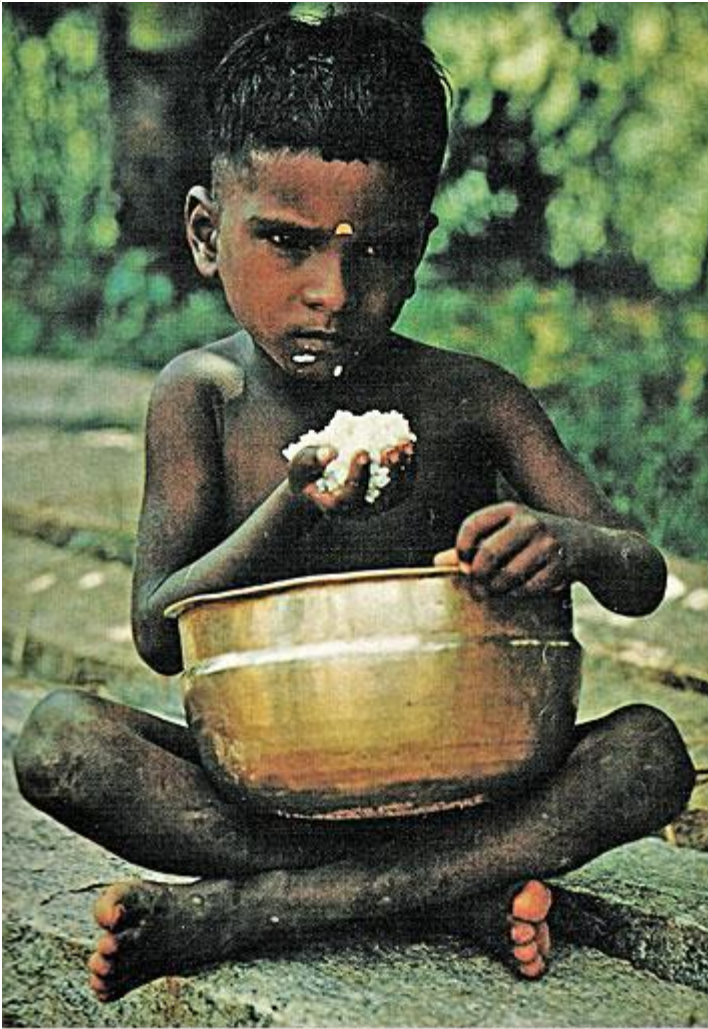


# India & Pakistan



The threat of hunger in India and Pakistan brought the Green Revolution to the subcontinent. [Photo LOOK magazine, Library of Congress LOC]

The story of the Green Revolution in India and Pakistan is the story of rice and wheat, hunger and governmental response to suffering.

By the end of World War II, India had been a colony of one foreign power or another for over 400 years with the British in charge for the last 200 years. In 1947, India achieved its independence, but was plunged into years of drought and political turmoil as the Muslim areas of Pakistan and Bangladesh violently formed their own nations from formerly Indian territory. In 1944, the new United Nations Food and Agriculture Organization (FAO) found that a third of Indians were underfed. Over 100 million people were hungry.

According to John H. Perkins in his book *Geopolitics and the Green Revolution*, during the first 10 years of independence, "building social equality was the guiding ideology" of the Indian government. The government began to break up huge imperial farms and give land to the peasants who had been working on them. These new land owners were encouraged to adopt modern agricultural technology, but few of them had the education or money reserves to take advantage of the science. In the mid-60s, a new government began to question the piecemeal approach to agricultural reform.

Traditionally, rice had been a staple of the Indian diet, and the most productive rice growing regions were in what would become Pakistan. With the partition of India and

■ Pakistan into two separate countries, much of

the rice India had been relying on became an expensive import crop. India needed to develop its own sources of food.

Since 1905, Indian and English scientists had been researching better crops and agricultural practices. And in the 1950s, the Central Rice Research Institute at Cuttack India had developed a new hybrid variety called ADT-27 that produced good increases in rice production.

But it wasn't enough. Since 1956, India had been importing more and more wheat from the U.S. under the [Food for Peace](#) program. They needed the imports to feed their people, and so dietary preferences were changing. In addition, the Indian government was aware of [Dr. Norman Borlaug's success with Mexican semi-dwarf varieties](#). An Indian plant breeder named M. K. Swaminathan had obtained some of the spring wheat Mexican varieties. Some thought that growing Mexican wheat varieties in India could be more productive than local rice varieties. So, in 1963 (with Rockefeller Foundation money) they brought Borlaug to India and Pakistan to tour their wheat breeding facilities and advise them. They may have gotten more than they bargained for.

India and Pakistan were such a young countries, and succeeding governments were so fragile that they felt the need to promote their own agricultural programs to maintain their political popularity. Local scientists had planted the Mexican varieties, but they hadn't followed modern farming practices.



["They had a field day the day I was coming." Borlaug remembers about his tour of Pakistan in this oral history video.](#) "The director of the research station took over to show the whole nursery... The weeds were nearly as high as the wheat. The whole nursery was miserable... This guy would say, 'You see, the Mexican wheats don't fit here. Look how good the tall Pakistan wheats are.' Which was true."

Borlaug noticed that two young plant scientists who had been trained by him in Mexico were standing nervously in the background. Later, these two scientists approached Borlaug and Haldore Hanson, a representative of the Ford Foundation (who later became director of CIMMYT). The young scientists needed to show Borlaug and Hanson something at daybreak the next day before their flight for another part of the tour.

"And so, I had my boots and clothes on. [He taps on the table.] Tap on the window. I went out. It was just getting daylight. We walked to the most remote corner of the experiment station. And there were four beautiful plots, about the width of this room and maybe twice as long, of the best four new dwarf Mexican varieties that were commercial in Mexico. They said, 'There they are. You see how they fit!'

And I said, 'Why didn't you plant the nursery like that?'

They said, 'They wouldn't let us.'"

When Borlaug wrote his report, he blasted the government-sponsored trials for not using enough fertilizer and "miserable weed control." In 1964, both India and Pakistan began importing, testing and demonstrating semi-dwarf varieties from Mexico. The results were promising. In 1965, Borlaug returned to the subcontinent to negotiate the next shipment of advanced wheat seeds. The governments agreed to purchase 450 tons of seed, but they placed the order too late to ship from the port in Mexico. Borlaug began arranging for alternate transportation, all over the phone from India. First, he arranged for 35 trucks to ship the seed to Los Angeles. The trucks got held up by customs officials first on the Mexican side and then on the American side of the border. Then, the race riots in Watts shut down the freeway and kept the trucks from reaching the port. Borlaug was awake and on the phone for two nights before the trucks made it to the ships. When the precious cargo was loaded, Borlaug -- half a world away -- went to sleep. He woke 20 hours later to discover that a war between India and Pakistan had broken out.

The war delayed arrival of the seeds until after the traditional October planting period had begun. Borlaug had the seeds planted anyway. A week later, he discovered that the seeds were germinating at only about half the usual rate. Later, it turned out that the seeds had been over-fumigated in Mexico. Borlaug didn't hesitate. He immediately ordered the seeding rates to be doubled.

In the spring of 1966, that crop was larger than any ever harvested in South Asia -- despite a dry year. For the next growing season, India and Pakistan ordered 18,000 tons of wheat seeds, the largest purchase of seed in the world up until then.

By 1968, normal rains had returned and Mexican wheat varieties had produced so much grain in India and Pakistan that there weren't enough people to harvest the crop. There weren't enough bullock carts to haul the wheat to threshing floors. There weren't enough jut bags, trucks, rail cars or grain storage facilities. Some towns closed schools temporarily to house the grain. And millions were no longer hungry.

In Pakistan, wheat yields nearly doubled from 4.6 million tons in 1965 to 7.3 million tons in 1970. By the year 2000, Pakistan produced over 21 million tons. Since the 1960s, food production in both nations has increased faster than the rate of population growth.

But the process was not easy. Borlaug soon realized that there were actually at least four steps that had to happen before the promise of better agricultural technology could be realized in any developing country –

- First, the technology must develop. This is the process of crossing the most promising varieties to produce the highest yields, best resistance to pests and diseases, best response to fertilizer and shortest growing period.
- Second, the psychological process of convincing farmers to adopt the new varieties and to follow the recommendations for growing them. For instance, semi-dwarf varieties need to be planted no more than 5 cm deep instead of the 10 to 15 cm for traditional varieties. The new plants could be planted later in the year. And the scientists had to convince farmers that it was critically important to irrigate the wheat crop 21 days after the plants emerged (when crown roots are forming) rather than the traditional 30 to 35 days. Borlaug and his colleagues were respectful in diffusing this information. They didn't dictate, but rather demonstrated plots of the new varieties right along side traditional

ones. As Forrest Hill, former vice president of the Ford Foundation told Borlaug, "They may be illiterate, but they can figure... They aren't afraid to change if they see the margins of change [are] double or triple. They're ready if the government gives them the tools with which to work."

- The third factor is economic. Do farmers have enough credit available to invest in the new seeds, fertilizer, weed killers and pesticides.
- Finally, the political factor is critical to support the other three. Governments can support or hinder the availability of credit. They can support or hinder demonstration projects. They can build the agricultural research institutions. And they can sometimes artificially lower the price of food. Before Borlaug lobbied against it, the Indian government kept the price of grain produced in India 40 percent below the world price. The logic was that there were so many poor people and they had to have cheap grain to survive. But, in fact, low prices kept local farmers from producing more with newer varieties and the government had to import grain at high prices from other countries. Borlaug helped convince the Indira Gandhi government to raise prices, increase the availability of agricultural loans and build local fertilizer plants.

In the last quarter of the 20th century, India and Pakistan have internalized the lessons of the Green Revolution. They have developed their own new varieties of wheat and rice out of the first semi-dwarf lines introduced in the 60s. They have built fertilizer plants and irrigation projects. And they have become self-sufficient.

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