

# The Passing of the Father of India's Green Revolution. The Devastating Impacts of "Hybrid High Yielding Varieties" and Toxic Chemicals? What Did the GR Really Do for India?

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***M S Swaminathan**, widely regarded as the father of the Green Revolution in India, recently passed away (28 September) at the age of 98. An agronomist, agricultural scientist and plant geneticist, Swaminathan played a key role in **introducing hybrid high yielding varieties of wheat and rice to India** and in encouraging many farmers to adopt high-input, chemical-dependent practices.*

The mainstream narrative is that Swaminathan's collaborative scientific efforts with Norman Borlaug helped save India from famine in the 1960s. Following his death, tributes from high-ranking officials, including Prime Minister Narendra Modi, and commentators have poured in praising his part in (supposedly) saving India from Malthusian catastrophe.

However, there is another side to the story of the Green Revolution, which seldom emerges in the mainstream.

For example, farmer Bhaskar Save wrote an open letter to M S Swaminathan in 2006. He was scathing about the impact of the Green Revolution and Swaminathan's role in it:

"You, M S Swaminathan, are considered the 'father' of India's so-called 'Green Revolution' that flung open the floodgates of toxic 'agro' chemicals - ravaging the lands and lives of many millions of Indian farmers over the past 50 years. More than any other individual in our long history, it is you I hold responsible for the tragic condition of our soils and our debt-burdened farmers, driven to suicide in increasing numbers every

year.”

We will return to this letter later.

To his credit, though, Swaminathan came out against genetically modified organisms in Indian agriculture. In a 2018 paper in the journal [Current Science](#), along with his colleague P C Kesavan, he provided a wide-ranging critique of genetically modified crops to date, questioning their efficacy and need. Perhaps he had become aware that the introduction of technology without proper economic, social, health and environmental impact assessments would produce a domino effect, like the Green Revolution. Of course, he came under attack from industry mouthpieces and industry-backed scientists in the media for his stance.

In the paper [New Histories of the Green Revolution](#) (2019), **Professor Glenn Stone** debunks the claim that the Green Revolution boosted productivity and saved India from famine. Indeed, although the media in the mid-1960s carried stories about a famine in India, Stone sees no evidence of famine or an impending famine. Stone argues that all the Green Revolution actually ‘succeeded’ in doing was put more wheat in the Indian diet (displacing other foodstuffs). He argues that food productivity per capita showed no increase or even actually decreased.

Renowned campaigner and environmentalist [Vandana Shiva](#) says that the Green Revolution saw 768,576 accessions of indigenous seeds taken from farmers in Mexico alone. She regards the Green Revolution as a form of colonisation:

“The ‘civilising mission’ of Seed Colonisation is the declaration that farmers are ‘primitive’ and the varieties they have bred are ‘primitive’, ‘inferior’, ‘low yielding’ and have to be ‘substituted’ and ‘replaced’ with superior seeds from a superior race of breeders, so called ‘modern varieties’ and ‘improved varieties’ bred for chemicals.”

This is one aspect of the Green Revolution that is too often overlooked: capitalist penetration of (intact, self-sufficient) peasant economies.

Stone says:

“The legend of the Green Revolution in India has always been about more than wheat imports and short-stalked grains. It is about Malthusianism, with post-war India supposedly proving the dangers of population growth outpacing food production. It is also about the Neo-Malthusian conviction that technological innovation is our only hope, capable of saving a billion lives when conditions are right.”

Image: A commemorative postage stamp from India released on 17 July 1968 marking the ‘Wheat Revolution’. (Licensed under GODL-India)



He says that beneficiaries of the legend have bolstered it and kept it alive and well in our historical imagination. According to recent studies and literature, however, a coherent reinterpretation is emerging that, Stone says, knocks out virtually all of the pillars of this narrative.

We must also consider counterfactual scenarios. What would have happened if India had taken a different route? Stone notes that the influential Planning Commission (PC) was trying simultaneously to create a functional state (after centuries of colonial rule), to avoid becoming a prized Cold War client, and to shape the country's agricultural destiny. India had plenty of rural labour and organic manures and the PC wanted to capitalise on these resources.

The PC was not opposed to chemical fertilisers but regarded them as highly expensive both to the state and to the farmer. It also believed that concentrated fertiliser use had ecological problems too: chemicals should only be used in combination with bulky organic manures to preserve tilth. What if organic ways of farming had received the funding and research and had been prioritised to the extent the Green Revolution had been?

For instance, in the paper [Lessons From the Aftermaths of Green Revolution on Food System and Health](#) (in *Frontiers in Sustainable Food Systems*, 2021) agriculture techniques, such as intercropping, Zero Budget Natural Farming (ZBNF) – with essential principles involving the enhancement of nature's processes – and the elimination of external inputs, can be practised with excellent results. The state government of Andhra Pradesh plans to convert six million farmers and eight million hectares of land under the initiative of Climate Resilient Zero Budget Natural Farming (ZBNF) because of the impressive outputs obtained in the ZBNF impact assessments in the states of Karnataka and AP.

Moreover, the Green Revolution [deliberately sidelined traditional seeds](#) kept by farmers that were actually higher yielding and climate appropriate. Also, in a [2019 paper](#) in the *Journal of Experimental Biology and Agricultural Sciences*, the authors note that native wheat varieties in India have higher nutrition content than the Green Revolution varieties.

Instead, we are left with a certain model of agriculture that was pushed for geopolitical and commercial reasons and are trying to deal with various deleterious aftermaths.

For example, according to Stone, post-war hand-to-mouth shipments of wheat from the US to India resulted not from Malthusian imbalance but from policy decisions. The 'triumphs' of the Green Revolution came from financial incentives, irrigation and the return of the rains

after periods of drought, and they came at the expense of more important food crops. Long-term growth trends in food production and food production per capita did not change in India. Stone concludes that the Green Revolution years, when separated out, actually marked a slowdown.

Much more can be said and has been written about the wider politics of the Green Revolution and how it became and remains enmeshed in modern geopolitics: the Rockefeller Chase Manhattan bank, the World Bank, the International Monetary Fund and the World Trade Organization have facilitated the structural adjustment of national economies and agrarian systems, intentionally creating food insecure areas and dependency for the benefit of Western financial, agricultural trade, seed, fertiliser and agrochemical interests.

For instance, many countries have been placed on commodity crop export-oriented production treadmills to earn foreign currency (US dollars – boosting the strength of and demand for the dollar and US hegemony) to buy oil and food on the global market (benefitting global commodity traders like Cargill, which helped write the WTO trade regime – the Agreement on Agriculture), entrenching the need to increase cash crop cultivation for exports.

In effect, what we have seen emerge is a model of agriculture that requires hundreds of billions of taxpayer subsidies annually to sustain the bottom line of big agribusiness. One of the not-so-hidden costs of the Green Revolution, of which there are many: degraded soils, polluted water, rising rates of illness, micro-nutrient deficiencies, less nutrient-dense food crops, unnecessary food insecurity, the sidelining of more appropriate indigenous seeds, the narrower range of crops that humanity now depends on due to changed cropping systems, the corporate commodification and pirating of seeds and knowledge, the erosion of farmers' environmental learning, the devastation of rural communities, farmers' debt, corporate-market dependency, etc.

So, with the passing of M S Swaminathan, let us return to Bhaskar Save (1922-2015) and his open letter, which touches on many of these issues. Save was not a scholar or an academic. He was a farmer, and his letter was a heartfelt call to action.

M S Swaminathan was at the time the chair of the National Commission on Farmers at the Ministry of Agriculture. Save wanted to bring attention to the devastating impacts of the Green Revolution and to encourage policy makers to abandon their policies of importing and promoting the use of toxic chemicals that the Green Revolution had encouraged.

Below is an abridged version of Bhaskar Save's open letter.

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**To: Shri M.S. Swaminathan,  
The Chairperson, National Commission on Farmers,  
Ministry of Agriculture, Govt. of India**

I am an 84-year-old natural/organic farmer with more than six decades of personal experience in growing a wide range of food crops. I have, over the years, practised several systems of farming, including the chemical method in the fifties – until I soon saw its pitfalls. I say with conviction that it is only by organic farming in harmony with Nature, that India can

sustainably provide her people abundant, wholesome food.

You, M.S. Swaminathan, are considered the 'father' of India's so-called 'Green Revolution' that flung open the floodgates of toxic 'agro' chemicals - ravaging the lands and lives of many millions of Indian farmers over the past 50 years. More than any other individual in our long history, it is you I hold responsible for the tragic condition of our soils and our debt-burdened farmers, driven to suicide in increasing numbers every year.

I am sad that our (now greyed) generation of Indian farmers, allowed itself to be duped into adopting the short-sighted and ecologically devastating way of farming, imported into this country. By those like you, with virtually zero farming experience!

For generations beyond count, this land sustained one of the highest densities of population on earth. Without any chemical 'fertilizers', pesticides, exotic dwarf strains of grain, or the new, fancy 'biotech' inputs that you now seem to champion. The fertility of our land remained unaffected.

In our forests, the trees like ber (jajube), jambul (jambolan), mango, umbar (wild fig), mahua (*Madhuca indica*), imli (tamarind) yield so abundantly in their season that the branches sag under the weight of the fruit. The annual yield per tree is commonly over a tonne - year after year. But the earth around remains whole and undiminished. There is no gaping hole in the ground!

From where do the trees - including those on rocky mountains - get their water, their NPK, etc? Though stationary, Nature provides their needs right where they stand. But 'scientists' and technocrats like you - with a blinkered, meddling itch - seem blind to this. On what basis do you prescribe what a tree or plant requires, and how much, and when.?

It is said: where there is lack of knowledge, ignorance masquerades as 'science'! Such is the 'science' you have espoused, leading our farmers astray - down the pits of misery.

This country has more than 150 agricultural universities. But every year, each churns out several hundred 'educated' unemployables, trained only in misguiding farmers and spreading ecological degradation.

Trying to increase Nature's 'productivity,' is the fundamental blunder that highlights the ignorance of 'agricultural scientists' like you. When a grain of rice can reproduce a thousand-fold within months, where arises the need to increase its productivity?

The mindset of servitude to 'commerce and industry,' ignoring all else, is the root of the problem.

Modern technology, wedded to commerce... has proved disastrous at all levels... We have despoiled and polluted the soil, water and air. We have wiped out most of our forests and killed its creatures. And relentlessly, modern farmers spray deadly poisons on their fields. These massacre Nature's jeev srushti - the unpretentious but tireless little workers that maintain the ventilated quality of the soil and recycle all life-ebbed biomass into nourishment for plants. The noxious chemicals also inevitably poison the water, and Nature's prani srushti, which includes humans.

Is it not a stark fact that the chemical-intensive and irrigation-intensive way of growing monoculture cash-crops has been primarily responsible for spreading ecological devastation



far and wide in this country? Within the lifetime of a single generation!

This country boasted an immense diversity of crops, adapted over millennia to local conditions and needs. Our numerous tall, indigenous varieties of grain provided more biomass, shaded the soil from the sun and protected against its erosion under heavy monsoon rains. But in the guise of increasing crop production, exotic dwarf varieties were introduced and promoted through your efforts. This led to more vigorous growth of weeds, which were now able to compete successfully with the new stunted crops for sunlight. The farmer had to spend more labour and money in weeding, or spraying herbicides.



The state of Punjab led India's Green Revolution and earned the distinction of being the "breadbasket of India." (Licensed under CC BY-SA 3.0)

The straw growth with the dwarf grain crops fell drastically to one-third of that with most native species! In Punjab and Haryana, even this was burned, as it was said to harbour 'pathogens'. (It was too toxic to feed farm cattle that were progressively displaced by tractors.) Consequently, much less organic matter was locally available to recycle the fertility of the soil, leading to an artificial need for externally procured inputs. Inevitably, the farmers resorted to use more chemicals, and relentlessly, soil degradation and erosion set in.

The exotic varieties, grown with chemical 'fertiliser', were more susceptible to 'pests and diseases', leading to yet more poison (insecticides, etc.) being poured. But the attacked insect species developed resistance and reproduced prolifically. Their predators - spiders, frogs, etc. - that fed on these insects and 'biologically controlled' their population, were exterminated. So were many beneficial species like the earthworms and bees.

Agribusiness and technocrats recommended stronger doses, and newer, more toxic (and more expensive) chemicals. But the problems of 'pests' and 'diseases' only worsened. The spiral of ecological, financial and human costs mounted!

With the use of synthetic fertilizer and increased cash-cropping, irrigation needs rose

enormously. In 1952, the Bhakra dam was built in Punjab, a water-rich state fed by 5 Himalayan rivers. Several thousand more big and medium dams followed all over the country, culminating in the massive Sardar Sarovar.

India, next to South America, receives the highest rainfall in the world. The annual average is almost 4 feet. Where thick vegetation covers the ground, and the soil is alive and porous, at least half of this rain is soaked and stored in the soil and sub-soil strata. A good amount then percolates deeper to recharge aquifers, or 'groundwater tables'.

The living soil and its underlying aquifers thus serve as gigantic, ready-made reservoirs gifted free by Nature. Particularly efficient in soaking rain are the lands under forests and trees. And so, half a century ago, most parts of India had enough fresh water all-round the year, long after the rains had stopped and gone. But clear the forests, and the capacity of the earth to soak the rain, drops drastically. Streams and wells run dry. It has happened in too many places already.

While the recharge of groundwater has greatly reduced, its extraction has been mounting. India is presently mining over 20 times more groundwater each day than it did in 1950. Much of this is mindless wastage by a minority. But most of India's people - living on hand-drawn or hand-pumped water in villages and practising only rain-fed farming - continue to use the same amount of ground water per person, as they did generations ago.

More than 80% of India's water consumption is for irrigation, with the largest share hogged by chemically cultivated cash crops. Maharashtra, for example, has the maximum number of big and medium dams in this country. But sugarcane alone, grown on barely 3-4% of its cultivable land, guzzles about 70% of its irrigation waters!

One acre of chemically grown sugarcane requires as much water as would suffice 25 acres of jowar, bajra or maize. The sugar factories too consume huge quantities. From cultivation to processing, each kilo of refined sugar needs 2 to 3 tonnes of water. This could be used to grow, by the traditional, organic way, about 150 to 200 kg of nutritious jowar or bajra (native millets).

While rice is suitable for rain-fed farming, its extensive multiple cropping with irrigation in winter and summer as well, is similarly hogging our water resources, and depleting aquifers. As with sugarcane, it is also irreversibly ruining the land through salinisation.

Soil salinisation is the greatest scourge of irrigation-intensive agriculture, as a progressively thicker crust of salts is formed on the land. Many million hectares of cropland have been ruined by it. The most serious problems are caused where water-guzzling crops like sugarcane or basmati rice are grown round the year, abandoning the traditional mixed-cropping and rotation systems of the past, which required minimal or no watering.

Efficient organic farming requires very little irrigation - much less than what is commonly used in modern agriculture. The yields of the crops are best when the soil is just damp. Rice is the only exception that grows even where water accumulates and is thus preferred as a monsoon crop in low-lying areas naturally prone to inundation. Excess irrigation in the case of all other crops expels the air contained in the soil's inter-particulate spaces - vitally needed for root respiration - and prolonged flooding causes root rot.

The irrigation on my farm is a small fraction of that provided in most modern farms today.

Moreover, the porous soil under the thick vegetation of the orchard is like a sponge that soaks and percolates to the aquifer, or ground-water table, an enormous quantity of rain each monsoon. The amount of water thus stored in the ground at Kalpavruksha, is far more than the total amount withdrawn from the well for irrigation in the months when there is no rain.

Clearly, the way to ensure the water security and food security of this nation, is by organically growing mixed, locally suitable crops, plants and trees, following the laws of Nature.

We should restore at least 30% ground cover of mixed, indigenous trees and forests within the next decade or two. This is the core task of ecological water harvesting – the key to restoring the natural abundance of groundwater. Outstanding benefits can be achieved within a decade at comparatively little cost. We sadly fail to realise that the potential for natural water storage in the ground is many times greater than the combined capacity of all the major and medium irrigation projects in India – complete, incomplete, or still on paper! Such decentralized underground storage is more efficient, as it is protected from the high evaporation of surface storage. The planting of trees will also make available a variety of useful produce to enhance the well-being of a larger number of people.

Even barren wastelands can be restored to health in less than a decade. By inter-planting short lifespan, medium life-span, and long life-span crops and trees, it is possible to have planned continuity of food yield to sustain a farmer through the transition period till the long-life fruit trees mature and yield. The higher availability of biomass and complete ground cover round the year will also hasten the regeneration of soil fertility.

The actual reason for pushing the ‘Green Revolution’ was the much narrower goal of increasing marketable surplus of a few relatively fewer perishable cereals to fuel the urban-industrial expansion favoured by the government.

The new, parasitical way of farming you vigorously promoted, benefited only the industrialists, traders and the powers-that-be. The farmers’ costs rose massively and margins dipped. Combined with the eroding natural fertility of their land, they were left with little in their hands, if not mounting debts and dead soils. Many gave up farming. Many more want to do so, squeezed by the ever-rising costs. Nature has generously gifted us with all that is needed for organic farming – which also produces wholesome, rather than poisoned food!

The maximum number of people can become self-reliant through farming only if the necessary inputs are a bare minimum. Thus, farming should require a minimum of financial capital and purchased inputs, minimum farming equipment (plough, tools, etc.), minimum necessary labour, and minimum external technology. Then, agricultural production will increase, without costs increasing. Poverty will decline, and the rise in population will be spontaneously checked.

Self-reliant farming – with minimal or zero external inputs – was the way we actually farmed, very successfully, in the past. Our farmers were largely self-sufficient, and even produced surpluses, though generally smaller quantities of many more items. These, particularly perishables, were tougher to supply urban markets. And so, the nation’s farmers were steered to grow chemically cultivated monocultures of a few cash-crops like wheat, rice, or sugar, rather than their traditional polycultures that needed no purchased inputs.

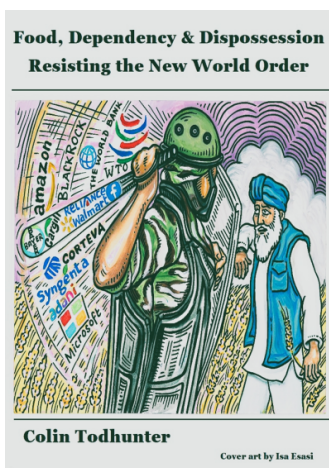


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Featured image: The B. P. Pal Centenary Award, eponymously named after the Indian agricultural scientist, being awarded to Swaminathan in 2006. (Licensed under GODL India)



Read Colin Todhunter's e-Book entitled

## Food, Dispossession and Dependency. Resisting the New World Order

We are currently seeing an acceleration of the corporate consolidation of the entire global agri-food chain. The high-tech/big data conglomerates, including Amazon, Microsoft, Facebook and Google, [have joined traditional agribusiness giants](#), such as Corteva, Bayer, Cargill and Syngenta, in a quest to impose their model of food and agriculture on the world.

The Bill and Melinda Gates Foundation is also involved (documented in '[Gates to a Global Empire](#)' by Navdanya International), whether through [buying up huge tracts of farmland](#), promoting a much-heralded ([but failed](#)) '[green revolution](#)' for Africa, pushing [biosynthetic food](#) and [genetic engineering technologies](#) or more generally [facilitating the aims of the mega agri-food corporations](#).

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