

# **SUSTAINABLE DEVELOPMENT AND ENVIRONMENT PROTECTION**



कला, वाणिज्य व विज्ञान  
कनिष्ठ व वरिष्ठ महाविद्यालय

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**ISBN No.** 978-93-83995-70-8

### **Published by:**

Anuradha Publications

Cidco-Nanded

**Publication Year:** 2017-18

**Price-** Rs. 100/-

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### **Printed by**

Gurukrupa Offset,

Near Police Station, Gangakhed

### **Typesetting by:**

Simran Computers

Gangakhed Dist.Parbhani

### **Cover Designby:**

Mr. Imran K. Mohammad

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## **ROLE OF TECHNOLOGY IN AGRICULTURE AND RURAL DEVELOPMENT**

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### **Introduction**

Economy of India is the seventh-largest in the world by nominal GDP and the third-largest by purchasing power parity. The agricultural sector is main occupation in India's economy but contributes to a declining share of its GDP (17% in 2013-14). India ranks second worldwide in farm output. Agriculture and allied sectors like forestry, logging and fishing accounted for 17% of the GDP and employed 49% of the total workforce in 2014. It is the largest employment source and a significant piece of the overall socio-economic development of India. On the eve of Independence in 1947, Indian agriculture was characterized by feudal land relations and primitive technology, and the resultant low productivity per hectare. As a consequence, rural India presented a picture of mass poverty and widespread unemployment and under-employment. Therefore, the first task of the Government in the immediate post-Independence period was to initiate growth process in agriculture on modern lines. Modernization of agriculture was required both in terms of technological and institutional changes.

### **Green Revolution in India**

Throughout history there have been many revolutions that have occurred and changed human lives, such as the American Revolution and the Industrial Revolution. In the mid- and late-20th century a revolution occurred that dramatically changed the field of agriculture, and this revolution was known as the Green Revolution. The Green Revolution was a period when the productivity of global agriculture increased drastically as a result of new advances. During this time period, new chemical fertilizers and synthetic herbicides and pesticides were created.

The chemical fertilizers made it possible to supply crops with extra nutrients and, therefore, increase yield. The newly developed synthetic herbicides and pesticides

controlled weeds, deterred or kill insects, and prevented diseases, which also resulted in higher productivity.

Method used in Green Revolution - Double/Multiple cropping system, Seeds with superior genetics, Proper irrigation system, HYV seeds, Use of pesticides and fertilizers, Use of Modern Machinery (Tractor, Harvester, Thresher).

In addition to the chemical advances utilized during this time period, high-yield crops were also developed and introduced. High-yield crops are crops that are specifically designed to produce more overall yield. A method known as multiple cropping was also implemented during the Green Revolution and led to higher productivity. Multiple cropping is when a field is used to grow two or more crops throughout the year, so that the field constantly has something growing on it. These new farming techniques and advances in agricultural technology were utilized by farmers all over the world, and when combined, intensified the results of the Green Revolution.

As a result of the Green Revolution and the introduction of chemical fertilizers, synthetic herbicides and pesticides, high-yield crops, and the method of multiple cropping, the agricultural industry was able to produce much larger quantities of food. This increase in productivity made it possible to feed the growing human population.

The ability to grow more food on the same amount of land was also beneficial to the environment because it meant that less forest or natural land needed to be converted to farmland to produce more food. This is demonstrated by the fact that from 1961 to 2008, as the human population increased by 100% and the production of food rose by 150%, the amount of forests and natural land converted to farm only increased by 10%. The natural land that is currently not needed for agricultural land is safe for the time being, and can be utilized by animals and plants for their natural habitat.

### **Double Cropping:**

Double cropping was a primary feature of the Green Revolution. The idea was for farmers to have two crop seasons within one year. This meant that the crop production would double within one year. This was based primarily on the natural one monsoon per calendar year. For farmers to have to double the crops per season there would have to be one artificial monsoon. These were created from a large irrigation facility. Dams were built in rural areas to collect large volumes of monsoon rainwater. Before the Green

Revolution, this water was wasted. This was a simple irrigation technique that rural farmers adopted. However, in a year without monsoon, this led to failure.

**Economy:**

The irrigation and growth of wheat and rice are very important to the economy and production of livelihood in India. These are the main products that most families can afford and live off on a daily basis. About 75% of cropped land is devoted to food grains such as rice, wheat, maize, and barley. Rice and wheat contribute to approximately 70%-90% of the food requirements for the people of India. Because of the high yielding varieties, the soils are too dry when the monsoon season fails when the agricultural industry needs an adequate amount of water for the rice and wheat to grow properly, but that water is not available, it poses a great problem to the success of the Green Revolution. Countries involved in the Green Revolution have subsidies in part with the prices of the fertilizers, pesticides and the production of wheat and rice. At the beginning, there were no problems with the Green Revolution until the farmers and government started to see problems arising. The sudden change in agricultural techniques developed caused a rapid change creating economic imbalance among farmers, which contributed to large interregional agricultural disparities. It has been brought to the attention of many farmers that crop productivity needs to increase in order to keep up with the competitive agricultural market. In order to survive the market, may need to increase productivity in order to keep an income coming in for a family. This requires new technology being brought into their farms to succeed in the agricultural industry in India, and yet not all farms can afford this new technology. There has been an ongoing debate in India surrounding the survival of farmers: whether to increase agricultural productivity or improve food quality. Ever since the Agreement on Agriculture was created in 1999 from the World Trade Organization this has been a topic surrounding not only farmers but this problem affects mostly everyone living in India. This idea was created to replace agriculture price support with direct payments to farmers from production dates.

**Farmer Suicide:**

The pressure farmers have to produce a certain amount of crops yearly puts many stresses on top of their busy lives. Farmers who cannot produce a certain amount of crops, they believe that the stress about not being able to provide for their families,

Which they believe life not worth living any longer. In 2002, there were over 1000 suicides reported from 12 districts of Maharashtra, India. The rising amount of debt that farmers collect from having to purchase fertilizers and pesticides puts a large strain on themselves. Within the process of producing the second round of crops within one year, when the second round does not produce as quickly or they do not have the same quality, farmers get very distressed that they will not be able to sell these crops. The government in India has been in denial about the number of suicides that have occurred since 1987, which has arisen to over 10,000 suicides committed by farmers. This is within the same time that the Green Revolution began to tumble and not be as successful.

### **Agricultural Machinery**

Agricultural Machinery Industry plays an important role in the Indian economy as the agriculture sector still contributes majorly to the country's GDP. The northern region comprising of Punjab, Haryana, Delhi, Chandigarh and Rajasthan has more than 300 registered small scale agricultural machinery and 9 tractor manufacturing units. For research and technology to have an impact on poverty reduction by boosting agricultural productivity, research itself needs to focus on the needs of poor people. The extent to which research and technology benefit poor people depends on the nature of the technology introduced as well as the institutional and policy context. Higher agricultural productivity might be achieved through qualitative improvements of crops (i.e. stress resistance), however, increases in income will not be realized without proper access to markets to sell excess produce and appropriate infrastructure development to reach those markets. Likewise, the introduction of mixed farming systems and reductions in purchased inputs might require institutional changes, for example in the form of extension service reform and the promotion of community-based groups. Recognizing the importance of research in improving agricultural productivity, the FAO has proposed the Anti-Hunger Program, which combines concrete measures to increase agricultural productivity and the uptake of appropriate technologies by poor rural communities, ensuring also access to food for the most needy through safety nets and other direct assistance. The intention of the Anti-Hunger Program is to give higher priority to research and resource mobilization for agriculture and non-farm activities in rural areas.

Agricultural produce is the biggest resource of economic activity and development in India. Be poultry, pisciculture, horticulture, apiculture, dairy

development, etc. These activities create a big base for agricultural machinery and other inputs. Any kind of industry which uses agricultural products as a raw material, directly adds to the list of products "Make in India (MII)". Hence, to boost agricultural production has multiple impacts, including MII. With increased agricultural production rural economy is boosted and migration of marginal farmers can be reduced. For example, to utilize the marginally productive land, we may shift to cultivation of Biofuels. Very soon fossil fuels will bid us a farewell? Better start now, earmark portions of marginally productive land for biofuels. This will not only increase effective land use but increase job opportunities in manufacturing biofuel sector. All marginally productive land could be utilized under conservative agricultural practices, to protect such lands from further degrading and stop creation of scrub land, any more. Since return from biofuel crop will be just like a cash crop. Returns will be quick. Hence any loan taken for growing biofuel crops will increase financial flow in the rural economy. Such initiatives will grow rural economy, reduce marginal land from degradation, stop unwanted migration from rural areas and reduce carbon emissions (both by cultivation and providing biofuel). These crops do not require extensive pest control, hence are bio friendly. Further, tillage practices are simple. Little extension support of farm technology will be required. In view of the said state conservation agriculture within local resources is a win win situation for all.

#### **High Yielding Variety Seeds:**

To feed the growing population and make farming a more sustainable and profitable business, DuPont delivers hybrid seed solutions that increases crop yields in different weather and soil conditions. India clearly needs a second green revolution that is broad-based, inclusive and sustainable; we need to produce more without depleting the natural resources any further. (Source: Prime Minister's Speech at ICAR Foundation Day 2011, ICAR website).

These seeds are of a better quality than that of normal quality seeds. The production from these seeds is better than production from the normal ones. These seeds are also known as miracle seeds. Some of the major examples are Paddy, Jowar, Bajra, and Wheat & Maize.



## Conclusion

Information technology is expanding rapidly and touches almost all areas of human activity. Farms that farmers can participate in the creation of web portals for direct sale that are so necessary, and system for data manipulation and store related any activity of farming. Agricultural universities must prepare students to use new IT, but also different, e.g., Meaning of extension services, and creating a new specific websites using the web should help farmers. Providing a better quality of life in rural decision making capabilities can be improved by the quality of information inputs. IT to meet these challenges and to remove the fast growing digital divide rural India can play a major role in facilitating the process of transformation. Rapid changes in the field of information technology in rural, it is necessary to develop and disseminate making electronic services. Undertaking tasks in the current bottlenecks need to be addressed immediately. IT penetration in rural to lead a national strategy needs to be drawn. A national coordinating agency with an advisory role can act as a catalyst in the process. No one organization can succeed alone, farmers and rural empowering function. At the same time, scattered and half-hearted efforts may not be successful in meeting the objective. Villages such as fertilizer sector, with the main part of the industry, have come together to promote early.

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