

## BETTER TECHNOLOGY HAS PRODUCED BETTER YIELDS IN AGRICULTURE IN INDIA

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### Abstract

Agriculture is one of the most important sector of Indian economy. Indian agricultural economy was largely subsistence in nature before Independence. Currently, India is a larger supplier of agricultural products in worldwide market. India supply large number of products like tea, coffee, spices, wheat, millets, fruits, vegetables, rice, etc. As far as production, India is the top producer of milk, and wheat is the second most important cereal crop in India after rice. Despite the above fact the National Gross Domestic Product has been declining, the progress in this field is still far behind. The main purpose of this paper is to identify the challenges faced by Indian agriculture in yielding of agricultural products and how better technology solving their problems.

**Keywords:** GDP, Sustainable, Exports, Smart Farming, Precision Farming.

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### Introduction

Agriculture is a vital part of India's economy, contributing to the country's GDP and providing a livelihood for a large portion of the population. Agriculture is a backbone of the Indian economy. According to Economic survey 2023-24, In the last five years, the agriculture sector has grown at an average growth rate of 4.18 percent per year. India exports more than 7 per cent of its food grains. Indian agriculture sector provides livelihood support to about 42.3 per cent of the population and has a share of 18.2 per cent in the country's GDP at current prices. Since independence it has gained an excellent level of progress, in the green revolution, blue revolution, yellow revolution. There has been a significantly increase in agricultural output and improvement in technology during the last 50 years. Production and yield of many crops such as rice and wheat has increased at an impressive rate. Among the other crops, the production of sugarcane, oilseeds, and cotton has also increased appreciably. India ranked first in the production of pulses and jute in 2011 it is second largest producer of rice, wheat, groundnut, sugarcane, and vegetables. Agriculture is demographically the broadest economic sector which plays a vital role in the overall economic scenario. The development of different regions and the entire economy of India relies upon the performance of agriculture to a significant degree. Agri exports at all time high of US \$50.2 billion in 2021-22, which is a good indication for the Indian economy toward the agriculture sector.

Presently, agricultural systems is neither economically nor environmentally sustainable. In future the technologies should lead to a sustainable improvement in the agriculture production which should not only improve the productivity of agriculture but also increase the quality of natural resources. Today, dependence on erratic monsoon, lack of commercialisation, degradation of cultivable land, regional variation and disorder in marketing of Agricultural products are some reasons due to which the growth in agriculture is still slow, which is a major issue as more than half of the population directly or indirectly depend on agriculture.

### Significance of Agriculture

Agriculture remains the most important sector of the Indian economy, whether it be the pre-independence or the post-independence periods. This fact is emphatically proved by the large number of people who depend on it for their livelihood. Agriculture provides a livelihood for about 42.3% of the population. Agriculture is the main occupation in rural areas. About 51.09% of India's land is used for crop cultivation, whereas in the world, the corresponding share is only about 12%. The agriculture sector is a key source of food security for a large portion of the population. The average monthly income per agricultural household increased from Rs. 6,426 in 2012-13 to Rs. 10,218 in 2018-19. According to the Economic Survey 2023-24, more than 45% of India's workforce is employed in agriculture. According to the Periodic Labour Force Survey (PLFS) conducted by the National Sample Survey Office (NSSO), Ministry of Statistics and Programme Implementation (MoSPI), about 45.76% of the total workforce is engaged in agriculture and allied sector during 2022-23. The Importance of agriculture in India can be gauged from the fact that about 51.09% of its land is devoted to crop cultivation. Despite various constraints, Indian agriculture has marched long way since independence.

Agriculture is not only the biggest sector of the economy, but also the biggest private sector too. It is the only profession which still carries no burden of individual income tax. For the improvement of agriculture proper planning should be taken. Planning like Promoting Crop Diversification, Investment and Access to credit in Agriculture and allied sectors (DFI 2016 report indicated that to double farmers' income over the period of 2016-17 to 2022-23, income would need to grow at an annual rate of 10.4 per cent, which in turn would require an annual growth rate in agriculture investment of 12.5 per cent), Agriculture Marketing, Sustainable Agriculture, farm mechanisation, bring innovative ideas in the farming sector for the solving the problems of agriculture in our country. According to the Ministry of Statistics and Programme Implementation, in 2021-22, 45.5 percent share of workers work in agriculture.

Since agriculture acts a crucial role in the Indian economy, it not only helps in the formation of capital but also provides provision of employment opportunities for people. This is the biggest unorganised sector of the economy accounting for more than 90 percent share in the total unorganised labour force of the economy. The crude materials that are available to the industries are created inside the agrarian division and it is a business opportunity for industrial products.

Source: Ministry of Statistics and Programme Implementation

### Importance of Better Technology in Agriculture in India

The importance of better technology in agriculture in India cannot be overstated, as it plays a critical role in enhancing productivity, sustainability, and profitability in the sector. Here are several key points highlighting the significance of improved technology in Indian agriculture:

- 1. Increased Productivity:** Advanced agricultural technologies, such as high-yield variety seeds, precision farming tools, and modern irrigation techniques, can significantly enhance crop yields. This is essential for meeting the food demands of a growing population.
- 2. Sustainable Practices:** Technologies that promote sustainable agriculture, such as organic farming, integrated pest management, and soil health monitoring, help reduce the negative environmental impact of farming practices. This is crucial in a country where soil degradation and water scarcity are significant concerns.
- 3. Efficient Resource Management:** Improved technology can optimize the use of water, fertilizers, and pesticides. For example, drip irrigation and sensor-based irrigation systems can reduce water wastage, while precision agriculture helps in applying inputs only where they are needed, thus minimizing costs and environmental impact.
- 4. Data-Driven Decision Making:** The use of data analytics, machine learning, and mobile applications can empower farmers with real-time information about weather conditions, market prices, and pest outbreaks. This enables informed decision-making, improving both productivity and profitability.
- 5. Access to Markets:** E-commerce platforms and digital marketplaces can connect farmers directly to consumers, reducing the role of middlemen and ensuring better prices for their produce. This technological shift can enhance farmers' incomes and provide them with more control over their sales.

**6. Post-Harvest Management:** Better technology in storage and processing can reduce post-harvest losses, which are a significant issue in India. Innovations such as cold storage, solar drying, and mobile processing units can help preserve the quality of agricultural produce and extend its shelf life.

**7. Climate Resilience:** Climate-smart agricultural technologies can help farmers adapt to changing weather patterns and extreme conditions, such as droughts and floods. This includes developing drought-resistant crop varieties and implementing agroforestry practices.

**8. Enhanced Livestock Management:** Technology in animal husbandry, such as veterinary telemedicine, health monitoring sensors, and better breeding techniques, can improve livestock productivity and health, contributing to the overall agricultural economy.

**9. Skill Development and Training:** The introduction of technology in agriculture necessitates training and skill development for farmers. This can lead to better employment opportunities and a more knowledgeable workforce, fostering rural development.

**10. Reducing Rural Poverty:** Improved agricultural technologies can help lift rural communities out of poverty by increasing productivity and income, thereby improving the standard of living for farmers and their families.

### Problems of Indian Agriculture

Indian agriculture faces numerous challenges that impact productivity, sustainability, and farmers' livelihoods. Here are some of the key problems:

**1. Fragmented Landholdings:** With a large number of small and marginal farmers, landholdings are often fragmented, leading to inefficient farming practices and low productivity.

**2. Low Agricultural Productivity:** Compared to global standards, agricultural productivity in India is relatively low due to outdated farming techniques, lack of access to modern technology, and insufficient investment in research and development.

**3. Dependence on erratic monsoons:** A significant portion of Indian agriculture is rain-fed, making it vulnerable to fluctuations in weather patterns. Irregular monsoon rains can lead to droughts or floods, severely affecting crop yields.

**4. Soil Degradation:** Intensive farming practices, excessive use of fertilizers and pesticides, and monoculture have led to soil degradation, loss of fertility, and reduced agricultural output over time.

**5. Water Scarcity:** Over-extraction of groundwater and inadequate irrigation infrastructure contribute to water scarcity, limiting agricultural productivity and sustainability.

**6. Pest and Disease Vulnerability:** Crop diseases and pest infestations can devastate yields. Limited access to pest-resistant varieties and biological pest control methods exacerbates this issue.

**7. Climate Change:** Changes in climate patterns affect agricultural productivity, crop selection, and water availability. Farmers often lack the knowledge and resources to adapt to these changes.

**8. Lack of Financial Support:** Many farmers struggle to access credit and insurance. High-interest loans from informal sources can lead to indebtedness and financial instability.

**9. Government Policies and Subsidies:** While there are various government schemes, the implementation can be inconsistent, and benefits may not reach all farmers equally.

**10. Sustainability Issues:** The over-reliance on chemical inputs and traditional farming methods can lead to long-term sustainability issues, affecting biodiversity and ecosystem health.

Addressing these challenges requires a multi-faceted approach, including policy reforms, investment in research and technology, better infrastructure, and improved access to markets and financial services.

### **Role of Technology for Improving Agriculture Yields in India**

Technology plays a pivotal role in improving agricultural yields in India, which is crucial for enhancing food security and farmer incomes. Here are several key areas where technology contributes significantly:

#### **1. Precision Agriculture:**

- **GPS and GIS:** These technologies help in mapping fields and analyzing soil health, moisture levels, and crop health, enabling farmers to make informed decisions on planting and resource allocation.

- **Drones and Satellite Imagery:** Drones can monitor crop health, assess damage, and optimize irrigation and fertilization, allowing for timely interventions.

Best practice in Kerala farmer uses UAVs in his plantation, shares the idea with agricultural scientists and officials

- A farmer in Kerala's Wayanad has been using unmanned aerial vehicles (UAV) or drone technology in his plantation after completing a six-month online course on "Drones for Agriculture" from the Wageningen University and Research of The Netherlands.

- The key advantages of drone technology in the agricultural sector include:

- Aerial spraying of fertilisers and insecticides
- Access to real-time information
- Drone imaging is more accurate and precise than satellite imaging as satellite imaging can be impacted due to various weather conditions
- Ability to capture micro-level images
- Selective application of weedicides and micronutrients
- Helps in precision farming
- Helps in the overall improvement of agricultural practices at a lower cost.

#### **2. Soil Health Management:**

Farmers can test soil nutrient levels and pH to apply the right fertilizers and amendments, leading to better crop growth and reduced input costs.

#### **3. Irrigation Technology:**

Drip and Sprinkler Irrigation and smart irrigation systems mainly used for arid areas.

#### **4. Genetic Engineering and Biotechnology:**

- **High-Yielding Varieties (HYVs):** Improved seed varieties that are drought-resistant, pest-resistant, and high-yielding contribute to increased productivity.

- **Genetic Modification:** Advances in biotechnology allow for the development of crops that can withstand harsh conditions and pests, ensuring better yields.

#### **5. Data Analytics and AI:**

Farm Management Software and AI algorithms can forecast crop yields, pest outbreaks, and market prices, helping farmers plan accordingly.

#### **6. Market Access and E-Commerce:**

- **Digital Platforms:** Technologies that connect farmers directly with consumers, such as e-commerce platforms and mobile apps, help them get better prices for their produce.

- **Supply Chain Management:** Innovations in logistics and supply chain technology improve the efficiency of getting products from farm to market.

### **7. Climate-Smart Agriculture:**

Technologies that promote agroecological practices, crop rotation, and intercropping enhance resilience to climate change and improve soil health.

### **8. Online Learning Platforms:**

These enable farmers to learn about new technologies, best practices, and sustainable farming techniques.

### **9. Research and Development:**

Partnerships between governments, universities, and private companies drive innovation in agricultural technologies tailored to local conditions.

By harnessing these technologies, India can improve agricultural productivity, enhance food security, and promote sustainable farming practices, ultimately leading to enhanced livelihoods for farmers and rural communities.

### **Conclusion**

Better technology in agriculture is crucial for India to achieve food security, enhance farmers' livelihoods, and promote sustainable agricultural practices. The government, private sector, and research institutions must collaborate to foster innovation and ensure that these technologies are accessible to all farmers, particularly smallholder farmers who form the backbone of Indian agriculture. Agriculture is a fundamental aspect of human civilization, influencing economic development, cultural identity, and environmental health. As the world continues to evolve, the future of agriculture will depend on balancing productivity with sustainability, ensuring that it meets the needs of a growing population while preserving the planet for future generations.

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