

The Demerits of Green Revolution for Local Paddy Seeds

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Submitted: 15.06.2021.

Revised: 22.06.2021.

Accepted: 02.07.2021.

Abstract: *In the second half of the twentieth century, India came to be known as the abode of 'Green Revolution'. In HYV seeds or High Yielding Variety seeds of wheat arrived in India which was not actually high yielding. But it is not only high yielding wheat seeds, but also paddy seeds, that came to India. Thousands of native rice species became silently extinct. Still, the poor farmers yielded to grab the bait of potential gain that international organizations have hung on the "hoof call", before them. They do not have the time and ability to calculate profit and loss. In addition to genetically modifying seeds to produce hybrid and high-yielding seeds, U.S. companies also produce the chemical fertilizers, pesticides, etc. needed to cultivate those seeds. Farmers in India and Bengal experiment with agricultural methods and seed sowing, which preserves both the diversity and continuity of cultivation, but does not preserve the increased profits of multinational trading companies. So they bring in a new technology called "Seed Protection Technology" in the interest of their growing financial gain. As a result the fertilized seeds become all barren seeds. Renowned voluntary organization RAFI calls this technology "Terminator" technology. Moreover, there have been some indirect losses which were not easily noticed in the initial stage, such as, decreased height of hay, endangerment of existence of Magur fish, snails, oysters etc. But the hope is that as a result of the tireless work of some people, we are getting back some native rice varieties, although the number is much lower than before.*

Keywords: *Indigenous Paddy, Green Revolution, Oryza sativa var Japonica, Oryza sativa var Indica, High Yielding Variety Seed or HYV, Terminator, Preserved Seed, Vrihi .*

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When the process of transformation is accelerated, socialist historians call it a revolution. The word 'Green Revolution' was introduced in India in the second half of the twentieth century. The term "Green Revolution" was first used by William S. Gaud, the administrator of the U.S. Agency for International Development (USAID), in a speech on 8 March 1968. He said, "These and other developments in the field of agriculture contain the makings of a new revolution. It is not a violent Red Revolution like that of the Soviets, nor is it a White Revolution like that of the Shah of Iran. I call it the Green Revolution."¹ In post-independence India, mass exploitation and increased capital investment in industry have long-term effects on agriculture. It was not possible for India to meet its deficit and as a result, it was necessary to import. In 1956, a controversial agreement called the PL-480 was signed with the United States.² This led to the arrival of HYV seeds or High Yielding Variety seeds in India. The key elements of the revolution includes, the use of the latest technological and capital inputs, adoption of modern scientific methods of farming, the use of high yielding variety of seeds, proper use of chemical fertilizers, consolidation of land holdings. Initially, the green revolution started in Punjab concentrating on wheat. Later it spread from Punjab to different states of the country. Besides wheat, crops like paddy, sorghum, barley etc. also came under the green revolution.

Now the question is, how much 'high yielding' were those seeds in reality? Was this green revolution logical in India at all? What are the far-reaching consequences? In this context, Mrs. Vandana Shiva has harshly criticized the Green Revolution in terms of Punjab. She has shown how within a few decades the land and ecosystem of rural Punjab was facing a crisis. For gaining the best result of these new high yielding seeds, it was required high rates of pesticides, chemical fertilizers, water etc. Otherwise it had less production than ordinary seed. Traditionally, Punjab was dependent on natural agricultural irrigation system. But the pesticides or chemical fertilizers that were used to cultivate these HYV seeds have a detrimental effect on the surrounding biodiversity, reduce soil fertility and enter the human body, leading to incurable diseases (such as cancer) in the near future. In the case of Punjab, these occurred within a few years.³

Not only Vandana Shiva, many other historians and researchers have discussed the far-reaching effects of the Green Revolution in Punjab. Not only high yielding wheat seeds, but also that of paddy came to India. Vijay Jardhari, a farmer from Jardhargaon village in Tehri district of Uttarakhand, started the 'Save the Seeds' or 'beej banchao' movement in the late 1980s.⁴ As a result of the green revolution; many local and primitive grains have been lost in the flow of time. Speaking in this context, Vijay Jardhari said that before the Green Revolution, about three thousand varieties of paddy seeds could be found in the Garowal area. That number now reduced to 320. But not just rice, this movement of Vijay Jardhari was towards every local seed. He repeatedly appealed to the farmers to cultivate all these local seeds instead of those so called high-yielding commercial seeds.⁵

Bengal aka West Bengal plays a leading role in paddy production in whole India. So what was the impact of this green revolution on Bengal? Was there a miserable situation alike Punjab? There are insufficient historical works about this. However, in Bengal the striking of the negative impact because of green revolution was not as exposing as of Punjab. But the impact was very deeper on food diversity. Thousands of native rice species went silently extinct. By the time it was known, was too late. Although there are some well-wishers who had partial success in their sincere recovery efforts, most of the local variety of paddy seeds have been lost in the meantime.

Rice is an important staple crop in India and Asia. It is known that in Southeast Asia only, more than eighty thousand paddy seedswere cultivated. In the case of India, the number is about eighty two thousand. However at present, only about 150 species are found in West Bengal.⁶ There were no such examples of rice in the Rig Veda. In the Rig Vedic age, paddy was called ‘*Vrihi*’.⁷ But there are plenty references of rice in the Yajurveda, Samveda, Arthaveda and Brahman, Aranyaka, Upanishads. In later Vedic literature, paddy is mentioned as an important household crop. In the fourth mandala of the Taittiriya Samhitā, there are fourteen types of grains mentioned in Sutra 7.4, of which, seven are agricultural grains and rest are wild grains. These are rice or “*vrihi*”, barley or “*yava*”, bean or “*masha*”, sesame or “*tila*”, bean or “*mudga*”, gram or “*khalavasha*”, wheat or “*godhuma*”, lentils Grain or “*masura*”, buckwheat or “*syamaka*”, *panicummiliaceum* (buckwheat) or priyangu, *panicumfrumentaceum* (buckwheat) or “*menava*” and wild rice or *nivara* / “*nivara*”.⁸ Thus, the grain called paddy was found in both agricultural and wild fields. So it can be said that even in that era there were different varieties of paddy.

Besides that, many varieties of native rice are found in Charak and Sushruta Samhita. Each of this rice has its own qualities as well as different tastes. Some are very sweet in taste, while some are tasteless or astringent. In addition, several species of rice had medicinal properties.⁹ Not only this, the size of the rice could also be varied. This is a proof that different species of paddy were produced at that time. However, in ancient Vedic texts, rice has been shown to be a much more devotional offering.¹⁰ We can hardly find the species names in those texts. But the Buddhist texts are much more realistic. Here rice is described as the staple food of the Gangetic valley.¹¹ Besides that, native rice is mentioned in Pānini’s Astādhyayī, Kautilya’s Arthśāstra, Patanjali’s Mahābhāṣya, Amarasimha’s Amarakosa, Hiuen Tsang’s Si-Yu-Ki, various Mangalākavyas and Puranas, rhymes, Jibanānanda Das’s poems in Bengal. W. W. Hunter’s book ‘A Statistical Accounts of Bengal’ also contains district-wise rice statistics of Bengal at that time.¹²

Now the effect of the green revolution on rice is discussed here. The scientific name of Asian rice is *Oryza sativa*. *Oryza sativa var Japonica* is cultivated in China, Japan and other countries and *Oryza sativa var Indica* is cultivated in the Indian subcontinent.¹³ During the Green Revolution, hybridization of *Japonica* and *Indica* led to the emergence of new hybrid rice.

It is said to be the seed of High Yielding Variety or HYV seed.¹⁴ Initially, production of these high yielding seeds was good in amount, but soon the prices of seeds, fertilizers, pesticides, pump sets etc. for irrigation increased. It happened because in the case of cultivating these high yielding seeds, various chemical pesticides had to be applied to protect the seeds from pests and diseases. Farmers also had to buy pesticides from foreign multinational companies for these foreign high yielding rice seeds. As a result, the cost of cultivation was doubled. Since 1965, due to the abundance of government subsidies in technology-based agriculture, commercial advertisements etc., the diversity of rice varieties, which had been cultivated for thousands of years, is on the brink of extinction.¹⁵ What the biggest natural calamity didn't perpetrate in history, this 'revolution' has done in fewer decades.

This modern cultivation is being carried out by force even on uncultivable land. In drought prone areas like Bankura, Birbhum etc., farmers are pumping water by placing deep pump sets in the land for which ground water level is declining, resulting in increasing soil erosion. Also where water supply is insufficient, the production of high yielding seeds significantly fell off.¹⁶ On the one hand, the cost of cultivation has increased; on the other hand, if the production is low, the farmer suffers on both sides. Even so, the lure of potential profit in front of the poor peasants, which the international organizations have hung as the "hoof call", is inevitable bait. They do not have the time and ability to calculate long-term profit and loss.

The continuous loss of species as a result of high yielding paddy cultivation, as well as the cost of cultivation, is a serious matter of analysis. Generally, third world countries do not have a culture to take the patent on living beings (animals and plants). This was first introduced in the United States in 1980.¹⁷ As a result, America soon began to seek monopoly business power over it. In addition to genetically modified seeds to produce hybrid and high-yielding seeds, U.S. companies also produced the chemical fertilizers, pesticides, etc. which needed to cultivate those seeds. In the hope of higher dividends and to maintain market dominance, multinational U.S. companies began selling seeds and seed-related farming equipment to farmers at the same time. This will double the company's revenue as well as create an uninterrupted market.¹⁸ But in a large subcontinent like India, where agriculture is the main subsistence; the security of the company's revenue is not guaranteed here.

From ancient times the farmers of India and Bengal have been experimenting with agricultural methods and sowing of seeds. Sometimes it has been observed that some farmers themselves have been able to cultivate a third type of hybrid seed from two types of paddy seeds. He has spread that new seed in his circle. The discoverer is lost with time but the discovery remains. Sometimes the name of the new paddy has remained in his name (for example – Subal Dhan).¹⁹ When the farmers take the crop home at the end of the season, they keep some of the seeds for the next season. This preserves both the diversity and continuity of cultivation but does not preserve the increased profits of the trading companies. So they launched a new

technology called “Seed Protection Technology” in the interest of their surging financial gain.²⁰ The seeds that can be harvested from this technology and re-applied are all barren seeds. As a result, farmers will not be able to plant the previous seeds in the next season even if they take the crop home. He will have to buy seeds from the company again. Renowned voluntary organization RAFI calls this technology “Terminator” technology.²¹ One of the unique goals of this seed was to build a monopoly on patented cereals in the Third World market.

Those all are the assessments of the direct loss related to the grain. However, there have been some indirect losses which were not noticed in the initial stage. In the case of paddy, the word ‘straw’ comes first in the list of indirect losses. The paddy plants were dried and turned into straw and used to make the roof of the house. Earthen walls and thatched roofs are a familiar sight in rural peasant houses. Straw and soil are bad conductors of heat, which protects the household from the heat of summer. The average paddy plant was 4 to 5 feet tall on average. With that it was possible to shade the roof of the house very easily. But most of these high-yielding rice plants are short, unfit for roofing. Tin asbestos as an alternative is actually unable to withstand the harshness of the sun.²²

Paddy lands are usually submerged. As a result, several fish are grown there. Paddy land is mainly a breeding ground for Magur fish. In addition, small anonymous small fish, snails, oysters etc shell products easily meet the demand for protein in the soil.²³ Besides, such lands are also suitable for duck grazing and these small snails, oysters are one of the favorite foods of ducks. While grazing, it unknowingly does the weeding work in the land.²⁴ But the existence of all these aquatic animals is endangered due to the prevalence of chemical fertilizers and pesticides. As a result, even large animals are facing food shortage. The normal ecosystem is being disrupted.²⁵ Now Magur fish has to be cultivated separately. So now its price is quite high in the market. Dr. Anupam Paul, Assistant Director, ATC Fulia, said that, in past about 40 kg of Magur was normally available in one bigha of land and at Rs. 50 per kg, the market price was around Rs. 20,000 and this happened without any kind of investment. Even if we invest more money there now, the yield is not the same.²⁶

Also the number of fallow lands is decreasing in case of high yielding cultivation of paddy. Uncultivated land is also being brought under forced cultivation. The forest is being cleared and converted into arable land. As a result, the production of normal crops is being affected and the cultivation of oilseeds and pulses is also declining significantly. Earlier, pulses like khesari, musur etc.²⁷ were spread 8-10 days before harvesting aman paddy seeds. But with the increase in boro paddy cultivation, it is no longer possible. As a result, there is a deficit in the production of pulses. Even nowadays we have to import pulses from outside. And naturally its price is also higher.

With all this, there is a shortage of ground water. Boro seed cultivation area has also increased along with groundwater pumping technology. It takes about three and a half thousand

liters of water to cultivate 1 kg of boro paddy. So it is easy to guess what the consumption of water per bigha is. The groundwater level in more than 50 blocks of West Bengal has gone down a lot due to continuous pumping. Somewhere the problem of arsenic has emerged.²⁸

The use of chemical pesticides on the land is killing the local and natural weeds, insects and small creatures. Those who are not dying are becoming more tolerant of those pesticides and the population is increasing. Not only this, their normal behavior is also changing. Pests are invading other crops as their resistance increases. A type of pest called 'Achcha' is attacking paddy in North Bengal tea gardens.²⁹ Farmers have to use more pesticides to kill insects or the company is bringing new and more powerful pesticides to the market and the farmer has to spend a lot of money to buy it. The waste of money and the destruction of the ecosystem are increasing consequently at a proportional rate. Excessive application of these pesticides on crops is indirectly affecting the human body and invites incurable diseases like cancer. Needless to say, these chemicals are slowly poisoning the human body.³⁰

But in this native rice, taste, nutritional values, medicinal quality are all stored. The cultivation of each species of paddy has been going on for thousands of years. For example, the cultivation of the 'Kalanamak' rice pudding that Sujata fed to Gautam Buddha still exists in Uttar Pradesh. Alexander the Great, the world-conquering Greek emperor, was so impressed with India's basmati rice that he arranged for it to be shipped to Greece. More than fifty indigenous varieties of rice are named from the chapter 'Birth of Dhanya' in the Shunya Purana written by Ramai Pandit.³¹ Besides, there are about sixty varieties of paddy in Bharat Chandra Raigunakar's 'Annadamangala'.³² So there is no room for doubt about the antiquity of paddy cultivation in Bengal.

Besides that, rice also has medicinal properties. Among the ancient texts, about a dozen species of rice are found in the Charaka Samhitā. Among them, Nivara or wild variety of rice can cure diseases like hemotheria.³³ The Sushruta Samhitā, based on medical science, contains a vast wealth-like list of rice with different medicinal properties. The most beneficial of these is Lohitak.³⁴ There were about twenty-five varieties of black rice in India.³⁵ Notable among these are 'Kala Bhat', 'Chakhao' etc. and some red paddy, such as 'Shatiya', 'Agniban', 'Lal Basmati' etc.³⁶ These are all rich in antioxidant, so their use as a preventative against incurable diseases like cancer is common. Red rice is rich in Zinc, Iron and Vitamin B which are very important for pregnant women and babies. The leaves of paddy like 'Khandā', 'Kalavati', 'Lankeshwar' etc. are purple in color. These colorful leaves are eaten as a vegetable as an antidote to cancer. Apart from these qualities, each one of this rice is unique in taste and smell. Moreover, due to the presence of anthocyanins in the young leaves of paddy, their production is increasing towards Jhargram and Nadia. As a result, the local people are beginning to consume the leaves.

But the hope is, as a result of the tireless work of some people, we are retrieving some native rice varieties. Although the number is much lower than before. Dr. Debal Deb has taken

a leading role in this work. About 23 years ago, Dr. Deb started searching for lost paddy in a remote village in West Bengal. The villagers are so poor that they cannot afford to buy seeds, they are still cultivating paddy in the indigenous way due to the scarcity of capacity. The farming method was also dependent on nature and natural ingredients. Therefore, Dr. Deb thought that ancient farming methods and seed conservation can also be learned from here.³⁷ The devotion of the local farmers to the cultivation impressed Dr. Deb. The only problem with the area he observed was drought. Dr. Deb and his colleagues tried and succeeded in rediscovering drought tolerant rice seeds through genetic research. They also find six types of salt tolerant rice seeds in the villages of the Sundarbans.³⁸ These rice plants were so strong that the 2009 cyclone Ayla did not do much damage to them. They were about 12 feet deep underwater and were still capable to live.³⁹

Seeing all this, Dr. Debal started storing traditional rice seeds in his own seed bank “Vrihi”. Not only that, he also used a unique approach to spread the word among the local farmers. He gives 1 kg of native rice seeds to each willing farmer for free. The only condition is that the farmer will return twice as much seed of that species of paddy to “Vrihi” at the end of the season.⁴⁰ Dr. Deb’s initiative has received a good response and the enthusiasm among the farmers to cultivate indigenous paddy has increased more than before.

Gratefully another inexorable personality, Dr. Anupam Paul, Assistant Director, Agriculture Training Center, Fulia, Nadia, has been engaged in this work for a long time.⁴¹ They have recovered 60 fragrant and 50 medicinal rice seeds from about 600 varieties of lost paddy and distributed them among local farmers. So far, about 400 local rice seeds have been handed over to the farmers.⁴² Dr. Anupam Pal said that if this traditional process of paddy cultivation continues, then maybe one day a real green revolution will take place.⁴³ He further said that the cost of cultivating all these indigenous paddy is two thirds of the cost of cultivating hybrid rice seeds at present and no chemicals are required for cultivation, only natural ingredients are sufficient. This organization is making similar efforts not only in Bengal but also in other states of India.

So in the end, the scientific name for making Third World agriculture a monopoly business was the ‘Green Revolution’. Punjab was its main pasture. But within a few decades, the expected picture of happiness and prosperity in Punjab was just the opposite in reality. In the case of Bengal it was not understood so vividly. The ‘high yielding’ business quietly laid its hands on the huge variety of paddy in Bengal. As far as is known, thousands of species have disappeared in the wheel of time. Yet the good news is that farmers have come to recognize the real ‘high-yielding’ method without falling into the trap of commercial advertising. If one day we can really recover some of our lost wealth, then the real ‘green revolution’ will come to Bengal.

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