**Green Revolution in India**

The **Green Revolution** was a period when [agriculture in India](https://en.wikipedia.org/wiki/Agriculture_in_India) was converted into an industrial system due to the adoption of modern methods and technology, such as the use of [high yielding variety (HYV) seeds](https://en.wikipedia.org/wiki/High-yielding_variety), tractors, irrigation facilities, pesticides, and fertilizers. Mainly led by agricultural scientist [M. S. Swaminathan](https://en.wikipedia.org/wiki/M._S._Swaminathan) in India, this period was part of the larger [Green revolution](https://en.wikipedia.org/wiki/Green_revolution) endeavor initiated by [Norman Borlaug](https://en.wikipedia.org/wiki/Norman_Borlaug), which leveraged agricultural research and technology to increase agricultural productivity in the developing world.

Under premiership of [Congress](https://en.wikipedia.org/wiki/Indian_National_Congress) leader Lal Bahadur Shastri the Green Revolution within India commenced in 1966, leading to an increase in food grain production, especially in [Punjab](https://en.wikipedia.org/wiki/Punjab,_India), [Haryana](https://en.wikipedia.org/wiki/Haryana), and [Uttar Pradesh](https://en.wikipedia.org/wiki/Uttar_Pradesh). Major milestones in this undertaking were the development of high-yielding varieties of [wheat](https://en.wikipedia.org/wiki/Wheat). and [rust](https://en.wikipedia.org/wiki/Rust_(fungus)) resistant strains of wheat. However, certain social activists like [Vandana Shiva](https://en.wikipedia.org/wiki/Vandana_Shiva" \o "Vandana Shiva) are of the opinion that it caused greater long term sociological and financial problems for the people of Punjab and Haryana



**Wheat production**

The main development was higher-yielding varieties of [wheat](https://en.wikipedia.org/wiki/Wheat), for developing [rust](https://en.wikipedia.org/wiki/Rust_(fungus)) resistant strains of wheat. The introduction of high-yielding varieties (HYV) of seeds and the improved quality of [fertilizers](https://en.wikipedia.org/wiki/Fertilizers) and [irrigation](https://en.wikipedia.org/wiki/Irrigation) techniques led to the increase in production to make the country self-sufficient in food grains, thus improving [agriculture in India](https://en.wikipedia.org/wiki/Agriculture_in_India). The methods adopted included the use of [high-yielding varieties](https://en.wikipedia.org/wiki/High-yielding_varieties) (HYVs) of seeds[[12]](https://en.wikipedia.org/wiki/Green_Revolution_in_India#cite_note-12) 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 irrigation facilities, the enthusiasm of farmers mobilized the idea of agricultural revolution. Due to the rise in use of chemical pesticides and fertilizers, there was a negative effect on the [soil](https://en.wikipedia.org/wiki/Soil) and the land (e.g., [land degradation](https://en.wikipedia.org/wiki/Land_degradation)).

**Other practices**

* [Irrigation](https://en.wikipedia.org/wiki/Irrigation) infrastructure
* Use of [pesticides](https://en.wikipedia.org/wiki/Pesticides)
  + Use of [insecticides](https://en.wikipedia.org/wiki/Insecticides)
  + Use of [herbicides](https://en.wikipedia.org/wiki/Herbicide)
* Consolidation of [holdings](https://en.wikipedia.org/wiki/Possession_(law))
* [Land reforms](https://en.wikipedia.org/wiki/Land_reforms)
* Improved [rural infrastructure](https://en.wikipedia.org/wiki/Rural_infrastructure)
* Supply of agricultural [credit](https://en.wikipedia.org/wiki/Credit_(finance))
* Use of chemical or [synthetic fertilizers](https://en.wikipedia.org/wiki/Synthetic_fertilizers)
* Use of [sprinklers](https://en.wikipedia.org/wiki/Irrigation_sprinkler) or [drip irrigation](https://en.wikipedia.org/wiki/Drip_irrigation) systems
* Use of advanced [machinery](https://en.wikipedia.org/wiki/Machinery)

**Rationale for the Green Revolution**

The Green Revolution in India was first introduced in [Punjab](https://en.wikipedia.org/wiki/Punjab,_India) in the late 1960s as part of a development program issued by international donor agencies and the Government of India.

During the [British Raj](https://en.wikipedia.org/wiki/British_Raj), India's grain economy hinged on a unilateral relationship of exploitation.] Consequently, when India gained independence, the weakened country quickly became vulnerable to frequent famines, financial instabilities, and low productivity. These factors formed a rationale for the implementation of the Green Revolution as a development strategy in India.

* Frequent famines: In 1964–65 and 1965–66, India experienced two severe droughts which led to food shortages and famines among the country's growing population.] Modern agricultural technologies appeared to offer strategies to counter the frequency of famines.] There is debate regarding India's famines prior to independence, with some arguing they were intensified by British taxation and agrarian policies in the 19th and 20th centuries, and others downplaying such impact of colonial rule.
* Lack of finance: Marginal farmers found it very difficult to get [finance](https://en.wikipedia.org/wiki/Financing) and [credit](https://en.wikipedia.org/wiki/Credit) at economical rates from the government and banks and hence, fell as easy prey to the [money lenders](https://en.wikipedia.org/wiki/Moneylender). They took loans from [landlords](https://en.wikipedia.org/wiki/Landlords), who charged high rates of [interests](https://en.wikipedia.org/wiki/Interest) and also exploited the farmers later on to work in their fields to repay the loans ([farm labourers](https://en.wikipedia.org/wiki/Farm_labourer)). Proper financing was not given during the Green Revolution period, which created a lot of problems and sufferings to the farmers of India. The government also helped those under loans.
* Low productivity: In the context of India's rapidly growing population, the country's traditional agricultural practices yielded insufficient food production. By the 1960s, this low productivity led India to experience food grain shortages that were more severe than those of other developing countries. Agricultural technological advancements offered opportunities to increase productivity.

**Criticism**

The Green Revolution yielded great economic prosperity during its early years. In Punjab, where it was first introduced, the Green Revolution led to significant increases in the state's agricultural output, supporting India's overall economy. By 1970, Punjab was producing 70% of the country's total food grains] and farmers' incomes were increasing by over 70%. Punjab's prosperity following the Green Revolution became a model to which other states aspired to reach.

However, despite the initial prosperity experienced in Punjab, the Green Revolution was met with much controversy throughout India.

**Indian economic sovereignty**

Criticism on the effects of the green revolution includes the cost for many small farmers using HYV seeds, with their associated demands of increased irrigation systems and pesticides. A case study is found in India, where farmers are buying [Monsanto](https://en.wikipedia.org/wiki/Monsanto) BT cotton seeds—sold on the idea that these seeds produced 'non natural insecticides'. In reality, they need to still pay for expensive pesticides and irrigation systems, which might lead to increased borrowing to finance the change from traditional seed varieties. Many farmers have difficulty in paying for the expensive technologies, especially if they have a bad harvest. These high costs of cultivation push rural farmers to take out loans—typically at high interest rates. Over-borrowing commonly entraps farmers into a cycle of debt.

On top of this, India's liberalized economy further exacerbates the farmers' economic conditions. Indian environmentalist [Vandana Shiva](https://en.wikipedia.org/wiki/Vandana_Shiva" \o "Vandana Shiva) writes that this is the "second Green Revolution". The first Green Revolution, she suggests, was mostly publicly funded (by the Indian Government). This new Green Revolution, she says, is driven by private (and foreign) interest—notably MNCs like Monsanto—as encouraged by the [neoliberal](https://en.wikipedia.org/wiki/Neoliberalism) context. Ultimately, this is leading to foreign ownership over most of India's farmland, undermining farmers' interests.

Farmer's financial issues have become especially apparent in Punjab, where its rural areas have witnessed an alarming rise in suicide rates.[[13]](https://en.wikipedia.org/wiki/Green_Revolution_in_India#cite_note-:12-13) Excluding the countless unreported cases, there has been estimated to be a 51.97% increase in the number of suicides in Punjab in 1992–93, compared to the recorded 5.11% increase in the country as a whole.[[13]](https://en.wikipedia.org/wiki/Green_Revolution_in_India#cite_note-:12-13) According to a 2019 Indian news report, indebtedness continues to be a grave issue affecting Punjabi people today, demonstrated by the more than 900 recorded farmer committed suicide in Punjab in the last two years.

**Environmental damage**

Excessive and inappropriate use of fertilizers and pesticides polluted waterways and killed beneficial insects and wildlife. It has caused [over-use](https://en.wikipedia.org/wiki/Overexploitation) of soil and rapidly depleted its nutrients. The rampant irrigation practices led to eventual [soil degradation](https://en.wikipedia.org/wiki/Soil_degradation). Groundwater practices have fallen dramatically. Further, heavy dependence on few major crops has led to [loss of biodiversity](https://en.wikipedia.org/wiki/Biodiversity_loss) of farmers. These problems were aggravated due to absence of training to use modern technology and vast illiteracy leading to excessive use of chemicals.

**Increased regional disparities**

The green revolution spread only in irrigated and high-potential rainfed areas. The villages or regions without the access of sufficient water were left out that widened the regional disparities between adopters and non-adopters. Since, the HYV seeds technically can be applied only in a land with assured water supply and availability of other inputs like chemicals, fertilizers etc. The application of the new technology in the dry-land areas is simply ruled out.

The states like Punjab, Haryana, [Western Uttar Pradesh](https://en.wikipedia.org/wiki/Western_Uttar_Pradesh), etc. having good irrigation and other infrastructure facilities were able to derive the benefits of the green revolution and achieve faster economic development while other states have recorded slow growth in agriculture production.