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The Future of Indian Agriculture

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Introduction

Indian agriculture has advanced quickly during the past 75 years. Two-thirds of the population of India depends on the agricultural industry because it is an agrarian nation. According to ICAR, India has a sizable amount of arable land with 15 agro-climatic zones, which can support a wide range of climatic conditions, soil types, and crop kinds. Improved and new mechanized agricultural equipment is being imported into India.

FROM THE FARM

Agri production estimates (mn tonnes)

Crops	2nd advance estimates*	3rd advance estimates**	% change
Wheat	111.32	106.41	-4.41
Rice	127.93	129.66	1.35
Cotton***	34.06	31.54	-7.40
Pulses	26.96	27.75	2.93
Oilseeds	37.14	38.49	3.63
Coarse cereals	49.86	50.7	1.68
Sugarcane	414.04	430.49	3.97
Jute & Mesta #	9.57	10.22	6.79

Note: *Released on Feb 16, 2022; **released on May 19, 2022; ***in million bales; 1 bale=170kg; #in million bales; 1 bale = 180kg

Source: NSO (National Statistical Office)

Major Constraints in Indian Agriculture:

- Poor Irrigation Infrastructure
- Exhaustion of soils
- Improper Supply Chain Management
- Farming as a viable livelihood
- Inadequate storage facilities
- Exemption on Agricultural Income.
- Small and marginal holdings
- Subsistence Agriculture
- Low Credit supply
- Low penetration of Technology
- Less Value-addition at primary level

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Planners and other stakeholders must address the critical issue of agriculture's future. The government and other organisations are attempting to resolve some of India's major agricultural problems, such as the smallholdings of farmers, primary and secondary processing, supply chains, infrastructure to support efficient resource use and marketing, and a decrease in market intermediaries. To conserve the environment and our natural resources, we must develop technology that is both affordable and efficient. The agricultural sector in India still has a lot of untapped potential despite all the obstacles that make production and return more difficult.

Emerging Trends in Future Agriculture

1. **Digital Agriculture**: The availability of digital resources to farmers not only enabled optimal capacity utilisation, but also provided the opportunity to enhance field operations.

Some technologies used in future agriculture are:

1.1 Artificial Intelligence

1.1.1 Crop and soil monitoring

1.1.2 Predictive Agricultural Analytics

1.1.3 Agricultural product Grading.

1.2 Unmanned Aerial vehicle (UAV)

1.3 Temperature and Humidity sensors,

1.4 Aerial imagery

1.5 GPS technology.

Implementation of digital agriculture in India: The following steps can be taken to make digital agriculture successful in India;

- Low-cost technology
- Portable hardware
- Academic support.

Benefits of digital agriculture:

- Prevents soil degradation.
- Raises the socio-economic status of farmers.
- Reduces environmental impact.

2. **Use Nano-Technology:**

- Nano-pesticides and nano-herbicides

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- Nano-materials for disease management
- Nano-fertilizers
- Nano-technology in seed development
- Nano-biosensors.

3. New Biological Techniques:

An increased emphasis is being made on the use of biological technology in farming operations and the development of new organic technology in order to avert additional environmental and agricultural harm.

4. Agricultural Diversification:

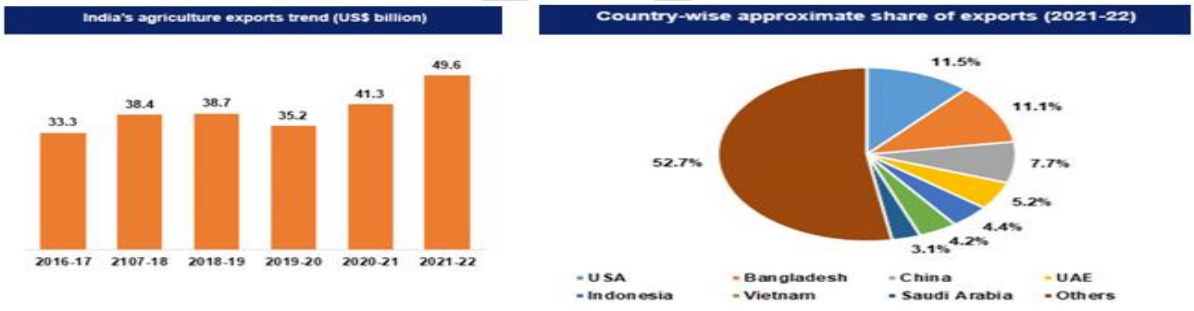
- Crop diversification can be used as a method to support sustainable agriculture, lessen reliance on imports, and increase farmer income.
- Bio-fuel (Energy Independence): Quest for Energy Independence will encourage the diversion of sugarcane for ethanol production, which will result in a decrease in the sugar glut in the country

5. Automation in agriculture:

- Self-driven tractors
- Self-driven: Tractors are the next self-propelled tractor or driverless tractors. Combined with GPS technology, there has been rapid growth in agriculture and farming as a whole. Farmers can now program their tractors and focus on operational activities.

6. Agricultural exports:

In terms of agricultural exports, India is in an excellent position because the country's agricultural industry benefits from low labour costs, favourable weather, and low input cost per unit of input.



Source: The Ministry of Commerce & Industry.

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7. Enhanced hybridization:

Gene Editing Boom for climate change in Agriculture. Disease resistance can be increased by using hybrid seeds with inherent qualities. The amount of chemical residue in soil and water is decreased, two to three sprays are saved, and fewer chemicals are used on plants.

8. Drip irrigation:

With the help of sensors and technology, drip irrigation may precisely focus on watering and crop protection goals depending on regional demands, pressure from pests and diseases, and requirements of the plant life cycle.

9. Precision farming:

The use of nutrients and other agricultural inputs can be considerably reduced while yields are increased by using precision agricultural management techniques. As a result, farmers save money on the costs of fertiliser, pesticides, and water.

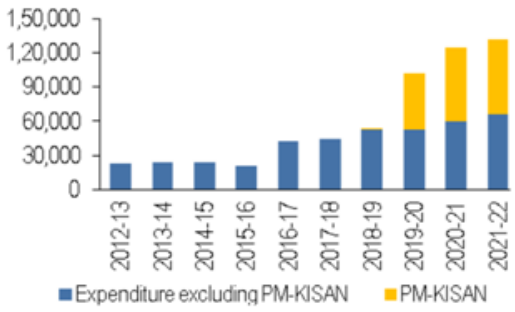
10. Organic farming:

In India, organic farming will thrive and help feed 1.6 billion people over the next ten years. By engaging in organic farming, environmental risks and soil deterioration can be minimised.

11. Improved Storage and Supply-Chain Facilities:

While not precisely known, India wastes some 20% of its fruits and vegetables and highly perishable/seasonal ones. The amount of wasted food will decrease, and agricultural waste will be used more effectively. The private sector will have a greater number of warehouses, and there will be more connections between public and private warehouses. This will assist in achieving market price stability for agri-outputs and balancing supply and demand.

12. Insured Farming:



Crop insurance's expanded coverage and the development of a social security system specifically for farmers will be bolstered by legislative changes that could one day increase their financial stability.

Figure 1: Expenditure of the ministry (Rs crore)

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Note: Revised estimate in 2021-2021; Budget estimate in 2020-2021.

Sources: Expenditure Budget, Union Budget (2014-2022);PRS

13. Changing Consumption Pattern:

Future demand for fruits and vegetables, dairy products, fish, and meat will rise as a result of globalisation, rising household incomes, and health consciousness.

14. Increase in Demand for Processed Food:

The export market is growing, and cities are setting the pace for diet diversification into high-value commodities. In the coming decade, cities will seek to protect their supply chains from external shocks. Green manufacturing will move closer to consumers in order to meet their demands for freshness and instant satisfaction.

Conclusion:

Food grain production surged to a record 308.65 million tonnes last season from a meagre 55 million tonnes (July 2020-June 2021).At current prices, India's gross value added (GVA) for the agricultural and related industries was 20.2% in the years 2020–21.The sixth-largest food and grocery market in the world is in India, and 70% of its sales come through retail.