

Negative Impacts of the Green Revolution

To come to some clarity on the impacts of the green revolution in India, we must engage in a discussion on the sites where the green revolution in India was implemented and note the impacts thereby in these sites. We will thus also attempt to bring about a more contemporary perspective on the impacts of the green revolution in India that was introduced with the objective of bringing the country out of the problem of food shortages.

The green revolution thereby was intended to overcome food shortages in India by increasing the yields of agricultural produce with the help of better irrigation systems, pesticides, fertilizers, agricultural machinery, etc. but also principally with the help of crop intensification focused on more resistant high-yielding crop varieties. This was supplemented with socio-economic policies that made credit available to farmers more readily and developmental extension officers were to disseminate knowledge to farmers in employing the new technologies. Among the Indian states that is said to have benefitted most from the green revolution in India is the state of Punjab, where food-grains production increased from 5.37 million tonnes in 1965-66 to 32 million tonnes in 1995-96. Food-grains production in Punjab in 1995-96 accounted for 21 per cent of total food-grains produced in India (Singh, 2016). However, although yields have substantially increased in Punjab, this is not the complete story.

The green revolution has led to many adverse effects in Punjab. These include reduction in soil fertility, soil contamination, soil erosion, water shortages, reduction in genetic diversity, greater vulnerability to pests, reduced availability for the local population of nutritious food crops, rural impoverishment, the displacement of small farmers and increased social conflict.

The focus was on large farms and wealthy farmers who could acclimatize with the more resource-intensive agricultural methods introduced in the early period of the green revolution in India. The argument for introducing the new crop varieties and the succeeding policy actions along with the resulting socio-economic effects was increasing agricultural production in terms of higher crop yields. Shiva however, argues that the seeds introduced during the early period of the green revolution in Punjab were not high-yielding by themselves. These high yields she says, were possible due to the seeds being highly responsive to certain inputs such as irrigation water and fertilizers (Shiva, 1991). The green revolution in India thus necessitated a resource-intensive process whereby those who could make significant capital investments could benefit whereas those who couldn't invest became more marginalized in regions affected by practices of the green revolution in India.

Beginning in the late 1960s however, the first wave of the green revolution in India helped the country attain food-grain self-sufficiency by the late 1970s. This first wave was mostly limited to producing the high-yielding wheat crop in some of the northern states of India such as Punjab. The second wave of the

green revolution in India began with the agricultural growth of the 1980s which took to include regions across the country beyond certain northern states and also included many more crops including rice. The second wave was able to raise rural incomes substantially in certain areas in rural India, although many other rural areas in India remained significantly poor (Fujita, 2010). Although it can be argued that productivity growth in agriculture can benefit certain farmers and act to raise rural incomes, many poorer farmers stood to not be able to benefit fully from the modern production techniques. By requiring greater investments in agricultural production, the green revolution in India has placed small and marginal farmers at a distinct disadvantage.

Environmental and health problems can also be encountered with the use of high-yielding crops. For example, resistance to one species of pest due to genetic modification might invite other species of pests to attack the crop as in the case of bollworm being replaced by other pest species in the case of Bt cotton. In terms of health impacts, not much can be conclusively said in the case of GM foods (Variava, 2017). There are however, concerns over increased chemicals being used in growing high-yielding varieties of crops and the consequent health effects. In terms of environmental consequences, other than potentially toxic substances being used as pesticides and herbicides, other consequences can follow in the shift from traditional agriculture to few high-yielding crop varieties grown on a large scale. Farmers have traditionally planted a wide variety of crops with unique genotypes. The planting of fewer crop varieties for

producing high yields can reduce genetic diversity among crop species in a country that the botanist N. I. Vavilov identified as among the 6 centres of origin of agronomic crop biodiversity. Soil quality can also decrease as a result of the green revolution in India in terms of soil degradation, contamination and fertility. High-yielding crop varieties can also increase irrigation requirements thus placing stresses on India's water budget.

There can be no guaranteed assurance that using high-yielding seeds will increase yields exponentially, which also can be dependent on agricultural practices and environmental elements. The stress on resources on the other hand, can place high requirements on farmers to invest in farm implements that can help them achieve high yields for their produce. In this small and marginal farmers can be placed at a distinct disadvantage in securing high profits for their produce.

The lack of development of policy instruments such as irrigation systems for example can also place them under stress especially during times of natural calamities. This can occur along with impacts on the environment and human health, the cumulative effects of which have not as yet been conclusively ascertained. A more comprehensive policy environment is required that can protect farmers, human health and the environment from the negative impacts of the green revolution in India. A balance must also be found between traditional techniques and modern farming as also with natural growth.