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A Primer on Green Revolution

M. N. O. Sadiku[1], S. R. Nelatury[2], S.M. Musa[1]

[1]College of Engineering, Prairie View A&M University, Prairie View, TX 77446
[2]School of Engineering and Engineering Technology, Pennsylvania State University, Erie, PA 16563-1701

Abstract The Green Revolution refers to the transformation in agricultural practices in many parts of the developing nations (such as Mexico, India, Pakistan, Tanzania, Nigeria, Malaysia, and the Philippines) that led to a significant increase in agriculture production between 1940 and the 1960s. It is a combination of controlling chemicals in the soil and pest and mechanization of agriculture. The revolution sought to replace subsistence agriculture with commercial agriculture. This paper provides a brief introduction on green revolution, its advantages and disadvantages.

Keywords green revelation, the third agricultural revolution, second green revolution

Introduction

Agriculture is the largest industry in the world, feeding billions of people. In order to be able to feed everyone, there was a need to introduce the latest in science and technology to agriculture production.

Humans have witnessed many revolutions that have dramatically changed lives, such as the American Revolution and the Industrial Revolution. Another revolution, known as the Green Revolution (GR), has occurred and has changed agriculture sector. The agricultural industry was able to produce large quantities of food.

The Green Revolution (or the third agricultural revolution) refers to a set the development of technology transfer initiatives occurring between the 1930s and the late 1960s. The term "Green Revolution" was first used William S. Gaud, in a March 1968. It was funded by the Rockefeller foundation**,** the Ford foundation, the World Bank, the US Agency for International Development (AID), aid agencies, and government agencies around the world. The Green Revolution spread technologies that already existed, but had not been widely implemented outside industrialized nations [1].

Today, most farmers practice modern farming under Green Revolution. The Green Revolution is an alternative solution pushed by the government to replace traditional agricultural means of growing crops.

Characteristics of GR

GR would not have been possible without earlier scientific breakthroughs. The GR refers to the application of science and technology to increase agricultural production and productivity. The GR transformed farming practices in many regions of the tropics and sub-tropics. Some of the major changes in agricultural practices due to Green Revolution are summarized as follows [2,3]:

- Mechanization on broad scale was a major change.
- GR farming is characterized by its uniform monocultures.
- Package of inputs and modern varieties and high yielding varieties.
- The adoption of new crop varieties.
- Increase in use of machinery and fertilizers.

- Increase in irrigational facilities and agricultural credit.
- Multiple cropping was implemented during the Green Revolution and led to higher productivity.
- The program demanded that farmers use pesticides to kill pests.

Timing is a critical aspect of revolutions. GR spread technologies which had existed only in industrialized world. The technologies included irrigation projects, pesticides, synthetic nitrogren fertilizer, and improved crop varieties.

GR In Emerging Economies

The Green Revolution was a great technological success story of the second half of the 20th century. Green revolution thrives in emerging economies including India, Africa, Latin America, and much of Asia.

- *Mexico*: Some regard 1944 as the beginning of GR when the Rockefeller Foundation tried to improve Mexican agricultural output. For this reason, some assert that the Green Revolution began in Mexico. The results were so astounding that Mexico was transformed from being an importer of wheat to an exporter [4]. The GR experience in Mexico has shown that rapidly increasing agricultural production and productivity is feasible in a relatively short time. The success of the program was repeated elsewhere in the developing world.
- *India*: From its independence in 1947 till 1965, India's agricultural production could not meet the country's needs. Since independence, GR became the catchword in India. In India, GR comprised three factors: the continual expansion of farming areas, doubling the existing output of crops, and making use of genetically improved seed. GR completely replaced the traditional farming system. Through GR, India was able to feed vast populations by relying on a genetically engineered rice variant. The Green Revolution was introduced in 1967-68 in India. It led to a spectacular increase in agricultural production of food grains, especially the wheat, and brought prosperity to the farmers. However, practical application of GR strategies has been uneven geographically. The agricultural modernization was experienced differentially by households of different economic status. Large farms benefit more from GR because they can afford canal irrigation, while the small farmers may need loans with high interest rates to irrigate their farms [5,6].
- *Africa:* African leaders have acknowledged that agriculture plays a crucial role in their economic development and that lack of investment in the sector would only leave them farther behind. Farmers in Africa are faced with challenges such as unstable governments, widespread corruption, and a lack of infrastructure particularly less developed roads and water resources. Agencies like the World Bank stressed fiscal discipline, leading African nations to withdraw support for agriculture. The Rockefeller Foundation along with the Gates Foundation launched a Green Revolution in Africa, the Alliance for a Green Revolution in Africa (AGRA). The revolution was designed to transform farming practice and reduce poverty in Africa. This involved a shift from traditional modes of agriculture production. The good news is that the economies of African countries are growing and the governments are supporting agricultural sector. Political will is being demonstrated through bold action by a number of African governments [7,8].

The same success story can be told of Vietnam, Pakistan, the Philippines, Malaysia, Korea, and China.

Advantages

To have a well-informed decision, it is best to look the main advantages and disadvantages of GR. The major advantages include the following [9]:

1. It allows agricultural operations on a massive scale
2. It makes plants that are resistant to pests and herbicides
3. It has the potential to be able to grow any crop anywhere
4. It eliminates the need to fallow lands
5. Ability to grow any crop virtually anywhere
6. Great increase in production of food grains (especially wheat and rice)
7. Positive impacts on poverty reduction and lower food prices

8. Farmers can grow and export cash crops for profit
9. Jobs opportunities are created in the agricultural and industrial sector
10. Increase in agricultural production and productivity
11. It decreases amount of human labor
12. Without GR, more land would be needed for agriculture

An important effect of GR is that traditional agricultural practices have been replaced by scientific practices. GR has caused increased agricultural production by overcoming cultural and religion constraints on technology.

Disadvantages

The critics of the Green Revolution insist that GR is an agricultural model which relied on a few staple and market profitable crops. They claim that it also produces problems.

Those problems or disadvantages include [9]:

1. It causes pests and weeds to develop hazards
2. It employs mono-culturing
3. It results in both the depletion and pollution of water
4. It tends to reduce the natural fertility of the soil
5. New machines meant less people are needed to farm
6. High cost: cost of farming equipment is expensive for small farmers
7. Income inequalities increased between rich and poor farmers
8. Pesticides and herbicides are a health hazard to farmers
9. Women farmers have gained proportionally less than their male counterparts

A revolution of this magnitude created some problems of its own. GR has been widely criticized for causing environmental damage and increased income inequality. Few nations can afford the equipment that GR programs require. GR brought more income to the already rich, thereby widening the gap between the rich and the poor.

Second Revolution

The first GR helped alleviate food shortage in several developing nations. Although the GR has improved agricultural output in some regions in the world, there is still room for improvement. During the post-GR period, there has been renewed interest in agricultural investment, and there are calls for the next Green Revolution. There has been recognition of the limitations of the first GR and the need to correct those limitations and minimize unintended negative consequences. Due to this, the Second Green Revolution (GR 2.0) will likely focus on improving tolerances to pests and disease in addition to technological input use efficiency. GR 2.0 is already taking place in low income nations [10]. GR 2.0 must focus on shifting the yield frontier for the major staples.

It should be all inclusive in its coverage of small farmers, rainfed areas, sustained use of resources, and application of nanotechnology.

Conclusion

Green revolution is the agricultural transformation of less developed nations. It has been a milestone in the international agricultural movement. It has had an enormous impact.

It has not been a red, bloody revolution as critics predicted.

The GR was successful for a number of reasons. There has been increased food production commensurate with the growing population. There had been a close relationship between farers, scientists, and policy makers. Some have hailed GR as the greatest thing that has happened to the developing world. More information about the Green Revolution can be found in [11-17] and other books available in Amazon.com

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About the Authors

Matthew N.O. Sadiku is a professor at Prairie View A&M University, Texas. He is the author of several books and papers. He is an IEEE fellow. His research interests include computational electromagnetics and computer networks.

Sudarshan R. Nelatury is an associate professor at Penn State University, The Behrend College, Erie, Pennsylvania. His teaching and research interests lie in electromagnetics and signal processing.

Sarhan M. Musa is a professor in the Department of Engineering Technology at Prairie View A&M University, Texas. He has been the director of Prairie View Networking Academy, Texas, since 2004. He is an LTD Sprint and Boeing Welliver Fellow.