Report on Contract Farming Industry in India (Focus: Processed Variety of Potato)

September 2025

Prepared for Farm Peace Limited

Disclaimer

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Executive Summary

- Agriculture is one of the key economic segments in India, contributing to nearly 18% of the country's GDP as well as supporting nearly 42% of the country's population. India is also one of the leading producers and a major exporter of agriculture products in the world.
- Adoption of contract farming in India is still in its infancy, with less than 2% of total agriculture land currently under contract farming. However, the potential of contract farming in India is huge, and in the coming years the sector is expected to register strong growth.
- Total area under contract farming in India was nearly 5.8 million hectares in 2024, and it is expected to reach nearly 7.8 million hectares by 2027. Among vegetables, tomato, onion and potato are the major crops currently grown under the contract farming model.
- Annual production of potatoes in India is estimated to be approximately 60 million tons in FY 2025, with nearly 85% of the annual production concentrated in the states of Uttar Pradesh, West Bengal, Bihar, Gujarat and Madhya Pradesh.
- Annual production of potatoes in the state of Gujarat is estimated to be nearly 4.5 million tons in FY 2025, accounting for nearly 7.5% of total annual production.
- Some of the notable processed potato varieties that are grown in the state of Gujarat include Santana, Frysona, and Chipsona, Sirpo Mira. Together these varieties have played a key role in transforming Gujarat into a major producer of processed potato varieties.
- Annual production of potato in India is expected to reach nearly 64.8 million tons by FY 2027, as against the production of 60.1 million tons in FY 2025. By FY 2027 the yield per hectare for potato farming in India is expected to reach 27.5 kg from 26.0 Kg in FY 2025.
- The competitive landscape for contract farming companies is shaped by a variety of factors, including the presence of large corporations, regional players, and emerging entrants. Iscon Balaji Foods Private Limited, HyFun Foods Private Limited, McCain Foods India Private Limited and Simplot India Foods Private Limited are few of the leading player in potato contract farming in India
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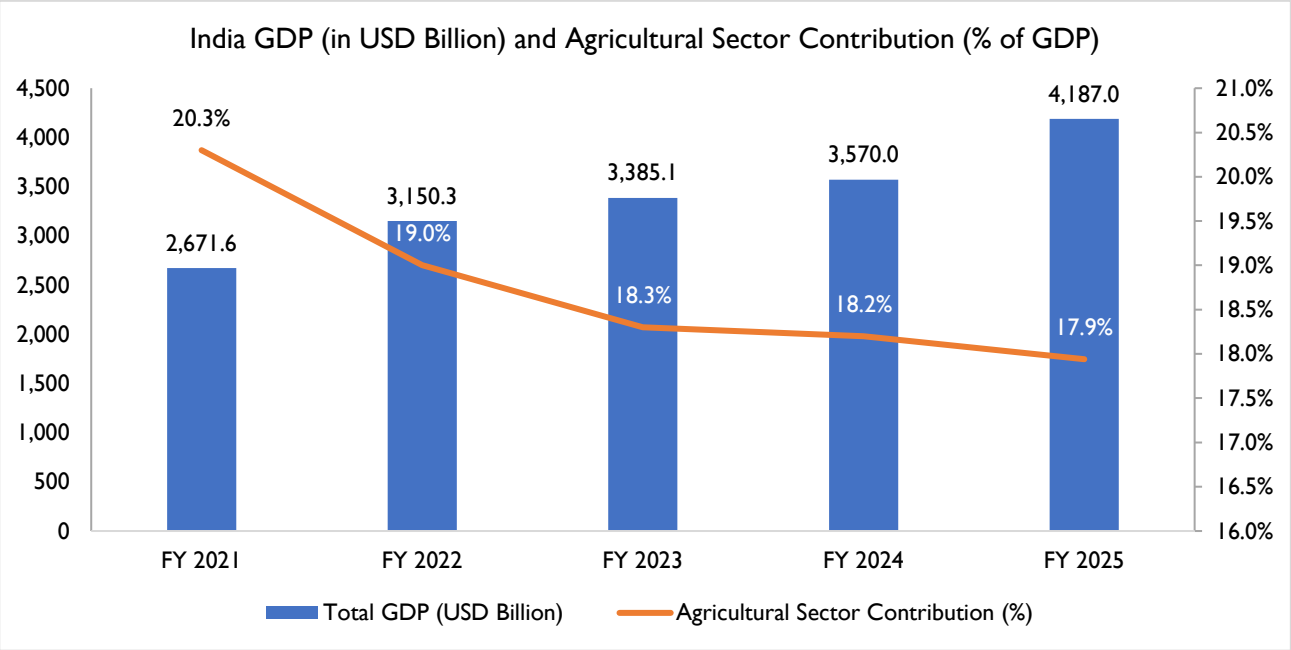
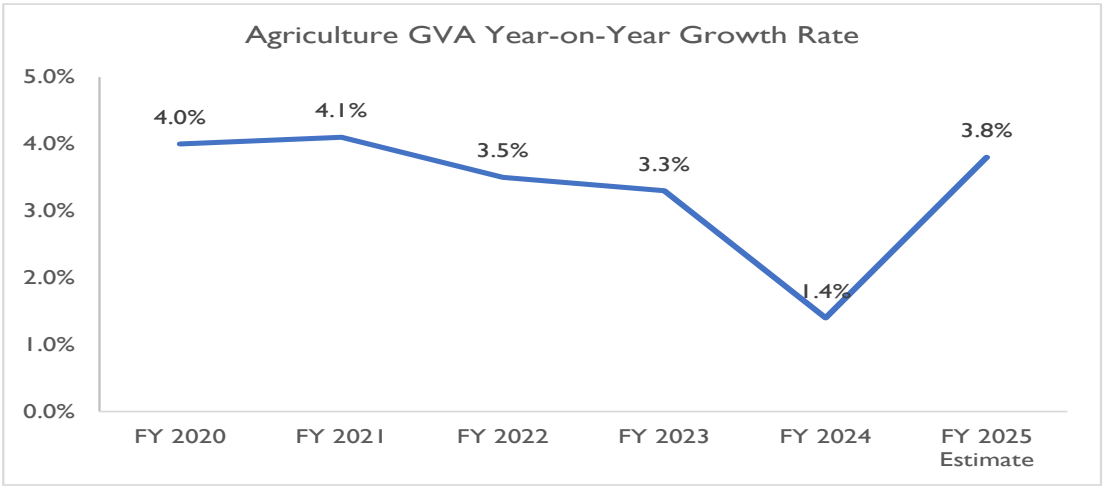
Indian Agriculture Sector

Indian agricultural sector plays a crucial role in the country's economy, providing livelihoods, ensuring food security, and contributing significantly to GDP. This sector encompasses a wide range of activities including crop production, livestock rearing, forestry, and fisheries. Agriculture sector's contribution to GDP has declined over the years as the country's manufacturing and services sector developed. It has declined to nearly 18% of GDP by FY 2025, from nearly 20.3% of GDP by FY 2021.



Source: Government of India

Agriculture GVA (Gross Value Added) in India is estimated to have grown by 3.8% in FY 2025, after recording a slower growth of 1.4% in FY 2024. The lower growth rate in FY 2024 is attributed to lower production from traditional crops due to unfavourable weather conditions.



Source: Government of India

Key Highlights

India is one of the major players in the agriculture sector worldwide and it is the primary source of livelihood for ~55% of India's population. According to the Economic Survey, the agriculture sector in India plays a pivotal role in supporting the livelihoods of approximately 42.3% of the population, contributing to approximately 18 % to the country's GDP at current prices.

The sector has demonstrated robust performance, with an average annual growth rate of 4.18% at constant prices over the past five years. For the fiscal year 2023-24, provisional estimates indicate a growth rate of 1.4% for the agriculture sector, reflecting its continued resilience and importance to the Indian economy.

India has the world's largest cattle herd (buffaloes), the largest area planted for wheat, rice, and cotton, and is the largest producer of milk, pulses, and spices in the world. It is the second-largest producer of fruit, vegetables, tea, farmed fish, cotton, sugarcane, wheat, rice, cotton, and sugar. The agriculture sector in India holds the record for second-largest agricultural land in the world generating employment for about half of the country's population. Thus, farmers become an integral part of the sector to provide us with a means of sustenance.

Foodgrain production in India touched 330.5 million metric tonnes (MT) in FY 2023 (3rd Advance Estimate). India is the world's 2nd largest producer of food grains, fruits and vegetables and the 2nd largest exporter of sugar. The Indian food industry is poised for huge growth, increasing its contribution to world food trade every year due to its immense potential for value addition. The Indian food processing industry accounts for 32% of the country's total food market, one of the largest industries in India and is ranked fifth in terms of production, consumption, export and expected growth.

Indian Agriculture Traditional Value Chain

A value chain is defined by a market-oriented collaboration of enterprises working together to produce, process, and market products and services in a streamlined and efficient manner. A well-organized agricultural value chain effectively integrates smallholder farmers with other key stakeholders and higher-level processes. This integration facilitates access to quality inputs, technology, industry standards, seamless credit, processing, and market linkages, among other critical resources.

In India, traditional agricultural value chains are typically small-scale, unorganized, fragmented, and disjointed, with produce passing through multiple channels and players, often unnecessarily. This results in redundant processes and multiple touchpoints at the farm gate. In contrast, an organized agricultural value chain enables intermediaries to coordinate their value-creating activities more effectively, resulting in greater overall value creation.

The existing value chain models in India can be classified into four types, each primarily aimed at reducing transaction costs and maximizing benefits for the value chain driver. However, these models tend to be biased toward the interests of the driver, which means they are not necessarily Pareto optimal i.e., they do not

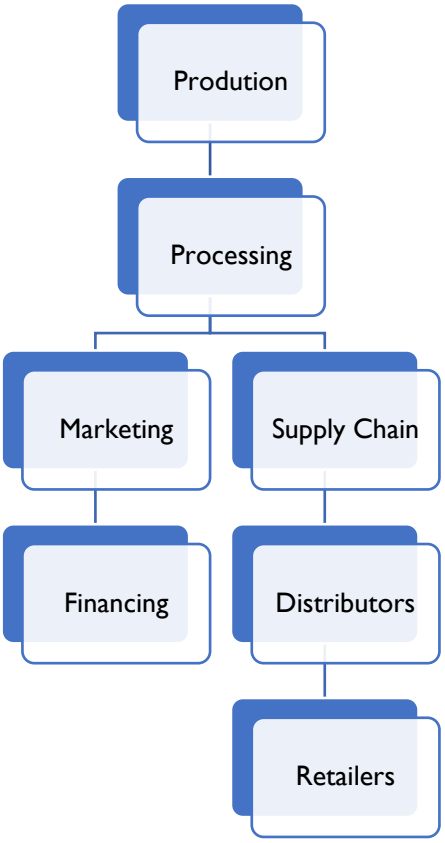
always achieve the most efficient and equitable distribution of benefits across all stakeholders in the value chain.

The agriculture value chain refers to the complete process through which an agricultural product is produced, processed, and ultimately consumed. This value chain includes a series of actors and activities that add value to the product at each stage. It typically involves steps such as processing, packaging, storage, transportation, and distribution. The agricultural value chain can take the form of a vertical integration system or a network of separate entities working together.

In essence, the agriculture value chain encompasses all the products and services required to move an agricultural product from the farm to the final consumer. According to the World Bank, the term "value chain" describes the entire range of activities that add value to a product as it moves through the production process, including sourcing raw materials, processing, and other key steps necessary for the product's progression to the market.

Value Chain of Indian Agriculture Industry (farm to fork)

Following block diagram explain the Value Chain of Indian Agriculture Industry.

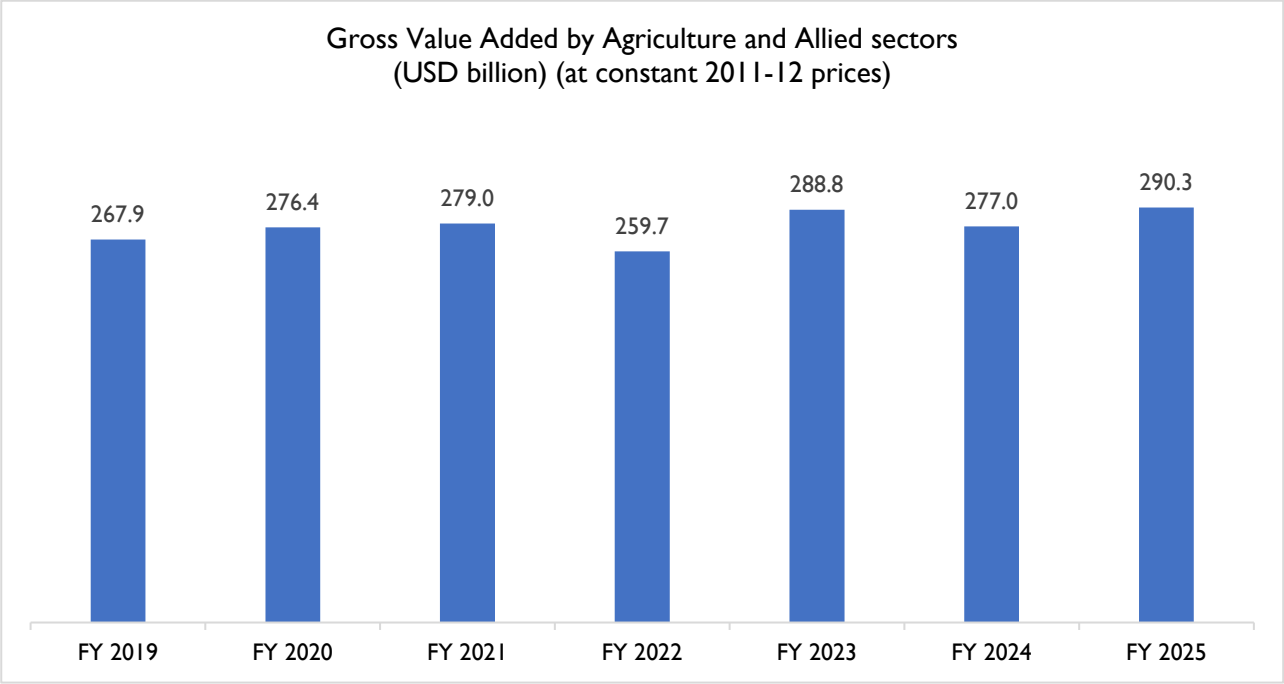


Segment	Description	Key Stakeholders
Production	This segment involves the cultivation of crops and rearing of livestock. It includes all activities from land preparation to harvesting.	- **Farmers**: Primary producers who cultivate crops and raise livestock. - **Input Suppliers**: Providers of seeds, fertilizers, pesticides, and equipment. - **Agronomy Experts**: Professionals offering advice on best farming practices. - **Equipment Manufacturers**: Companies that produce machinery used in farming. - **Farm Labor**: Workers involved in various farming operations. - **Farmer Producer Organizations (FPOs)**: Cooperatives that help farmers with collective bargaining and resource access.
Processing	This segment relates to converting raw agricultural produce into processed food items, enhancing shelf life and marketability.	- **Processing Units**: Factories that convert raw products (e.g., milling rice or grinding wheat). - **Self-Help Groups (SHGs)**: Community-based organizations engaging in small-scale processing. - **FMCG Companies**: Firms with processing units (e.g., ITC, Nestlé) that produce packaged foods. - **Cooperative Societies**: Local cooperatives involved in processing agricultural products.
Marketing	This segment encompasses all activities involved in selling processed agricultural products to consumers, including market research and pricing strategies.	- **Wholesalers and Retailers**: Entities that buy in bulk from producers or processors for resale. - **Exporters**: Businesses facilitating the sale of agricultural products to international markets. - **E-commerce Platforms**: Online marketplaces connecting farmers directly with consumers (e.g., BigBasket).
Supply Chain	The supply chain involves the logistics of moving agricultural products from producers to consumers, ensuring timely delivery and quality maintenance.	- **Logistics Providers**: Companies responsible for transporting goods from farms to markets. - **Warehousing Facilities**: Storage units holding agricultural products before reaching consumers or processors. - **Cold Chain Operators**: Specialized logistics providers maintaining temperature-controlled environments for perishable goods.
Financing	Financing is essential for enabling farmers to invest in inputs, technology, and infrastructure necessary for production and processing.	- **Banks and Financial Institutions**: Provide loans and credit facilities to farmers and agribusinesses. - **Microfinance Institutions (MFIs)**: Offer financial services to smallholder farmers lacking access to traditional banking. - **Government Schemes**: Various programs aimed at providing financial support to farmers.

The traditional value chain in Indian agriculture is complex and multifaceted, involving various stakeholders across multiple segments. Each segment plays a critical role in ensuring that agricultural products more efficiently from production to consumption while adding value at each stage. Addressing challenges within this value chain such as fragmentation, market access issues, and financial constraints will be essential for enhancing the overall productivity and sustainability of Indian agriculture.

Size and Structure of Indian Agriculture Sector

The Indian agriculture sector is poised for significant growth, driven by various factors including increasing demand for food products, government initiatives, and technological advancements. In absolute value terms, the Gross Value Added (GVA) by agriculture and allied sector reached approximately USD 290.3 Bn in FY 2025



Source: Ministry of Agriculture

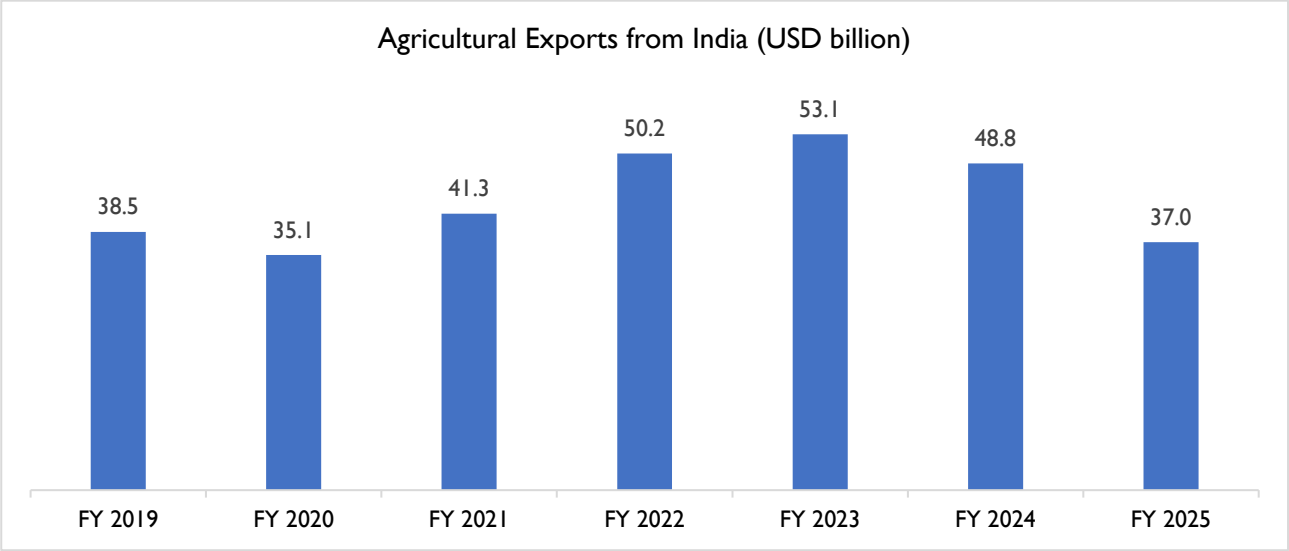
The Agriculture and Allied industry sector witnessed some major developments, investments, and support from the Government in the recent past. Between April 2000-March 2024, FDI in agriculture services stood at USD 3.08 billion.

According to the Department for Promotion of Industry and Internal Trade (DPIIT), the Indian food processing industry has cumulatively attracted a Foreign Direct Investment (FDI) equity inflow of about USD 12.58 billion between April 2000-March 2024. This accounts for 1.85% of total FDI inflows received across industries.

During 2024-25 (April-May), processed vegetables accounted for USD 122.91 million, miscellaneous processed items accounted for USD 302.07 million and processed fruits & juices accounted for USD 143.51 million.

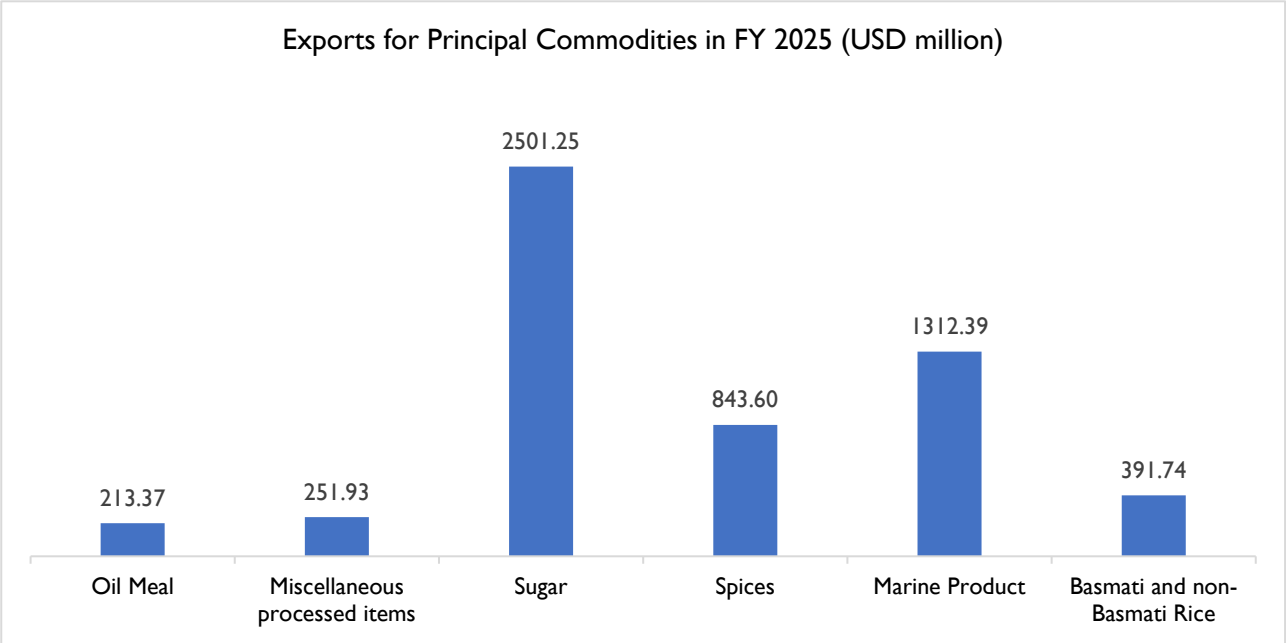
Rapid population expansion in India is the main factor driving the industry. The rising income levels in rural and urban areas, which have contributed to an increase in the demand for agricultural products across the nation, provide additional support for this. In accordance with this, the market is being stimulated by the growing adoption of cutting-edge techniques including blockchain, Artificial Intelligence (AI), geographic information systems (GIS), drones, and remote sensing technologies, as well as the release of various e-farming applications.

Annual export of agricultural products from India stood at approximately USD 37 Billion in FY 2025. India is a major exporter of agriculture products in global markets, and its key exports comprise of grains, marine products, fruits & vegetables, among others.



Source: Agricultural and Processed Food Products Export Development Authority (APEDA)

The exports for principal commodities in FY 2025 (April-May) were the following:



Source: Agricultural and Processed Food Products Export Development Authority (APEDA)

Geographical Distribution of Agricultural Land

The geographical distribution of agricultural land in India reflects the country's diverse agro-climatic conditions, land use patterns, and socio-economic factors.

a) Total Agricultural Land Area

- **Total Geographical Area**: India has a total geographical area of approximately 306.97 **million hectares**.
- **Agricultural Land**: Agricultural land (including net sown area, current fallow, other fallow land, culturable wasteland, and land under miscellaneous tree crops) constitutes about **58.5%** of the total geographical area, amounting to **179.6 million hectares**.

b) Net Sown Area (NSA)

- **Current NSA**: The net sown area in India is approximately **138.99 million hectares**, accounting for around **45.3%** of the total reporting area.
- **State Variations**:
    - States like **Punjab, Haryana, and Uttar Pradesh** have a higher proportional share of net sown area compared to the national average.
    - In contrast, states such as **Himachal Pradesh, Uttarakhand, and the northeastern states** have less than half of the national average due to physical constraints like hilly terrain and limited fertile land.

c) Land Use Distribution

The following table summarizes the distribution of land use in India:

Land Use Type	Area (in Lakhs Hectares)	Percentage (%)
Forests	720.2	23.5%
Area put to non-agricultural uses	285.5	9.3%
Barren & unculturable land	165.9	5.4%
Permanent pastures & other grazing lands	102.1	3.3%
Land under Misc. tree Crops	29.5	1.0%
Culturable Wasteland	115.9	3.8%
Fallow Land Other than Current Fallows	111.6	3.6%
Current Fallow	149.1	4.9%

Net Area Sown	1389.9	45.3%
Total	**3069.7**	**100%**
Agricultural Land (5+6+7+8+9)	1796.0	58.5%
Cultivated Land (8+9)	1539.0	50.1%

Source: Ministry of Agriculture

d) Regional Distribution

- **North-Western Region**: States like Punjab and Haryana are major contributors to food grain production due to their fertile alluvial plains and extensive irrigation facilities.
- **Eastern Region**: West Bengal and Uttar Pradesh also have significant agricultural output, particularly in rice and sugarcane.
- **Southern Region**: States like Tamil Nadu and Karnataka focus on cash crops such as cotton, coffee, and horticultural products.
- **Western Region**: Gujarat has emerged as a leading producer of **potatoes**, along with groundnuts and cotton, driven by the adoption of modern farming practices and irrigation support. Rajasthan, on the other hand, has a high share of cultivable wasteland, though parts of the state also support oilseed and coarse cereal production.

Irrigation and Agricultural Practices

- Approximately 35% of India's agricultural land is irrigated, while the remaining two-thirds continues to rely heavily on monsoon rainfall for cultivation. **Gujarat, with its progressive irrigation development, has expanded its potato acreage significantly in recent years, making it a key hub in India's potato production network.** The country has made strides in improving irrigation infrastructure through canal systems, tube wells, and micro-irrigation schemes but regional disparities remain, with eastern and rainfed areas facing greater vulnerability to monsoon variability.

Agriculture Cropping Pattern in India

India's diverse climate has led to a variety of cropping patterns. The Three main seasons are Kharif (monsoon, rice, maize, cotton), Rabi (winter, wheat, pulses), and Zaid (short season, vegetables, melons). Cropping intensity varies, with mono-cropping (single crop) and multi-cropping (multiple crops in a year) being common.

The Factors influencing patterns are climate, soil type, farm size, and government policies. Historically, subsistence farming dominated, but a shift towards cash crops and market orientation is underway. While diversification offers benefits like improved soil health and dietary intake, challenges like water scarcity and unequal benefits for small farmers persist. Moving forward, India needs to promote sustainable practices and technological advancements alongside diversified cropping patterns to ensure food security for its growing population.

Major Crops and Regional Variations

Two-thirds of India's population is engaged in agricultural activities. It is a primary activity, which produces food grains and raw materials for industries. India is geographically a vast country, so it has various food and non-food crops which are cultivated in three main cropping seasons which are Rabi, Kharif and Zaid.

Cropping Season	Time Period	Crops	States
Rabi	Sown: October-December Harvested: April-June	Wheat, Barley, Peas, Gram, Mustard, Potato Etc.	Punjab, Haryana, Himachal Pradesh, Jammu and Kashmir, Uttarakhand And Uttar Pradesh
Kharif	Sown: June-July Harvested: September-October	Rice, Maize, Jowar, Bajra, Tur, Moong, Urad, Cotton, Jute, Groundnut, Soybean Etc.	Assam, West Bengal, Coastal Regions of Odisha, Andhra Pradesh, Telangana, Tamil Nadu, Kerala and Maharashtra
Zaid	Sown And Harvested: March-July (Between Rabi and Kharif)	Seasonal Fruits, Vegetables, Fodder Crops Etc.	Northern and Northwestern States

Impact of Government Policies

The agriculture sector in India is expected to generate better momentum in the next few years due to increased investment in agricultural infrastructure such as irrigation facilities, warehousing, and cold storage. Furthermore, the growing use of genetically modified crops will likely improve the yield for Indian farmers. India is expected to be self-sufficient in pulses in the coming few years due to the concerted effort of scientists to get early maturing varieties of pulses and the increase in minimum support price.

Through the Ministry of Food Processing Industries (MoFPI), the Government of India is taking all necessary steps to boost investments in the food processing industry in India. Government of India has continued the umbrella PMKSY scheme with an allocation of Rs. 4,600 crore (USD 559.4 million) till March 2026.

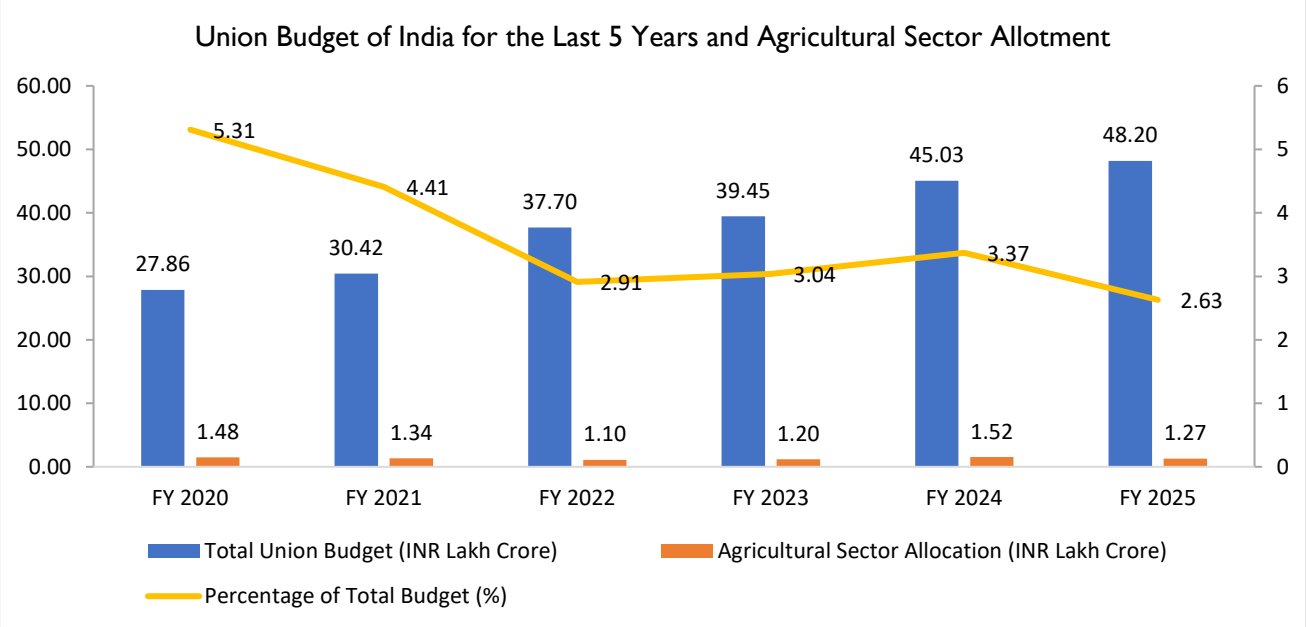
Government Initiatives and Schemes:

Some of the recent major Government initiatives in the sector are as follows:

- In the Union Budget 2024-25, a provision of Rs. 1.27 lakh crore has been made for agriculture and allied sector.
- In January 2024, The Ministry of Food Processing Industries has approved the following under the corresponding component schemes of PMKSY: 41 Mega Food Parks, 399 Cold Chain projects, 76 Agro-processing Clusters, 588 Food Processing Units, 61 Creation of Backward & Forward Linkages Projects, and 52 Operation Green projects.

Union Budget 2019 to 2024:

The following graph summarizes the total Union Budget of India for the last five years along with the allocation for the agricultural sector:



Source: Ministry of Agriculture & Farmers Welfare

- Through several Digital Initiatives, such as the National e-Governance Plan in Agriculture (NeGP-A), the construction of Digital Public Infrastructure (DPI), digital registries, etc., the government has taken a number of steps to ensure access to IT across the nation.
- The Agricultural Technology Management Agency (ATMA) Scheme has been implemented in 704 districts across 28 states and 5 UTs to educate farmers. Grants-in-aid are released to the State Government under the scheme with the goal of supporting State Governments' efforts to make available the latest

agricultural technologies and good agricultural practices in various thematic areas of agriculture and allied sector.

- Since its inception, i.e. from January 2001 to December 2022, a total of 42,164 storage infrastructure projects (Godowns) with a capacity of 740.43 Lakh MT have been assisted in the country under the Agricultural Marketing Infrastructure (AMI) sub-scheme of the Integrated Scheme for Agricultural Marketing (ISAM).
- The Centre has granted permission to 5 private companies to conduct cluster farming of specified horticulture crops on approximately 50,000 hectares on a trial basis, with a total investment of Rs. 750 crore (USD 91.75 million). The 5 companies chosen through a bidding process for the pilot cluster farming program are Prasad Seeds, FIL Industries, Sahyadri Farms, Meghalaya Basin Management Agency.
- 27,003 Loans have been sanctioned in the country under credit linked subsidy component of the PM Formalisation of Micro Food Processing Enterprises Scheme (PMFME).
- In July 2022, the PM Formalisation of Micro food processing Enterprises (PMFME) scheme was launched for providing financial, technical, and business support for setting up/ upgradation of micro food processing enterprises in the country with an outlay of Rs. 10,000 crore (USD 1.27 billion).
- The Indian government is planning to launch Kisan Drones for crop assessment, digitization of land records, and spraying of insecticides and nutrients.
- NABARD will assist in the creation of a blended capital fund with a focus on the agricultural start-up ecosystem which will be used to fund agriculture and rural enterprise startups that are related to the farm product value chain.
- A network of 729 Krishi Vigyan Kendras has been established at the district level across the country to ensure that newer technologies such as improved variety seeds of crops, new breeds/ strains of livestock and fish, and improved production and protection technologies reach farmers.
- Ministry of Civil Aviation launched the Krishi UDAN 2.0 scheme in October 2021. The scheme proposes assistance and incentive for the movement of Agri-produce by air transport. The Krishi UDAN 2.0 will be implemented at 53 airports across the country, largely focusing on Northeast and tribal regions, and is expected to benefit farmers, freight forwarders, and airlines.
- In October 2021, the Agricultural and Processed Food Products Export Development Authority (APEDA) signed a Memorandum of Understanding (MoU) with ICAR-Central Citrus Research Institute (ICAR-CCRI), Nagpur, for boosting exports of citrus and its value-added products.
- In October 2021, the Union Ministry of Agriculture and Farmers Welfare announced that 820,600 seed mini kits will be distributed free of cost in 343 identified districts across 15 major producing states under a special programme. This programme is likely to boost production and productivity by speeding up the seed replacement rate and subsequently, help in increasing farmers' income.
- In September 2021, Prime Minister launched 35 crop varieties with special traits such as climate resilience and higher nutrient content.

- Prime Minister of India launched the Pradhan Mantri Kisan Samman Nidhi Yojana (PM-Kisan) and transferred Rs. 2,021 crore (USD 284.48 million) to bank accounts of more than 10 million beneficiaries on February 24, 2019. As per the Union Budget 2021-22, Rs. 65,000 crore (USD 8.9 billion) was allocated to Pradhan Mantri Kisan Samman Nidhi (PM-Kisan).
- The Indian government has initiated Digital Agriculture Mission for 2021-25 for agriculture projects based on new technologies such as artificial intelligence, blockchain, remote sensing and GIS technology, drones, robots, and others.
- In September 2021, the Union Ministry of Agriculture and Farmers' Welfare signed 5 MoUs with CISCO, Ninjacart, Jio Platforms Limited, ITC Limited, and NCDEX e-Markets Limited. This MoU will have 5 pilot projects, which will help farmers make decisions on the kind of crops to grow, the variety of seeds to use, and best practices to adopt to maximise yield.
- With a budget of USD 1.46 billion, the 'Production-Linked Incentive Scheme for Food Processing Industry (PLISFPI)' has been approved to develop global food manufacturing champions commensurate with India's natural resource endowment and to support Indian food brands in international markets.
- The Agriculture Export Policy, 2018 was approved by the Government of India in December 2018. The new policy aimed to increase India's agricultural export to USD 60 billion by 2022 and USD 100 billion in the next few years with a stable trade policy regime.
- The Government of India is going to provide Rs. 2,000 crore (USD 306.29 million) for the computerisation of the Primary Agricultural Credit Society (PACS) to ensure cooperatives are benefitted through digital technology.
- The Government of India launched the Pradhan Mantri Krishi Sinchai Yojana (PMKSY) with an investment of Rs. 50,000 crore (USD 7.7 billion) aimed at the development of irrigation sources for providing a permanent solution to drought.
- Government plans to triple the capacity of the food processing sector in India from the current 10% of agricultural produce and has also committed Rs. 6,000 crore (USD 729 million) as investments for mega food parks in the country, as a part of the Scheme for Agro-Marine Processing and Development of Agro-Processing Clusters (SAMPADA).
- The Government of India has allowed 100% FDI in the marketing of food products and in food product E-commerce under the automatic route.
- To enhance the income of farmers, the government has taken initiatives across several focus areas. Income support is provided to farmers through PM KISAN Scheme, crop insurance is assured through the Pradhan Mantri Fasal Bima Yojana, and irrigation facilities are ensured under Pradhan Mantri Krishi Sinchai Yojana.
- Access to institutional credit is being provided through Kisan Credit Card and other channels.
- Under the e-NAM initiative, markets across the length and breadth of the nation are now open to farmers, to enable them to get more remunerative prices for their produce. Online, Competitive,

Transparent Bidding System with 1.74 crore farmers and 2.39 lakh traders put in place under the National Agriculture Market (e-NAM) Scheme.

- The umbrella scheme Pradhan Mantri Annadata Aay SanraksHan Abhiyan (PM-AASHA) ensures Minimum Support Price (MSP) to farmers for various Kharif and Rabi crops while also keeping a robust procurement mechanism in place.
- As per the Economic Survey 2022-23, Rs. 13,681 crore (USD 1.6 billion) were sanctioned for Post-Harvest Support and Community Farms under the Agriculture Infrastructure Fund.
- In order to increase the level of food- processing industry and encouraging rural entrepreneurship across the country including rural areas, the Ministry of Food Processing Industries (MoFPI) is implementing the Central Sector Umbrella Scheme Pradhan Mantri Kisan SAMPADA Yojana (PMKSY), Production Linked Incentive Scheme for Food Processing Industry (PLISFPI) and centrally sponsored PM Formalization of Micro Food Processing Enterprises (PMFME) Scheme.
- The PMFME Scheme provides financial, technical, and business support for setting up/upgradation of 2 Lakh micro food processing enterprises through credit-linked subsidy during 5 years from 2020-21 to 2024-25 with an outlay of Rs. 10,000 crore (USD 1.27 billion).
- Under component schemes of PMKSY, MoFPI mostly provides financial assistance in the form of grants-in-aid to entrepreneurs for the creation of modern infrastructure and setting up of food processing/preservation industries including Cold Chains with associated infrastructure like primary processing facilities, collection centres, pre-conditioning, pre-cooling, ripening, packing, etc.
- As per the Union Budget 2023-24, A new sub-scheme of PM Matsya Sampada Yojana with the targeted investment of Rs. 6,000 crore (USD 729 million) to be launched to further enable activities of fishermen, fish vendors, and micro & small enterprises, improve value chain efficiencies, and expand the market.
- Digital Public Infrastructure for Agriculture: Agriculture will be built as an open source, open standard, and interoperable public good. this will enable inclusive, farmer-centric solutions through relevant information services for crop planning and health, improved access to farm inputs, credit, and insurance, help for crop estimation, market intelligence, and support for the growth of the Agri-tech industry and start-ups.
- To enhance the productivity of extra-long staple cotton, Government will adopt a cluster-based and value chain approach through Public Private Partnerships (PPP). This will mean collaboration between farmers, the state and industry for input supplies, extension services, and market linkages.
- Computerisation of 63,000 Primary Agricultural Credit Societies (PACS) with an investment of Rs. 2,516 crore (USD 305.9 million) initiated.
- To make India a global hub for 'Shree Anna', the Indian Institute of Millet Research, Hyderabad will be supported as the Centre of Excellence for sharing best practices, research, and technologies at the international level.

Government Policies specific to Potato Production

The Operation Greens Scheme, announced in the Union Budget 2018–19 with an outlay of INR 500 crore, was launched to strengthen the Tomato, Onion, and Potato (TOP) value chain by promoting Farmer Producer Organizations (FPOs), agri-logistics, processing facilities, and professional management.

Implemented by the Ministry of Food Processing Industries (MoFPI) since November 2018, it has two components: long-term interventions for integrated value chain development and short-term measures to prevent distress sales and reduce post-harvest losses.

In May 2020, under the *Aatmanirbhar Bharat Packag*e, the short-term scope was expanded from TOP to all fruits and vegetables (TOTAL), while in Union Budget 2021–22, long-term interventions were extended to 22 perishable crops. The scheme provides a 50% subsidy for transportation and storage, with proposals invited through the SAMPADA portal. It is complemented by the National Agricultural Market (e-NAM), which enhances market connectivity and transparency for farmers.

Separately, to contain the spread of Potato Cyst Nematode (PCN)—a pest causing severe crop damage—the Ministry of Agriculture and Farmers Welfare had earlier issued a notification in the *Gazette of India* prohibiting the movement of seed potatoes from Himachal Pradesh, Tamil Nadu, Uttarakhand, and Jammu & Kashmir.

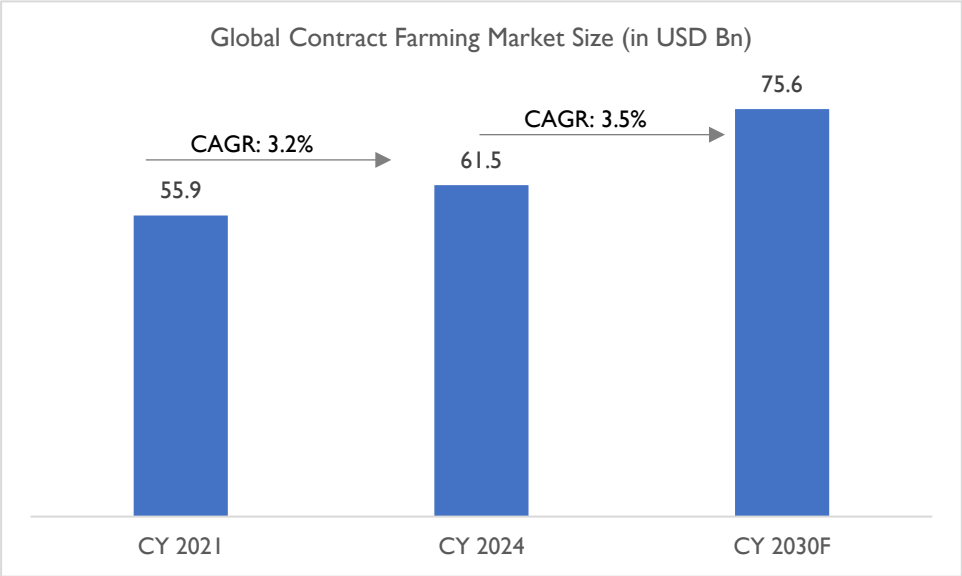
Based on an advisory from the Central Potato Research Institute (CPRI), this regulation aimed to safeguard national potato production. However, as of March 2024, the restrictions have been revised, and seed potato movement is now permitted under strict regulatory compliance to balance pest control with farmers' access to quality seed.

Contract Farming: Global Scenario

The global market for contract farming is estimated to be valued at USD 61.5 Bn in CY 2024, growing by a CAGR of nearly 3.2% between 2021 and 2024. Global market is heavily concentrated across few large, developed nations (mainly in North America and Europe) where the model has found widespread acceptance. Large scale farms / large land holdings, robust regulations, and advanced farming infrastructure has all helped in the development of contract farming in developed economies.

Meanwhile the penetration / adoption of contract farming across developing economies (including India) is relatively lower. Farming as a sector is yet to become organized and continues to be dominated by small farmers, which is acting as a deterrent in the spread of contract farming.

Going ahead, the global market for contract farming is expected to increase by CAGR of 3.5% between CY 2024 and 2030 to reach USD 75.6 Bn. The dominance of developed economies is expected to continue unabated during the forecast period.



Source: D&B Research, CY – Calendar Year, 2030F – 2030 Forecast

Contract Farming Landscape in India

Contract farming in India has emerged as a significant mechanism to strengthen the agricultural sector, enhance productivity, and create structured frameworks for farmer-market linkages. As of now, between 1 - 2% of the total agricultural land is under contract farming and it is expected to increase in the coming years steadily. It acts as a vital bridge between smallholder farmers and markets, offering opportunities for inclusive growth.

Currently, the trend in contract farming is on the rise; however, its growth is not as rapid as anticipated due to gaps in communication regarding its benefits and various challenges that persist. Despite these challenges, the Indian government has recognised the potential of contract farming to address issues such as price volatility and market access for farmers.

Moreover, there is a growing demand for high-value crops in India, which encourages agribusiness firms to engage in contract farming. Companies are increasingly looking to secure reliable sources of raw materials while providing farmers with access to better inputs and technology. However, the successful implementation of contract farming requires addressing existing barriers such as lack of awareness among farmers, inadequate access to financial services, and the need for improved bargaining power.

Overview of Contract Farming in India

The Food and Agriculture Organization (FAO) defines contract farming as "an agreement between farmers and processing and/or marketing firms for the production and supply of agricultural products under forward agreements, frequently at predetermined prices." Essentially, it is a formal arrangement between farmers and buyers that outlines the terms and conditions for the production and sale of agricultural commodities.

The success of contract farming hinges on three critical factors: market provision, resource provision, and management specifications. Under such agreements, farmers commit to growing specific crops for a buyer at a pre-agreed price. In return, buyers pledge to purchase the produce and often provide support, such as assistance with land preparation, inputs like seeds and fertilizers, technical guidance, and other resources.

A written agreement formalizes the arrangement, detailing important aspects such as price, quantity, quality, transportation, and delivery timelines. Also, contract farming provides a pathway for integrating small and marginal farmers into modern supply chains, equipping them with better resources and knowledge. It not only strengthens farmer-buyer linkages but also supports the broader goal of rural development by fostering sustainable agricultural practices and improving overall productivity

Objectives Behind the Introduction of Contract Farming in India:

Objectives	To provide small-scale farmers with a stable and reliable source of income by reducing market uncertainties.
	To encourage the cultivation of market-oriented crops, increasing the focus on high-demand produce.
	To emphasize the importance of food processing and value addition, thereby enhancing the economic value of crops.
	To attract private-sector investments into agriculture, fostering modernization and technological advancements.
	To reduce the burden on the government to ensure fair prices for agricultural produce under all circumstances.
	To simplify the procurement of raw materials for food processing units and other industries.
	To educate farmers about agribusiness, helping them understand market dynamics and the value chain of their produce.
	To promote crop diversification, reducing the reliance on traditional cropping patterns and improving soil health over time.

History

Contract farming in India, compared to Africa and South America, is a relatively recent phenomenon. As mentioned earlier, its origins can be traced back to the colonial period, particularly in the latter half of the nineteenth century, when cotton exports to Britain surged due to the disruption of supplies from the United States during the Civil War. The British sought to transform India into a hub for commercial crop exports such as tea, coffee, rubber, and indigo.

Attracted by lucrative prices offered by buyers for these new crops, farmers embraced them despite the absence of a pre-existing market. The Imperial Tobacco Company (ITC) introduced Virginia tobacco cultivation in Andhra Pradesh in the 1920s through contract farming, receiving a positive response from educated and well-off farmers. Trained personnel were employed to promote tobacco cultivation, which was later replaced by an auction system in 1984.

The success of sugar cooperatives in Maharashtra and dairy cooperatives in Gujarat during the 1950s introduced features resembling contract farming, though these were not formal contracts. Their achievements inspired private companies to adopt similar models.

The organized seed trade also advanced with the establishment of the National Seed Corporation of India in 1963, alongside initiatives such as high-yielding cereal introductions, the Seed Review Committee, the Seeds Act of 1966, and the National Commission on Agriculture. Private companies, lacking large farms for seed multiplication, began employing contract farming. Maharashtra Hybrid Seeds Co. (Mahyco) pioneered large-scale seed production in the early 1970s in Maharashtra's Marathwada region, eventually expanding to Vidarbha, Andhra Pradesh, and Karnataka.

In 1976, WIMCO, a leading match manufacturer, introduced poplar cultivation through a well-structured contract farming system to address the shortage of matchwood. Poplar farming was concentrated in Uttar Pradesh, Punjab, Haryana, and Uttarakhand. Western India Match Company (WIMCO) also procured tomatoes for processing companies in Andhra Pradesh and Karnataka.

Similarly, Pepsi Foods, a subsidiary of PepsiCo, launched a tomato contract farming project in Punjab's Hoshiarpur district in the 1990s. Within three years, the initiative increased tomato yields from 7.5 tonnes to 20 tonnes per acre. PepsiCo introduced modern techniques, improved seed varieties, and mechanized farming, which boosted productivity and reduced production costs.

Subsequently, the company ventured into potato contract farming, chili cultivation and potato farming. Hindustan Lever Limited (HLL), a subsidiary of Unilever, later acquired Pepsi-Cola Company's tomato facility and became a major food processing player in India. During this period, Nijjer Agro Foods also engaged in contract farming, supplying tomatoes to Nestlé.

Despite some poorly designed and unsuccessful projects, a few initiatives achieved notable success, such as gherkin and flower processing in Karnataka, oleoresin and spice extraction in Kerala, and medicinal and herbal supplement cultivation in northern foothills. By the late 1990s, contract farming expanded to include subsistence and food crops. Hindustan Lever's entry into the wheat flour market fostered contract farming, supported by financial institutions like the State Bank of India and Industrial Credit and Investment Corporation of India (ICICI Bank). Companies like Rallis (a Tata subsidiary) and Mahindra and Mahindra acted as intermediaries, supplying inputs and extension services to farmers. However, the involvement of intermediaries widened the gap between consumer spending and farmer receipts.

In 2002, the Punjab government launched a tripartite contract farming initiative involving farmers, seed companies, and the Punjab Agro Foodgrains Corporation (PAFC) to diversify crops from the paddy-wheat rotation. However, the state later withdrew its role as a facilitator. Non-crop contract farming also gained traction, with poultry farming for broilers and eggs introduced in Tamil Nadu in the 1990s. The Coimbatore region became a hub for broiler production, accounting for 75% of India's poultry production.

In 2002, Appachi Cotton Company used street plays to promote cotton cultivation under the Integrated Cotton Cultivation (ICC) model, ensuring a robust support system for farmers. This initiative successfully attracted 900 farmers from districts like Coimbatore, Theni, and Namakkal. Finally, in 2003-04, contract

farming was formally incorporated into India's agricultural policy framework through reforms in the Agriculture Produce and Marketing Committee (APMC) Act, 2003.

Advantages of Contract Farming:

Advantages to Farmers:

- Guaranteed and Fixed Pricing Structure: Farmers often face uncertainty regarding the prices of their produce after harvest due to market fluctuations. Contract farming ensures pre-determined prices, protecting farmers from price volatility and offering them financial stability.
- Assured Market and Buy-Back Guarantee: Farmers are relieved from the challenge of finding buyers for their produce, as private companies commit to purchasing the harvest. This reduces farmers' transportation costs and eliminates the need to sell at distressed prices.
- Access to Modern Technology: Contract farming introduces farmers to advanced agricultural technologies, enabling them to improve crop quality and yield. This technological exposure ultimately boosts their income and efficiency.
- Improved Access to Credit and Financial Services: Rural farmers often face challenges in accessing credit and crop insurance. Contract agreements facilitate easier access to financial services, empowering farmers to invest in their fields and manage risks effectively.
- Skill Development and Knowledge Transfer: Buyer companies provide technical guidance, cropping schedules, and best practices to farmers. This knowledge transfer enhances farmers' expertise and productivity, leading to long-term benefits.
- Provision of Inputs and Production Support: Farmers receive essential inputs like seeds, fertilizers, and pesticides directly from the buyer companies. Additionally, companies educate farmers on the optimal use of these inputs, ensuring cost-effective and sustainable farming practices.
- Environmental Benefits: Contract farming often includes training on sustainable practices, which can reduce environmental degradation and promote eco-friendly farming.
- Reduction in Post-Harvest Losses: Timely procurement and structured harvesting schedules minimize wastage, ensuring better utilization of resources.

Advantages to Buyers:

- Consistent Quality and Quantity of Produce: Contract farming enables companies to secure timely delivery of farm produce that meets specific quality standards, ensuring a steady supply for their processing needs.
- Traceability: With constant monitoring of farming practices, companies can trace the inputs and methods used during production. This ensures transparency and compliance with quality standards, a significant advantage in global markets.

- Protection Against Market Volatility: Contract farming ensures a consistent supply of raw materials, shielding companies from supply-demand fluctuations in open markets. This stability is crucial for meeting the growing demand for processed food products.
- Cost Efficiency: Procuring farm produce directly from farmers reduces costs by minimizing the involvement of intermediaries, such as agents or commission-based traders.
- Strengthened Farmer Relationships: Engaging in contract farming fosters long-term partnerships with farmers. This collaboration builds trust and enhances the reliability of supply chains.
- Sustainability and CSR Alignment: By supporting farmers through contracts, companies can align their operations with corporate social responsibility (CSR) goals, contributing to rural development and sustainable agricultural practices.

Disadvantages

Disadvantages to Farmers:

- Reduced Freedom and Flexibility: Farmers may lose the ability to make independent decisions or sell to alternative buyers when market prices increase.
- Delays and Manipulations: There is a risk of delays in payment, late delivery of inputs, and manipulation of agreed quality and quantity specifications by buyers.
- Rejections and Reduced Purchases: Buyers might purchase less than the pre-agreed quantities or reject produce for not meeting required standards, leaving farmers at a loss.
- High Input Costs: Inputs provided by buyers may be priced higher than market rates, increasing production costs for farmers.
- Environmental Risks: Growing a single type of crop (monoculture) can lead to greater environmental risks, such as soil degradation and vulnerability to pests and diseases.
- Dependency and Vulnerability: Farmers may become overly dependent on a single buyer, leaving them vulnerable to exploitation or sudden withdrawal of contracts.
- Indebtedness: Loans provided by buyers can create a risk of indebtedness, particularly if the harvest does not yield the expected results.

Disadvantages to Buyers:

- High Transaction Costs: Contracting with many small farmers increases administrative and logistical expenses.
- Risk of Side-Selling: Farmers might break contracts and sell produce to other buyers offering higher prices.
- Misuse of Inputs: There is a potential for farmers to use seeds, fertilizers, or other inputs provided by the company for purposes other than contract farming.
- Loss of Flexibility: Buyers may face limitations in seeking alternative suppliers during periods of low contract fulfilment.

- Reputational Risks: If contracts fail or issues arise with farmers, companies may suffer reputational damage, impacting their market presence.

Regulatory Landscape

The Indian government has introduced several significant policies aimed at promoting contract farming to enhance agricultural productivity and improve farmer-market linkages. One of the foundational pieces of legislation is the Model Agricultural Produce Market Committee (APMC) Act, 2003. This act was designed to facilitate direct procurement of agricultural produce from farmers by processors and contractors.

By allowing buyers to register with the Market Committee, it ensures legal oversight of contract farming agreements while exempting them from paying market fees or commissions when procuring produce through contracts. This framework aims to reduce transaction costs and encourage private sector participation in agriculture.

In 2018, the government introduced the Draft Model Contract Farming Act, which sought to establish a comprehensive regulatory framework for contract farming across states. This act proposed the creation of a Contract Farming (Development and Promotion) Authority at the state level to oversee implementation and ensure compliance.

Key features included mandatory registration of contracts, exclusion from APMC regulations, and provisions for price protection for farmers through pre-agreed prices or price determination mechanisms. Although this act was intended to foster fair practices and transparency, it faced challenges in implementation due to varying state responses.

The National Bank for Agriculture and Rural Development (NABARD) has also played a crucial role in supporting contract farming through financial interventions. NABARD introduced special refinance packages aimed at financing contract farming projects within Agri Export Zones (AEZs). It provided 100% refinance for disbursements made by banks for contract farming initiatives involving commercial crops like oilseeds, cotton, and fruits. These financial support mechanisms are essential for encouraging farmers to engage in contract farming arrangements by mitigating risks associated with production uncertainties.

The government further promotes Public-Private Partnerships (PPPs) as a means to facilitate contract farming arrangements. These partnerships aim to provide farmers with access to credit, inputs, and technical support while ensuring that agribusinesses have a reliable supply of quality produce. By fostering collaboration between public institutions and private entities, these initiatives enhance the overall efficacy of contract farming systems.

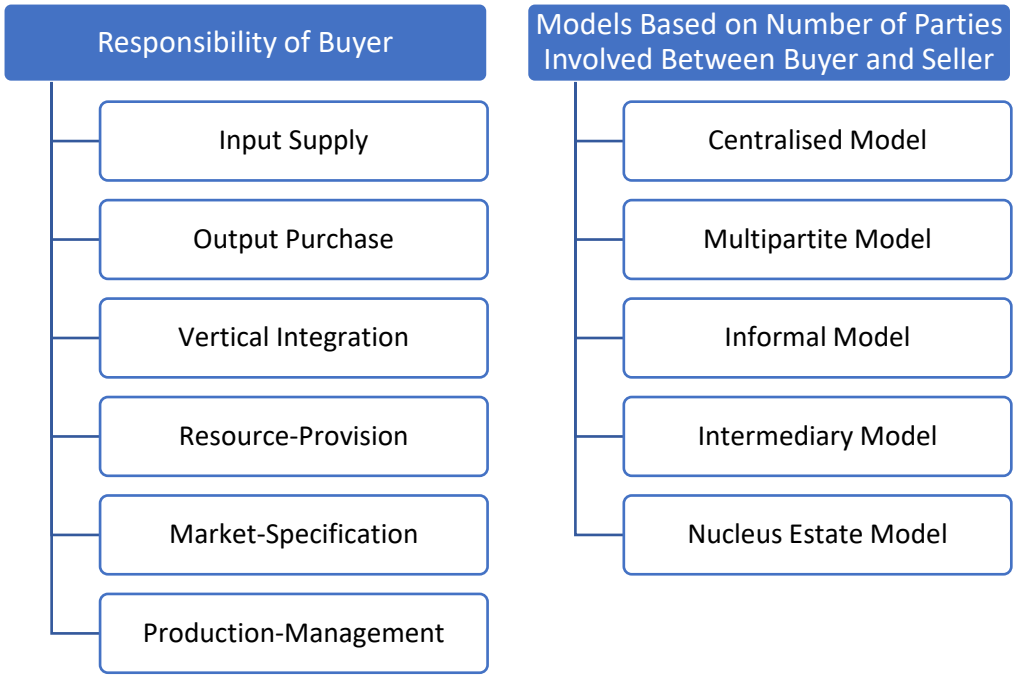
Also, the National Agricultural Policy explicitly recognizes contract farming as a tool for increasing private sector participation in agriculture. The policy aims to promote capital inflow into agriculture through partnerships with agribusiness firms while providing assured markets for high-value crops like oilseeds and fruits.

The National Agricultural Market (E-NAM) initiative complements contract farming by improving market connectivity for farmers. E-NAM provides an online platform where farmers can access real-time price information and sell their produce directly to buyers across the country, thereby enhancing transparency in pricing and competition among sponsors.

Different Models of Contract Farming

In some countries, the type of contract farming is fixed and predefined. However, in countries like India, there is no strictly fixed type of contract. Instead, the models and types of contracts or trading are determined by the Food and Agriculture Organization (FAO). Various models of contract farming are designed based on the specific contract type (responsibility of buyer) and (number of parties involved between buyer and seller). The decision to enter a particular type of contract depends entirely on the agreement between the buyer and the seller.

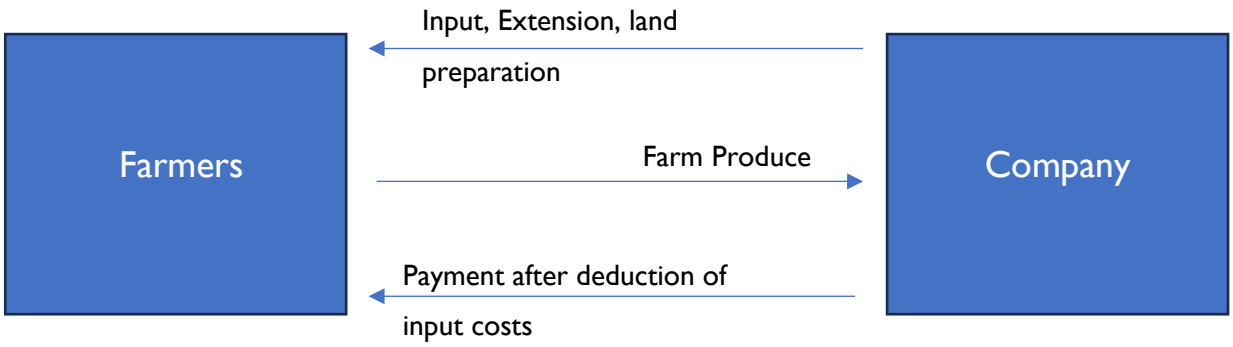
Below are the different models based on the responsibility of buyer and models based on number of parties involved between buyer and seller:



Based on Responsibility of Buyer

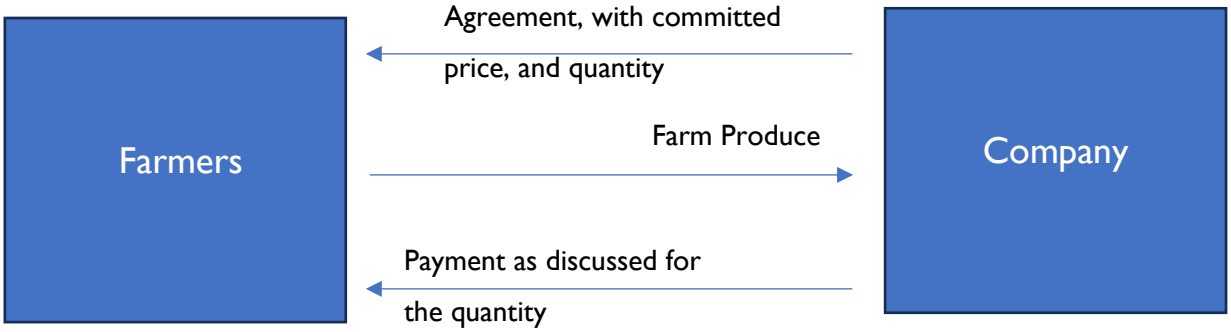
Input Supply: Input supply contracts involve companies providing essential resources such as seeds, fertilizers, pesticides, and technical guidance to farmers. This arrangement aims to improve the productivity and quality of agricultural produce. Farmers retain full control over the cultivation process, but companies are not obligated to purchase the final output.

This model is particularly beneficial in areas where farmers lack access to high-quality inputs and is commonly observed in the cultivation of staple crops like wheat, rice, and cotton, especially in Bihar and Uttar Pradesh. This model helps bridge resource gaps for smallholder farmers, enhancing productivity and ensuring food security. The demand for this model remains stable as governments and private firms promote it to increase agricultural productivity and ensure food security.



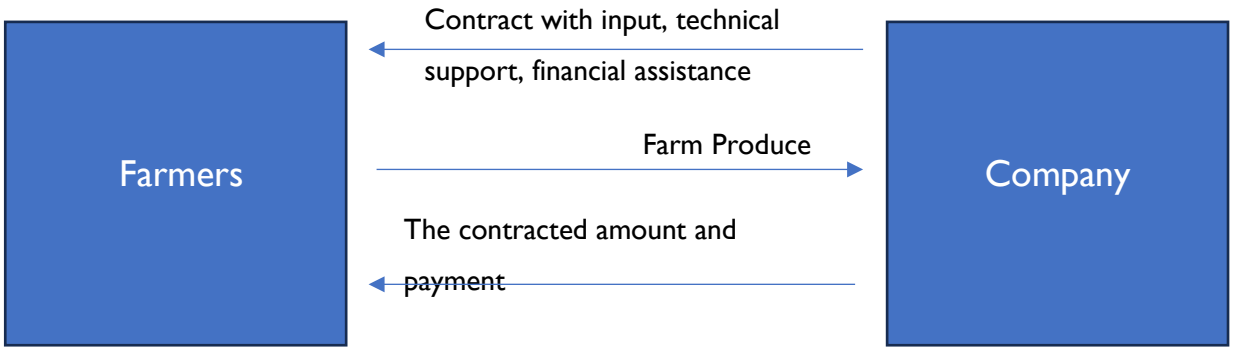
Output Purchase: Output purchase contracts are structured around agreements where the contracting company commits to buying a predetermined quantity of produce at an agreed price. Farmers are responsible for growing the crops while adhering to the company's quality standards. These contracts offer farmers a guaranteed market, reducing the risks associated with price volatility.

This model is widely used in industries relying on perishables, including fruits, vegetables, and food grains, and is extensively adopted for crops like potatoes (for chips), chilies (for spices), and tomatoes (for ketchup). With the rapid growth of the food processing and export sectors, the demand for this model is increasing significantly, ensuring both market stability and fair pricing for farmers.



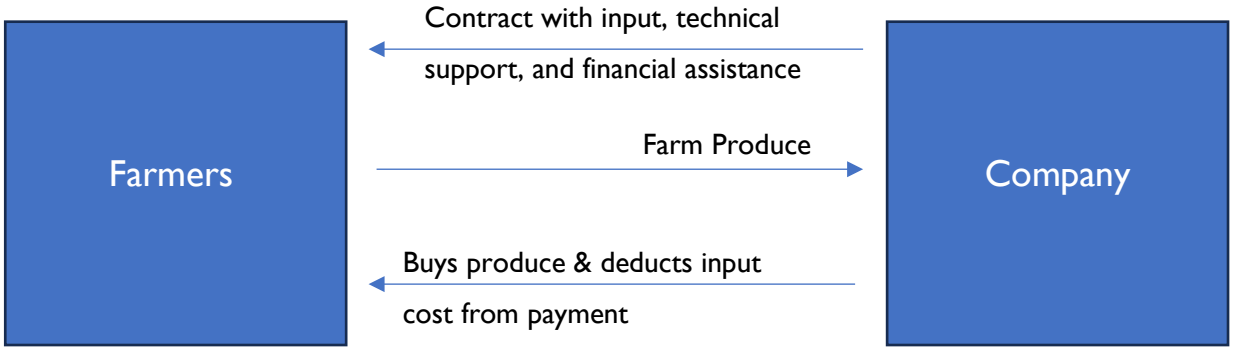
Vertical Integration: Vertical integration contracts encompass the entire supply chain, where the contracting firm provides inputs, technical support, and financial assistance while taking responsibility for purchasing the output. Farmers act as production partners, adhering to strict guidelines for cultivation or rearing.

This model ensures high levels of standardization and consistent supply and is particularly relevant in the poultry, dairy, and aquaculture sectors where the quality is paramount. Companies like Suguna Foods and Amul have successfully implemented this model in India, creating robust supply chains. The growing demand for quality-assured produce has driven the popularity of vertical integration, making it one of the most preferred models across industries.



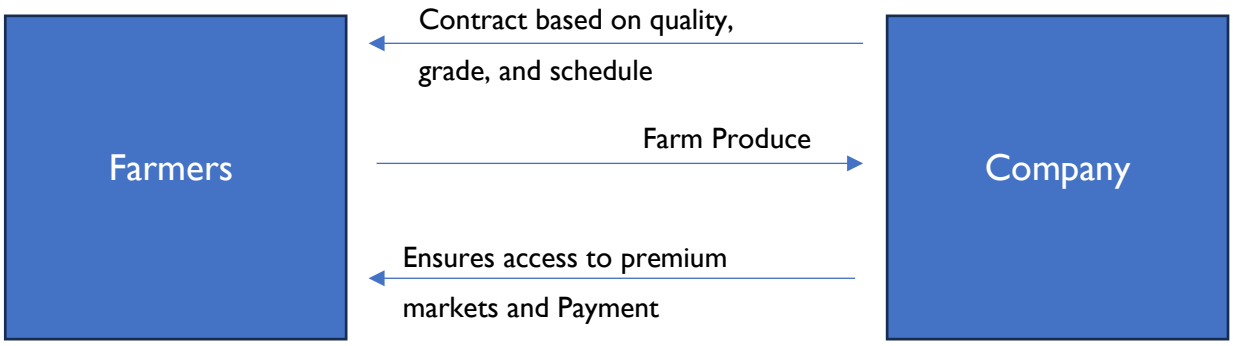
Resource-Provision: Resource-provision contracts involve the contracting firm offering financial and technical assistance in addition to supplying inputs. Farmers often repay the firm through a portion of their produce or revenue.

This model is particularly beneficial for high-investment crops that require substantial upfront costs. In India, this model is prominently used in sugarcane cultivation, with sugar mills in Maharashtra and Uttar Pradesh being key players. It is also common in horticulture and cotton farming. While its adoption is moderate, it is crucial for supporting farmers in resource-intensive farming operations, ensuring that they have access to necessary inputs and expertise.



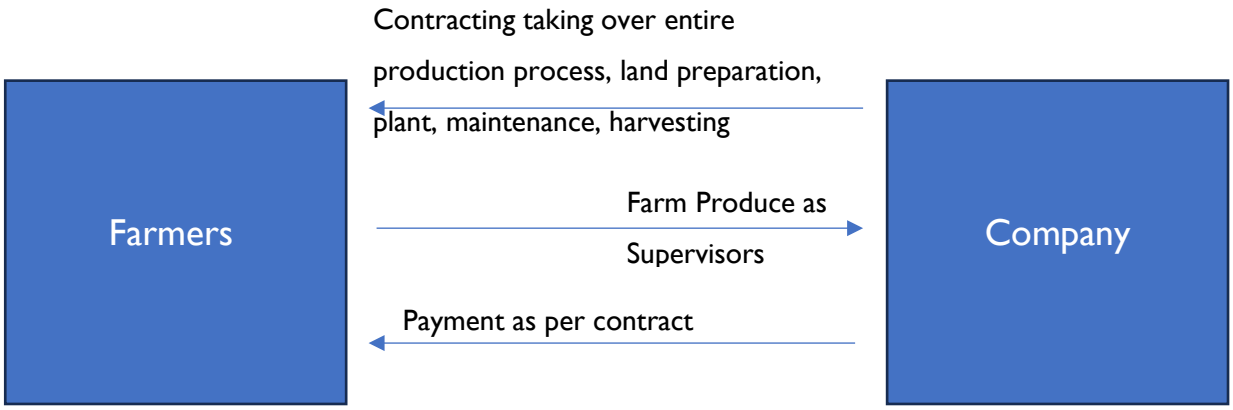
Market-Specification: Market-specification contracts focus on pre-defining market standards such as quality, grading, and delivery schedules. Farmers grow crops or rear livestock exclusively for the contracting firm while adhering to these specifications. These contracts cater to high-value and niche markets, particularly in the export sector.

In India, this model is gaining traction for organic farming and export-oriented crops like exotic fruits, herbs, and flowers. States like Sikkim, known for its organic farming initiatives, have embraced this model extensively. With the rising global demand for organic and sustainable produce, this model is experiencing increasing demand and has significant growth potential.



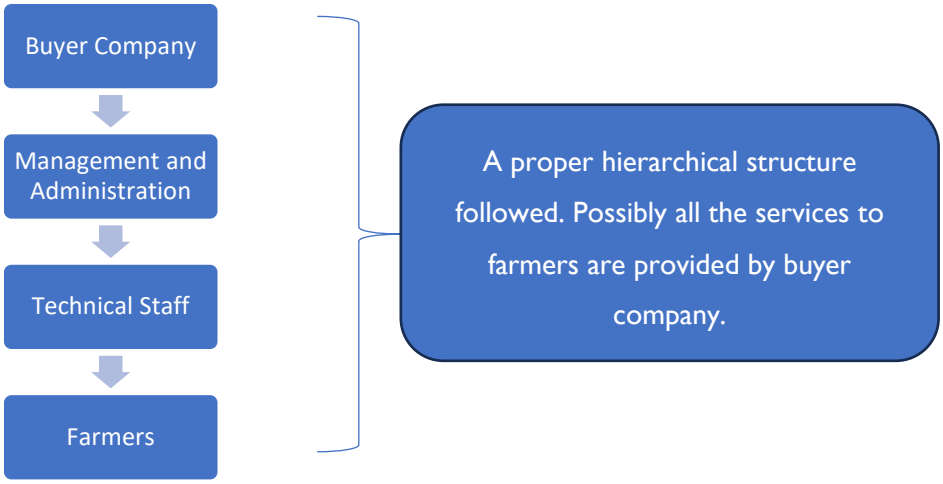
Production-Management: Production-management contracts involve the contracting firm taking over the entire production process, including land preparation, planting, maintenance, and harvesting. Farmers either work as supervisors or labourers, while the firm retains full control over operations.

This model is ideal for large-scale industrial farming or high-value crops requiring precision farming. Though less common in India due to land ownership patterns, this model is used in corporate farming ventures and livestock industries such as broiler chicken production. It has steady growth, particularly in areas where industrial-scale agriculture and standardization are priorities.



Based on Number of Parties Involved

Centralised Model:

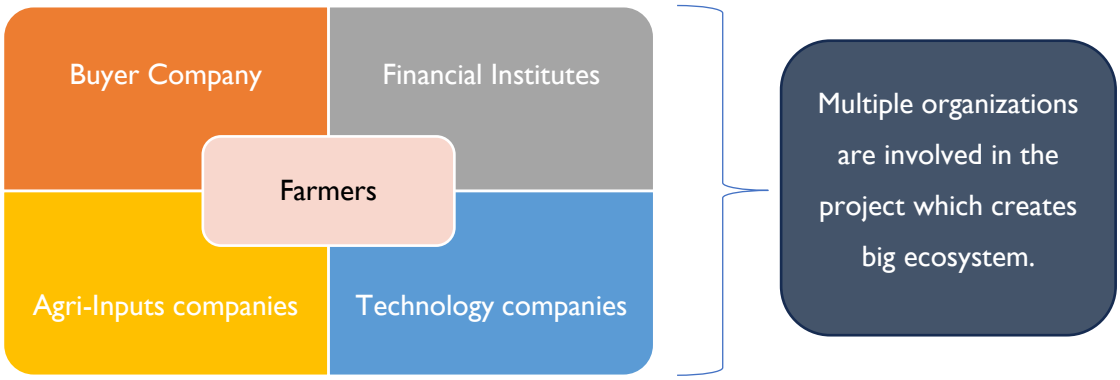


In this model of contract farming, a single centralized processor or buyer enters into contracts directly with farmers. The buyer manages and oversees the entire process, offering a range of services such as technical support and advice, without involving other stakeholders or entities.

The scope of services provided by the buyer can vary, from supplying high-quality seeds to more comprehensive support, including land preparation, seedlings, agro-chemicals, and even harvesting. Additionally, in this model, the buyer sources produce from many small farmers, rather than focusing on a few large-scale producers.

This model is particularly advantageous for small farmers, as approximately 86% of farmers in India fall under the small and marginal category. By adopting a centralized approach, contract farming can provide these farmers with the support they need to thrive.

Multipartite Model:

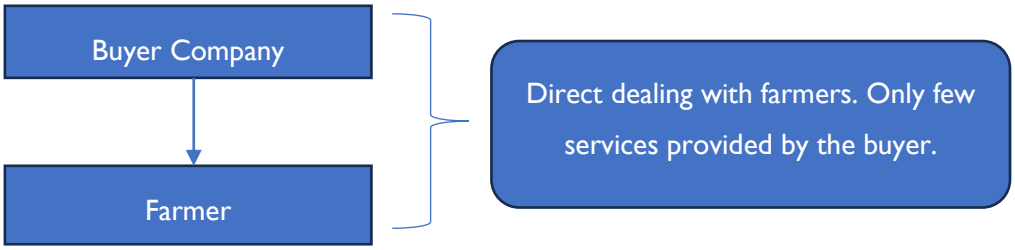


In the multipartite model, unlike the centralized system managed by a single entity, multiple organizations work together to support farmers by contributing their specialized expertise. Financial institutions provide funding, agricultural input companies deliver essentials like seeds and fertilizers, and technology providers

offer farm-level solutions tailored to specific needs. Once the crops are harvested, the main buyer company procures the produce.

This model fosters a collaborative ecosystem, with different stakeholders operating under a unified project framework. It is typically implemented on a larger scale, involving significant quantities of produce. The multipartite approach creates a mutually beneficial system, giving farmers access to a wide range of services while ensuring coordinated efforts among all parties involved.

Informal Model:

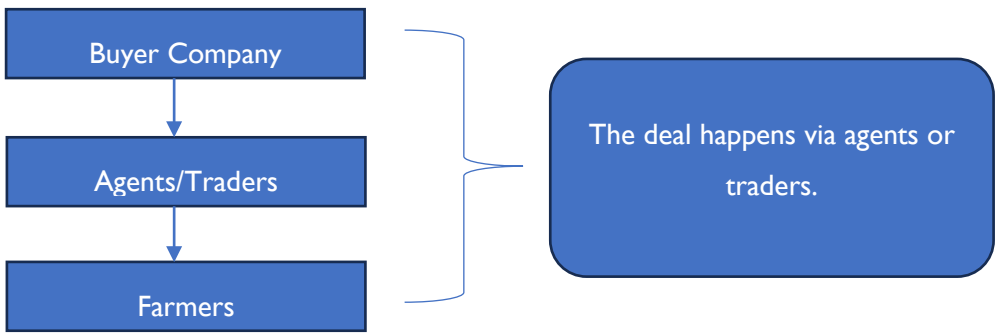


As the name implies, the informal model operates on a less structured basis. This approach is typically adopted by individual entrepreneurs or small companies that establish short-term agreements with farmers, often for a single growing season. It is commonly used for crops like fresh vegetables and fruits.

Unlike long-term contracts seen in other models, the informal model is characterized by its flexibility, with agreements lasting only as long as necessary, depending on the specific needs and resources of the buyers. In this setup, buyers often rely on government support for services such as extension programs, technology transfer, technical guidance, and access to credit facilities.

Alternatively, buyers may enter agreements with farmers without providing additional services, focusing solely on guaranteeing the purchase of their produce. This model offers a simple and adaptable solution for both parties, tailored to seasonal or short-term demands.

Intermediary Model:

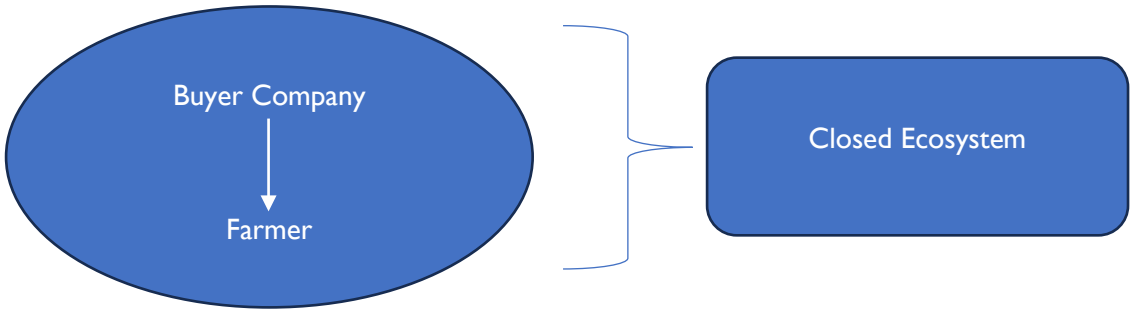


The intermediary model involves the participation of intermediaries, such as agents or traders, who act as a link between farmers and the buyer company. In this arrangement, the company does not interact directly with the farmers. Instead, the intermediaries establish and maintain contact with the farmers, serving as external representatives of the buyer. Once the crops are harvested, the intermediaries collect the produce from the farmers and deliver it to the buyer company.

This model is typically adopted by companies that prefer to avoid the complexities of directly managing farmers or providing them with services. While it reduces the company's workload, it can also create a layer of separation that might impact the overall efficiency and communication within the supply chain.

The intermediary model is particularly useful for companies operating in regions where building direct relationships with farmers is logistically challenging or where intermediaries already have established networks. However, its success depends heavily on the reliability and transparency of the intermediaries to ensure fair treatment of farmers and consistent quality of produce.

Nucleus Estate Model:



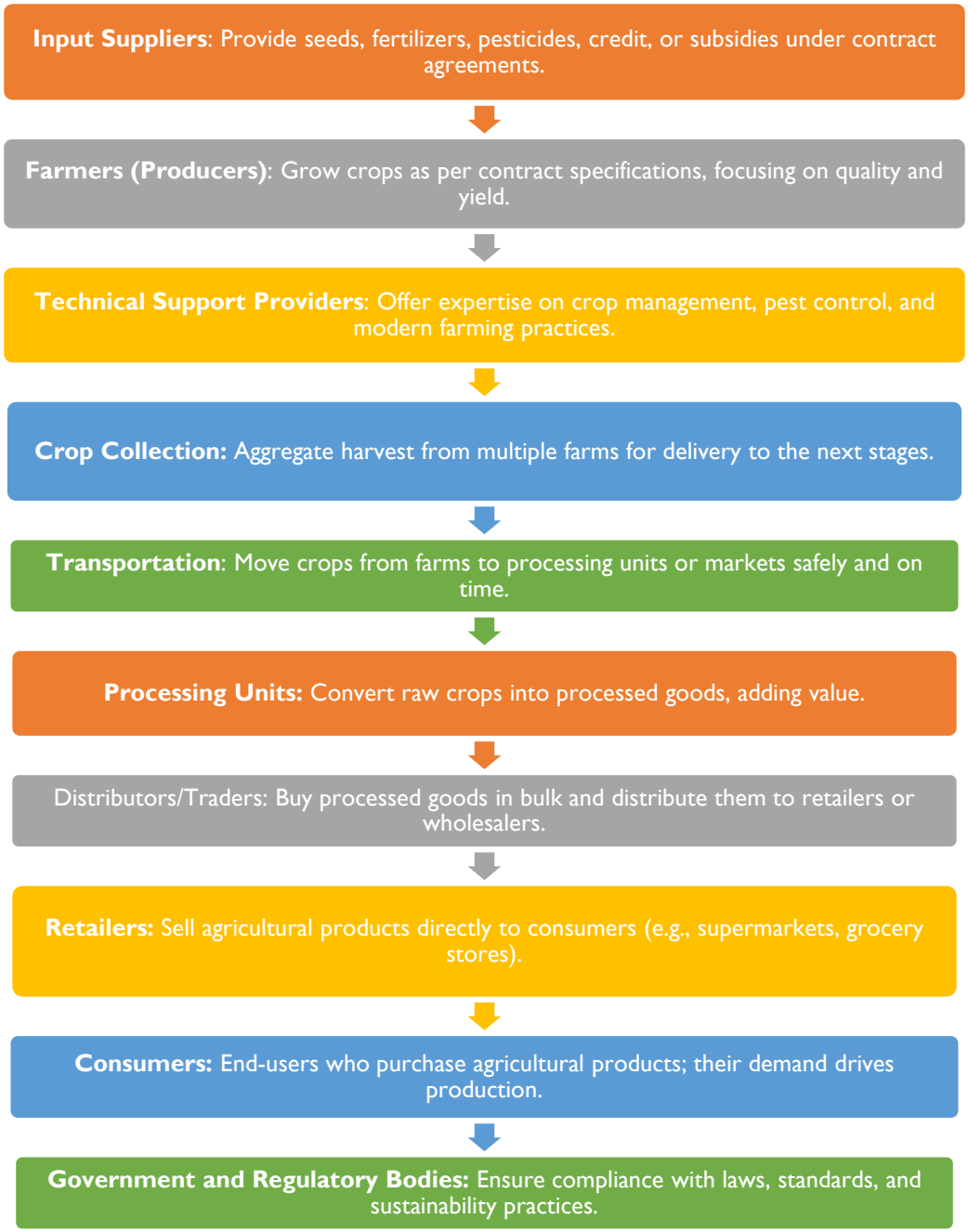
The nucleus estate model is a form of contract farming where the buyer company owns and directly manages the farming operations. The land used may either belong to the company or be leased from farmers. This model creates a self-contained ecosystem in which the buyer has full control over farming activities, from land preparation to harvest. Such control allows the company to ensure consistent quality and meet specific standards for the produce.

This model is particularly suitable for companies that require a steady and predictable supply of raw materials, especially when their production needs can be met by the yield from the nucleus estate. In addition to meeting their own demands, companies using this model may also engage with surrounding farmers as out-growers, offering contracts to produce additional quantities while maintaining a centralized control system.

The nucleus estate model is often implemented in industries requiring high-quality inputs, such as plantations for tea, coffee, or sugarcane, where consistency and standards are critical. By integrating farming operations, this approach minimizes risks related to quality, supply chain disruptions, and external dependencies, while also creating opportunities to transfer best practices and technology to nearby farmers.

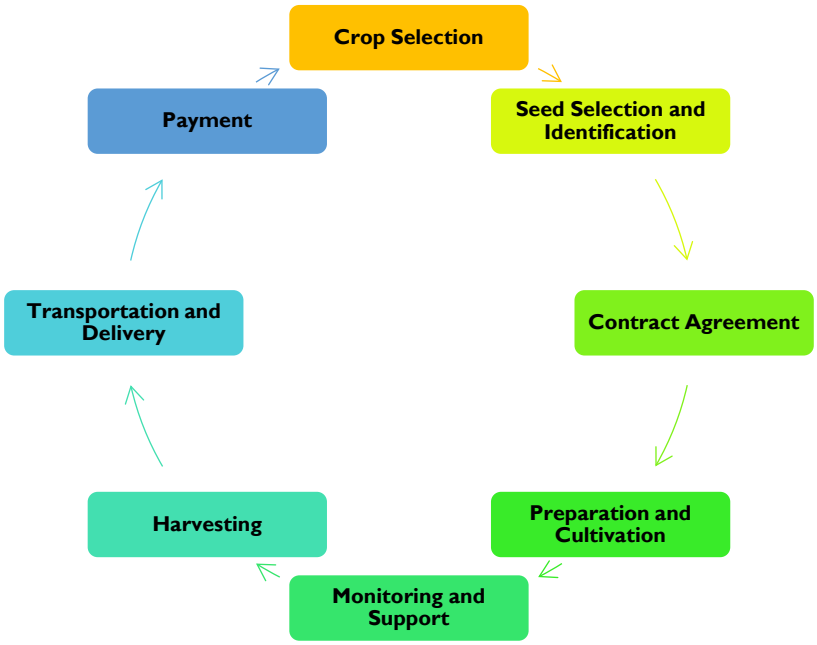
Value Chain of Contract Farming in India

Contract farming in India represents a significant shift in agricultural production and marketing strategies. It involves agreements between farmers and buyers (such as agribusiness firms, processors, or retailers) to produce specific crops under predetermined conditions. The value chain of contract farming encompasses several stages, from production to marketing, and involves multiple stakeholders.



Contract farming in India involves a structured process that connects farmers with agribusiness firms, ensuring a steady supply of agricultural products.

Key Stages in Contract Farming



Crop Selection

Identification of Suitable Crops: Farmers and contracting firms collaborate to identify crops that are suitable for the local climate and have market demand. This selection often considers factors like profitability, market trends, and export potential

Variety Selection: The choice of specific crop varieties is crucial. Firms may provide genetically superior seeds or hybrids that are best suited for contract farming, ensuring higher yields and better quality.

Seed Selection and Identification

Seed Quality Assurance: Contracting firms supply or recommend certified seeds with high germination rates and resistance to pests/diseases.

Matching Seeds to Varieties: Seeds are selected based on the chosen crop variety to achieve uniformity and contract quality standards.

Contract Agreement

Formulation of Contracts: Contracts outline essential terms including pre-agreed prices, quality standards, quantity, and timelines for delivery. These contracts can range from informal oral agreements to formal written documents registered with Agricultural Produce Market Committees (APMCs)

Input Supply Terms: The contract may include provisions for supplying inputs such as seeds, fertilizers, and technical assistance from the contracting firm

Preparation and Cultivation

Land Preparation: Farmers prepare their land according to the specifications provided by the contracting firm.

Cultivation Practices: Farmers follow prescribed agricultural practices, often with guidance from agronomists associated with the contracting firm. This may include irrigation techniques, pest management, and fertilization schedules.

Monitoring and Support

Field Visits: Technical personnel from the contracting firm regularly visit farms to monitor crop health and provide advice on best practices throughout the growing cycle.

Adjustments as Needed: Based on these visits, adjustments can be made to cultivation practices to ensure compliance with contract standards.

Harvesting

Timely Harvesting: Farmers harvest crops at the right time as specified in the contract to meet quality requirements.

Quality Control: The harvested produce is often inspected by representatives from the contracting firm to ensure it meets agreed-upon standards before delivery.

Transportation and Delivery

Logistics Management: The contracting firm typically manages transportation logistics. They may provide transport vehicles or reimburse farmers for transportation costs incurred when delivering produce.

Delivery to Processing or Market: Once harvested, produce is delivered directly to processing facilities or markets as stipulated in the contract. This step is crucial for maintaining freshness and quality.

Payment

Settlement of Payments: Upon successful delivery and acceptance of produce, payments are made to farmers as per the terms outlined in the contract. This can include immediate payment or structured payments based on delivery schedules.

The value chain of contract farming in India is a systematic process that connects farmers with agribusiness firms, ensuring the production and delivery of agricultural products.

Legal and Contractual Arrangements

Contract farming can be defined as agricultural production carried out according to an agreement between farmers and a buyer which establishes conditions for the production and marketing of a farm product. To be binding and enforceable, such agreements depend not only on good contractual design, but also on the existence of an adequate legal framework.

The farmer agrees to provide agreed quantities of a specific agricultural product. These should meet the quality standards of the purchaser and be supplied at the time determined by the purchaser.

Currently, contract farming requires registration with the Agricultural Produce Marketing Committee (APMC) in few states. This means that contractual agreements are recorded with the APMCs which can also resolve disputes arising out of these contracts. Further, market fees and levies are paid to the APMC to undertake contract farming. The Model APMC Act, 2003 provided for contract farming and was released to the states for them to use this as reference while enacting their respective laws.

Consequently, 20 states have amended their APMC Acts to provide for contract farming, while Punjab has a separate law on contract farming. However, only 14 states notified rules related to contract farming, as of October 2016.

Legal Framework of Contract Farming in India:

The legal framework governing contract farming in India has evolved to provide a structured approach that facilitates agreements between farmers and buyers, ensuring fair practices and protection for both parties.

Indian Contract Act, 1872

The Indian Contract Act serves as the foundational legal structure for contracts in India, including those related to agriculture. It outlines the principles governing the formation, execution, and enforcement of contracts.

Key Provisions:

- **Formation of Contracts**: Defines what constitutes a valid contract, emphasizing mutual consent, lawful consideration, and the competency of parties involved.
- **Breach of Contract**: Specifies remedies available in case of breach, including damages and specific performance.
- **Relevance to Contract Farming**: This act ensures that contracts between farmers and buyers are legally enforceable, providing a basis for resolving disputes.

Model APMC (Agricultural Produce Market Committee) Act, 2003

The Model APMC Act regulates the marketing of agricultural produce and facilitates contract farming by providing specific provisions.

Key Features:

- **Direct Sales**: Farmers can sell their produce directly to buyers outside APMC market yards without incurring market fees.
- **Compulsory Registration**: Requires registration of contract farming sponsors to ensure transparency and accountability.
- **Dispute Resolution Mechanism**: Establishes a framework for resolving disputes between farmers and buyers through designated authorities.
- **Impact on Contract Farming**: Promotes smoother transactions by reducing bureaucratic hurdles and ensuring fair practices in agricultural marketing.

Draft Model Contract Farming Act, 2018

Proposed by the Ministry of Agriculture to create a standardized regulatory framework for contract farming across states in India.

Key Features:

- **Contract Registration Authority**: Suggests establishing a state-level agency responsible for overseeing contract farming agreements.
- **Price Protection Mechanism**: Aims to provide safeguards against price volatility through predefined pricing structures.
- **Promotion of Fair Practices**: Encourages transparency and fairness in contracts, protecting the interests of both farmers and buyers.
- **Current Status**: While it has not been enacted universally across states, it serves as a guideline for states looking to implement contract farming regulations.

State-Level Regulations

Various states have enacted their own laws or amended existing laws to facilitate contract farming based on the Model APMC Act or the Draft Model Contract Farming Act.

For example: Tamil Nadu has introduced its own law governing contract farming practices based on the Model Act.

Other states like Karnataka, Goa, Odisha, and Uttar Pradesh are also working on implementing similar laws.

Dispute Resolution Mechanisms

Dispute resolution is crucial in contract farming due to potential disagreements over quality standards, pricing, or delivery issues. Here are some mechanisms established under various laws:

- **APMC Act Provisions**: Disputes related to contracts can be referred to a designated authority that must resolve issues within a specified timeframe (usually within 30 days).
- **Arbitration and Mediation**: Many contracts include arbitration clauses that require disputes to be settled through arbitration rather than litigation.

- Mediation is also encouraged as a less adversarial means of resolving conflicts.

Contractual Arrangements in Contract Farming in India:

Contract farming in India involves structured agreements between farmers and buyers, which are essential for ensuring a stable supply of agricultural products while providing farmers with guaranteed markets. These contractual arrangements include several key elements that define the relationship, responsibilities, and expectations of both parties.

Extent of Contract Farming Adoption in India

Contract farming has emerged as a significant mechanism for addressing inefficiencies in the agricultural value chain in India. Its adoption, however, remains uneven across various regions, crops, and farmer groups. According to the National Academy of Agricultural Sciences (NAAS) policy paper, contract farming is primarily concentrated in high-value perishable commodities such as fruits, vegetables, and cash crops.

The participation rate of smallholder farmers in contract farming for these perishable commodities is reported to be substantial, reflecting a moderate level of adoption. This participation is largely driven by agribusiness firms that provide essential inputs, technical support, and assured markets, enabling farmers to mitigate challenges such as price volatility and market uncertainties.

The extent of contract farming adoption varies significantly by state and crop type. For instance, Punjab and Haryana lead in contract farming for basmati rice, wheat, and vegetables, with a notable proportion of these crops grown under contracts. Maharashtra has a strong presence of contract farming for cotton and sugarcane, while Karnataka sees a considerable amount of coffee and gherkin production occurring through contract arrangements.

In Tamil Nadu, lower adoption rates are observed for crops like turmeric and poultry. Uttar Pradesh has higher adoption rates for sugarcane and mangoes, while Andhra Pradesh and Telangana also engage in contract farming for paddy and horticultural products. Gujarat has emerged as a leading state for potato contract farming, with companies such as PepsiCo and McCain partnering with farmers.

The state's favourable climate, strong storage infrastructure, and focus on processing-grade potatoes have made it central to India's potato supply chain. Farmers benefit from assured procurement, superior seed varieties, and technical assistance, which has boosted both yields and income stability. In contrast, the northeastern states lag behind in adoption rates, primarily focusing on tea and rubber.

Nevertheless, evidence suggests that contract farming can significantly enhance farm incomes and reduce market risks. Studies indicate that contract producers often earn substantially more than their non-contract counterparts due to higher yields and assured output prices.

For example, companies like PepsiCo have successfully implemented models where farmers receive seeds, technical advice, and guaranteed procurement at pre-agreed prices. Similarly, Kay Bee Exports links the

purchase price of okra to export market fluctuations while providing necessary inputs to maintain quality standards.

In Gujarat, McCain has established long-term partnerships with potato farmers, supplying high-quality seed varieties, agronomic support, and assured buy-back arrangements for processed potato products, further demonstrating the potential of potato-based contract farming in India.

While contract farming has made notable progress in integrating smallholder farmers into modern agricultural value chains, its adoption remains uneven across regions and crops. Addressing challenges related to farmer awareness, legal protections, and inclusivity will be crucial for expanding its reach and realizing its full potential in transforming Indian agriculture.

Regional Variations in Contract Farming

The demand for crops in contract farming depends on various factors, including the region's soil quality, weather conditions, the presence of manufacturing companies, and the types of products they produce, as well as government initiatives. Among the states, Punjab has emerged as a leader in contract farming, primarily due to the significant presence of companies facilitating such arrangements.

Region	Crops Commonly Grown	Key Companies/Examples	Market Demand
Punjab & Haryana	Basmati Rice, Wheat, Tomatoes, Potatoes	PepsiCo (tomatoes), L&T Foods (basmati rice)	Strong demand for basmati rice in international markets and a high local demand for fresh vegetables.
Maharashtra	Cotton, sugarcane, okra	Kay Bee Exports (okra), various sugar mills	Significant demand for cotton in the textile industry; sugarcane contracts ensure a steady supply for mills.
Karnataka	Coffee, spices, gherkins	Various local agribusiness firms	Rising demand for processed foods and exports; coffee is a major export commodity.
Tamil Nadu	Turmeric, pulses, poultry	Local poultry firms, spice exporters	Increasing demand for spices and poultry products in domestic and export markets.
Uttar Pradesh	Sugarcane, mangoes	Sugar mills (various), mango exporters	High demand for sugarcane from mills; mangoes targeted for export markets and processing.

Andhra Pradesh & Telangana	Paddy, chillies, horticultural products	Various food processing companies	Growing demand for processed foods; urban consumers seek high-quality vegetables and fruits.
Northeast India	Tea, rubber, traditional fruits	Local tea estates, rubber plantations	Increasing interest in organic products; tea is a significant export commodity.
Gujarat	Potatoes, Groundnut, Cotton, Castor seeds	McCain Foods (potato processing), Balaji Wafers (snacks), various cotton exporters	Strong demand for potatoes for processing (chips, fries) and exports; high demand for cotton and groundnut in textile and edible oil industries.

Key Insights: Punjab also introduced its own legislation, the Punjab Contract Farming Act, in 2013. By the 2016-17 period, 20 states had amended their Agricultural Produce Market Committee (APMC) Acts in line with the Model Act of 2003, and 14 states had notified rules specifically addressing contract farming (Government of India, 2003)

Crops Commonly Covered Under Contract Farming

Contract farming in India has emerged as a critical strategy to integrate farmers into modern agricultural value chains. It serves as a mechanism to ensure the production of high-quality crops, enhance productivity, and provide farmers with assured markets, inputs, and technical support. Based on insights from the National Academy of Agricultural Sciences (NAAS) policy paper and other sources, the crops commonly covered under contract farming in India include a wide range of high-value, perishable, and staple crops. Below is an expanded and detailed discussion of these crops.

Fruits and Vegetables: Fruits and vegetables dominate contract farming in India due to their perishability, high market demand, and significant export potential. Key crops include tomatoes, potatoes, onions, carrots, mangoes, bananas, papayas, and grapes.

a) Tomatoes and Potatoes: PepsiCo has been a pioneer in contract farming for tomatoes and potatoes in Punjab. The company provides farmers with high-quality seeds, technical guidance, and assured procurement at pre-agreed prices, ensuring stable incomes for participating farmers. PepsiCo's tomato contract farming model has helped increase yields by 50% while reducing input costs by 20%. Also, the consumption of Potatoes in PepsiCo is more than 50% from contract farming only.
b) Onions and Carrots: These crops are often contracted by food processing companies for dehydrated products or ready-to-eat meals. The demand for processed vegetables has surged due to urbanization and changing dietary preferences.

c) Mangoes and Grapes: These fruits are primarily grown under contract farming arrangements for export markets or juice production. Companies like Coca-Cola have engaged in mango sourcing for their juice brands.

The largest demand for fruits and vegetables comes from urban centres, export markets, and the food processing industry. Contract farming arrangements ensure a consistent supply of produce while reducing post-harvest losses. According to NAAS reports, income from vegetables grown under contract farming can be up to 30% higher compared to non-contract arrangements.

Cereals: Cereals like rice (including basmati), wheat, and maize are increasingly being cultivated under contract farming arrangements. These crops cater to both domestic consumption and export markets.

a) Basmati Rice: Contract farming of basmati rice is prevalent in states like Punjab and Haryana, where companies such as LT Foods procure high-quality produce for export purposes.
b) Maize: Maize is widely grown under contracts for use in animal feed, starch production, and ethanol manufacturing. Companies provide hybrid seeds to farmers to improve yields.

The demand for cereals is driven by their essential role in the Indian diet as well as their use in industrial applications. Contract farming ensures that farmers receive fair prices while meeting the quality requirements of buyers. NAAS reports indicate that contract farming can enhance yields by approximately 20-25%, providing farmers with more stable incomes.

Pulses: Pulses such as black gram (urad), green gram (moong), and lentils are also included under contract farming arrangements. These crops are vital for India's food security due to their protein content. Companies involved in pulses processing often engage with farmers to ensure a steady supply of raw materials for packaged pulses sold in retail markets. The government has also encouraged contract farming of pulses to reduce dependency on imports by ensuring higher domestic production. The demand for pulses is primarily driven by domestic consumption, with India being one of the largest consumers of pulses globally.

Oilseeds: Oilseeds such as soybean, groundnut, sunflower, and mustard are increasingly cultivated under contract farming agreements due to rising demand for edible oils.

a) Soybean: Companies like ITC have supported soybean production through their Integrated Business Division (IBD), offering technical assistance, inputs, and assured procurement.
b) Groundnut and Sunflower: These oilseeds are contracted by edible oil manufacturers to meet growing consumer demand for healthier cooking oils.

The oilseed market is expected to grow significantly with a demand increase of around 5-7% annually, driven by both domestic consumption and export opportunities as the health awareness among consumers is increasing. Contract farming ensures that companies have access to high-quality oilseeds while providing farmers with stable incomes. The Indian oilseed market is projected to grow significantly.

Cash Crops: High-value cash crops such as sugarcane, cotton, and tobacco are widely grown under contract farming models.

a) Sugarcane: Sugar mills across Maharashtra and Uttar Pradesh engage in long-term contracts with farmers to secure a steady supply of raw materials for sugar production.
b) Cotton: Cotton is contracted by textile companies like Bayer CropScience, which provides seeds, fertilizers, and pest management solutions.
c) Tobacco: Tobacco companies often enter into contracts with farmers to ensure compliance with quality standards required for export markets.

These crops are essential for industrial applications, making contract farming an effective model for ensuring consistent supply chains.

Spices: Spices such as turmeric, chillies, coriander, and cardamom are increasingly being cultivated under contract farming arrangements due to their high market value. Companies involved in spice exports engage with farmers to ensure compliance with international quality standards. For example, turmeric grown under contract farming is often used in pharmaceutical products or exported as powdered spice. The demand for spices is driven by both domestic consumption and export opportunities. Contract farming ensures that farmers meet stringent quality requirements while accessing global markets.

Medicinal Plants: Medicinal plants like aloe vera, ashwagandha, tulsi (holy basil), and aromatic crops such as patchouli have gained prominence under contract farming due to the growing demand for herbal products. Pharmaceutical companies often collaborate with farmers to cultivate these plants under controlled conditions. The herbal medicine industry has seen significant growth globally, creating opportunities for Indian farmers engaged in medicinal plant cultivation.

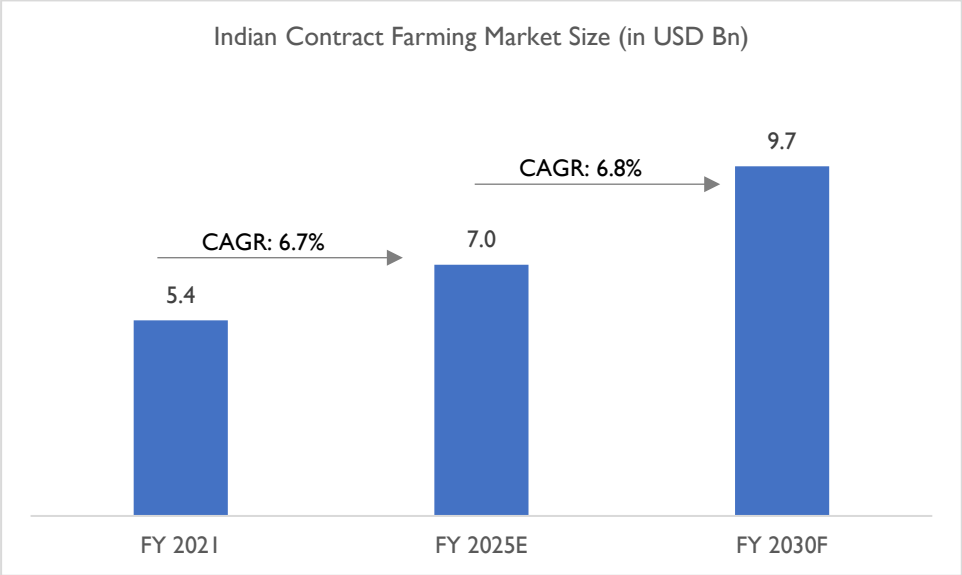
Dairy Products: Although not a crop in the traditional sense, dairy farming has adopted contract models where companies provide veterinary services, feed inputs, and assured markets for milk production. Firms like Amul have established cooperative models that ensure fair prices while maintaining quality standards. The dairy sector contributes significantly to rural incomes in India, making it an integral part of agricultural development strategies.

Indian Market for Contract Farming

Contract farming in India has become a prominent way for farmers to integrate with modern supply chains, especially with the increasing demand for quality produce in both domestic and international markets. The system involves an agreement between a buyer (usually a company or processor) and a farmer, where the buyer commits to purchasing the farmer's produce at agreed terms and conditions, such as price, quantity, quality, and delivery schedule.

India Market Size & Growth Prospects

Indian market for contract farming is estimated to be valued at USD 7.0 Bn in FY 2025. During the time FY 2021-25, the Indian market for contract farming has increased by a CAGR of nearly 6.7%. Despite agriculture playing an important role in national economy, the penetration of contract farming in India is very limited. Factors ranging from marginalized / fragmented nature of the industry to need for regulations have all prevented the growth of contract farming in India. Going ahead, the industry is expected to reach a value of USD 9.7 Bn by FY 2030, registering a CAGR of 6.8% between FY 2025 and 2030.



Source: D&B Research, FY 2025E – Estimate, FY 2030F-Forecast

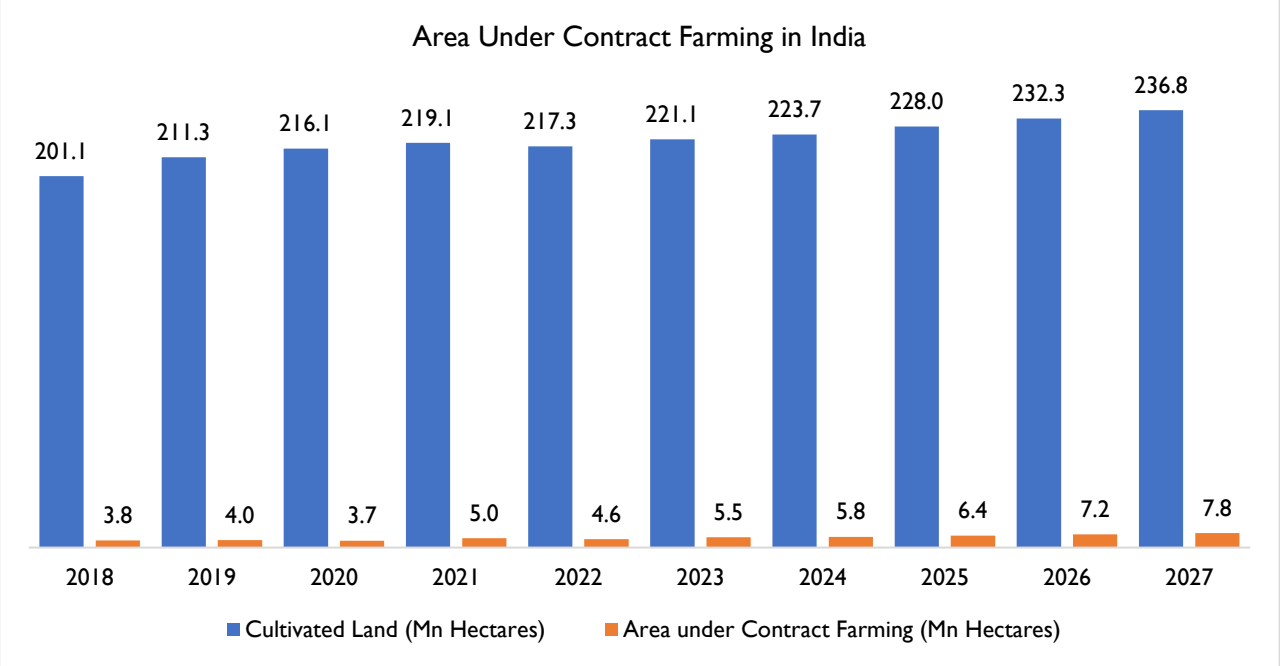
Area Under Contract Farming in India

Cultivated Land area in India experienced a steady increase between CY 2018 and CY 2027, growing from 201.1 million hectares to 236.8 million hectares. This represents a net growth of approximately 35.7 million hectares over the decade.

Meanwhile, the area under contract farming witnessed a significant expansion between 2018 and 2027, increasing from 3.8 million hectares to 7.8 million hectares. This represents a substantial net increase of 4 million hectares, demonstrating a robust growth trajectory in the contract farming sector. This trend underscores the increasing adoption of contract farming models within the agricultural landscape.

From CY 2018 to CY 2027, the growth in cultivated land is at a moderate pace of 1.8% CAGR, while the growth in area under contract farming is much higher at 8.3% CAGR, indicating an increasing trend in the adoption of contract farming.

The short-term CAGR (CY 2025- CY 2027) for cultivated land is 1.91%, whereas the CAGR for contract farming is projected to be significantly higher at 10.40%. This suggests a rapid growth in contract farming adoption in the next few years.



Source: Ministry of Agriculture and Farmers Welfare

Key Products Currently Covered Under Contract Farming in India

Contract farming has seen significant growth in India in recent years, especially in high-demand crops like tomato, onion, and fruits. These crops are vital to India's agricultural economy, and contract farming plays a key role in improving productivity, providing assured markets, and enhancing the overall agricultural supply chain.

Crop	Year	Total Production (Lakh MT)
Tomato	FY 2023	213.2
	FY 2024	215.4
	FY 2025 (Adv Estimates)	207.5
Onion	FY 2023	242.6
	FY 2024	288.7
	FY 2025 (Adv Estimates)	307.7

Potato	FY 2023	601.41
	FY 2024	570.53
	FY 2025 (Adv Estimates)	601.75
Fruits	FY 2023	1129.7
	FY 2024	1132.2
	FY 2025 (Adv Estimates)	1145.1

Source: Ministry of Agriculture and Farmers Welfare, Refers to total production in India

Tomatoes:

Tomatoes are one of India's most important vegetable products, including fresh and processed (e.g., ketchup, sauces). Major food processing companies like Ketchup manufacturers, soups, and sauces producers are involved in contract farming for tomatoes. Companies like Hindustan Unilever, Nestle, and ITC have been sourcing tomatoes directly from contract farmers to ensure a consistent and high-quality supply for processing.

Region-wise Concentration: Tomato contract farming is prominent in regions like Punjab, Himachal Pradesh, Madhya Pradesh, and parts of Maharashtra. These areas have favourable climate and soil conditions for tomato cultivation.

Onion:

Onion is another important crop in India, both as a staple food and for usage in food processing companies. Contract farming has expanded to promote improved production and market linkages due to its relevance in domestic consumption and export.

Large-Scale Processing: Companies involved in the onion dehydration industry, where onions are dried and processed into powders and flakes, engage in contract farming to secure a consistent supply of quality onions.

Export Demand: India is one of the largest exporters of onions, and with export markets becoming more demanding in terms of quality, contract farming has become an important mechanism for ensuring consistent supply that meets export standards.

Region-wise Concentration: Major onion-producing states like Maharashtra, Karnataka, Gujarat, and Rajasthan are seeing a rise in contract farming, where companies provide inputs, ensure quality standards, and help farmers achieve better yields.

Potato:

Potato is one of the most significant crops under contract farming, largely driven by the **snack food and frozen foods industry**. Companies like **PepsiCo and McCain** work closely with farmers to ensure supply

for potato chips, frozen fries, and other processed potato products. These firms provide high-quality seed varieties, technical know-how, and buy-back arrangements at pre-agreed prices, ensuring farmers stable incomes.

Production Scenario: Annual production of potato in India is estimated to be 601.75 lakh metric tons in 2024-25[1]. As per the second advance estimate, the annual production volume would increase by nearly 1.4 over previous year.

Region-wise Concentration: Gujarat has emerged as the **hub of potato contract farming**, supported by its favorable climate, strong cold storage infrastructure, and proximity to processing plants. Apart from Gujarat, states like Uttar Pradesh, Punjab, and West Bengal are also prominent in potato contract farming.

Fruits:

The contract farming model in fruits has gained significant traction, especially for high-value fruits like mangoes, apples, grapes, bananas, oranges, and pomegranates.

High-Value Fruits: Fruits like mangoes, grapes, pomegranates, and bananas are being increasingly cultivated under contract farming agreements to meet both domestic and international market requirements.

Regional Distribution: Maharashtra, Karnataka, Andhra Pradesh, and Tamil Nadu are major hubs for fruit contract farming, especially for crops like grapes, mangoes, and bananas.

[1] As per Ministry of Agriculture, Second Advance Estimate

Potato Farming Scenario

Overview

The potato (Solanum tuberosum L.) stands as the world's most important vegetable crop and the third most significant food crop after rice and wheat. Recognizing its potential to address global food security and poverty alleviation, the Food and Agriculture Organization (FAO) in 2008 designated the potato as a key crop for the future.

Renowned for its nutrient-rich profile, the potato plays a pivotal role in enhancing farmers' livelihoods. Its cultivation is highly voluminous and labour-intensive, offering substantial employment opportunities across the processing, storage, transportation, and marketing of fresh and processed potatoes. As a nutrient-dense and labor-oriented crop, the potato is instrumental in generating employment and ensuring food and nutritional security, particularly in developing nations like India.

In India, the potato holds a significant position as a leading vegetable crop, contributing around 28% of the nation's total vegetable production. As the second-largest producer of potatoes globally, India accounts for nearly 15% of global potato output.

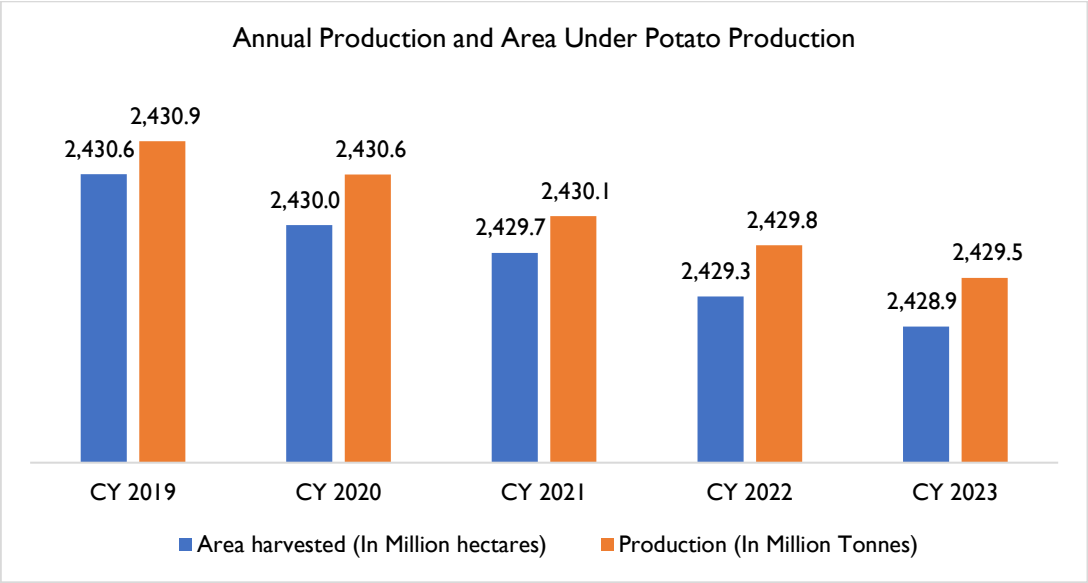
While the export of potatoes, seed potatoes, and related products currently represents just 1.05% of the country's overall production, export volumes have exhibited a robust growth trajectory, with a CAGR of 14.1% over the past two decades. This report explores the structure of potato marketing systems in India, highlights existing challenges, and outlines strategies for improvement. Furthermore, it examines the current status, growth patterns, and untapped potential of India's potato and potato product exports.

Global Production Scenario

The graph highlights the annual production and harvested area of potatoes globally from CY 2019 to CY 2023. Both parameters have remained largely stable over the period, with production fluctuating only slightly between 2,429 and 2,431 million tonnes and the harvested area staying close to 2,429–2,431 million hectares. This overall stability suggests that potato cultivation globally has reached a plateau, with no significant expansion in cultivated land or output levels.

The close alignment of production and harvested area indicates limited improvements in productivity, as yields have not shown meaningful growth. Several factors explain this trend. First, potato cultivation globally has reached a mature stage, leaving little scope for expanding the cropped area due to competition from other essential food and cash crops.

Second, productivity gains have stagnated as many farmers continue to rely on traditional farming practices with limited adoption of modern technology and mechanization. Third, climatic variability such as fluctuations in rainfall, temperature, and irrigation availability affects potato yields, leading to minor year-on-year variations.



Source: Food and Agriculture Organization of the United Nations (FAOSTAT)

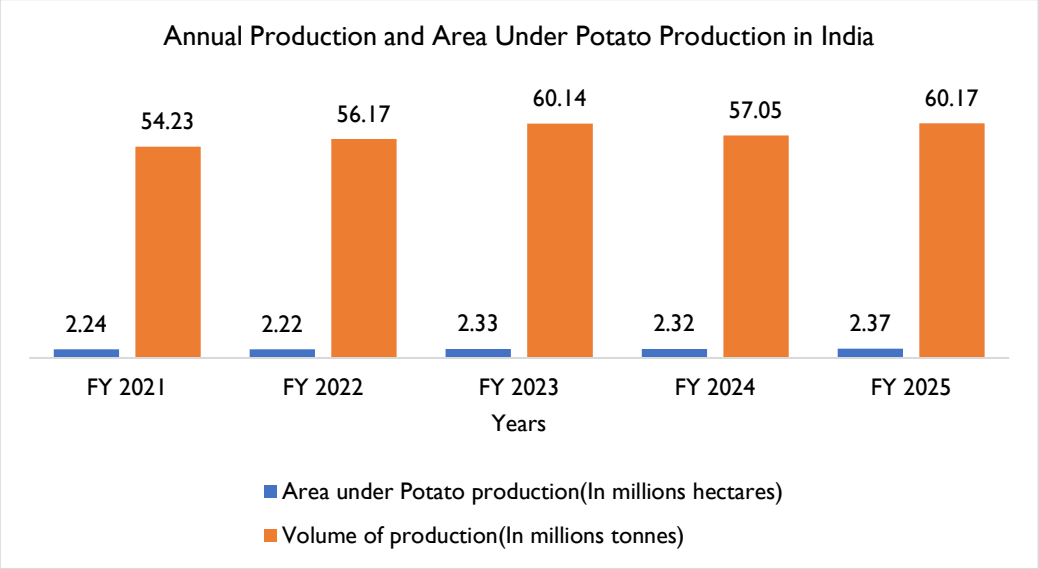
Additionally, rising input costs for seeds, fertilizers, and water discourage farmers from scaling up cultivation, while market volatility and unstable potato prices make large-scale expansion risky. Overall, the trend reflects a stable but stagnant potato sector, where production growth is constrained by both land and productivity challenges.

Future improvements are likely to come not from increasing the area under cultivation but from enhancing yields through better seed varieties, modern irrigation, mechanization, and storage infrastructure. Such measures will be critical to improving efficiency and ensuring long-term sustainability in global potato production.

Indian Production Scenario

The graph presents the annual production volume and area under potato cultivation in India from FY 2021 to FY 2025. Over this period, the cultivated area remains nearly stable, ranging between 2.22 and 2.37 million hectares, while production shows more noticeable fluctuations, increasing from 54.23 million tonnes in FY 2021 to over 60 million tonnes in FY 2023 and FY 2025. This indicates that while the land under potato cultivation has not expanded significantly, variations in productivity have influenced the overall production trend.

The data suggests that changes in potato output are less a result of area expansion and more linked to yield performance. For instance, the increase in production from FY 2022 (56.17 million tonnes) to FY 2023 (60.14 million tonnes) despite only a marginal increase in area (2.22 to 2.33 million hectares) reflects improved yield, possibly due to favourable climatic conditions, better seed quality, and efficient farming practices. Conversely, the dip in FY 2024 to 57.05 million tonnes, despite a slight increase in cultivated area, points to the role of weather shocks, pest incidence, or input constraints affecting productivity.



Source: Department of Agriculture & Farmers Welfare

By FY 2025, production rebounds to 60.17 million tonnes, again highlighting the impact of favourable conditions and potentially higher adoption of improved farming techniques. In conclusion, India's potato production between FY 2021 and FY 2025 demonstrates that yield improvements and productivity factors, rather than land expansion, are the primary drivers of growth. The sector's performance underscores the importance of resilient farming practices, technological adoption, and infrastructure support to stabilize production against climatic variability and input-related challenges.

Growing Season

Potatoes are cultivated across India in different seasons, primarily influenced by regional climatic conditions. The main growing seasons are categorized into Rabi, Kharif, and Spring/Summer crops, each with distinct sowing and harvesting periods.

Rabi Season (Main Season): The Rabi season is the primary growing season for potatoes in India, accounting for more than 80% of the total production. The sowing period typically occurs from October to December, with harvesting taking place from December to March. This season is particularly prevalent in the northern plains, especially in states like Uttar Pradesh, Punjab, Bihar, and West Bengal. The cool winter temperatures, ranging from 15–20°C, during this period are ideal for tuber formation and growth, contributing to high yields.

Kharif Season: The Kharif season is another important period for potato cultivation, although it contributes less to the overall production compared to Rabi. Potatoes are sown during the Kharif season from June to July and harvested between October and November. This season is more common in regions like the Deccan Plateau, including states such as Maharashtra, Karnataka, and Andhra Pradesh. The cultivation during this time relies on moderate monsoon rains, which can vary significantly across different regions.

Spring/Summer Crop: In addition to the main Rabi and Kharif seasons, potatoes are also grown as a spring or summer crop in certain regions. The sowing for this crop occurs from January to February (spring) or

May (summer), with harvesting typically happening between April and June. This practice is common in hilly areas such as Himachal Pradesh and Uttarakhand, where cooler temperatures at higher altitudes allow for successful potato cultivation during these months.

Regional Variations: In India, regional variations allow for year-round potato cultivation in some areas. For instance, in the southern plains, particularly in states like Tamil Nadu, potatoes can be grown throughout the year during summer (April-May), autumn (August-September), and spring (January). This flexibility in growing seasons reflects the adaptability of potato farming practices across diverse climatic conditions.

Top 5 Production Hubs

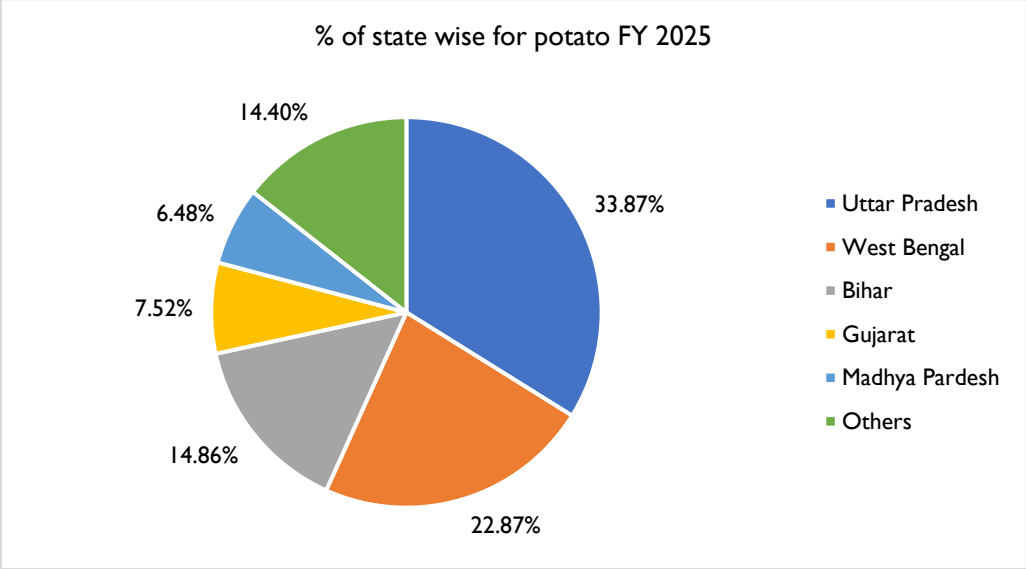
In FY 2025, potato production in India was highly concentrated in a few leading states, with Uttar Pradesh, West Bengal, and Bihar together accounting for more than 70% of the national output. Uttar Pradesh leads by a wide margin, contributing 33.87% of the national output, thanks to its extensive cultivation in the fertile Indo-Gangetic plains and well-developed irrigation systems. West Bengal follows with 22.87%, leveraging favorable agro-climatic conditions and strong local demand that supports year-round production.

Bihar ranks third with a 14.86% share, benefiting from fertile soil and government-led initiatives to strengthen horticulture output. Gujarat, contributing 7.52%, has emerged as an important hub due to technological adoption, contract farming, and improved storage infrastructure. Madhya Pradesh accounts for 6.48%, reflecting its gradual rise in potato cultivation as farmers diversify crop choices.

Together, these five states account for nearly 86% of India's potato production, underscoring their central role in meeting domestic demand and ensuring supply stability. The dominance of these hubs highlights the need for targeted investments in productivity enhancement, cold storage facilities, and value-chain development in these regions to further strengthen India's potato economy.

State	Production in Mn Tonnes	Percentage of total India Production (FY 2025 Second AE)
Uttar Pradesh	20.3	33.8%
West Bengal	13.7	22.8%
Bihar	8.9	14.8%
Gujarat	4.5	7.5%
Madhya Pradesh	3.9	6.5%

Potato production percentage state-wise (in FY 2025):



Uttar Pradesh:

Uttar Pradesh is the largest potato-producing state in India, contributing approximately 20.38 million tonnes, which accounts for about 33.87% of the country's total production. The state's dominance is due to its fertile alluvial soil, favourable climatic conditions during the Rabi season, and extensive irrigation networks.

Major potato-producing districts include Agra, Meerut, Farrukhabad, and Kanpur, where farmers benefit from well-established farming practices and access to high-quality seeds like Kufri Jyoti. The state government supports farmers through subsidies on fertilizers, seeds, and irrigation facilities, while cold storage infrastructure ensures reduced post-harvest losses and better market access.

The Uttar Pradesh government has launched several initiatives aimed at enhancing potato production and supporting farmers in the state. One of the most significant measures is the recent reduction in potato seed prices, which was announced in October 2024.

The government slashed seed prices by 500 rupees per quintal, making quality seeds more accessible to farmers. This price reduction applies to various potato seed categories, including Foundation First and Second varieties, and aims to encourage farmers to cultivate potatoes on approximately 6.96 lakh hectares of land in the 2024-25 fiscal year.

The initiative is designed not only to reduce costs but also to empower farmers to become seed producers themselves, addressing the ongoing issues of seed shortages. In addition to price reductions, the Uttar Pradesh government has introduced a subsidy program that offers 25,000 rupees per hectare for bagging and tagging potato seeds intended for processing varieties. This support focuses on popular processing varieties such as Kufri Chipsona and Kufri Frysona, aiming to boost the processed food industry within the state and enhance farmers' incomes.

Another significant initiative is a memorandum of understanding (MoU) signed between the Uttar Pradesh government and Yara India, a leading crop nutrition company. This partnership aims to revolutionize potato

farming by introducing digital technologies and best farming practices. The collaboration focuses on enhancing crop productivity and quality, providing farmers with access to innovative solutions that improve efficiency and sustainability in their farming practices.

The establishment of the Yara Knowledge Grow Center in Agra serves as a hub for training and development, where farmers can learn about advanced agricultural techniques. The state also benefits from its strong agricultural research infrastructure, including the ICAR-Central Potato Research Institute (CPRI) regional station located at Modipuram. This institute plays a crucial role in developing improved potato varieties suitable for Uttar Pradesh's agro-climatic conditions, further enhancing productivity.

West Bengal:

West Bengal is the second-largest potato producer in India, contributing around 13.76 million tonnes annually, which is approximately 22.87% of the national production. The state benefits from fertile alluvial soil in the lower Gangetic basin and a favourable climate for potato cultivation. Major potato-producing districts include Hooghly, Burdwan, Midnapore, and Bankura.

The average yield in West Bengal has increased to 29,017 kg/ha (2023) due to advancements in agricultural practices and access to high-yielding seed varieties. However, challenges such as inadequate cold storage facilities and post-harvest losses persist. The state government has initiated programs to improve irrigation systems and promote modern farming techniques.

The West Bengal government has implemented several initiatives to enhance potato production and support farmers in the state. One significant effort is the establishment of the All India Coordinated Research Project (AICRP) on Potato, which has been operational since 1971. Based at Kalyani, this project focuses on research and development to promote high-yielding potato varieties, improve agronomic practices, and address pest and disease management.

The AICRP has successfully identified several high-yielding cultivars suitable for various agro-climatic conditions in West Bengal, contributing to increased average tuber yields. Additionally, the government has introduced innovative cultivation methods such as the Apical Rooted Cutting (ARC) process, which enhances seed potato multiplication. This method is being promoted through various agricultural centres, aiming to improve the availability of quality seed potatoes and reduce dependency on external sources.

In response to recent market fluctuations and price surges, the government has also engaged with the West Bengal Cold Storage Association to explore strategies for stabilizing potato prices. This includes proposals to supply potatoes at reduced rates during periods of high demand, thereby alleviating financial pressures on consumers and farmers alike.

Moreover, initiatives like SAFAL outlets have been established by the state agriculture marketing department to facilitate direct sales from farmers to consumers, cutting out intermediaries and ensuring better prices for both parties. These outlets help in making potatoes available at wholesale rates, thus supporting local farmers while addressing consumer needs.

Bihar:

Bihar ranks third in potato production with an annual output of approximately 8.9 million tonnes, contributing about 14.8% of India's total production. The state's alluvial soil and favourable climatic conditions make it ideal for potato farming, particularly in districts like Nalanda, Purnia, and Patna. Farmers have adopted improved farming practices and high-yielding varieties such as Kufri Jyoti, supported by government initiatives like subsidies on seeds and fertilizers. Despite these advancements, challenges such as limited cold storage capacity and fluctuating market prices remain significant barriers for farmers.

The Bihar government has implemented several initiatives aimed at enhancing potato production and supporting farmers in the state. One of the most significant initiatives is the promotion of processing-quality potato cultivation. In response to the growing demand from food processing units, the Cooperative Department has unveiled a comprehensive plan to support farmers affiliated with vegetable producer cooperative societies. This initiative focuses on training farmers to cultivate high-quality processing-grade potatoes and tomatoes, which will reduce reliance on imports and enhance local self-sufficiency.

The government has established around 300 block-level vegetable producer cooperative societies across 20 districts, with a total membership of over 38,500 farmers. These societies facilitate training programs that equip farmers with essential skills and knowledge for effective cultivation. Additionally, Bihar's agricultural sector has benefited from innovative practices such as the Small Farmers Large Field model, which aims to address challenges faced by smallholder farmers. This model encourages collaboration among small farmers to cultivate larger areas collectively, thereby improving economies of scale and access to resources. The initiative is supported by organizations like the International Potato Center (CIP), which provides comprehensive training on best practices in potato farming, including irrigation management and pest control.

Gujarat:

Gujarat plays a significant role in India's potato production, contributing approximately 4.52 million tonnes annually, which accounts for about 7.52% of the country's total output. The state's success in potato farming can be attributed to several key factors that enhance its agricultural productivity. Gujarat benefits from a diverse climate and well-drained sandy loam soil, which are ideal for potato cultivation.

The state's average yield stands at around 30.64 tonnes per hectare, significantly higher than the national average of 23.67 tonnes per hectare. Major potato-producing districts include Banaskantha, Kutch, Ahmedabad, and Surendranagar. The favourable conditions allow for multiple cropping seasons, enabling farmers to grow potatoes during both the Rabi and Kharif seasons.

The state government of Gujarat has implemented several initiatives to enhance potato production and support farmers in the region. One of the notable initiatives is the Sujalam Sufalam Yojana, which focuses on improving irrigation facilities across the state. This scheme aims to provide efficient water management and irrigation infrastructure, which is crucial for potato cultivation, especially in arid regions like Banaskantha and

Kutch. By enhancing irrigation practices, farmers can achieve higher productivity per hectare and ensure better crop yields.

Additionally, the SAUNI Yojana (Saurashtra Narmada Avtaran Irrigation Yojana) aims to provide irrigation to drought-prone areas by utilizing surplus water from the Sardar Sarovar Dam. This initiative is particularly beneficial for potato farmers, as it helps in maintaining consistent moisture levels in the soil, which is essential for healthy potato growth.

Madhya Pradesh:

Madhya Pradesh produces around 3.90 million tonnes of potatoes annually, contributing about 6.48% to India's total production. The state benefits from diverse agro-climatic zones that allow for extended cropping seasons, particularly in districts like Indore, Ujjain, and Dewas. Modern irrigation techniques such as drip irrigation have been adopted to enhance water efficiency, while government programs support the use of high-yielding seed varieties and fertilizers. However, challenges such as market volatility and limited access to advanced farming technologies hinder further growth.

The Madhya Pradesh government has implemented several initiatives to boost potato production and support local farmers. One of the most significant efforts is the large-scale training campaign organized by Siddhi Vinayak Agri Processing Pvt. Ltd., which recently educated over 2,000 farmers in the Malwa region about the benefits of diversifying from traditional wheat cultivation to potato farming. This initiative emphasizes the economic advantages of crop diversification and introduces new, climate-smart potato varieties such as Ganesh and Winner, which are designed for higher yields and better marketability.

These varieties are climate-resilient, with Ganesh maturing in 80-90 days and having a yield potential of 28-30 metric tons per hectare, while Winner matures in 110-115 days with a yield potential of 35-40 metric tons per hectare. The five states of Uttar Pradesh, West Bengal, Bihar, Madhya Pradesh, and Punjab collectively account for more than 90% of India's total potato production. These states dominate due to their favourable climatic conditions, fertile soils, advanced farming practices, and government support initiatives.

Types of potato cultivated in India

Kufri Sindhuri: It is a highly versatile and resilient potato variety cultivated across diverse regions such as Maharashtra, Bihar, Gujarat, Karnataka, Punjab, Uttar Pradesh, and Jammu & Kashmir. The variety produces medium-sized, round tubers with deep eyes and a distinct red color. Kufri Sindhuri is moderately resistant to early blight and tolerant to Potato Leaf Roll Virus (PLRV), which makes it more robust against diseases. It is well-regarded for its slow rate of degeneration, allowing for prolonged storage, and is capable of tolerating both temperature and water stress to some extent, which makes it suitable for areas prone to such conditions. The crop matures in 110-120 days, yielding an average of 40 tons per hectare. Kufri Sindhuri is known for its resilience to late blight, further enhancing its appeal in areas with varying climatic conditions. This variety is particularly suitable for processing purposes such as making chips, thanks to its good texture

and quality when processed. Its combination of disease resistance, storage potential, and adaptability to diverse growing conditions make it a popular choice for farmers and the processing industry alike.

Kufri Chandramukhi: It is a widely grown potato variety found in regions including Maharashtra, Bihar, Gujarat, Haryana, Himachal Pradesh, Madhya Pradesh, Orissa, Punjab, Uttar Pradesh, and West Bengal. The tubers are large, oval, and slightly flattened, with a smooth white skin and dull white flesh. The eyes of the tubers are fleet, and the variety matures in 80-90 days, yielding an average of 25 tons per hectare. This variety is highly suitable for producing instant flakes and chips, due to its excellent cooking qualities, especially its low sugar content and desirable texture when processed. Kufri Chandramukhi's resistance to late blight makes it a reliable choice for cultivation in regions with moderate to high rainfall, where fungal diseases such as blight are common. It is valued for its fast maturation, making it an excellent option for early market availability, and its suitability for processing into high-quality products further boosts its demand in the commercial sector.

Kufri Jyoti: Cultivated in areas like Maharashtra, Bihar, Gujarat, Haryana, Uttar Pradesh, Punjab, Karnataka, and West Bengal, Kufri Jyoti is a popular early-maturing variety known for its large, oval-shaped tubers with white flesh. The variety matures quickly in hills, with a maturity period of 80-90 days, yielding an average of 20 tons per hectare. Kufri Jyoti is moderately resistant to both early and late blight, and it has a slow rate of degeneration, which means that it can be stored for longer durations without significant quality loss. Its resistance to diseases and early maturation makes it an excellent choice for processing purposes, particularly in regions where early availability of potatoes is essential. Kufri Jyoti is widely used for making chips and fries, and its favourable characteristics for **processing** make it an important variety in the Indian potato industry. It also plays a crucial role in intensive cropping systems, helping to meet the demand for processed potato products during the early seasons.

Kufri Lauvkar: Primarily grown in Maharashtra, Madhya Pradesh, and Karnataka, Kufri Lauvkar is a large, round variety of potato with white skin and fleet eyes. It matures in a quick 75-80 days, which is relatively early, allowing it to build up high yields under warmer climates. The average yield of Kufri Lauvkar is 30 tons per hectare, and it is especially prized for its suitability in chip-making. The high dry matter content of this variety makes it ideal for the production of chips, as it provides a better texture and crispiness. Kufri Lauvkar is well-suited for regions with warmer temperatures and shorter growing seasons. Its ability to yield rapidly in warmer climates ensures a steady supply of potatoes to meet market demand, especially for processing industries that require high-quality raw materials for chips and other processed products.

Kufri Badshah: Grown extensively in states like Gujarat, Haryana, Madhya Pradesh, Punjab, Uttar Pradesh, and Jammu & Kashmir, Kufri Badshah is a large, oval potato variety with fleet eyes and dull white flesh. One of the most notable features of Kufri Badshah is its high yield, with an average of 50 tons per hectare, making it one of the highest-yielding varieties. The variety matures in 100-110 days and is known for its resistance to diseases such as early and late blight, as well as **Potato Virus X (PVX)**. Kufri Badshah is well-suited for table purposes, as its tubers are of uniform size and shape, making them highly marketable. Additionally, its

high resistance to diseases ensures it performs well in diverse climates, providing a consistent and reliable crop for farmers. The variety's fast-growing nature, combined with its disease resistance, makes it a popular choice for regions where crop reliability and yield maximization are important.

Kufri Bahar: Kufri Bahar is predominantly cultivated in Haryana, Uttar Pradesh, Himachal Pradesh, and Jammu & Kashmir, and it is known for its large, round-oval tubers with medium deep eyes and white flesh. The variety matures in 100-110 days, yielding an average of 45 tons per hectare. Kufri Bahar has a slow rate of degeneration, which allows it to be stored for longer durations without significant loss in quality. It is particularly suited for table purposes, as its smooth skin and consistent tuber shape make it appealing in fresh markets. Kufri Bahar is moderately resistant to late blight, which ensures it can be grown successfully in areas where fungal diseases are common. Its ability to produce a high yield in varied climatic conditions makes it a valuable crop for farmers looking to maximize their production potential, particularly in regions where potato cultivation is a major agricultural activity.

Kufri Lalima: Cultivated mainly in Bihar and Uttar Pradesh, Kufri Lalima is known for its striking red, round tubers with medium deep eyes and white flesh. The variety matures in 100-110 days, yielding an average of 40 tons per hectare. Kufri Lalima is moderately resistant to early blight and resistant to **Potato Virus Y (PVY)**, making it more robust against these common potato diseases. While it is not suitable for processing, it is an excellent variety for fresh consumption due to its appealing color and texture. The variety's high resistance to PVY and early blight, along with its moderate yield, makes it particularly suited for regions with higher disease pressure.

Kufri Jawahar: Kufri Jawahar is a versatile variety grown in regions such as Gujarat, Haryana, Madhya Pradesh, Punjab, and Karnataka. The variety features medium-sized, round-oval tubers with creamy white skin and pale-yellow flesh. Kufri Jawahar matures in 80-90 days and has an average yield of 40 tons per hectare. It is moderately resistant to late blight, which helps ensure a healthy crop even in wet or humid conditions. This variety is ideal for intensive cropping systems due to its early maturation and relatively high yield. Kufri Jawahar is commonly used for table purposes, and its attractive appearance and moderate disease resistance make it a popular choice for both fresh markets and farmers seeking a dependable crop for regular harvest cycles.

Kufri Sutlej: Kufri Sutlej is cultivated across Bihar, Haryana, Punjab, Uttar Pradesh, and Madhya Pradesh. It produces large, oval tubers with fleet eyes and white flesh. The variety matures in 90-100 days and yields approximately 40 tons per hectare. Kufri Sutlej is moderately resistant to late blight, which makes it suitable for cultivation in areas with varying weather conditions. This variety is primarily used for table purposes due to its uniform shape and consistent texture. Kufri Sutlej is known for its ability to produce high-quality tubers for fresh consumption, and its moderate disease resistance ensures a good yield in areas where fungal diseases can pose challenges.

Kufri Ashoka: Kufri Ashoka, grown in Bihar, Haryana, Punjab, Uttar Pradesh, and West Bengal, is a large, oval-long variety with white flesh and fleet eyes. It matures in 70-80 days and yields 40 tons per hectare. Kufri Ashoka is susceptible to late blight, which can pose challenges in areas with high humidity or rainfall. However, its early maturity makes it a viable option for farmers looking to capitalize on the early-season potato market. It is typically used for table purposes due to its attractive tuber shape and texture, making it a preferred variety for fresh consumption.

Kufri Pukhraj: Kufri Pukhraj is cultivated across a range of regions, including Maharashtra, Orissa, Uttar Pradesh, Bihar, Gujarat, Haryana, Himachal Pradesh, Punjab, Madhya Pradesh, and West Bengal. The variety features large, oval tubers with a slightly tapered shape, white skin, and yellow flesh. Kufri Pukhraj matures in 70-90 days and has an average yield of 40 tons per hectare. It is resistant to early blight and moderately resistant to late blight, making it a good choice for areas where disease management is crucial. Kufri Pukhraj is suitable for table purposes and fresh consumption due to its attractive appearance and high yield potential. It is a reliable crop for farmers seeking high-quality potatoes for direct market sales.

Kufri Chipsona-1: Kufri Chipsona-1 is cultivated in regions such as Bihar and Uttar Pradesh. The variety is characterized by medium to large, oval tubers with white skin and dull white flesh. Kufri Chipsona-1 matures in 90-110 days and yields an average of 40 tons per hectare. It is resistant to late blight and tolerant to frost, making it a resilient option for cultivation in areas with fluctuating temperatures. This variety is primarily used for processing, particularly for making chips and French fries, due to its high dry matter content and desirable texture for crispy products.

Kufri Chipsona-2: Similar to Kufri Chipsona-1, Kufri Chipsona-2 is also grown in Bihar and Uttar Pradesh. It produces medium, round-oval tubers with white skin and yellow flesh. Kufri Chipsona-2 matures in 90-110 days and yields approximately 35 tons per hectare. Like its counterpart, it is **resistant to late blight** and **frost-tolerant,** making it suitable for regions where temperature variations and disease pressures are common. This variety is ideal for **processing** into chips and French fries, thanks to its **high dry matter** content, which ensures a crispy texture in processed products.

Kufri Anand: Kufri Anand, predominantly cultivated in the plains of Uttar Pradesh and Bihar, produces medium oval-long tubers with smooth white skin and white flesh. It matures in 100-110 days, yielding approximately 35-40 tons per hectare. This variety is resistant to late blight, which helps in ensuring a healthier crop in regions where fungal diseases are prevalent. Kufri Anand is primarily grown for table use, and its moderate yield combined with good disease resistance makes it an attractive option for farmers aiming to meet the fresh market demands.

LR Potato (Lady Rosetta): The LR potato variety, also known as Lady Rosetta, is a widely grown potato known for its suitability for processing. It is primarily cultivated in regions such as Punjab and Gujarat, where it is used extensively for chips production. Lady Rosetta matures relatively quickly, within a span of 80-100 days, making it a suitable choice for early-season markets. The variety produces a high yield, ranging from

250 to 300 quintals per hectare, which adds to its appeal among farmers looking to maximize productivity. LR potatoes are highly preferred for processing due to their high dry matter content and good frying quality, which ensures that the final product has the desired crispiness and texture. This makes them ideal for processing into potato chips in various processing units across Punjab and Gujarat. Lady Rosetta's adaptability to various climatic conditions, combined with its quick maturation, makes it an excellent variety for commercial production of processed potato products.

Diamond Potato: The **Diamond potato** variety is primarily cultivated in states like Uttarakhand, Haryana, and Punjab. Known for its suitability for **processing**, particularly for making chips, Diamond potatoes are a popular choice in the processing industry, much like varieties such as **Chipsona** and **LR potatoes**. These potatoes are highly valued for their ability to yield high-quality products, especially in terms of texture and crispiness, after frying. The variety matures in around 90-110 days, offering a moderate yield, although the exact yield depends on growing conditions and management practices. The typical yield for Diamond potatoes is not less than 250 quintals per hectare, which places them on par with other high-yielding varieties. Because of their excellent processing qualities and good storage potential, Diamond potatoes are widely used in the **chips processing units** across the states of Uttarakhand, Haryana, and Punjab, contributing significantly to the demand for processed potato products.

E 4486: The **E 4486** variety is an early to medium-maturing potato variety that is widely grown in regions such as Uttar Pradesh, Haryana, Bihar, West Bengal, Gujarat, and Madhya Pradesh. It takes around 135 days to mature, making it relatively longer than some other early-maturing varieties, but it compensates with its high yield and excellent processing qualities. E 4486 can yield anywhere from 250 to 300 quintals per hectare, which makes it an attractive option for farmers looking to achieve high productivity per unit area. The variety is primarily used for **processing** and is especially sought after by **chips manufacturers**. Like other processing potatoes, E 4486 has a high dry matter content, which contributes to its desirable properties for chips production, ensuring a crispy and firm texture after frying. Its widespread use in regions like Uttar Pradesh, Haryana, Bihar, West Bengal, Gujarat, and Madhya Pradesh makes it a significant variety in the processing potato market. The versatility and consistent yield of E 4486 make it a staple in the processing industry, supporting both local and national demand for processed potato products.

302 Potato: The 302-potato variety is highly regarded as the first choice of potato traders in the Agra region, particularly for its superior yield and quality. This variety is known for its exceptional productivity, with yields being 1.5 times higher than that of many common potato varieties. The 302- potato have earned its reputation due to its ability to produce high yields, making it a popular choice among both farmers and mandi traders. The variety matures in approximately 80-90 days, which positions it as a fast-maturing crop suitable for early-season markets. Its yield per hectare ranges from 400 to 450 quintals, making it one of the most productive potato varieties grown in India.

The 302 potato is particularly favoured in the Agra region, where it is cultivated by farmers who are attracted by its quick maturation and high output. Its consistent yield ensures it remains a profitable crop for those involved in potato cultivation and marketing. Due to its high yield and quality, the 302-potato variety is in high demand, with farmers and traders often traveling long distances to buy or cultivate it. As a result, this variety plays a significant role in the potato supply chain, particularly for the fresh market. Additionally, the 302 potato is often used for both table consumption and processing, further increasing its commercial appeal. The combination of rapid maturation, high yield, and market demand makes it a key variety in the Indian potato industry.

Penetration of Scientific Method in Potato Farming

Superior Seeds: By adopting superior seeds, farmers have seen substantial improvements in their yield, income, and overall productivity. As technology advances, these benefits are expected to grow, offering even more robust solutions to the challenges faced by modern agriculture. The use of superior seeds can significantly increase production capacity. According to various studies, high-quality seeds can result in a **25-30% increase in crop yield**. This improvement is due to better germination rates, disease resistance, and overall plant health.

High-Quality Varieties: The introduction of high-quality seed varieties like Kufri Jyoti, Kufri Chandramukhi, and Kufri Pukhraj has significantly boosted potato production. Developed for better yield, disease resistance, and adaptability to various climatic conditions, these varieties have been instrumental in increasing the average yield per hectare in many regions, according to the Central Potato Research Institute (CPRI, 2021). Advances in genetic engineering and biotechnology, such as Clustered Regularly Interspaced Short Palindromic Repeats / CRISPR-associated protein 9 (CRISPR/Cas9), promise to create even more resilient and high-yielding potato varieties. These innovations will enhance disease resistance and adaptability to changing climatic conditions, providing farmers with seeds that meet the demands of a growing population and evolving environmental challenges.

Technological Advancements: Innovations in seed production technologies, such as micropropagation, net house production, and apical rooted cuttings, have improved the quality and availability of disease-free seeds. These methods ensure a consistent supply of high-quality planting material, crucial for maintaining high yields and disease resistance. The integration of advanced technologies like aeroponics and hydroponics in seed production is expected to further enhance efficiency and scalability. These techniques provide farmers with a reliable source of high-quality seeds, reducing dependency on traditional soil-based methods and minimizing the risk of disease transmission.

Increased Productivity: The use of certified seeds has led to higher yields and better disease resistance, making potato farming more efficient and profitable. Certified seeds are rigorously tested for quality, ensuring they meet the required standards for germination, purity, and health. This has resulted in a marked increase in productivity and farmer income. Continued research and development in seed technology will drive further

improvements in seed quality and productivity. Future advancements may include genetically modified (GM) potato varieties with enhanced nutritional content, pest resistance, and tolerance to abiotic stresses like drought and salinity, playing a crucial role in ensuring food security and farmer profitability.

Farmer Adoption and Education: The adoption of superior seeds requires farmer education and training. Extension services and agricultural universities play a vital role in educating farmers about the benefits of using high-quality seeds and best practices for seed selection and planting. Programs like the National Agricultural Innovation Project (NAIP, 2020) have successfully promoted the use of superior seeds among smallholder farmers. The future of farmer education will be shaped by digital platforms and mobile applications providing real-time information and guidance on seed selection, planting, and crop management. These digital tools will enable farmers to make informed decisions and adopt the latest technologies with ease. Additionally, government initiatives and partnerships with private sector companies will further enhance the reach and effectiveness of farmer training programs.

Fertilizers: Fertilizers are essential for potato farming due to their high nutrient demand. They provide crucial nutrients like nitrogen, phosphorus, and potassium, which support various growth stages, from leaf development to tuber formation. Continuous potato farming can deplete soil nutrients, and fertilizers help replenish these, ensuring soil fertility and healthy crop growth. Adequate fertilization can increase potato yields by up to 30%, improve tuber quality, and enhance disease resistance. Proper nutrient management leads to higher productivity, profitability, and sustainable farming practices.

Nutrient Management: Potatoes are heavy feeders and require a balanced supply of nutrients. The use of NPK (Nitrogen, Phosphorus, Potassium) fertilizers is crucial for optimal growth and tuber production. According to a study by the Indian Council of Agricultural Research (ICAR), the appropriate use of Nitrogen, Phosphorus, and Potassium (NPK) fertilizers can increase potato yields by up to 30% (ICAR, 2021).

1. **Soil Fertility**: Maintaining and improving soil fertility is essential for potato cultivation. Practices such as crop rotation, cover cropping, and the use of organic amendments like manure and compost help enhance soil structure, increase organic matter content, and improve nutrient availability. These practices not only support the growth of healthy potato plants but also ensure sustainable soil health for future crops.
2. **North India**: For optimal potato growth, farmers are recommended to apply 120 kg Nitrogen , 60 kg diphosphorus pentoxide , and 120 kg potassium oxide per hectare. This balanced application ensures that the plants receive sufficient nitrogen for vegetative growth, phosphorus for root development, and potassium for overall plant health and tuber quality.
3. **South India**: In the southern regions, it is advised to apply 100 kg Nitrogen , 50 kg diphosphorus pentoxide and 100 kg potassium oxide per hectare. This slightly lower dosage is tailored to the region's soil and climatic conditions, ensuring that the nutrients are used efficiently without leading to excessive leaching or runoff.

4. **West India**: Farmers in the western parts of India should use 110 kg Nitrogen , 55 kg diphosphorus pentoxide, and 110 kg K2O per hectare. This combination supports the unique soil characteristics and weather patterns of the region, promoting robust plant growth and high tuber yields.
5. **East India**: For the eastern regions, an application of 130 kg Nitrogen , 65 kg diphosphorus pentoxide, and 130 kg potassium oxide per hectare is recommended. The higher nutrient levels cater to the specific needs of the soil and climatic conditions, ensuring optimal nutrient uptake and crop productivity.

Organic Options: In addition to chemical fertilizers, organic options such as compost, green manure, and bio-fertilizers are also being used to improve soil health and provide essential nutrients. These organic inputs not only enhance soil fertility but also promote the growth of beneficial microorganisms that support plant health. The Organic Farming Association of India (OFAI) emphasizes the role of organic fertilizers in sustainable potato farming. The use of compost helps improve soil structure, water retention, and nutrient availability. Green manure crops like legumes add organic matter and fix nitrogen in the soil, while bio-fertilizers like Rhizobium and Azospirillum enhance nutrient availability and promote plant growth.

Fertilizer Application Techniques: Proper application methods and schedules are essential to ensure that potatoes receive the right amount of nutrients at the right time. Techniques such as fertigation, where fertilizers are applied through irrigation systems, have gained popularity among farmers. This method ensures a more efficient use of fertilizers and reduces wastage. There are various benefits of fertigation in improving nutrient use efficiency and crop yields. By delivering nutrients directly to the root zone, fertigation minimizes nutrient losses and ensures that plants receive a steady supply of nutrients throughout their growth cycle. Additionally, split application methods, where fertilizers are applied in multiple doses, help match nutrient availability with the crop's growth stages, optimizing nutrient uptake and reducing the risk of nutrient leaching.

Soil Testing and Customization: Regular soil testing is critical for determining the specific nutrient needs of a potato crop. Customizing fertilizer applications based on soil test results ensures that plants receive the right balance of nutrients. Government initiatives like the Soil Health Card Scheme have been instrumental in promoting soil testing and balanced fertilization among farmers (Ministry of Agriculture & Farmers' Welfare, 2021). Soil tests help identify nutrient deficiencies and excesses, allowing farmers to tailor their fertilizer applications to meet the crop's requirements precisely. By following the recommendations from soil tests, farmers can improve nutrient use efficiency, reduce input costs, and minimize the environmental impact of excessive fertilizer use.

Pesticides: Pesticides play a vital role in potato farming by protecting crops from various pests and diseases that can severely impact yields and quality. Effective pest control ensures healthy growth, leading to higher productivity and profitability for farmers. By reducing pest-related losses, pesticides contribute to the sustainability and success of potato cultivation.

Pest Control and Productivity: Pesticides are essential for managing pests and diseases that can significantly impact potato yields. By effectively controlling these threats, pesticides help ensure healthy crop growth, leading to higher yields and better-quality produce. This directly contributes to increased farmer productivity and profitability. For example, the judicious use of pesticides has led to a reduction in pest-related losses. The future of pest control in potato farming will be shaped by advancements in biological control methods and the development of eco-friendly pesticides. Innovations such as RNA interference (RNAi) technology and genetic biocontrol agents will provide new avenues for managing pests with minimal environmental impact. The adoption of smart pest monitoring systems will enable farmers to detect and respond to pest outbreaks promptly, reducing the need for blanket pesticide applications. Few uses of pest control are as follows:

1. In North India, for instance, Quinalphos at 2 ml/litre is used for aphid and whitefly control, while Mancozeb at 2.5 g/litre is applied for late blight.
2. In South India, Carbaryl at 2 g/litre is used for the potato tuber moth, and Chlorothalonil at 2 g/litre is applied for early blight.
3. West India utilizes Imidacloprid at 0.5 ml/litre for aphids and Metalaxyl-M at 2 g/litre for late blight.
4. In East India, Thiamethoxam at 0.3 g/litre is used for whiteflies, and Propiconazole at 1 ml/litre is applied for early blight.

Integrated Pest Management (IPM): Many farmers are adopting Integrated Pest Management (IPM) practices, which combine chemical pesticides with biological control methods to reduce pest populations. IPM strategies include the use of pheromone traps, natural predators, and crop rotation to manage pests in an eco-friendly manner. It is demonstrated by many of the agricultural researchers the effectiveness of IPM in reducing pesticide use and improving crop health. The future of IPM will be driven by advancements in agroecology and the integration of technology. Digital platforms and mobile apps will provide farmers with real-time information and guidance on IPM practices, enabling them to implement these strategies more effectively. Research into new biological control agents and pheromone-based technologies will further enhance the effectiveness of IPM in managing pests sustainably. Few uses of IPM are as follows:

1. In North India, pheromone traps and natural predators like ladybugs are used for aphid control, and crop rotation helps disrupt pest life cycles.
2. In South India, farmers implement trap cropping and use neem-based biopesticides for whiteflies.
3. In West India, Bacillus thuringiensis (Bt) is utilized for controlling the potato tuber moth, and intercropping with legumes is practiced.
4. In East India, sticky traps and biological agents like Trichoderma are used for early blight control.

Bio-Pesticides and Herbal Solutions:

The use of bio-pesticides and herbal solutions is gaining traction among farmers as these methods are environmentally friendly and help maintain soil health. Bio-pesticides, derived from natural materials such as plants, bacteria, and minerals, provide effective pest control without the harmful side effects associated with chemical pesticides. There is growing popularity of bio-pesticides in sustainable potato farming. The future of bio-pesticides will be marked by the development of more potent and targeted formulations. Advances in microbial and plant-based bio-pesticides will provide farmers with a broader range of options for managing pests effectively. The commercialization of new bio-pesticide products and the establishment of robust supply chains will ensure that farmers have easy access to these eco-friendly solutions. Few bio-pesticides uses are as follows:

1. In North India, neem oil at 3% is applied for aphids, and Bacillus subtilis at 2 g/litre is used for late blight control.
2. In South India, Azadirachtin at 1% is used for whiteflies, and Pseudomonas fluorescens at 2 g/litre is applied for early blight.
3. In West India, Verticillium lecanii at 2 g/litre is used for aphids, and Beauveria bassiana at 2 g/litre is applied for the potato tuber moth.
4. In East India, NSKE (Neem Seed Kernel Extract) at 5% is used for aphids, and Trichoderma harzianum at 2 g/litre is applied for early blight.

Education and Training: Proper management of pesticides requires farmer education and training. Extension services and agricultural universities play a crucial role in educating farmers about the safe and effective use of pesticides. Programs like the National Horticulture Mission (NHM) have been successful in promoting the adoption of IPM and bio-pesticides among potato farmers. Nationwide initiatives like the NHM conduct workshops and training sessions for farmers on the use of IPM and bio-pesticides. Farmer Field Schools (FFS) provide hands-on training in pest management techniques and safe pesticide use, while the All India Coordinated Research Project on Potato offers resources and training on advanced pest management practices.

Potato Farming in Gujarat

Overview

Gujarat is rapidly establishing itself as a global powerhouse in the potato market contributing 7.52% of India's total potato production in FY 2025. This transformation is driven by strategic investments, advanced infrastructure, and a focus on high-value potato varieties suited for processing and export.

One of the most notable developments is the dramatic rise in India's exports of French fries. In CY 2007, India was a net importer, bringing in around 6,000 metric tonnes of French fries. By CY 2023, this had flipped dramatically, with exports reaching approximately 30,000 metric tonnes valued between USD 20–25 million. This shift highlights India's, and particularly Gujarat's, growing role in the global processed potato market.

Banaskantha district in Gujarat has emerged as a key hub, recognized globally as the largest producer of Santana potatoes. This variety is preferred for French fries due to its oblong shape and golden color. Supporting this growth are significant investments in potato processing by major companies. Amul operates a state-of-the-art plant in Banaskantha that processes 50 metric tonnes of potatoes daily using Dutch machinery from M/S Kiremko.

Companies like HyFun Foods, McCain Foods, and Iscon Balaji Foods have collectively invested over ₹1,500 crore in Gujarat's potato processing sector. Iscon Balaji Foods stands out as Asia's largest producer of dehydrated potato flakes and currently operates across 19,000 acres, with plans to expand to 25,000 acres. HyFun Foods is also scaling up by doubling its processing capacity with a new plant in Mehsana.

Contract farming has played a pivotal role in Gujarat's potato revolution. It provides farmers with financial stability and shields them from market volatility and unpredictable weather conditions. These arrangements have encouraged the consistent supply of high-quality produce needed for processing.

Gujarat's FY 2025 Potato Season

Production Surge

Gujarat is projected to see a **15% increase in potato production** in FY 2025, largely driven by favorable weather conditions and expanded cultivation. The estimated harvest is 4.52 million tons in FY 2025, up from 4 million tons last year.This rise positions Gujarat for a strong presence in both domestic and export markets. Additionally, during the FY 2023 planting season:

- **105,000 metric tonnes (MT)** of seed potatoes were planted across **44,000 hectares** in North Gujarat's main potato-growing districts: Aravalli and Sabarkantha.
- Statewide, **405,000 MT** of seed potatoes were planted over **147,000 hectares**, covering both **table and processing varieties**.
- The **expected production** in the FY 2024 season (Estimated as of FY 2023 (Feb)) includes:

- **1.9 million MT** of processing-grade potatoes
- **3.3 million MT** of table potatoes

Market Prices and Trends: Wholesale prices are currently between ₹9 to ₹10 per kg, while retail prices range from ₹15 to ₹25 per kg, depending on location and quality. Prices are expected to remain stable until April–May, with a potential rise of ₹4 to ₹5 per kg thereafter.

Consumer Demand: Retail demand has increased with warmer weather, particularly for home preparation of snacks like 'patri' (thin potato wafers) and chips. The availability of high-quality potatoes has enhanced consumer satisfaction across markets.

Agricultural Practices: Farmers in Gujarat have adopted modern and efficient practices such as:

- **High-quality seeds**
- **Drip irrigation systems**
- **Water-soluble fertilizers**

These techniques have boosted yield and ensured better quality produce.

Contract Farming: Advance contract farming is widely practiced, enabling farmers to secure buyers before or shortly after planting. This reduces financial risks from market volatility and weather uncertainties.

Harvest & Supply Chain

- Potatoes are harvested **once annually** between **February and mid-March**.
- Post-harvest, the supply is maintained through cold storage, with exports continuing until **August–September**, and domestic supply extending to **November**.

Cold Storage Infrastructure

- Gujarat had 850 cold storages with a total capacity of 3,12,386 MT as of FY 2025.
- The state continues to lead in terms of cold storage projects sanctioned under the MIDH scheme.
- With increasing horticulture production, storage utilization is expected to remain high, ensuring strong returns for operators during peak harvest seasons.

Regional Market Insights: In Rajkot Market (as on March 2025), potato arrivals have been substantial, totalling 24,125 man (a local unit), with wholesale prices ranging from ₹7 to ₹13 per man. Market conditions have stabilized in terms of both arrival and pricing.

Key Exporter: M S International

- A leading exporter of processing-grade potatoes from Gujarat.

- Owns a **cold storage facility with 28,000 MT capacity**.
- Operates **two modern pack houses** with equipment from Dutch company **Allround** for grading, sorting, and packaging.
- Sources produce through **contract farming** and supplements capacity by renting additional storage facilities.

Popular Variety

The 'Lady Rosetta' variety is widely cultivated in Gujarat due to its suitability for making potato chips and French fries, supporting the processing and snack industries. In addition, Lady Rosetta is predominantly used for chip-making, while varieties such as Santana and Fraysona are increasingly used for fries and processing purposes.

Major varieties	Cropped Area in %	% of farmers
Kufri Badshah	69	33.3
Kufri Pukhraj	12	30.8
Lady Rosetta	9.4	17.5
Rest of Others	9.6	18.4

Source: D&B Desk Research, Industry Reports

Climate Advantage of Gujarat for Potato Cultivation

Gujarat, particularly regions like Banaskantha, Sabarkantha, and Mehsana, offers an ideal agro-climatic zone for the cultivation of **processing-grade potatoes**. The state's **semi-arid to sub-tropical climate**, with **cool winters and dry conditions**, plays a pivotal role in developing potatoes with desirable characteristics for processing industries.

Key climatic advantages:

- **Cool day-night temperatures during winter months** (ideal sowing season from November to February)
- **Low humidity** during the tuber maturity stage
- **Dry harvest periods** that reduce post-harvest rotting
- Minimal rainfall during the growing and harvesting periods, preventing fungal infections and physiological stress

Low Sugar Accumulation: A Critical Factor for Processing

One of the main quality parameters for potatoes meant for processing (e.g., chips, fries) is **low reducing sugar content** (glucose and fructose). Excess sugar in potatoes leads to:

- **Dark colour and bitter taste** when fried due to the Maillard reaction
- **Rejection by processors** like PepsiCo (Lay's), McCain, HyFun Foods, and ITC

Gujarat's climate naturally favours **low sugar accumulation** in tubers due to:

- **Optimal soil temperatures** during bulking (16–20°C), which slows down sugar formation
- **Gradual cooling and warming cycles**, minimizing physiological stress that causes sugar build-up
- **Dry weather** during the late growth phase, helping maintain starch dominance over sugars
- **Less diurnal fluctuation** than regions with extreme temperatures, supporting stable sugar-starch balance

Usage of G-3 and G-4 Seeds in Processed Potato Cultivation in Gujarat

Processed potato cultivation in Gujarat has grown rapidly, driven by increasing demand from the frozen food and snacks industry particularly for French fries and chips. A critical factor in achieving the consistent quality required by processors is the use of certified seed potatoes, notably **Generation-3 (G-3)** and **Generation-4 (G-4)** seeds. These seeds, developed through a structured multiplication system from disease-free tissue culture origins (G-1 to G-4), offer high sprouting rates, uniform tuber size, and low disease incidence making them especially suitable for processing-grade potato varieties like **Chipsona**, which demand high dry matter and low sugar content.

However, Gujarat's relatively short and mild winters while suitable for commercial potato cultivation do not provide the prolonged cool conditions or altitude needed for high-quality seed production. As a result, farmers in Gujarat depend heavily on **certified G-3 and G-4 seed potatoes sourced from cooler regions**, primarily **Punjab** and **Himachal Pradesh**. These states have ideal climates, higher altitudes, and established government frameworks, such as the **Punjab Tissue Culture Based Seed Potato Act, 2020**, which regulate and certify seed production under stringent quality standards.

According to the Act, **G-3 and G-4 seed tubers** must meet specific parameters: a size range of 30–55 mm and weight between 25–125 grams, with limited tolerance for oversized tubers. They must be clean, healthy, and free from major physical defects, with off-types limited to 0.10% by number. Disease tolerance thresholds are tightly controlled e.g., late blight, dry rot, and charcoal rot must not exceed 0.5% for G-3 and 1.0% for G-4, while total disease presence must remain under 7.5% and 9.0%, respectively. Proper field management practices such as **roguing, haulm destruction**, and **gap filling** are mandated to maintain seed purity and prevent the spread of disease.

In Gujarat, food processing companies like **McCain, HyFun, and Balaji Wafers** play a major role by engaging in **contract farming**, wherein they supply certified G-3/G-4 seeds procured from the north. These companies ensure quality control through bulk procurement, traceability, and support infrastructure. Cold

chain logistics is vital in this process to maintain the viability of the seeds during transport and storage ahead of the sowing season in **October–November**.

By using G-3 and G-4 seeds, Gujarat farmers are able to produce high-quality potatoes with lower sugar levels essential for deep frying and extended shelf life in processed forms. This system not only boosts productivity and farmer income but also strengthens Gujarat's position as a major hub for processed potato production in India.

Processed Potato

Potato processing in India involves converting raw potatoes into value-added products such as chips, French fries, flakes, starch, and frozen goods. While potatoes have long been a staple in Indian diets, traditionally consumed in their fresh form, shifting consumer preferences toward convenience and packaged foods have led to a growing interest in processed potato products. This evolving demand is creating new opportunities for food processors, agri-entrepreneurs, and farmers across the country.

The market for processed potatoes is expanding rapidly, fueled by urbanization, rising disposable incomes, and the growing presence of modern retail outlets and quick-service restaurants (QSRs). Items like potato chips, frozen fries, and dehydrated flakes are gaining popularity, especially among younger and urban consumers. Despite being one of the world's largest potato producers, India processes only a small portion of its total output, highlighting significant growth potential. Government support through schemes like PMFME (Pradhan Mantri Formalisation of Micro food processing Enterprises) and PMKSY (Pradhan Mantri Kisan SAMPADA Yojana), along with increasing private investments in cold chain infrastructure and food processing technology, is further encouraging the sector's development.

The potato processing value chain includes multiple stages such as cleaning, peeling, slicing, blanching, frying or drying, and packaging, each tailored to the end product. To ensure quality and supply consistency, many processors are engaging in contract farming with cultivators who grow specific potato varieties suitable for processing. The development of backward linkages, like quality seed supply, and forward linkages such as cold storage, logistics, and distribution, has helped improve efficiency across the chain. With advancements in automation and food preservation technology, processed potato products are becoming increasingly reliable, scalable, and competitive in both domestic and export markets.

Steps Involved in the Growing of Processed Varieties of Potatoes

Lab Development of Seed Tubers (G-1 Stage): The process begins in laboratories where mini-tubers are developed using tissue culture techniques. These mini-tubers are called G-1 and are the first generation of seed potatoes.

Progressive Multiplication: G-2 to G-4: G-1 tubers are planted to grow G-2 tubers. The process continues annually: G-2 → G-3 → G-4. By the G-4 stage, the tubers have multiplied significantly 10 G-1 tubers can yield over 150 G-4 tubers. This entire multiplication process is carried out on controlled farms or through aeroponics, mainly in Punjab, Haryana, Himachal Pradesh, and Uttar Pradesh.

Quality Control & Disease Management: Tubers are highly sensitive during the multiplication stages. Rigorous field inspections ensure that infected or underperforming plants are removed to prevent disease spread.

Procurement & Inspection of G-4 Tubers: Once the tubers reach the G-4 stage, they are considered high-quality planting material. These are procured by companies from reputed suppliers like ITC and Utkal. The agricultural head conducts on-field inspections post-procurement to check for any viral diseases.

Transport & Controlled Storage in Gujarat: Tubers are transported to Gujarat from September onward. They are stored in controlled environments to preserve quality until plantation begins in November.

Pre-Season Planning & Field Officer Allocation: A pre-season meeting is held to allocate villages and farmers to field officers. The goal is to ensure seamless coordination and consistent farmer support throughout the season.

Farmer Selection & Seed Distribution: Farmers are selected based on cluster suitability and cultivation capacity. Seed distribution is carried out from October 20 to November 7, using trucks (25–60 tons capacity).

Plantation & Crop Monitoring: Plantation in Gujarat begins in early November ideal due to favorable winter conditions. Field officers visit farms every two weeks to: Guide farmers on pesticides, drip irrigation, and manure application, Upload real-time crop photos via a company app for central monitoring, Escalate any unresolved issues to the agricultural head.

Early Harvesting

- **Timing Advantage**: Early harvesting (Jan 25 – Feb 15) helps farmers beat the seasonal glut and secure premium prices, compared to the traditional mid-Feb–March harvest.
- **Regional Focus**: Widely adopted in North Gujarat districts like Banaskantha, Sabarkantha, and Aravalli, where hilly terrain enables faster crop maturity.
- **Modern Practices**: Farmers use drip irrigation, seed grading, and mechanized harvesting to improve yield, quality, and efficiency.
- **Contract Farming**: Tied up with processors and chip manufacturers, ensuring stable prices, assured procurement, and market access for uniform-quality produce.
- **End Use**: Early potatoes are sent directly to processing units to make French fries, wafers, hash browns, starch, and potato powder ensuring value addition and faster cash flow.

Pre-Harvest Deal Finalization: Prices and volumes are finalized before harvest via personal meetings with processing units. This ensures income stability and prevents post-harvest price manipulation.

Harvest Management: Field officers create individual harvest schedules for each farmer to prevent overlaps and to ensure efficient logistics and transport.

Harvest Windows: Regular Harvest (February 25 – March 25): From standard plains-grown crops.

Supply to Processing Units & Storage: Regular Harvest potatoes fulfill deals, and any surplus is stored in cold storage for future sales based on market demand.

Farmer Payments: Payments are made between March 25 – April 5. Transparent and timely disbursement builds farmer trust and satisfaction.

Process Potato Characteristics:

Processing potatoes are characterized by their high dry matter content often reaching up to 25% which makes them ideal for industrial uses. This higher dry matter results in a crispier texture, better taste, and longer shelf life. In contrast, regular table potatoes typically contain only around 15% dry matter, making them less suitable for processing applications.

Here's the table **segregated into Processed Potato Varieties** and **Other Varieties**, based on common usage of varieties like **Kufri Chipsona-1, Kufri Himsona, Kufri Chandramukhi, Diamond**, etc.

Variety	Dry Matter (%)
Kufri Chipsona-1	25.66%
Kufri Himsona	25.33%
Kufri Chandramukhi	26.00%
Diamond	22.33%

Source: Indian Journal of Agricultural Research

Here are **3–4 major table potato varieties** from your list, commonly cultivated for **culinary use rather than processing:**

Major Table Potato Varieties	Dry Matter (%)
Kufri Jyoti	16.66%
Kufri Pukhraj	18.00%
Kufri Surya	17.33%
Kufri Uday	15.22%

Source: Indian Journal of Agricultural Research

Potato Varieties Overview:

Lady Rosetta (LR) Potato

Lady Rosetta is a round-shaped, red-skinned potato variety used exclusively for making chips or wafers. It is widely used by brands such as Balaji Wafers, Lays, and others in the snack food industry. Primarily cultivated in Punjab, Uttar Pradesh, and Gujarat, regions known for their favourable conditions for high-quality potato farming.

This variety is ideal for producing chips due to its texture. India produces a significant quantity of Lady Rosetta potatoes annually, catering to both domestic consumption and exports. Key Export Destinations of this variety of potato include United Arab Emirates. Saudi Arabia, Malaysia & United Kingdom. These markets appreciate the quality and versatility of Lady Rosetta potatoes, making them a preferred choice in both retail and food processing sectors.

Santana Potato Variety

Santana is a processing variety used only to produce French fries. It has a distinctive creamy flesh, which results in golden-yellow-coloured fries when cooked. The Santana potato is cultivated in India, primarily in the states of Punjab, Uttar Pradesh, and Gujarat, regions known for their excellent potato farming conditions and high-quality produce.

This variety is widely used in processing, commonly to make French fries. The production of Santana potatoes has been increasing steadily in India, contributing to the overall growth of the potato industry. In CY 2023, India exported approximately 30,000 metric tons of Santana potatoes, showing a significant rise from previous years. Santana potatoes from India are exported to several countries, including United Arab Emirates, Malaysia, Sri Lanka & United Kingdom

Several key companies are actively involved in contract farming of the Santana potato variety in Gujarat, supporting farmers with quality seed, agronomy guidance, and assured procurement:

- **HyFun Foods**: HyFun Foods began contract farming with about 500 farmers in 2015-16, expanding to over 7,500 farmers. They provide high-quality seeds, real-time agronomy advice through their HyFarm Pathshala app, and support efficient irrigation and planting techniques tailored for Santana. HyFun ensures direct procurement and prompt payments, helping farmers increase yields and conserve water. They also operate advanced cold storage and processing facilities in Mehsana.
- **McCain Foods**: McCain initiated Santana potato cultivation in Gujarat around 2005-2006, focusing on selecting the best growing regions and varieties. They collaborated closely with farmers for rapid multiplication of quality seed and adoption of modern agronomy practices, including micro-irrigation and improved storage. McCain's efforts helped establish Gujarat as a major hub for premium French fry potatoes.
- **Advait Agrotech Private Limited**: Based in Gujarat, Advait Agrotech specializes in potato cultivation and contract farming, along with wholesale supply, bulk storage, and exports, supporting the Santana variety among others.
- **Iscon Balaji Foods**: Iscon Balaji is expanding its contract farming operations to cover 25,000 acres across Gujarat and neighboring states. They are investing in new processing plants and sourcing Santana potatoes through contract farming arrangements.

- **Amul**: Amul procures high-quality Santana potatoes from its dairy farmers in Banaskantha under contract farming models. The company processes and exports frozen potato snacks, leveraging advanced Dutch processing technology.

Frysona Potato Variety:

Aspect	Details
Main Production Area	Banaskantha and Sabarkantha, Gujarat
Yield	35-40 t/ha
Maturity	90-110 days
Fry Color	White (second grade)
Processing Use	French fries, flakes
Contract Farming	Supported by companies like HyFun Foods
Price Range	Rs 180-190 per 20 kg (contract farming)
Market Position	Secondary to Santana in premium market
Challenges	Weather impact, lower fry color preference

Source: D&B Desk Research, Industry Reports

Frysona is one of the key potato varieties grown in Gujarat, primarily used for French fries production alongside the premium Santana variety. However, Frysona fries are white in color and considered second grade compared to the golden-hued fries from Santana.

In Gujarat, the Banaskantha and Sabarkantha districts, is a significant producer of Frysona potatoes, although it is more famous for Santana. Frysona is grown on a substantial scale but is generally considered lower grade for French fries due to its white flesh. The average yield of Frysona is around 35-40 tonnes per hectare, with crop maturity in about 90-110 days. It produces oblong tubers over 75 mm in size, suitable for processing French fries. Frysona is well adapted for processing into flakes and French fries but is considered inferior in quality to Santana due to the white color of fries produced.

Companies like HyFun Foods provide contract farming support for Frysona, along with Santana and FryoM varieties. They supply disease-free quality seeds and technical advice, ensuring stable prices and assured procurement for farmers. Frysona fetches a lower price compared to Santana because of its second-grade status. Prices under contract farming were around Rs 180-190 per 20 kg, with some production decline due to adverse weather. Frysona is used by French fry processors who depend on both contract farming and spot market purchases. The demand fluctuates seasonally, with processors consuming cold-stored potatoes during off-peak periods.

Chipsona Potato Variety

Aspect	Details
Main Varieties	Kufri Chipsona-1, 2, 3, 4
Yield	30–35 t/ha (Chipsona-3: 33 t/ha)
Crop Duration	110–120 days
Harvest Season	Feb–Mid March
Processing Use	Chips, French fries

Source: D&B Desk Research, Industry Reports

Chipsona is mainly used for flakes, chips, starch, and powder. Due to its round shape, it is not suitable for French fries, especially for the frozen foods market. Multinational companies do not use Chipsona for fries production; however, some local processors may use it in limited capacity.

The **Chipsona variety of potato** plays a significant role in Gujarat's processed potato industry. This variety has been developed specifically for **processing applications** such as chips and crisps and is widely cultivated in regions like **Banaskantha, Sabarkantha, and Mehsana** due to the state's ideal agro-climatic conditions. The Chipsona series was developed by the **Central Potato Research Institute (CPRI)** in India. Key variants include **Chipsona-1, Chipsona-2, Chipsona-3, and Chipsona-4**, each bred for:

- **High dry matter content** (above 20%)
- **Low reducing sugars**
- **Uniform tuber shape and smooth skin**, ideal for mechanized peeling and slicing
- **Excellent frying colour**, making them perfect for chips and crisps

Why Chipsona Thrives in Gujarat

Gujarat's climate complements the Chipsona variety exceptionally well:

- **Cool and dry winters** (ideal for low sugar accumulation)
- **Well-drained loamy soils** that promote uniform tuber development
- **Low humidity** and minimal late-season rainfall, reducing disease pressure and promoting better storage quality
- **Widespread cold storage availability** supports off-season supply and contract processing

As a result, Chipsona potatoes cultivated in Gujarat:

- Exhibit **low glucose/fructose levels**, preventing browning during frying

- Maintain **firm texture and high yield per hectare**
- Are preferred by **processors like McCain, HyFun Foods, and Balaji Wafers**

Many processing units in Gujarat, particularly in **Deesa and Palanpur**, are fully integrated with farms producing Chipsona under **Good Agricultural Practices (GAP)**.

Additionally, several companies are actively involved in contract farming of Chipsona potato varieties (such as Kufri Chipsona-1, Chipsona-2, Chipsona-3, and Chipsona-4) in Gujarat. These companies support farmers with seeds, technical guidance, and assured procurement for chips and processing markets.

Sarpo Mira Potato Variety Production Scenario in Gujarat

Sarpo Mira is a late-maturing, large, pink-skinned potato variety known for its **exceptional resistance to late blight** and other diseases, making it highly suitable for sustainable and low-input cultivation. It has a deep root system that provides drought tolerance and tall, dense foliage that suppresses weeds naturally. The variety produces large, uniform tubers with high dry matter content, ideal for French fries and other processing uses. Sarpo Mira also stores well without refrigeration or anti-sprouting treatments.

In Gujarat, Sarpo Mira is grown notably in the Aravalli district and other suitable regions, where farmers benefit from its **high yield potential, disease resistance, and long storage life**. Its adaptability to local conditions and reduced need for chemical sprays make it attractive for commercial cultivation, especially for processing industries focused on quality and sustainability.

Innovator Potato Variety:

The **Innovator** potato variety, developed by **HZPC Holland B.V.** and introduced in **1999**, has become a preferred choice for **processing applications**, particularly in the production of **frozen French fries**. Known for its high dry matter content, low sugar levels, and long tuber shape, Innovator is tailored to meet the requirements of large-scale food processors and Quick Service Restaurants (QSRs).

Cultivation in Gujarat

In **Gujarat**, the Innovator variety is primarily grown in the districts of Banaskantha, Sabarkantha, Mehsana, and Aravalli during the winter season (October–February). The region's short, cool winters and dry climate provide ideal conditions for cultivating this medium-early maturing variety. A typical crop cycle ranges from 110–120 days, aligning well with Gujarat's agro-climatic conditions.

Agronomic and Processing Qualities

- **Tuber Characteristics**:
    - **Shape**: Long-oval
    - **Skin**: Brown, russet-type
    - **Flesh**: Light yellow

  - **Size**: Large, uniform
  - **Dry Matter**: ~20.6%
  - **Starch Content**: ~14.8%
  - **Specific Gravity**: ~1.081
  - **Cooking Type**: Type B (slightly mealy)
- **Processing Advantages**:
  - High yield of long, uniform fries
  - Excellent frying color and texture
  - Low oil absorption due to high dry matter
  - Maintains quality after long-term cold storage
  - Suitable for **frying, baking, and boiling**

Disease Resistance & Sensitivities

- **Resistant To**:
  - Wart disease
  - Leaf and tuber blight
  - Cyst nematodes (Pa2 and Pa3)
- **Moderately Susceptible To**:
  - Common scab
- **Sensitive To**:
  - Internal bruising
  - Herbicide Metribuzin

Due to these sensitivities, **careful agronomic practices** and **herbicide management** are essential during the crop cycle.

Newly Introduced Varieties:

Red Potatoes (New Introduction): ITC has initiated **trial cultivation** of a red potato variety in 2019 in **Chandrala village, Gandhinagar**. This variety is rich in **anthocyanin**, an antioxidant with health benefits, aiming to enhance the **nutritional value** of potatoes in India.

Colomba Variety: The Colomba potato variety, introduced by Mahindra HZPC, is rapidly emerging as a preferred choice among Gujarat farmers due to its high yield, early maturity (75–80 days), and resistance to common scab.

Compared to traditional table varieties like Pukhraj and Badshah, Colomba delivers approximately 20% higher yields and fetches ₹3–4 more per kilogram, resulting in an additional income of ₹35,000 to ₹50,000 per acre. Its bright skin and large tubers command a 15–20% price premium in key markets like Surat and Deesa. With low nitrogen requirements, strong adaptability to Gujarat's climate, and excellent storage potential, Colomba is significantly boosting farmer profitability and market appeal.

Trade Scenario: Potatoes

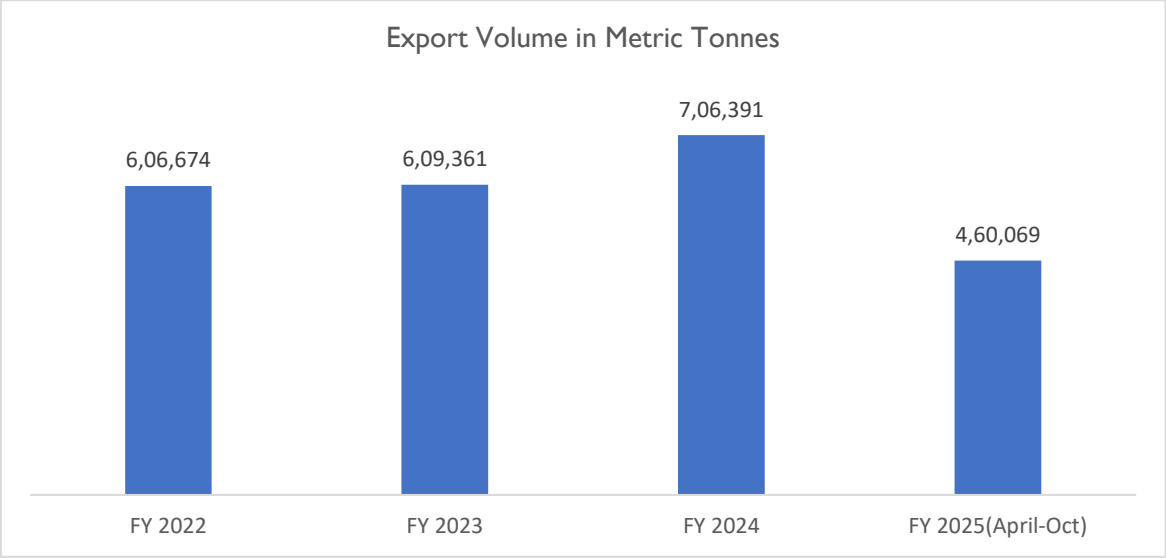
Export Scenario

India has witnessed steady growth in potato exports over recent years, driven by rising demand for processed potato products in international markets. These include frozen and chilled potatoes, potato starch, seeds, and other value-added derivatives. While raw potato exports remain relatively limited, the focus on processed products has contributed to higher export volumes and enhanced value.

- In FY 2022, the export volume stood at 606,674 metric tonnes.
- By FY 2024, it increased to 706,391 metric tonnes, marking a 16.43% growth over two years.
- For FY 2025 (April–October), the export volume reached 460,069 metric tonnes, reflecting consistent growth when compared to the same period in previous years.

This upward trend underscores India's growing competitiveness in processed potato exports, catering to evolving global demand. The rising export value of India's potatoes and potato products is driven by improved domestic production, modern farming techniques, and the introduction of high-yield, disease-resistant varieties.

Government initiatives like Operation Greens and export promotion schemes have enhanced infrastructure for storage, transportation, and processing, reducing losses and ensuring quality. India's focus on processed products, such as frozen and seed potatoes, caters to growing global demand, particularly for convenience foods. Favourable trade policies, adherence to international quality standards, and improved cold storage and supply chains have further strengthened India's position in the global market, boosting the export value of this segment.

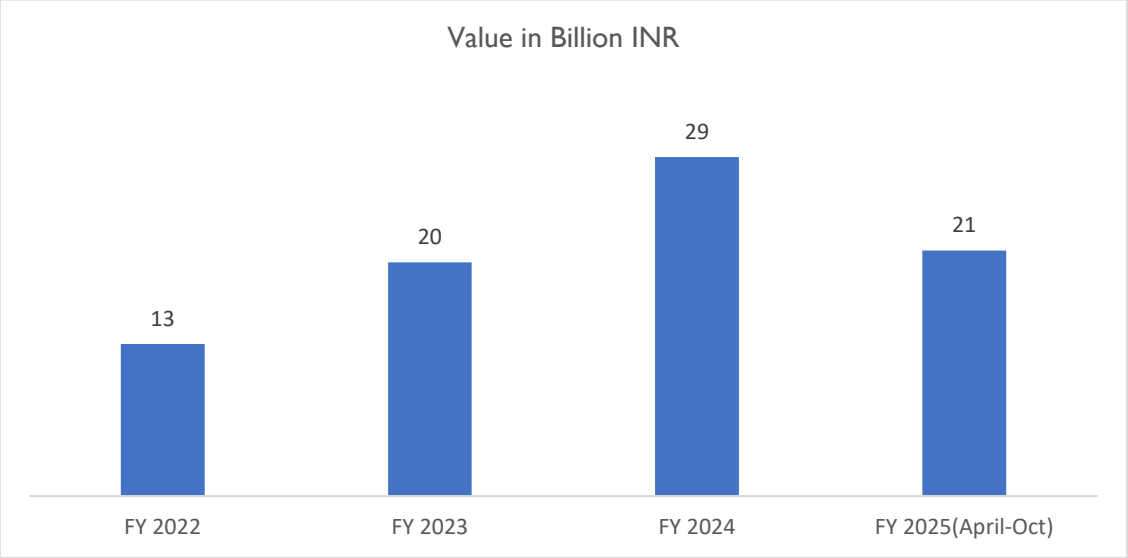


Source: Directorate General of Foreign Trade (DGFT)

India's export value of potato products has experienced robust growth over the last three years, reflecting increasing global demand for processed and value-added potato products. This trend highlights India's

strengthened position in the international market for products such as frozen and chilled potatoes, potato starch, and seeds, which command higher prices compared to raw potatoes.

- In FY 2022, the export value was 13 billion INR.
- By FY 2023, it surged to 20 billion INR, recording a remarkable 53.85% increase within a year.
- In FY 2024, the export value climbed further to 29 billion INR, representing a 45% growth over the previous year.
- For FY 2025 (April–October), the export value stands at 21 billion INR, indicating sustained momentum and continued growth for the year.



Source: Directorate General of Foreign Trade (DGFT)

Top 3 Export Markets for Potato

India's potato export market is substantial, with a wide range of countries importing potato products. Historically, the majority of Indian potatoes were exported to Nepal, Oman, and Saudi Arabia. However, recent shifts in demand have led to changes in the export rankings. As of last year, Bangladesh has risen in demand, now ranking alongside Nepal and Oman as the top three export destinations for Indian potatoes. Other notable markets include Indonesia, Malaysia, and several others.

Nepal:

Year	Quantity (MT)	Value in INR Lakh
FY 2022	257,904	29,197
FY 2023	294,733	35,451
FY 2024	236,883	25,612

Nepal has consistently been the largest importer of Indian potatoes, though its share in India's total potato exports has fluctuated in recent years. In FY 2022, Nepal accounted for 43% of India's potato exports, which further rose to 48% in FY 2023. However, in FY 2024, the share declined sharply to 34%, with export volumes falling from 2.94 lakh MT in FY 2023 to 2.36 lakh MT in FY 2024, despite India's overall potato exports touching 7.06 lakh MT during the same year. The dip can be attributed to fluctuating domestic production levels in India and rising competition from other suppliers such as Bangladesh.

Potato exports to Nepal have shown steady growth until FY 2023, registering a 14% year-on-year increase in that period. Demand for fresh potatoes remains consistently strong, as Nepal relies heavily on imports to meet domestic requirements. While Nepal produces around 3.1 million tonnes annually covering nearly 90% of its consumption the country still faces seasonal gaps. With an annual demand of ~3.4 million tonnes, imports from India play a crucial role, particularly in the off-season when supply shortages peak. Going forward, Nepal's potato demand is expected to continue expanding, ensuring a sustained market opportunity for Indian exporters.

The Indian government, under the Foreign Trade Policy (FTP) 2023, has streamlined export procedures to maintain seamless trade with Nepal. Tariff-free exports of agricultural commodities, including potatoes, continue under bilateral arrangements, strengthening trade flows. Additionally, improved cross-border infrastructure, such as enhanced road connectivity and logistics, has facilitated smoother and faster transportation of perishable products like potatoes.

Oman:

Year	Quantity (MT)	Value in INR Lakh
FY 2022	30,733	5,781
FY 2023	39,107	9.321
FY 2024	43,739	10,340

Oman has shown steady growth as an importer of Indian potatoes over the past three years, both in terms of volume and share of India's total exports. In FY 2022, Oman accounted for around 5% of India's potato exports (30,733 MT), which rose to 6% in FY 2023 with 39,107 MT. This upward trend continued in FY 2024, with imports reaching 43,739 MT, maintaining a 6% share of India's total exports of 7.06 lakh MT. The sustained demand is primarily driven by Oman's expanding population, its dependence on food imports, and a strong preference for fresh Indian produce.

Exports of Indian potatoes to Oman have consistently increased, registering a growth of about 11% in FY 2024 compared to the previous year. This steady rise highlights Oman's growing reliance on Indian suppliers, supported by competitive pricing and established trade ties. The market outlook remains positive as Oman's food consumption patterns continue to favor imported fresh produce, especially potatoes.

The Directorate General of Foreign Trade (DGFT) has relaxed restrictions such as the Minimum Export Price (MEP) on potato exports, improving the affordability of Indian potatoes in Gulf markets. Strengthened trade relations under India–Gulf Cooperation Council (GCC) frameworks have further supported agricultural exports to Oman. Additionally, investments in cold storage facilities near major ports have ensured that perishable goods like potatoes retain freshness during transit, enhancing India's export competitiveness in the region.

Bangladesh:

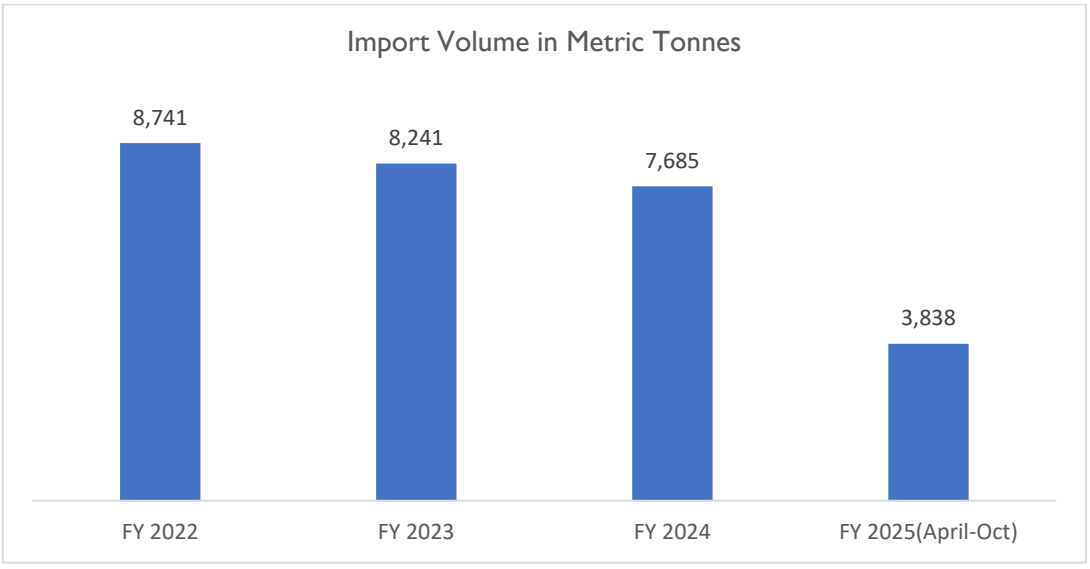
Year	Quantity (MT)	Value in INR Lakh
FY 2024	71.789	9,174

Bangladesh has recently emerged as a major importer of Indian potatoes due to rising domestic demand and improved trade relations between the two countries. Exports to Bangladesh surged significantly in FY 2024 after no recorded exports in the previous two years. This growth can be attributed to Bangladesh's increasing reliance on imports to meet its food security needs.

India has facilitated cross-border trade with Bangladesh by simplifying customs procedures and reducing tariffs on perishable goods like potatoes. Special trade corridors have been established to ensure faster movement of goods between the two countries. Bilateral agreements under SAFTA (South Asian Free Trade Area) have further reduced barriers to agricultural exports.

Import Scenario

India's import of potato products has shown a relatively stable trend over recent years, with slight declined variations across different periods. The focus of imports remains on specific value-added potato products rather than raw potatoes.



Source: Directorate General of Foreign Trade (DGFT)

Key Takeaways:

- In FY 2022, the import volume was 8,741 metric tonnes.
- By FY 2023, it decreased slightly to 8,241 metric tonnes, reflecting a 5.72% decline.
- In FY 2024, the import volume further reduced to 7,685 metric tonnes, representing an overall 12.08% decrease from FY 2022.
- For FY 2025 (April-October), the import volume is recorded at 3,838 metric tonnes, suggesting a continued downward trend in imports.

This decline highlights India's growing self-reliance and improved domestic production of processed and value-added potato products.

Reasons for the decrease in import:

Instead of raw potatoes, the focus has moved to high-value, processed items like frozen potato products, specialty starches, and other derivatives, which cost more per unit. Additionally, India has become more self-reliant in producing raw potatoes, reducing the need for large volumes of imports. India's potato imports have decreased due to a mix of stronger domestic production, supportive government policies, and improved supply chain management.

Despite challenges like weather-related crop damage and high food inflation, the government has worked proactively to minimize import dependency while addressing temporary supply gaps. Advancements in farming techniques and high-yielding varieties have helped maintain production levels.

However, localized issues, such as heatwaves and late blight disease in key states like Uttar Pradesh and West Bengal, have caused occasional disruptions. To manage these challenges, the government allowed limited imports from Bhutan to stabilize prices without significantly increasing overall imports and they have renewed the agreement of importing potatoes from Bhutan is free and without any license up to 2027[2].

Government initiatives have been crucial in reducing reliance on imports. Programs like Operation Greens (TOP) aim to stabilize prices for tomatoes, onions, and potatoes by providing financial support for storage, transportation, and processing. This helps reduce post-harvest losses and ensures a consistent domestic supply.

Additionally, the Directorate General of Foreign Trade (DGFT) has implemented measures like tariff rate quotas to regulate imports during shortages while safeguarding domestic farmers. Efforts to expand cold storage facilities across the country have also helped reduce post-harvest losses and market volatility. By improving storage infrastructure and promoting efficient stock management, the government is reducing the need for imports during off-season periods. Collaborations with organizations like NAFED (National

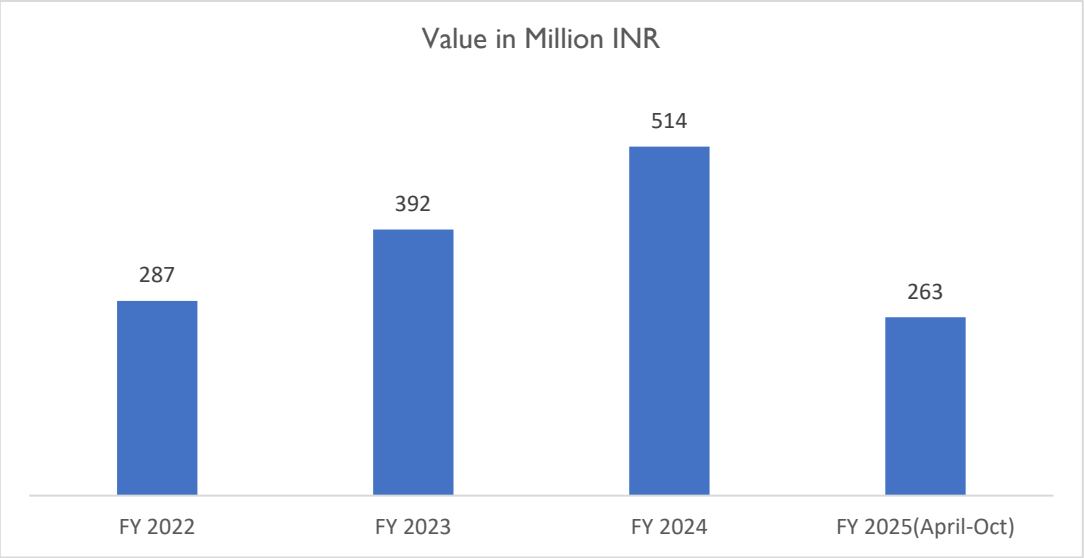
[2] DGFT

Agricultural Cooperative Marketing Federation) have strengthened supply chains and ensured better distribution, especially in regions like Assam and the Northeastern states.

The government is also investing in research and development to enhance domestic production. Institutions like the Central Potato Research Institute (CPRI) are developing climate-resilient potato varieties to tackle challenges like extreme weather and diseases such as late blight. These advancements aim to boost productivity and reduce risks from climate change.

While India has allowed limited imports from neighbouring countries like Bhutan to manage short-term supply gaps, the long-term focus remains on strengthening domestic production and supply chains. With initiatives like Operation Greens, better storage facilities, and research-driven farming improvements, India is steadily reducing its reliance on potato imports.

The decrease in import volume but increase in import value for potato products can be explained by a shift in what India is importing and the price per unit. Global price increases, driven by factors like supply chain issues and higher production costs, have also made imports more expensive. With this, exchange rate fluctuations may also have contributed to the rise in costs.



Source: Directorate General of Foreign Trade (DGFT)

Top 3 Import Partners

India, while being a significant exporter of potatoes, also imports potatoes to meet domestic demand during shortages or price fluctuations. The primary import markets for Indian potatoes include Bhutan, Bangladesh, and Nepal. Below is a detailed country-wise analysis of the import market, historical trends, and government initiatives.

Bhutan

Year	Value in INR Lakh

FY 2022	**610**
FY 2023	**860**
FY 2024	**1,080**

India has been actively importing potatoes from Bhutan, particularly in response to rising domestic prices and production challenges. In the fiscal year 2023, India imported fresh or chilled potatoes from Bhutan worth approximately 86 million INR, primarily to bolster supplies in its northeastern states such as Tripura and Assam, which have faced price surges due to local shortages.

The Directorate General of Foreign Trade (DGFT) has extended the unlicensed import of potatoes from Bhutan until June 30, 2027, allowing Indian traders to import these essential commodities without a license. This decision follows reports that Bhutan's government is exploring export markets in neighbouring countries like Nepal and Bangladesh to ensure stability for its farmers amid fluctuating prices in India.

Bhutan's Ministry of Agriculture and Livestock aims to diversify its export markets while ensuring that its farmers are not adversely affected by price fluctuations in India. This strategic approach not only helps stabilize Bhutan's agricultural sector but also supports India's efforts to manage domestic supply and demand effectively.

Bangladesh

Year	Value in INR Lakh
FY 2023	**90**
FY 2024	**140**

Bangladesh has recently emerged as a minor supplier of potatoes to India. Imports from Bangladesh are typically limited and occur during specific periods when domestic production faces challenges. While imports from Bangladesh have historically been minimal, there was a slight increase in FY 2024 due to India's need to stabilize prices amidst fluctuating domestic supply.

Cross-border trade agreements under SAFTA (South Asian Free Trade Area) have facilitated smoother import processes. Special trade corridors have been established between India and Bangladesh to expedite the movement of perishable goods like potatoes.

Nepal

Year	Value in INR Lakh
FY 2022	**70**
FY 2023	**120**
FY 2024	**170**

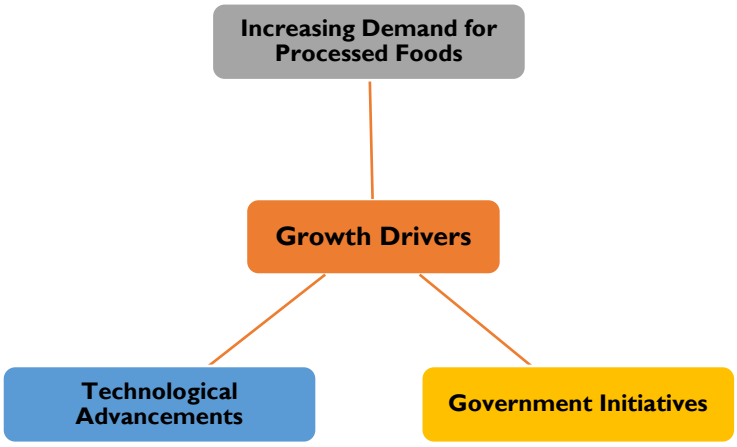
Nepal is another minor supplier of potatoes to India. Imports from Nepal are primarily driven by regional demand in northern states close to the Indo-Nepal border. Imports from Nepal have shown a gradual increase over the last three years, reflecting India's strategy to diversify its import sources during periods of high domestic demand.

The Indian government has maintained tariff-free imports of potatoes from Nepal under bilateral agreements. Improved road connectivity between India and Nepal has facilitated faster transportation of agricultural goods.

Growth Forecast

The contract farming industry in India is expected to experience substantial growth driven by various factors, including increasing demand for agricultural products, supportive government policies, and advancements in agricultural practices.

Growth Drivers:



The contract farming industry in India is expected to experience substantial growth driven by various factors, including increasing demand for agricultural products, supportive government policies, and advancements in agricultural practices.

Increasing Demand for Processed Foods:

The global food industry is witnessing a rapid rise in demand for processed and convenience foods due to changing lifestyles, urbanization, and higher disposable incomes. Consumers increasingly prefer ready-to-eat, frozen, and packaged products that save time and offer consistent quality. Within this segment, processed potato products such as french fries, chips, and frozen snacks are seeing strong growth, driven by the expansion of quick-service restaurants (QSRs) and fast-food chains.

Export opportunities for frozen potato products are also growing, with India and other emerging markets becoming key suppliers. The rising youth population and their preference for western-style food have further contributed to steady growth in this category. This shift is expected to remain a major demand driver for the processed food sector over the next decade.

Technological Advancements:

Continuous improvements in food processing and preservation technologies have transformed the efficiency, quality, and scalability of the industry. Advanced cold chain logistics, packaging innovations, and automation in production have allowed companies to maintain the freshness and safety of processed foods, including perishable products like potatoes.

Modern machinery ensures uniform slicing, frying, and freezing of potatoes, leading to higher productivity and consistency in quality. Precision agriculture and digital farming technologies also support farmers in producing high-quality raw potatoes suitable for processing. With better storage and shelf-life extension technologies, companies are able to reduce waste and expand their distribution reach globally. These advancements not only reduce costs but also increase the competitiveness of processed food products in both domestic and international markets.

Government Initiatives:

Supportive policies and government programmes play a crucial role in driving the food processing sector forward. In India, initiatives such as the Pradhan Mantri Kisan Sampada Yojana (PMKSY), subsidies for food processing units, and the establishment of mega food parks encourage investment and modernization in the sector. Specific schemes supporting potato farmers and processors, including cold storage infrastructure and export promotion, have directly benefited the processed potato value chain.

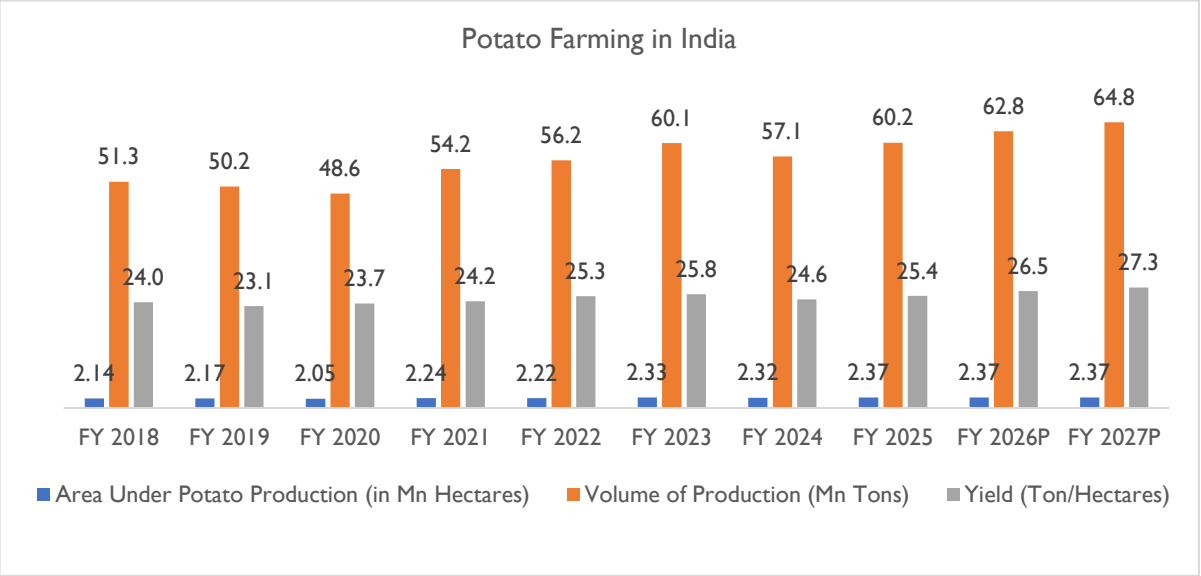
Governments also promote food safety and quality standards, which enhance the credibility of local products in export markets. In addition, trade agreements and incentives are opening new avenues for processed food exports, especially for potato-based products in high-demand regions like the Middle East and Southeast Asia. By ensuring farmer–industry linkages, the government helps stabilize raw material supply while boosting employment in rural areas.

Expected Growth in Potato Farming in India

The potato contract farming industry in India is poised for significant growth over the next three years. This growth is driven by increasing demand for processed potato products, advancements in agricultural practices, and supportive government policies.

The area under potato cultivation has grown from 2.14 million hectares in FY 2018 to 2.33 million hectares in FY 2023, reflecting a 1.7% CAGR during this period. This indicates a steady increase in the area allocated for potato cultivation due to growing demand and the crop's importance as a staple food in India. The expected growth rate for the area under cultivation is slower, with an anticipated 0.43% CAGR from FY 2025 to FY 2027. From FY 2018 to FY 2023, the area under potato production grew by approximately 0.19 million hectares, showing moderate expansion.

The volume of potato production increased from 51.3 Mn tonnes in FY 2018 to 60.2 Mn tonnes in FY 2025, registering a 2.3% CAGR during this period. This demonstrates strong production growth supported by improved farming practices and rising demand. Going forward, production is expected to reach to 64.8 Mn tonnes in CY 2027, reflecting a projected 3.8% CAGR. This sustained growth highlights India's strengthening position in global potato output.



Source: Agriculture & Farmers Welfare, Press Information Bureau

The yield per hectare has remained relatively stable, with a slight improvement from 24.0 tonnes per hectare in FY 2018 to 25.8 tonnes per hectare in FY 2023. This represents a 1.5% CAGR in yield, suggesting steady improvements in crop management and technology that have led to a moderate increase in yield over the years. Moreover, from FY 2018 to FY 2023, the yield per hectare increased by approximately 1.8 tonnes per hectare, showing consistent improvements in productivity.

The yield is expected to improve gradually in the coming years, as scientific farming practices become widespread. By FY 2027, the yield is projected to reach 27.3 tonnes per hectare, reflecting advancements in farming technology, better seed varieties, and improved crop management techniques. Between FY 2025 and FY 2027, the yield per hectare is expected to improve by a CAGR of approximately 3.8%.

Investment in Infrastructure & Technological Advancements

Processing Facilities: There is a notable increase in investment in potato processing facilities across India. Major companies are expanding their operations to meet the growing demand for frozen and processed potato products. For instance, the Indian frozen potato products market is projected to grow from USD 1.4 billion in 2022 to USD 2.8 billion by CY 2028, at a CAGR of 12.25%.

Cold Chain Development: Investments in cold storage and logistics infrastructure are critical for maintaining the quality of potatoes from farm to market. Enhanced cold chain facilities will reduce post-harvest losses and ensure that farmers can meet quality standards required by processors.

Improved Farming Techniques: The adoption of modern agricultural practices, including precision farming, better irrigation techniques, and high-yield seed varieties, is expected to enhance productivity in potato cultivation. This will enable contract farmers to produce higher-quality potatoes that meet processing standards.

Digital Platforms for Contract Farming: The emergence of digital platforms that connect farmers with processors is streamlining the contract farming process. These platforms facilitate better communication, provide market information, and ensure timely payments, thereby improving farmers' confidence in contract farming.

Key Factors Impacting Future Growth in the Industry

Several key factors are expected to significantly influence the growth of the potato contract farming industry in India. These factors encompass market dynamics, technological advancements, government initiatives, and challenges that need to be addressed for sustainable growth.

Increasing Demand for Processed Potato Products: The demand for processed potato products, such as frozen fries and chips, is on the rise due to changing consumer preferences towards convenience foods. Urbanization and increased disposable incomes are driving this trend.

Government Support and Policy Framework: The Indian government has introduced various policies aimed at promoting contract farming, including the Farmers (Empowerment and Protection) Agreement on Price Assurance and Farm Services Act, which aims to protect farmers' rights in contracts.

Financial Assistance: Schemes like PM-KISAN provide direct income support to farmers, enabling them to invest in better inputs and technologies that enhance productivity.

Technological Advancements: The adoption of precision agriculture techniques, including soil health monitoring and data analytics, helps farmers optimize inputs and improve yields. Technologies such as drones for crop monitoring can enhance efficiency.

Farm Management Systems (FMS): The use of FMS can help farmers manage their production processes more effectively, ensuring compliance with quality standards set by processors and improving overall profitability.

Quality Assurance and Traceability: Ensuring consistent quality is crucial for meeting the standards required by processors. Implementing traceability systems allows farmers to maintain records of production practices, enhancing marketability.

Food Safety Concerns: With increasing focus on food safety, adhering to quality assurance protocols can help farmers secure long-term contracts with processors who prioritize compliance with safety regulations.

Infrastructure Development: Investment in cold storage facilities and transportation infrastructure is essential for reducing post-harvest losses and ensuring that potatoes reach markets in optimal condition Expanding processing facilities will create more demand for contract-farmed potatoes, allowing farmers to tap into higher-value markets.

Market Access and Information: The emergence of digital platforms that connect farmers directly with buyers can improve market access and reduce reliance on intermediaries. This transparency can lead to

better pricing for farmers. Providing farmers with timely information about market trends and pricing can empower them to make informed decisions regarding production and sales.

Rules and Regulations: The existing power dynamics between smallholder farmers and large agribusinesses can lead to unfavourable contract terms for farmers. Addressing this imbalance is crucial for fostering a more equitable contract farming environment. The evolving legal framework surrounding contract farming needs clarity to ensure that farmers feel secure entering into agreements with corporations.

Quality Control Issues: Farmers may struggle with meeting stringent quality requirements without adequate support or resources, leading to potential penalties or rejection of produce.

The potato contract farming industry in India is positioned for growth driven by increasing demand for processed products, supportive government policies, technological advancements, and improved infrastructure. However, addressing challenges such as power imbalances, legal uncertainties, and quality control issues will be essential for realizing the full potential of this sector. By focusing on these key factors, stakeholders can work collaboratively to create a sustainable and profitable environment for potato contract farming in India.

Growth in Demand for Processed Potato Variety

The demand for processed potato variety (those used specifically for making processed potato products) is directly related to the growing demand for processing food products in India. Over the past few years, the demand for processed potato products including frozen fries, chips and other forms has been growing steadily. This growth has been fuelled by the strong expansion in fast food sector, evolving food consumption pattern among consumers, development of new processing technologies, as well as changes in demographic landscape.

Growth in Food Service Industry: Fast-food franchises and quick service restaurants segment in India have witnessed a strong growth over the past decade. The expansion has been fuelled by the growth in store count of existing players as well as entry of new players (both home grown and foreign). Since potato based processed products like chips and fries are a staple offering in all these restaurants, the growth in food service industry has directly increased the consumption of processed potato products.

Evolving Food Consumption Pattern: Indian economy has witnessed rapid changes in the last 10 – 15 years, and central to this has been the rise of a large middle class consumer base. This has directly resulted in higher demand for a wide range of consumer goods. Factors like urbanization, and increase in income levels together with exposure to lifestyle & consumption pattern in developed markets have all played a part. One of the direct consequence of this shift has been a change in food consumption pattern, with an increase in the frequency of eating out as well as consumption of processed food. Since processed potato based products is a core snack item (in fast food restaurants as well as packaged foods), the changes in consumption pattern has positively impacted the demand for processed potato varieties.

Threat & Challenges

Analysis of Major Threats & Challenges Impacting the Industry

The contract farming industry for potatoes in India has gained traction as a mechanism to enhance agricultural productivity and ensure better market access for farmers. However, several threats and challenges hinder its effective implementation.

Power Imbalance Between Farmers and Corporations

- There is a significant power imbalance between smallholder farmers and large agribusiness corporations. Many contracts are structured in a way that favours the corporations, often leaving farmers vulnerable.
- **Impact**: This imbalance can result in less favourable contract conditions for farmers, such as lower prices and strict quality requirements. Farmers may feel compelled to accept unfavourable terms due to their reliance on these contracts for income.

Quality Control Issues

- Contract farmers often face stringent quality requirements imposed by companies, which can be difficult to meet without adequate support.
- **Impact:** If farmers fail to meet these standards due to inadequate resources or knowledge, they may face penalties or rejection of their produce. This can result in financial losses and decreased trust in the contracting process.

Delayed Payments and Procurement Issues

- Delays in payments from companies can create cash flow problems for farmers who rely on timely income from their produce.
- **Impact:** Farmers may struggle to cover their operating costs, leading to increased debt and financial stress. Instances of companies refusing to procure surplus produce or reneging on contracts exacerbate this issue.

Inadequate Support for Inputs

- While some contract farming agreements promise to provide seeds and other inputs, these are often of poor quality or insufficient quantity.
- **Impact:** Farmers may end up using inferior seeds or inputs that do not yield the expected results, affecting overall productivity. This reliance on substandard inputs can lead to lower quality crops and diminished profits.

Market Fluctuations and Price Volatility

- The agricultural market is subject to fluctuations due to various factors such as weather conditions, demand changes, and policy shifts.
- **Impact:** Price volatility can severely affect farmers' incomes, especially when they have invested heavily based on projected prices that do not materialize. This unpredictability makes it challenging for farmers to plan their finances effectively.

Legal and Regulatory Challenges

- The legal framework governing contract farming in India is still evolving. The Farmers (Empowerment and Protection) Agreement of Price Assurance and Farm Services Act, 2020 aims to promote contract farming but has faced criticism.
- **Impact:** Farmers fear that the legal provisions may favor corporations over their interests, making them wage labourers on their own lands. The lack of effective dispute resolution mechanisms can leave farmers without recourse when contracts are breached.

Dependence on Corporates for Inputs and Technology

- Many contract farming models require farmers to depend heavily on corporations for inputs like seeds and fertilizers as well as technical guidance.
- **Impact:** This dependence can limit farmers' autonomy and knowledge development. If corporations fail to provide adequate support or if the provided inputs are subpar, it can lead to poor crop yields.

Limited Engagement of Smallholder Farmers

- Large agribusinesses often prefer working with medium or large-scale farmers due to perceived reliability and ability to meet production targets.
- **Impact:** Smallholder farmers may be excluded from lucrative contract farming opportunities, limiting their income potential and perpetuating inequality within rural communities.

The contract farming industry for potatoes in India presents both opportunities and challenges. While it has the potential to enhance productivity and provide assured markets for farmers, significant threats such as power imbalances, quality control issues, delayed payments, inadequate support for inputs, market volatility, legal challenges, dependence on corporates, and limited engagement of smallholders must be addressed. For contract farming to be a sustainable solution for potato cultivation in India, stakeholders including governments, agribusinesses, and farmer organizations must work collaboratively to create fairer systems that protect the interests of all parties involved.

Competitive Landscape

The competitive landscape of contract farming is shaped by the increasing involvement of agribusiness corporations, cooperatives, and multinational companies aiming to secure consistent, high-quality raw materials. As companies like ITC, HyFun Foods, PepsiCo, McCain, etc. are major players in this, there is increasing number of SMEs as well which will increase the competition in industry. The competitive landscape for contract farming companies is shaped by a variety of factors, including the presence of large corporations, regional players, and emerging entrants.

Large multinational agribusinesses typically dominate the market, offering farmers advanced technology, financial support, and access to global markets. In contrast, smaller local players often focus on specific crops or regional markets, providing more tailored services and building strong relationships with farmers. Companies also compete by offering different types of agreements, from exclusive contracts to flexible, non-exclusive ones, as well as by providing additional support like inputs, technical expertise, and access to extension services.

Technological innovation plays a key role in the competitiveness of contract farming companies, with advancements in precision agriculture, blockchain for traceability, and mobile platforms enhancing efficiency and transparency. Additionally, companies that offer risk management strategies, sustainability initiatives, and cost-efficient operations have a competitive edge, particularly in markets where environmental concerns and fair trade are becoming more important.

The ability to manage supply chains effectively, especially in terms of cold chain logistics for perishable goods, also differentiates companies in the contract farming sector. Following this, several key factors shape the industry, including market demand, the regulatory environment, and evolving consumer preferences, which influence both production and distribution practices.

Growing Demand from Processed Food Industry: The Indian processed food market has seen exponential growth, driven by urbanization, changing lifestyles, and an increased preference for ready-to-eat products. Potatoes are a key ingredient in popular snacks such as chips and fries, making them indispensable to companies like PepsiCo, ITC, and McCain. These companies seek specific potato varieties like Lady Rosetta and Atlantic, which offer optimal quality for processing. According to the Ministry of Food Processing Industries (MoFPI), the processed food sector is growing at a CAGR of 11.5%, highlighting the rising competition among firms to meet demand.

Competitive Pricing and Farmer Benefits: Pricing plays a crucial role in influencing farmer participation. Companies that offer consistent and attractive pricing, irrespective of market fluctuations, have an edge. Farmers prefer partners who provide timely payments and premium rates for high-quality produce. Studies by NABARD (2022) revealed that contract farming arrangements result in 20–25% higher incomes for farmers compared to traditional markets, making pricing a key driver of competition.

Access to Quality Inputs and Technology Support: Providing high-quality seeds, fertilizers, and technology is a differentiator in the potato contract farming market. Companies that invest in capacity building and farmer training not only enhance productivity but also build loyalty. For instance, PepsiCo's "Partnership Farming Model" provides farmers with advanced seeds and agronomy support, leading to a 30% improvement in yield. Such initiatives are a major factor influencing competition.

Infrastructure and Logistics Capability: Efficient logistics and cold storage facilities are crucial for maintaining the quality of potatoes, which are highly perishable. Companies with robust infrastructure are better positioned to meet year-round demand. India faces a cold storage deficit of 10–12%, particularly in potato-growing regions like Uttar Pradesh and Punjab, according to the National Centre for Cold Chain Development (NCCD). This scarcity creates intense competition among firms to secure reliable storage and transportation solutions.

Regional Presence and Farmer Network: Potato production is heavily concentrated in states like Uttar Pradesh, West Bengal, and Gujarat, which collectively account for over 60% of India's output. Companies with a strong local presence and well-established farmer networks in these regions enjoy logistical efficiencies and easier access to quality produce. For example, McCain Foods has developed a significant presence in Gujarat, enabling efficient sourcing and quality control.

Sustainability and Climate Resilience: As global and domestic markets demand eco-friendly practices, sustainability has emerged as a significant factor. Companies incorporating water-saving techniques, eco-friendly fertilizers, and reduced pesticide use are better positioned in the market. Initiatives like PepsiCo's "Positive Agriculture" program, which promotes sustainable farming practices, not only appeal to environmentally conscious stakeholders but also enhance farmer retention.

Technology and Digital Platforms: Technological advancements, such as the use of IoT devices, satellite monitoring, and mobile apps, are revolutionizing contract farming. Digital platforms like AgriBazaar and DeHaat facilitate seamless contract management, crop monitoring, and market updates. Companies adopting these technologies improve efficiency and farmer engagement, gaining a competitive edge.

Export Opportunities and Quality Standards: India is emerging as a significant exporter of potatoes, with the volume of potato exported from India growing by a CAGR of nearly 7.9% between FY 2022 and 25. Companies focusing on export markets face heightened competition to meet stringent quality standards. High-value export opportunities incentivize firms to invest in infrastructure and farmer training, further intensifying competition.

Entry of Organized Players and MNCs: The entry of multinational corporations like PepsiCo, McCain, and ITC has reshaped the competitive dynamics of the sector. These players bring advanced technologies, global expertise, and large-scale operations, making it challenging for smaller companies to compete. Domestic firms are compelled to innovate and collaborate with farmers to maintain their market position.

Government Policies and Support: The Model Contract Farming Act, 2018, encourages formal contracts between farmers and companies, providing a legal framework for fair agreements. Government incentives, such as subsidies for cold storage and irrigation, further shape competition. Companies aligning with these policies and leveraging government support are better positioned to expand their operations and enhance farmer engagement.

Trust and Relationship Management: Establishing trust through fair practices, transparent contracts, and grievance redressal mechanisms is critical for long-term success. Farmers value companies that offer risk-sharing mechanisms, such as crop insurance and input cost subsidies. Trust-building initiatives directly impact a company's ability to attract and retain farmers.

Brief Profile of Major Competitors

Iscon Balaji Foods Private Limited

Iscon Balaji Foods (IBF), founded in 2012, represents a powerful blend of expertise in the food industry and exceptional business insight. The collaboration between Balaji Wafers, with decades of experience in potato cultivation and processing, and the Iscon Group, a renowned real estate firm known for its strategic direction, has been central to IBF's growth. The Company also practices contract farming.

- Head Office- Ahmedabad, Gujarat
- Manufacturing Unit-
  - Potato Flakes- Jaygurudev Cold Storage, National Highway-No:8, Kanajiri Nadiad Kheda-387 310, Gujarat
  - Frozen French Fries- Village-Limbasi, Taluka-Matar, Tarapur Road, District - Kheda-387 520, Gujarat
- **Product Offerings:**
  - Potato Flakes- Extrusion Grade Potato Flakes, Caterer Grade Potato Flakes
  - Frozen French Fries
  - Frozen Speciality Products- Herb Potato Patty, Premium Veggie Decker, Potato Cheese Shots, Chilly Garlic Potato Shots, Roasties (Hash Brown), Aloo Tikki, Herbed Potato Wedges

Key Strengths:

Starting with the production of potato flakes, IBF has now expanded into creating a range of premium frozen potato delicacies. Balaji Wafers, with over 40 years in the potato industry, is estimated to produce 100,000 kgs of potato wafers and 500,000 kgs of savouries daily.

Located in Anand, IBF's potato flakes manufacturing facility processes 200,000 kgs of high-quality potatoes every day, meeting the demands of major snack manufacturers and hotel industry leaders in India, such as Haldiram, ITC, and Bikaji. The company also operates over 5,000 acres of potato farming, working closely with more than 1,000 farmers. This end-to-end involvement in the supply chain ensures the highest quality products reach markets both domestically and internationally.

HyFun Foods Private Limited

In 1962, the first generation of entrepreneurs at M/s. Asandas & Sons began trading potatoes and onions. The business grew under the leadership of the second generation, and in November 2015, the third generation, led by Mr. Haresh Karamchandani, founded HyFun to produce a variety of products, including French fries, burger patties, and cheese poppers. Within just five years, HyFun emerged for catering to leading global quick-service restaurant (QSR) brands as a B2B player. The company follows the contract farming model, and follows a seed to shelf model.

HyFun proudly supports the 'Make in India' initiative and now exports its products to over 40 countries worldwide. They are committed to being an "Indian Company with Global Standards." The unwavering passion for delivering international quality food has brought them closer to their customers. Having successfully launched in the retail market, they are now expanding their presence on B2C platforms, aiming to make premium delicacies.

Mission: Their mission is to surpass customer expectations by offering premium quality, affordable products. They are committed to continuous innovation and enhancing safety measures across their manufacturing, processing, and supply operations to ensure excellence at every stage.

Vision: Their vision is to establish a global presence while upholding the highest quality standards. They aim to leverage innovative techniques and build a trusted brand, recognized for its enduring commitment to customer satisfaction for years to come.

- Head quarter- Ahmedabad, Gujarat
- Manufacturing unit- Survey No. 337, Ganeshpura, Mehsana-Ahmedabad Highway, Dist: Mehsana – 384450, Gujarat, India.

Product Offerings:

- Range of French Fries- French Fries, XLF Fries, Crinkle Fries, Skin on Fries, Flavoury Fries, Super Crispy Fries, Skin on Coated Fries, Rustic Fries
- Potato Specialities- Potato Wedges, Classic Wedges, Lime 'n' Mint Wedges, Spicy Wedges
- Veggie Specialties- Jalapeño Cheesy Pops, Veggie Stix, Crispy Veggie Bites, Chilli Garlic Poppers
- Indian Ethnic- Aloo Tikki, Sabudana Patty, Cheesy Paneer Patty, Kings Patty, Veg Burger Patty, Classic Patty with Herbs & Chilli, Sabudana Patty, Spicy Hash Brown, Hash Brown Mini Triangle, Hash Brown Triangle, Hash Brown Patties, Hash Brown Gems, Hash Brown Round, Hash Brown Oval
- Baked Snacks- Margherita Pizza, Veg Paradise Pizza, Tandoori Paneer Pizza, Garden Fresh Pizza, Mexicano Puffets, Italiano Puffets, Schezwan Puffets, Apple Crumble Pie Puffets, Apple Pie, Mango - Peach Pie, Pineapple Pie

Key Strengths:

The company has announced a fresh brand identity and ambitious expansion plans focused on the Indian market. This comes alongside a significant investment of INR 1,100 crore (USD 134.9 million) in India's Gujarat province to establish three new state-of-the-art manufacturing facilities.

The new investment will come through a combination of internal funds and bank loans. Founded in 2015, HyFun has experienced significant growth, achieving over INR 1000 crore (USD 122.6 million) in revenue last year. The company attributes this success to its unique "seed-to-shelf" model.

This approach involves partnerships with both farmers and international food chains. HyFun currently collaborates with over 6,000 farmers and anticipates procuring over 300,000 tonnes of potatoes this year. HyFun's expansion strategy prioritizes the Indian market. The company aims to quadruple production and achieve a revenue target of INR 5,000 crore (USD 613.5 Million) by 2028. Currently, export markets account for 70% of HyFun Foods' current turnover.

McCain Foods India Private Limited

McCain Foods Ltd. is a global producer of French fries and potato specialties, based in Florence Ville, New Brunswick, Canada. known for their delicious and convenient food products, McCain is serving in the frozen food industry, offering nutritious and tasty options for families worldwide. McCain Foods (India), a wholly-owned subsidiary of McCain Foods Limited, has been actively engaged in agricultural R&D and developing the frozen food market in India and neighbouring countries since 1998.

At McCain, they are dedicated to creating high-quality food products, manufactured at their plant in Mehsana. They maintain impeccable quality standards by using the finest ingredients. The company follows a farm to fork model.

- Head Office- Gurugram, Haryana
- Manufacturing Unit- Mehsana, Gujarat

Product Offerings: Aloo Tikki, Patties, Crispy Potatoes, French Fries, Potato Bites, Veggie Fingers, Mini Cheese Samosas, Emotibites, Potato Cheese Shots, Vegie Nuggets, Cheesy Pizza Fingers, Burger Patties, and more.

Key Strengths:

- **Local Sourcing**: McCain procures potatoes from North Gujarat and is expanding its sourcing to Madhya Pradesh and Uttar Pradesh to increase volumes.
- **Global Presence**: McCain Foods has a strong global presence, operating in over 160 countries and holding a significant market share in the frozen food industry.
- **Sustainability Initiatives**: The company is committed to sustainability, aiming to reduce food waste by 50% by 2030 and using renewable energy sources for a significant portion of its operations.

- **R&D and Innovation**: McCain is actively engaged in agricultural R&D and innovation, focusing on developing new products and improving existing ones to meet consumer demands.

Simplot India Foods Private Limited

Simplot India Foods Private Limited is a subsidiary of Simplot Australia, serving in the frozen food industry. Incorporated in 2012 and headquartered in Delhi, India, Simplot India Foods specializes in the procurement and trading of potatoes. The company is actively involved in the agriculture industry, focusing on food manufacturing and seafood product preparation and packaging. Simplot India Foods operates from its plant in Mehsana, Gujarat, and is committed to quality, using the highest quality ingredients to produce a diverse range of products.

The leadership team of Simplot India Foods includes key figures such as Deepanshu Chaudhary as Company Secretary and directors Manish Sharma, Nikhil Tandon, Meghan Swan, and Erik Brandenburg. The company is dedicated to sustainability and innovation, aiming to reduce food waste and improve the efficiency of its operations. The Company partners with farmers to source potatoes.

With a mission to contribute to feeding the world, Simplot remains a family-owned business with production facilities world-wide, including in the USA, Canada, Mexico, Argentina, China, Australia and, now, India.

- Manufacturing Plant- Gujarat, with these regional customers can look forward to 50% faster shipments compared to product sourced from North America.

Product Offerings: Conventional Fries, Clear Coated Fries, Formed and Speciality Potatoes, Seasoned and Battered Potatoes

Key Strengths:

- ❖ **Innovative Processing Capabilities**: The new India plant features advanced processing capabilities, allowing the production of Straight Cut and Crinkle Cut Fries, specialty cuts, and battered products. This flexibility extends to manufacturing formed products, including other vegetables, mashed, and battered formed products in the future.
- ❖ **Commitment to Sustainability**: The plant has 100% wastewater recycling capabilities, highlighting Simplot's dedication to environmental sustainability and responsible resource management.
- ❖ **Strong Agricultural Partnerships**: Since 2013, Simplot has partnered with local farmers in India to optimize their operations and produce world-class products. This long-term collaboration strengthens the company's supply chain and ensures high-quality raw materials.
- ❖ **Strategic Location**: The new facility in India enables Simplot to better serve the Asia-Pacific region and meet the growing demand for potato products in the Middle East and Southeast Asia.

Financial Analysis of Peers[3]

Financial Snapshot	Farm Peace Limited[4]			McCain Foods India Private Limited			Iscon Balaji Foods Private Limited		
INR Crores	**FY2023**	**FY2024**	**FY2025**	**FY2022**	**FY2023**	**FY2024**	**FY2022**	**FY2023**	**FY2024**
Total Income	26.30	62.75	79.98	815.90	1,189.23	1,244.68	403.42	678.03	1,189.40
Revenue from Operations	26.28	62.55	79.24	808.17	1,171.89	1,214.04	388.16	668.11	1,185.66
EBITDA	0.52	9.43	9.67	114.53	232.52	178.06	41.07	77.02	387.32
EBITDA Margin	1.99%	15.08%	12.20%	14.17%	19.84%	14.67%	10.58%	11.53%	32.67%
PAT	0.32	6.46	6.68	42.06	125.70	89.04	9.41	28.51	263.37
PAT Margin	1.21%	10.33%	8.43%	5.20%	10.73%	7.33%	2.43%	4.27%	22.21%
Net Worth (Total Assets - Total Liabilities)	2.89	9.35	36.28	541.71	668.48	757.55	129.08	157.62	420.99
Long Term Borrowing	0.00	0.41	0.17	0.00	0.00	0.00	240.01	326.15	377.73
Debt Equity Ratio	0.69	0.76	0.07	0.00	0.00	0.00	3.16	3.35	1.73
Return on Capital Employed	10.62%	57.05%	24.80%	10.94%	25.71%	16.00%	5.65%	9.65%	30.70%
Return on Equity	11.05%	69.13%	18.42%	7.76%	18.80%	11.75%	7.29%	18.09%	62.56%
Return On Asset	1.90%	20.44%	9.65%	5.44%	13.83%	8.50%	1.42%	3.09%	18.62%

[3] The financials for Simplot India Foods Pvt Ltd and HyFun Foods Pvt Ltd are not available in the balance sheets files with MCA.

[4] There is no long-term borrowing for the Farm Peace Ltd in 2023 and McCain Foods India Private Limited

Company Profile: Farm Peace Limited

Farm Peace is a dynamic and forward-thinking company dedicated to transforming the potato farming industry through innovation, sustainability, and community engagement. As a collective of innovators, dreamers, and doers, Farm Peace is committed to supporting both farmers and consumers with sustainable practices and advanced AgriTech solutions. Farm Peace believes in creating a harmonious cycle of quality and community by supporting sustainable practices. From seed to shelf, the company ensures that its products are of the highest quality and contribute to a sustainable future.

Key Metrics:

- **Years in Business:** 4+
- **Team Size:** 120+
- **Farmer Association:** 500+
- **Acres Farms Under Supervision:** 5000+

Combining tradition with cutting-edge AgriTech, Farm Peace delivers the finest potato products while minimizing environmental impact. The company's ethical practices and transparency ensure trust, and by partnering with local farmers, it empowers communities. With a vision for sustainable excellence and a customer-centric approach, Farm Peace is dedicated to revolutionizing agriculture for a healthier planet and thriving communities.

Farm Peace is a collective of passionate individuals driven by the desire to innovate and sustain. The team comprises experts in AgriTech, farming, and environmental science, all working together to revolutionize the potato farming industry. Farm Peace believes in the power of community and strives to empower local farmers, ensuring that their efforts lead to prosperous futures.

At Farm Peace, it is understood that efficient logistics form the backbone of a successful agricultural supply chain. A logistics network that spans across Pan India ensures that high-quality agricultural products are delivered to every corner of the country swiftly and reliably. Pride is taken in the delivery of only the highest quality produce, with premium seeds sourced from the fertile lands of North Indian states such as Punjab, Haryana, and Uttar Pradesh. These regions are renowned for their rich soil and ideal climate conditions, ensuring that crops are nurtured from the very beginning. The commitment to excellence extends beyond the farm, with every step of the process meticulously overseen to ensure that potatoes are harvested, processed, and delivered with the utmost care. The vibrant markets are served with fresh, nutritious potatoes, brought straight from Seed to Shelf.

Services Offered:

- **Seed Supply:** Farm Peace provides high-quality seed supply services, offering certified seeds selected for their superior yield, disease resistance, and adaptability to various growing conditions. Farmers can rely on Farm Peace for productive and reliable seed solutions.
- **Technical Field Support:** The team of agronomists and field experts at Farm Peace offers personalized technical support to optimize farming practices. This includes soil analysis, crop management, pest control, and irrigation techniques, ensuring farmers achieve the best possible outcomes.
- **Logistical Support:** Efficient logistics are crucial for successful farming. Farm Peace offers comprehensive logistical support, including transportation, storage, and distribution solutions. These services ensure that produce reaches its destination quickly and in perfect condition, minimizing delays and losses.
- **Payment Security:** Understanding the importance of financial stability in farming, Farm Peace provides transparent and secure financial transactions. This ensures that farmers receive timely payments for their produce, allowing them to focus on farming without financial uncertainties.

Products Offered:

- **Raw Potato Supply:** Farm Peace offers processed varieties of potatoes. The commitment to quality means that every product is a testament to sustainable farming practices and cutting-edge Agrotech innovations.
- **Processing Variety:** Farm Peace engages in contract farming with agricultural partners, offering a variety of seeds such as SANTANA, FRAYSONA, and SARPMIRA. Through a buy-back arrangement, the company collects potatoes from farmers and supplies them directly to end-users.
- **Chips Variety:** Farm Peace also engages in contract farming for chip varieties, offering seeds such as L.R. and CHIPSONA. The company procures potatoes through a buy-back model and delivers them directly to end-users.

Distribution Channels: The products are sold through Modern Trade, ensuring widespread availability and accessibility for consumers.