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THE ORGANIC FARMING AND GREEN REVOLUTION - 2.0 IN INDIA

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Abstract

The well-known Bengal famine in 1943 in British ruled India resulted and estimated four million people died of Hunger that year alone in Eastern India. This famine led, on one hand, to the green revolution in India.

The Green Revolution (a term used for Rapid increases in wheat and rice yields in developing countries brought about by improved varieties combined with the expanded use of fertilizers and other chemical inputs) has had a dramatic impact on incomes under foot supplies in many developing countries.

- (a) There were three basic elements observed in the method of the Green Revolution:
- (b) Continued expansion of farming areas;
- (c) Double cropping existing farmland;
- (d) Using fields with improved genetics

The green revolution has facilitated institutional and social changes in rural areas, provided opportunities for self-sustaining economic growth and reduced poverty. The final outcome of technological change is influenced by the institutional and policy environments within which it is introduced. Though there are remarkable socio economic changes observed as the outcome of Green revolution, there are some residue impacts affected in your broad manner which needs to be rectified immediately. The goal of this literature review is to look at the positive and negative impact of the green revolution in India and the path ahead for the present requirement need to be implemented .

Green Revolution in India

The Green Revolution a term used for rapid increases in wheat and rice fields in developing countries brought about by improved varieties combined with the expanded use of fertilizers and other chemical inputs) has had a dramatic impact on incomes and food supplies in many developing countries.

The world's worst recorded food disaster happened in 1943 in British-ruled India. Known as the Bengal famine, an estimated four million people died of Hunger that year alone in Eastern India (that included today's Bangladesh). This famine led, on one hand, to the Green Revolution in India and on the other legislative measures to ensure that businessmen would never again be able to profit for reasons of profit. However, the term "Green Revolution" is applied to the period from 1967 to 1978. Between 1947 and 1967, efforts at achieving food self-sufficiency were not entirely successful.

The main development was higher-yielding varieties of wheat, which were developed by the Indian Agricultural Research Institute with the American agronomist Dr Norman Borlaug, Indian Geneticist M.S. Swaminathan and many other scientists.

The introduction of high-yielding varieties of seeds (hybrid seeds) and the increased use of chemical fertilizers and irrigation led to the increase in the population needed to make the country self-sufficient in food grains, thus improving agriculture in India. The methods adopted included the use of high yielding varieties (HYVs) of seeds with modern farming methods.

The production of wheat has produced the best results in fueling self sufficiency of India. Along with high yielding seeds and the irrigation facilities, the enthusiasm of farmers mobilized the idea of the Agricultural Revolution. Due to the rise in use of chemical pesticides and fertilizers there were negative effects on the soil and the land such as Land Degradation

The goal of this literature review is to look at the positive and negative impact of the green revolution in India and the path ahead for the present requirement to be implemented.

Statistical Results of the Green Revolution

- The Green Revolution resulted in a record grain output of 131 million tons in 1978-79. This established India as one of the world's biggest Agricultural producers. No other country in the world which attempted the green revolution record at that level of success. India also became an exporter of food grains around the time
- Yield per unit of farmland improved by more than 30 per cent between 1947 (When India gained political Independence) and 1979 When the Green Revolution was considered to have delivered its goods.
- The crop area under the High Yielding Varieties (HYV) group went from 7 per cent to 22 per cent of the total cultivated area during the ten years of the Green Revolution. More than 70 per cent of the wheat crop area 30 percent of the rice crop area 20 percent of the millet under corn crop area, used the HYV seeds

Economic Results of the Green Revolution

- Crop areas under-high yield varieties need more water, more fertilizer, more pesticides, fungicides and certain other chemicals. This spurred the growth of the local manufacturing sector. Such industrial growth created new jobs and contributed to the country's GDP (Gross Domestic Product).
- The increase in irrigation created a need for new dams. To Harness monsoon water stored was used to create hydroelectric power, industrial growth created jobs and improved the quality of life of the people in villages.
- India paid back all loans it had taken from the World Bank and its affiliates from the purpose of the Green Revolution; this improved in the correct word in the eyes of the lending Agencies.
- Some developed countries especially Canada which were facing a shortage in agriculture labour their results of Green revolution that that they important Indian farmers experience in green revolution with the help of Indian government this not only helped the relatives of the exported in the informer but also added albeit modestly, to India foreign exchange earnings.

Impact of the Green Revolution

- **Degradation of Land** : Due to change in land use pattern and employing two and three crop rotations every year land quality has gone down and yield has suffered.
- **Degradation of land part 2** : Due to heavy chemical fertilizer inputs land has become hard and carbon material has gone down.
- **When they have increased** : Due to heavy crop rotation patterns we do not give rest to land nor do we have time to employ a proper weed removal system which has increased weeds.
- **Pest infestation has gone up** : Pests which we used to control by biodegradable methods have become resistant to many pesticides and now these chemical pesticides have become non effective.
- **Loss of biodiversity** : Due to heavy use of chemical pesticides, insecticides and we have lost many birds and friendly inserts and this is a big loss in a long time.
- **Chemicals in water** : These chemicals which we have been using in our farms go down and contaminate groundwater which affects our children's health.
- **Water table has gone down** : Water table has gone down due to lack of water harvesting systems and now we have to pull water from 300 to 400 ft. depth which was 40 to 50 feet earlier.
- **Loss of old seeds** : We have started using new seeds and lost old one since new one give better yields but due to this we have lost many important greens in these seeds.

World Wide Organic Farming - A Glance

To overcome the above mentioned Green Revolution impacts, an organic farming system has been followed up in recent days. The advantages of organic farming have yielded good results and become very popular in India because of its special features.

Here we explore the pros and cons of organic farming presents for consumers and producers, as well as examining the environmental effects of organic farming.

Good things About Organic Farming

Consumer benefits

Nutrition : The nutritional value of food is largely a function of its vitamin and mineral content. In this regard, organically grown food is dramatically superior in mineral content to that grown by modern conventional methods. Because it fosters the life of the soil, organic farming reaps the benefits of soil life and greatly facilitates plant access to soil nutrients.

Poison-free : A major benefit to consumers of organic food is that it is free of contamination with health harming chemicals such as pesticides, fungicides and herbicides. If we take cancer example representative data on the number of new cancer Cases in New South Wales Australia has been collector by bhai the New South Wales Central cancer registry Adjusted to take account of our aging population, their graph(above) shows that between 1972 and 2004 the incidence of new cancer cases per year (average for both sexes) has risen from 323 to 488 per 100,000 people. This is an increase of over 50% in just 32 years.

Food Tastes Better : Animals and people have the sense of taste to allow them to discern the quality of the food they ingest. It comes as no surprise, therefore, that organically grown food tastes better than that conventionally grown. The tastiness of fruit and vegetable is directly related to its sugar content, which in turn is a function of the quality of nutrition that the plant itself has enjoyed. This quality of fruit and vegetable can be empirically measured by subjecting its juice to Brix analysis, which is a measure of its specific gravity (density). The Brix score is widely used in testing fruit and vegetables for their quality prior to export.

Food Keeps Long : Organically grown plants are nourished naturally, rendering the structural and metabolic integrity of their cellular structure superior to those conventionally grown. As a result, organically grown foods can be stored longer and do not show the latter's susceptibility to rapid mold and rotting.

Grower benefits

A healthy plant grown organically in properly balanced soil resists most diseases and insect pests. This was proven by US doctor and soil nutrition Dr. Northerner who conducted many experiments to test the hypothesis during the 1930's.

Disease and Pest Resistance : For instance, in an orange grove infested with scale, he restored the mineral balance to part of the soil and the trees growing in that part became clean while the rest remained diseased. By the same means he grew healthy rose bushes between rows that were riddled by insects, and tomato and cucumber plants, both healthy and diseased, where the vines intertwined. Northerner observed that the bugs ate up disease and refused to touch the healthy plants.

Weed Competitiveness : Weeds are nature's band-aids, placed by the wisdom of creation to heal and restore damaged soils. When farmers husband the life of the soil, as they do in organic agriculture, the improved conditions dissuade many weeds and favor their crops. The crops being healthier, are also better able to compete with those weeds that are present.

Lower input costs : By definition, organic farming does not incur the use of expensive agrichemicals - they are not permitted! The greater resistance of their crops to pests and the diseases save farmers significantly in expensive insecticides, fungicides and other pesticides. Fertilizer is either created in situ by green manuring and leguminous crop rotation or on-farm via composting and worm farming. Biodynamic farmers use a low cost microbial solution sprayed onto their crops. The creation of living, fertile soil conditions through early corrective soil re-mineralization and strategic keyline chisel ploughing are significant establishment costs that, however, reap ongoing benefits to production at minimal maintenance.

Drought Resistance : Organically grown plants are more drought-tolerant. Chemical fertilizer is soluble, plants are forced to imbibe it every time they are thirsty for water. They can and do enjoy good growth as long as water is readily available. As soon as water becomes limited, however, the soluble nutrient salts in the cells of chemically fed plants are unable to osmotically draw sufficient water to maintain safe dilution. They soon reach toxic concentrations, and the plant stops growing, hays off and dies earlier than it otherwise would have.

Added Value : There is a discerning market of consumers who recognize the greater food value of organic produce and are willing to pay premium prices for it.

Organic farming Disadvantages

Productivity :

Proponents of industrialized agriculture point to its superior productivity. In the short term, this yield is possible by expending massive inputs of chemicals and machinery, working over bland fields of a single crop (monoculture). However, over the longer time frame, productivity advantages dwindle. Industrialized agriculture thrashes the land, and diminishes its soil life to the point where it can no longer function to convert available organic matter into soil fertility. Productivity begins to wane, and attempts to bolster it with increasing chemical inputs (common advice from farm consultants) has a similar effect to flogging a dead horse. Because it relies on living soil to build fertility, the benefits of organic farming for soil life is fundamental to its methods.

Organic farming benefits food production without destroying our environment resources, ensuring sustainability for not only the current but also future generations.

Cultivation :

While their conventional counterparts may sow by direct drilling of seed into herbicide treated soils, organic farmers are usually at least partly dependent on cultivation to remove prior to sowing. In contrast to cultivation, direct drilling does not mechanically disrupt soil structure and removes the risk of exposed soil being lost to wind or water erosion. This is a valid argument where farmers work for working marginal quality soils. However, the structure of agrichemical deadended soils is weakened by the corresponding loss of soil life and thus unable to maintain its integrity under occasional cultivation and so it's a circle argument! Structurally sound (life-rich) soils may be cultivated regularly without significant damage, particularly if protected appropriately by windbreaks and Keyline soil conservation measures. Even the need to cultivate may be questioned... After noticing a rise thriving wild amongst weeds on roadsides, Japanese alternative agriculturalist Masanobu Fukuoka succeeded in establishing crops by broadcasting seed coated in clay onto untilled land.

Genetically Modified Crops :

Organic growers do not use genetically modified or engineered food crops, some of which are engineered to tolerate herbicides (e.g. "Roundup Ready canola") or resist pests (eg. Bollworm resistant cotton). Conventional Growers, on the other hand, are free to "take advantage" of Genetically Modified Crops (GM Crops). According to a report from the Directorate- General for agriculture of the European Commission, Productivity gains attributed to GM crops are usually negligible when growing conditions, farmer experience and soil types are factored in, and are often in fact negative. The main advantage farmers using such crops gain is convenience only. There are worrying indications that GM crops may be associated with harm to both human health and environment. The main concern is that once they are released it is nigh impossible to "un-release" them.

Time

Indeed, organic farming requires greater interaction between a farmer and his crop for observation, timely intervention and weed control for instance. It is inherently more labor intensive than chemical/mechanical agriculture so that, naturally, a single farmer can produce more crops using industrial methods than he or she could by solely organic methods.

Skill

It requires considerably more skill to farm organically. However, because professional farming of any sort naturally imparts a close and observant relationship to living things, the best organic farmers are converted agrichemical farmers. Organic farmers do not have some convenient chemical fix on the shelf for every problem they encounter. They have to engage careful observation and greater understanding in order to know how to tweak their farming system to correct the cause of the problem rather than simply putting a plaster over its effect. This is a bigger issue during the conversion period from conventional to wholly organic when both the learning curve and transition related problems are peaking (it takes time to build a healthy farm ecosystem that copes well without synthetic crutches).

Environmental Effects Organic Farming

Climate Friendly

The synthetic inputs upon which conventional agriculture is so dependent are energy expensive to mine and manufacture. Today the embodied energy of industrial agriculture uses up nine calories for each one calorie of food that it produced. Organic agriculture with its low input needs of naturally derived substances produces less greenhouse gas emissions and is considerably more climate friendly.

Ecological Friendly

It doesn't use soluble fertilizers Though rarely acknowledged, the chief source of the annual algae blooms that plague Perth's major river (the Swan) is conventional agriculture. Farmers pour tons of phosphate and nitrogenous fertilizer on their cropping lands every year. Because it is soluble, much of this is either washed off the soil surface and into waterways (especially nitrates). With fresh water reserves under increasing pressure from climate change this is a grave situation for humanity. The soluble nutrient pollutants that contaminate surface waters fuel the overgrowth of algae. What is not used up by algae in fresh waterways, spews out into the ocean where it supports the growth of algae on sea plants and coral reef systems. This blocks access to sunlight, causing whatever it smothers to die. Eighty percent of the seagrass meadows in Perth's Cockburn Sound - an important nursery habitat for wild fish stocks - have been decimated due to this process which is called "eutrophication".

It doesn't use pesticides or herbicides Another pollution caused by agricultural use is the contamination of groundwater reserves with poisonous nasties, Particularly (in Australia) atrazine and simazine, but also dieldrin, chlorpyrifos, amitrol, metolachlor, trifluralin and diuron dieldrin, Lindane, and alachlor. While systematic monitoring of pesticide contamination of Ground water in Australia is limited, available tests have detected pesticides in at least 20% of samples, indicating significant contamination. Ground water studies in the US have found similarly significant contamination. In Carolina, For Example, Over 27% of wells sampled in 1997 were found to be contaminated with pesticides predominantly from routine agriculture usage. There is no economically viable method to clean up widespread contamination. Pesticides contamination poses a serious unreasonable public health threat to current and future groundwater users. Synthetic agriculturals (and most plastics widely used in our society) are derived from oil, and thus a source of endocrine - disrupting chemicals (especially xenoestrogens) in the environment. There is also evidence to link xenoestrogens to a range of human medical concerns, particularly reproductivity problems such as reduced sperm count in men and breast cancer in women. Even the "safest" herbicides such as Roundup (Glyphosate) - the second most widely used in the USA - are now known to pose a danger to wetland ecologies, and can totally decimate frog populations at routine contamination levels.

Organic Farming and Peak Oil

Agricultural farming is extremely energy reliant, particularly in the extraction, manufacture and processing of the synthetic chemicals upon which it is so dependent. In a world of diminishing oil supplies the days of chemical agriculture are numbered! One has only to study the experience of Cuba to know this is so. In the early 1990s Cuba had the most industrialized agriculture in Latin America, fueled by cheap, readily available Soviet oil. With the collapse of the Soviet Union, this supply was cut, virtually overnight. At first Cuba was faced with dire food shortages and despite rationing the average Cuban lost 10 kilograms in weight! Under the community - focused direction of its socialist leadership, Cuba rapidly made a successful transition to organic agriculture and more labor intensive methods, including reintroducing the use of bullocks in the cultivation of crops.

Green Revolution 2.0

A confluence of factors has come together in recent years to generate renewed interest in agriculture and spur the early stages of Green Revolution- 2.0 which should take lead by complying with the effects of earlier Green Revolution and fulfilling the requirements ahead.

Green Revolution - 2.0 is already beginning to place, and it is happening in low income countries as well as emerging economies.

Finally, at the global level, there has been an increased tightening of food markets driven by population and income growth as well as diversion of food grain for biofuel and livestock feed. As a consequence, the long - term declining trend in real food prices, observed worldwide since 1975, leveled off by 2005. The food price crisis of 2008, sustained high prices, and more recent peaks observed in 2011 and 2012 have brought agriculture back onto global and national agendas.

By 2050, Global population is projected to increase by about one- third, which will require a 70% increase in food production. To meet this need, Green Revolution -2.0 must continue to focus on shifting the yield frontier for the major staples.

Increasing cereal productivity not only meets demand for staples, it also allows for the release of land to diversify into high - value crops and movement of labor out of agriculture, where other economic opportunities provide greater returns. Green Revolution - 2.0 must also focus on improving tolerance to stresses, both climatic and biotic (pest and disease). Improved varieties that are tolerant to drought or submergence enhance smallholder productivity in marginal environments and provide tools to adapt to climate change.

Conclusion

The Green Revolution has done a lot of positive things, saving the lives of millions of people and exponentially increasing the yield of food crops. But environmental degradation makes the Green Revolution an overall inefficient, short-term solution to the problem of food insecurity. So a more sustainable and environmentally friendly system of cultivation needs to be practiced called Organic farming.

Green Revolution - 2.0 would be welcomed by everyone in the world if there are no such residue impacts as seen in Green revolution. The world is on the brink of a 'Green Revolution -2.0', which promises to both feed a growing world population and to do so sustainably - without compromising the needs of future generations to feed themselves.

As per the proverb 'Necessity is the mother of invention', long ago there was the necessity for green revolution and this is the time to gear up for a flawless Green Revolution - 2.0 in India. Let's join our hands for it !

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