problems. Since the Green Revolution and industrial agriculture are based on adapting plants to chemicals, and for breeding for industrial processing, the quality of food degrades. Industrial wheat bred for industrial processing has led to the emergence of gluten allergies. Traditional wheat bred for nutrition do not contribute to gluten allergies. This is why Monsanto took a patent No. EP 0445929 B1 on May 21st, 2003 on an old Indian wheat variety that did not lead to gluten allergies. On January 27th, 2004 the Research Foundation for Science, Technology and Ecology along with Greenpeace and Bharat Krishak Samaha filed a petition at the EPO challenging the patent rights given to Monsanto, leading to the patent being revoked. Today, there is a Second Green Revolution underway: one comprised of GMOs. GMOs, or Genetically Modified Organisms, are genetically engineered crops with genes for toxins introduced into them. Like the original Green Revolution, GMOs claim to 'feed the world'. But the reality is that GMOs do not produce more, they have led to increased chemical use, and they fail to control weeds and pests. Genetic engineering creates an entirely new type of pollution on our planet, negatively impacting plants and animals, human health, and the livelihoods of farmers and local communities. The only beneficiaries of GM crops are corporations, because they sell more toxic chemicals and they also collect royalties on seed. As a matter of fact, corporations' greed and desire to own seeds is the only reason why GMOs are being pushed undemocratically into food and farming systems across the world.

But something is shifting. A new paradigm of truly green technologies is emerging that produce food using less land, less water, less fossil fuels, no agricultural chemicals, no GMOs. Food is produced by the soil, the seed, the sun, the water, and the farmer, all interacting with one another. Food embodies ecological relationships, and the knowledge and science of the interactions and interconnectedness that produce food is called agroecology.

Food is the web of life – the currency of life, our nourishment, our cells, our blood, our mind, our culture and identity. The contributions of biodiversity, compassion, and the knowledge and intelligence of



small farmers feed the world. That is why in spite of priority given to industrial agriculture, even today 70% of the food comes from small farms.

Food is life, and it is created through living processes that sustains life. In agriculture and food production, nature and nature's laws come first. Violating these laws and trespassing on nature's limits of renewal - of seed and soil, water and energy - is a recipe for food insecurity and future famines. While rejuvenating nature's economy, ecological agriculture produces more and better food, and rejuvenates the health and wellbeing of communities. Taking care of the Earth and feeding people go hand in hand.

Feeding the planet raises some of the most fundamental questions of our times. The food question becomes an ethical question about our relationship with the Earth and other species; about whether we have a right to push species to extinction, or deny large members of the human family their right to safe, healthy, and nutritious food. It becomes an ecological question about whether humans will live as members of the Earth community, or will push themselves to extinction by destroying the ecological foundations of agriculture. It becomes a cultural question about our food cultures, our identity, and our sense of place and rootedness.

Feeding people is a knowledge question about whether we continue to think through a destructive, reductionist, mechanist paradigm, seeing seed and soil as dead matter and mere machines to be manipulated and poisoned, or we think of seed and soil as living, self-organising, self-renewing systems that can give us food without the use of chemicals and poisons. It is also a knowledge question about whether we see centuries of farming by peasants as based on knowledge, and farmers as intelligent, or we think of farmers as ignorant just because they may not have been to university.

The food question is also an economic question: about whether the poor eat or go hungry; about whether public taxes go to subsidise an unhealthy and non-sustainable food system; about whether seeds are in the commons or owned through patents by corporations; and about whether food is distributed on principles of justice, fairness and sovereignty, or on the basis of the unfair rules of so

called 'free trade'.

Once I realised how misguided, and even false, the dominant system of agriculture was, I decided to do something about it. I dedicated my life to saving seeds and promoting of organic farming and ecological agriculture. Instead of intensifying chemical and capital inputs that were pushing our small farmers into debt, I committed myself to intensifying biodiversity and ecological processes, working with nature, rather than declaring war against her.



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Figure 1: Seed bank at Navdanya's Bija Vidyapeeth centre, Dehra Dun

In 1987, I started Navdanya, a movement for saving seeds, protecting biodiversity, and spreading ecological methods in farming. We have helped create 120 community seed banks, which have provided open access seeds to farmers to grow tasty, nutritious crops with no external inputs, thus increasing their own nutrition while getting higher incomes. These seed banks have rescued farmers in times of climate extremes including draughts, floods and cyclones. Beginning with the saving and sharing of seed, we



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Figure 2: Crop diversity at Navdanya's Bija Vidyapeeth farm, Dehra Dun

now share the seeds of the knowledge of agroecology. Through our Earth University we spread the ideas and practices related to living seed, living soil, living food, living economies and living democracies. Through the practice of biodiversity-based, ecological agriculture, we teach how food can be grown in health and abundance, and farming can be done to enhance the fertility of the soil, increase biodiversity, conserve water, and reduce Greenhouse Gases that contribute to climate change. My own research and lived experience over the last three decades has taught me that the answer to the food question does not lie in industrial agriculture, but in agroecology and ecological farming. We have evolved criteria of productivity, that better capture health and nutrition and the true costs of agriculture. Our report "Health per Acre" shows that farmers practising biodiversity-based agroecology can produce enough food for two India's, while rejuvenating nature's resources. Our book "Wealth per Acre" shows that the social and ecological externalities of chemical farming in India are \$1.2 trillion annually, including the human cost of 300,000 farmers suicides due to the debt trap they are caught in with dependence on high costs seeds and chemicals.

The contest between the two paradigms of food is a contest between two ideas and organising principles. One paradigm is based on the Law of Exploita-

tion and the Law of Domination, beginning with wars and rooted in violence. The second paradigm is embedded in agroecology and living economies and is based on the Law of Return: of giving back to society, small farmers, and the Earth. It embodies the values of sharing and caring, not selfishness and greed. Today, a paradigm shift has become a global survival imperative that cannot wait any longer.

I am delighted to be the member of the editorial board "Future of Food: Journal on Food, Agriculture and Society". As a new international journal, it could gain a considerable readership throughout the period of the last 3 years. Also, the journal has been indexed by many international organizations, universities and academics repository. The journal is based on the policy of open access and no cost on authors. Herewith, we are pleased to publish our Volume 3 Issue 2, on the theme of "Innovative Green Technologies in Agriculture and Food Production & Processing". The selected research papers presented in this volume will provide further insight on innovative solutions on Food processing/ production in regional and global perspectives.