



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 11, Issue 5, May 2022

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.118

9940 572 462

6381 907 438

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www.ijrset.com



Indian Agriculture Sector-Status and Prospects

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ABSTRACT: India has the second-largest arable land resources in the world. With 20 agri-climatic regions, all the 15 major climates in the world exist in India. The country also has 46 of the 60 soil types in the world. India is the largest producer of spices, pulses, milk, tea, cashew, and jute, and the second largest producer of wheat, rice, fruits and vegetables, sugarcane, cotton, and oilseeds. Further, India is second in the global production of fruits and vegetables and is the largest producer of mango and banana. During 2019-20 crop year, food grain production reached a record of 296.65 million tonnes. For FY 2021-22, the government has set a target to increase production by 3.9%. Consumer spending in India will return to growth in 2022 post the pandemic-led contraction, expanding by as much as 7%. Private consumption expenditure (at constant prices) was estimated at Rs. 80.8 trillion (US\$ 1.08 trillion) in FY22 against Rs. 75.6 trillion (US\$ 1.01 trillion) in FY20.

Total area sown with rabi crops was 34.8 million hectares by November 27, 2020, 4% more than the previous season, and 2% above the average of the last five years. According to the Ministry of Agriculture, 44% of wheat and other rabi crops were harvested out of a total of 97 lakh hectares sown area in the 2020-21 rabi season. As of October 27, 2021, the total rabi area stood at 0.53 lakh hectares. A total of 50.90 lakh hectares of kharif crops will be sown in the kharif season of 2021-22. In the rabi marketing season 2021-22, the government purchased a record 43.33 MT of wheat. In case of pulses and oilseeds, the government through nodal agencies has procured total 1.04 million tonne at MSP value of US\$ 761.63 million (Rs. 5662.82 crores) so far in 2021.

Production of horticulture crops in India reached a record 331.05 million metric tonnes (MMT) in 2020–21 (as per 3rd advance estimate), an increase of 10.5 million metric tonnes over FY20. The production of fruits, flowers, spices and honey is expected to rise. India has the largest livestock population of around 535.78 million, which translates to around 31% of the world population. Milk production in the country is expected to increase to 208 MT in FY21 from 198 MT in FY20, registering a growth of 10% y-o-y.

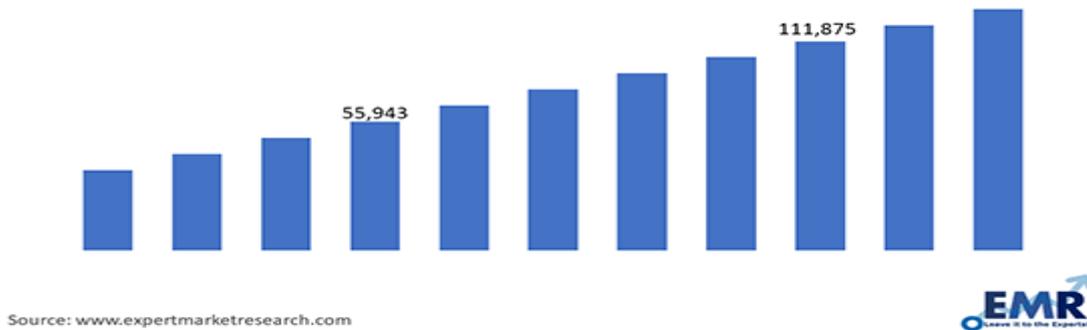
KEYWORDS: agriculture, Indian, status, prospects, irrigation, kisan, crops, rabi, kharif, fields

I. INTRODUCTION

India can be among the top five exporters of agro-commodities by shifting its focus on cultivation and effectively handholding farmers, according to the World Trade Centre. The total agricultural and allied products exports stood at US\$ 41.25 billion in FY21. The principal commodities that posted significant positive growth in exports between FY20 and FY21 were the following:

Indian Agriculture Market

Historical Market and Forecast
INR Billion



- Wheat and Other Cereals: 727% from Rs. 3,708 crore (US\$ 505 million) to Rs. 5,860 crore (US\$ 799 million)
- Non-Basmati Rice: 132% from Rs. 13,130 crore (US\$ 1,789) to Rs. 30,277 crore (US\$ 4,126 million)
- Soya Meal: 132% from Rs. 3,087 crore (US\$ 421 million) to Rs. 7,224 crore (US\$ 984 million)[1,2]
- Raw Cotton: 68% from Rs. 6,771 crore (US\$ 923 million) to Rs. 11,373 crore (US\$ 1,550 million)
- Sugar: 39.6% from Rs. 12,226 crore (US\$ 1,666 million) to Rs. 17,072 crore (US\$ 2,327 million)
- Spices: 11.5% from Rs. 23,562 crore (US\$ 3,211 million) to Rs. 26,257 crore (US\$ 3,578 million)

The Agriculture Export Policy, 2018 aimed to increase India's agricultural export to Rs. 4,19,340 crore (US\$ 60 billion) by 2022. Government aims to raise fishery export from India to Rs. 1 lakh crore (US\$ 14.31 billion) by 2024-25.

In 2021, India witnessed growth in agriculture product exports:

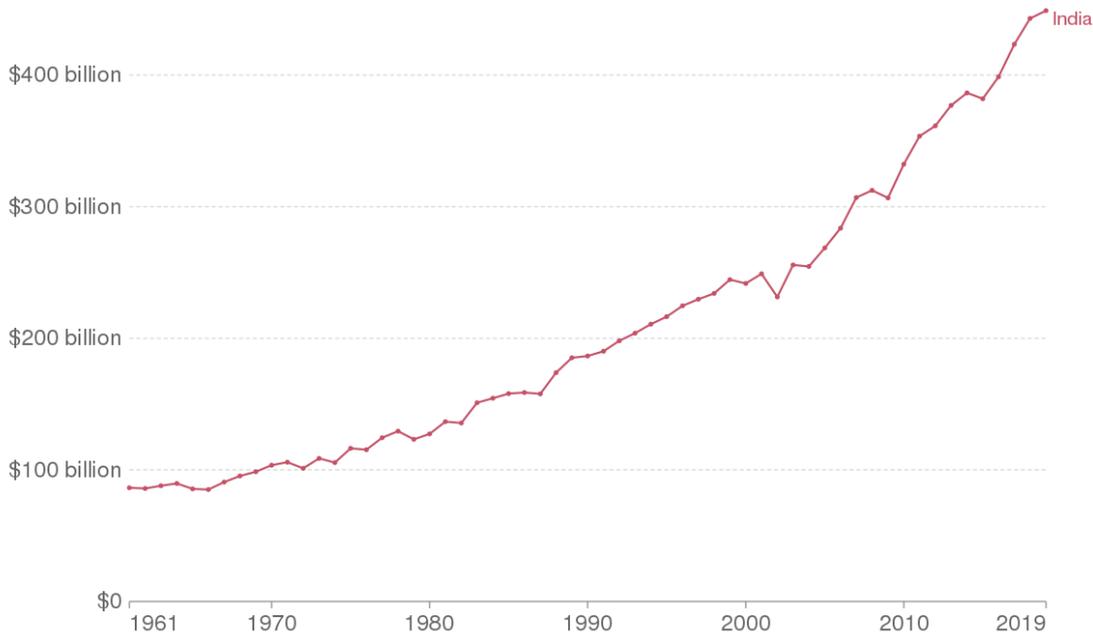
- In June 2021, India exported 24 metric tonnes of groundnuts to Nepal from West Bengal, boosting groundnut exports from Eastern India.
- In FY21, India exported 1.91 lakh tonnes of banana worth Rs. 619 crore (US\$ 82.90 million).

According to Department for Promotion of Industry and Internal Trade (DPIIT), Indian food processing industry attracted Foreign Direct Investment (FDI) equity inflow of about US\$ 15.02 billion between April 2000 and November 2021.[3,4]

Gross Value Added by agriculture, forestry, and fishing was estimated at Rs. 19.48 lakh crore (US\$ 276.37 billion) in FY20. Share of agriculture and allied sectors in gross value added (GVA) of India at current prices stood at 17.8 % in FY20.

Agricultural output, 1961 to 2019

Total agricultural output is the sum of crop and livestock products. It is measured in constant 2015 US\$, which means it adjusts for inflation.



Source: United States Department for Agriculture (USDA) Economic Research Service

The Ministry of Agriculture and Farmers Welfare's budget has been enhanced from Rs. 1.25 lakh crore (US\$ 16.20 billion) in 2020-21 to Rs. 1.32 lakh crore (US\$ 17.28 billion) in 2021-22.

NABARD will assist 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.

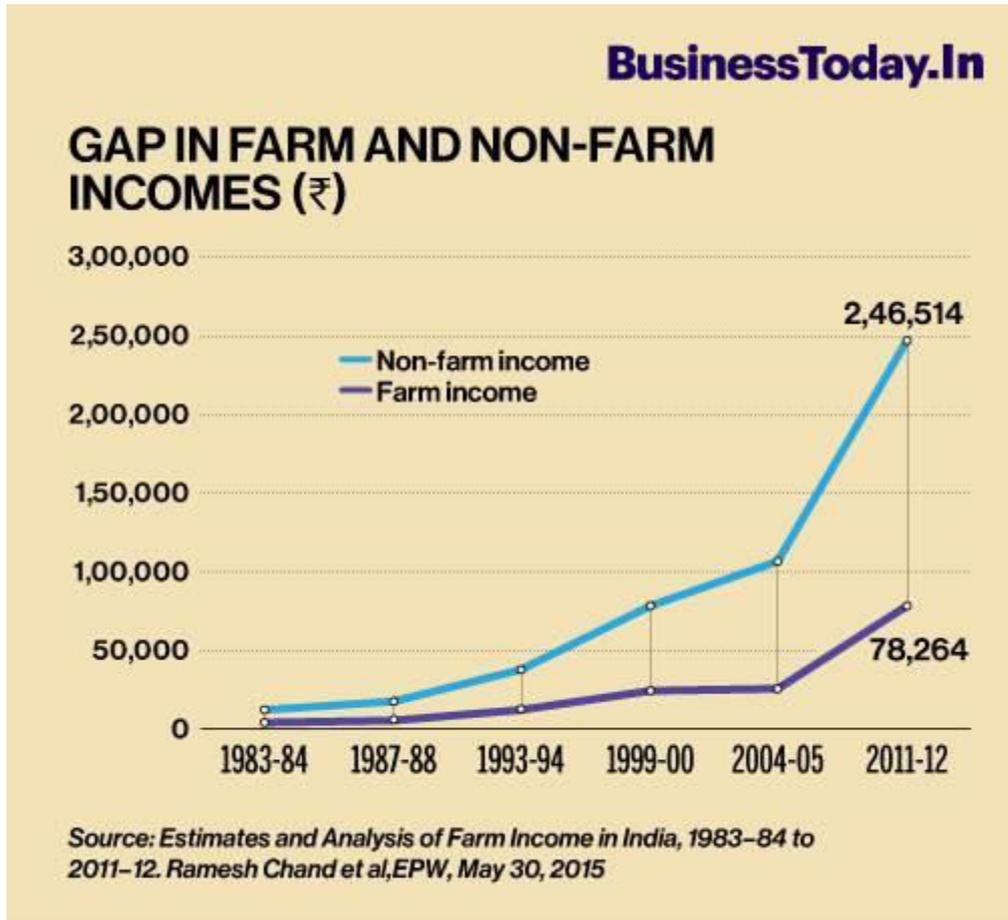
The government is promoting the use of drones in agriculture by providing financial assistance through the 'Sub-Mission on Agriculture Mechanization.' [5,6]

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.

In October 2021, the Union Minister of Home Affairs launched the 'Dairy Sahakar' scheme in Anand, Gujarat.

In September 2021, Prime Minister Mr. Narendra Modi launched 35 crop varieties with special traits such as climate resilience and higher nutrient content.

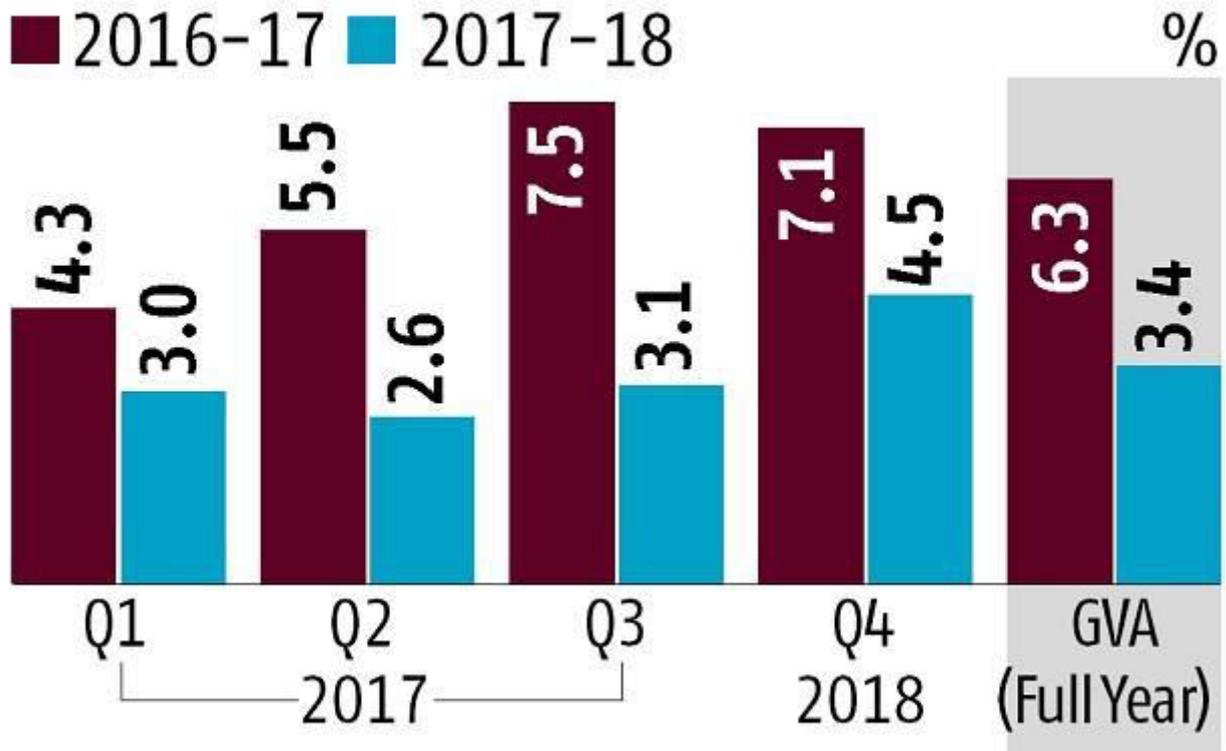
The Electronic National Agriculture Market (e-NAM), launched in April 2016 to create a unified national market for agricultural commodities by networking existing Agriculture Produce Marketing Committees (APMCs), had 16.6 million farmers and 131,000 traders registered on its platform until May 2020. As per the Union Budget 2021-22, government announced that through e-NAM (National Agriculture Market), ~1.68 crore farmers were registered and trade worth Rs. 1.14 lakh crore (US\$ 15.63 billion) was carried out; 1,000 more mandis will be integrated to achieve transparency and bring competitiveness. [7,8]



The Government of India has introduced several projects to assist the agriculture sector. Pradhan Mantri Gram Sinchai Yojana (PMGSY) aims to irrigate the field of every farmer and improve water use efficiency to achieve the motto, 'Per Drop More Crop'. Overall, the scheme ensures improved access to irrigation. As per the Union Budget 2021-22, Rs. 11,588 crore (US\$ 1.5 billion) was allocated to Pradhan Mantri Krishi Sinchai Yojana (PMKSY). As per the Union Budget 2021-22, Rs. 1.33 lakh crore (US\$ 18.41 billion) was allocated to the Ministry of Agriculture. The Indian Prime Minister launched the Pradhan Mantri Kisan Samman Nidhi Yojana (PM-Kisan) and transferred Rs. 18,000 crore (US\$ 2.45 billion) to bank accounts of >90 million beneficiaries on December 25, 2020. As per the Union Budget 2021-22, Rs. 65,000 crore (US\$ 8.9 billion) was allocated to Pradhan Mantri Kisan Samman Nidhi (PM-Kisan). As per the Union Budget 2021-22, Rs. 8,514 crore (US\$ 1.17 billion) was allocated to the Department of Agricultural Research and Education.[9,10]

Prime Minister of India launched the Pradhan Mantri Kisan Samman Nidhi Yojana (PM-Kisan) Benefits under the PM Kisan plan have been delivered to about 11.78 crore farmers as of February 22, 2022, and Rs. 1.82 lakh crore (US\$ 23.97 billion) have been released to qualified recipients across India in various payments.

(at 2011-12 prices)



Source: MOSPI

In April 2021, the Government of India approved a PLI scheme for the food processing sector with an incentive outlay of Rs 10,900 crore (US\$ 1,484 million) over a period of six years starting from FY22.

To boost farmer incomes and growth of the agricultural economy, the Indian government released funds in June 2021 for farm mechanisation such as establishment of custom hiring centres, farm machinery bank and high-tech hubs in different states.

In November 2020, Netafim India, a leading smart irrigation solutions provider, launched FlexNet, a revolutionary mainline and sub-mainline piping for above and below-ground drip irrigation systems for Indian farmers.

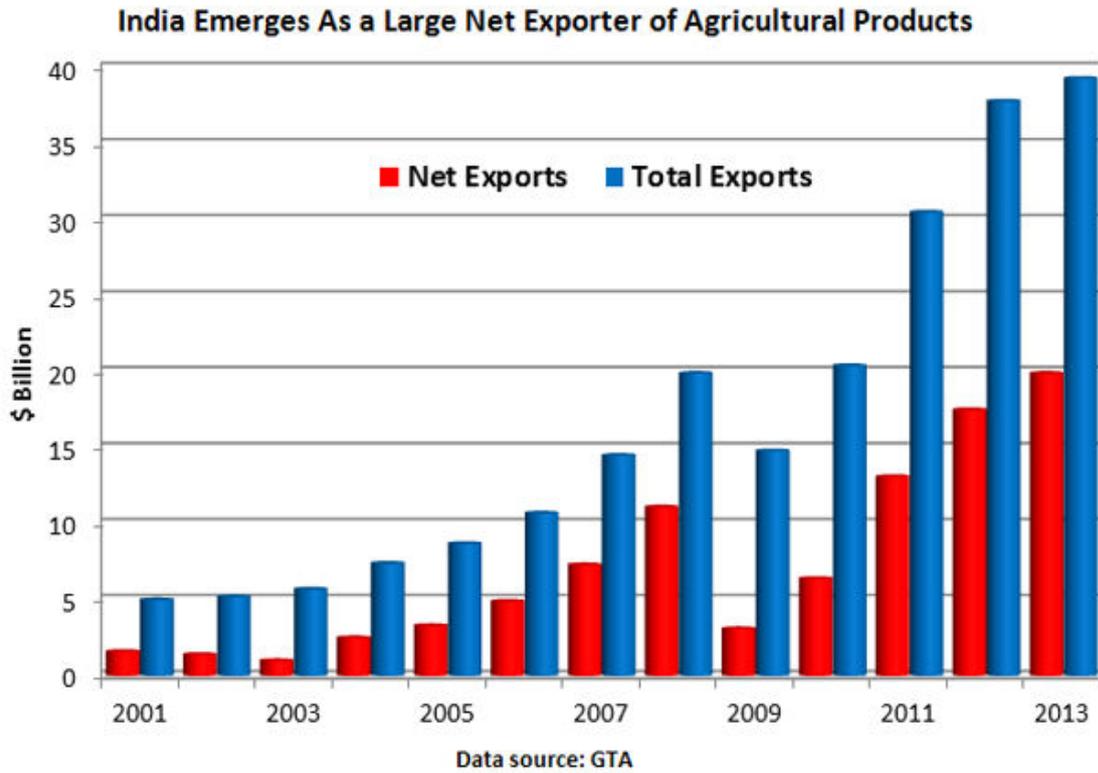
In September 2020, the government launched the PM Matsya Sampada Yojana, e-Gopala App and several initiatives in fisheries production, dairy, animal husbandry and agriculture. Under this scheme, an investment of Rs. 20,000 crore (US\$ 2.7 billion) will be made in the next 4-5 years in 21 states.

In June 2020, Government introduced Pradhan Mantri Formalization of Micro Food Processing Enterprises (PM-FME) scheme. It is expected to generate total investment of Rs. 35,000 crore (US\$ 4.97 billion), generate 9 lakh skilled and semi-skilled employment, and benefit 8 lakh units through access to information, training, better exposure, and formalization.[11,12]



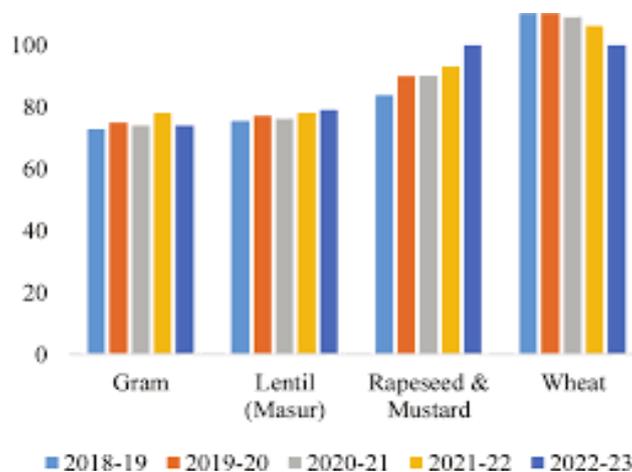
II. DISCUSSION

Agriculture in India is livelihood for a majority of the population and can never be underestimated.



Although its contribution in the gross domestic product (GDP) has reduced to less than 20 per cent and contribution of other sectors increased at a faster rate, agricultural production has grown. This has made us self-sufficient and taken us from being a begging bowl for food after independence to a net exporter of agriculture and allied products.

Total foodgrain production in the country is estimated to be a record 291.95 million tonnes, according to the second advance estimates for 2019-20. This is news to be happy about but as per the estimates of Indian Council for Agricultural Research (ICAR), demand for foodgrain would increase to 345 million tonnes by 2030.[13,14]



Increasing population, increasing average income and globalisation effects in India will increase demand for quantity, quality and nutritious food, and variety of food. Therefore, pressure on decreasing available cultivable land to produce more quantity, variety and quality of food will keep on increasing.

India is blessed with large arable land with 15 agro-climatic zones as defined by ICAR, having almost all types of weather conditions, soil types and capable of growing a variety of crops. India is the top producer of milk, spices, pulses, tea, cashew and jute, and the second-largest producer of rice, wheat, oilseeds, fruits and vegetables, sugarcane and cotton.

In spite of all these facts, the average productivity of many crops in India is quite low. The country's population in the next decade is expected to become the largest in the world and providing food for them will be a very prime issue. Farmers are still not able to earn respectable earnings.



Even after over seven decades of planning since the independence, majority of the farmers are still facing problems of poor production and/or poor returns. Major constraints in Indian agriculture are:

1. According to 2010-11 Agriculture Census, the total number of operational holdings was 138.35 million with average size of 1.15 hectares (ha). Of the total holdings, 85 per cent are in marginal and small farm categories of less than 2 ha (GOI, 2014).
2. Farming for subsistence which makes scale of economy in question with majority of small holdings.
3. Low-access of credit and prominent role of unorganised creditors affecting decisions of farmers in purchasing of inputs and selling of outputs
4. Less use of technology, mechanisation and poor productivity for which first two points are of major concern
5. Very less value addition as compared to developed countries and negligible primary-level processing at farmers level.
6. Poor infrastructure for farming making more dependence on weather, marketing and supply chain suitable for high value crops.[15,16]

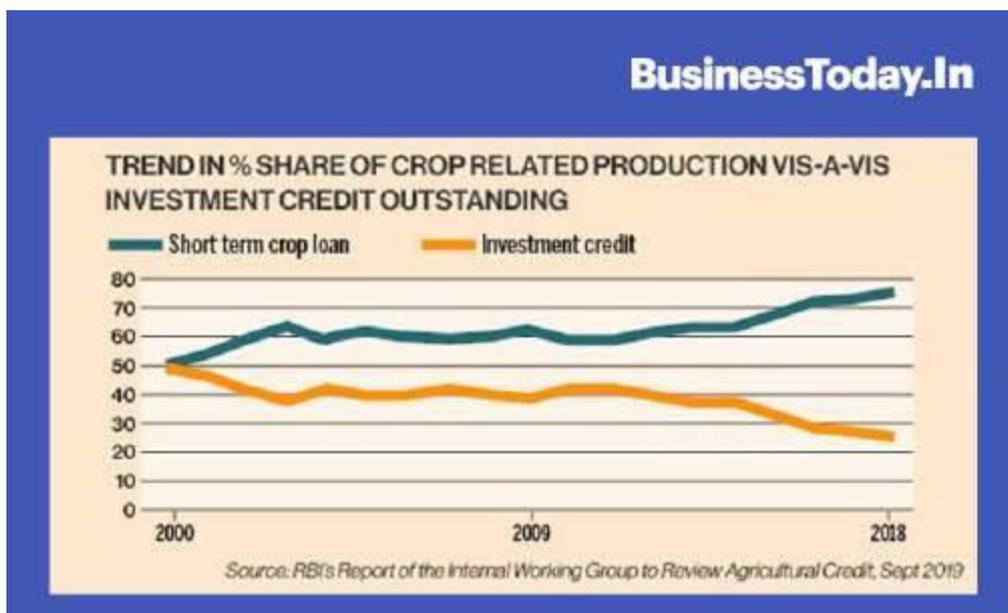
India's agricultural products exports

| | 2021-22 (\$ billion) | change y-o-y % |
|-----------------|-------------------------|-------------------|
| Rice | 9.6 | 9 |
| Marine products | 7.7 | 30 |
| Sugar | 4.6 | 65 |
| Spice | 3.9 | - |
| Buffalo meat | 3.3 | 4 |
| Raw cotton | 2.8 | 48 |
| Wheat | 2.1 | 273 |



Future of agriculture is a very important question for the planners and all other stakeholders. Government and other organisations are trying to address the key challenges of agriculture in India, including small holdings of farmers, primary and secondary processing, supply chain, infrastructure supporting the efficient use of resources and marketing, reducing intermediaries in the market. There is a need for work on cost-effective technologies with environmental protection and on conserving our natural resources.

The reforms towards privatisation, liberalisation and globalisation affected inputs market at a faster pace. Agricultural marketing reforms after 2003 made changes in marketing of agricultural outputs by permitting private investment in developing markets, contract farming and futures trading, etc. These amendments in marketing acts have brought about some changes but the rate is less.[17,18]





Along with this, the information technology revolution in India, new technologies in agriculture, private investments especially on research and development, government efforts to rejuvenate the cooperative movement to address the problems of small holdings and small produce etc are changing face of agriculture in India.

Many startups in agriculture by highly educated young ones show that they are able to understand the high potential of putting money and efforts in this sector. Cumulative effects of technology over the next decade will change the face of agriculture.

All the constraints in agriculture make the productivity and returns complex but still a high untapped potential is there in India's agriculture sector.[19,20]

Advantageous weather and soil conditions, high demand for food, untapped opportunities, various fiscal incentives given by the government for inputs, production infrastructure, availability of cheap credit facilities and for marketing and export promotion are attracting many individuals, big companies, startups and entrepreneurial ventures to do a lot of investments on innovations, inventions, research and development and on other aspects of business.

The efforts are being done to convert all the challenges in agriculture into opportunities and this process is the future of agriculture.

III. IMPLICATIONS

1. Changing demand due to increase in incomes, globalisation and health consciousness is affecting and going to affect more the production in future. Demand for fruits and vegetables, dairy products, fish and meat is going to increase in future.

2. Researches, technology improvements, protected cultivation of high value greens and other vegetables will be more. There will be more demand of processed and affordable quality products.

3. More competition will be there among private companies giving innovative products, better seeds, fertilisers, plant protection chemicals, customised farm machinery and feed for animals etc in cost effective ways at competitive prices giving more returns on investment by farmers. Use of biotechnology and breeding will be very important in developing eco-friendly and disease resistant, climate resilient, more nutritious and tastier crop varieties.

4. Some technologies will be frequently and widely used in future and some will become common in a short time while some will take time to mature. For producing the same products in other way so as to use resources judiciously and using new resources also like hydroponics, use of plastics and bio-plastics in production. There will be more of vertical and urban farming and there will also be efforts in long term to find new areas for production like barren deserts and seawater.

5. Precision farming with soil testing-based decisions, automation using artificial intelligence will be focused for precise application inputs in agriculture. Sensors and drones will be used for precision, quality, environment in cost effective manner.

Small and marginal farmers will also be using these technologies with the help of private players, government or farmer producer organisations (FPO). Use of GPS technology, drones, robots etc controlled by smart phones etc can make life of farmers easy and exciting with good results. These advanced devices will make agriculture be more profitable, easy and environmentally friendly.

6. Use nano-technology for enhancement of food quality and safety, efficient use of inputs will be in near future. Nano-materials in agriculture will reduce the wastage in use of chemicals, minimise nutrient losses in fertilisation and will be used to increase yield through pest and nutrient management. IFFCO has already done successful tests in nano-fertilisers.

7. India has improved remarkably in its digital connectivity and market access has become very easy. The number of internet users is projected to reach 666.4 million in 2025. Farmers will be behaving more smartly with mobiles in hands and would be able to be more aware and connected with different stake holders. Government will be making wide use of digital technology for generating awareness among farmers, information sharing, government schemes using digital technology for direct transfers of money.

8. There will certainly be more work by government, village communities, agri startups and private players in conserving sharply depleting water resource. Use of digital technology can make revolution in this direction. There will



be use of satellites, IoT, drones for better collection of data regarding soil health, crop area and yield which will make cost for insurers less with better estimations and system will be more exact and effective.

9. There will be more of niche marketers in operations, area, and crop specific small equipments which will make operations even at small farms easier and efficient. Food wastage will be less and better use of waste materials in agriculture will be more. Number of warehouses in private sector will be more and linkages between government and private warehouses will be increasing. This will help in balancing supply with demand and stabilisation of prices of agri-outputs in the market.

10. Retailing in agriculture will largely be digitalised. A study estimates that over 90 per cent of kirana stores across the country will be digitalised by 2025 with modern traceable logistics and transparent supply chain. Many players have already taking kiranastores to the door steps of consumers like Amazon and Jio Mart.

Question arises whether farmers will be able to make use of modern technologies in a country where education, holding size, infrastructure, low level of technology adoption and many other constraints are there. [19]

IV. RESULTS

Hon'ble Union Minister of State, Shri Kailash Choudhary on 09th March, 2022 inaugurated Pusa Krishi Vigyan Mela 2022 in New Delhi. The three day Krishi Mela was organized by the ICAR-Indian Agricultural Research Institute (IARI) on the theme "Self-reliant Farmer with Technical Knowledge". On this occasion, Shri Choudhary dedicated "Pusa Agri Krishi Haat Complex" developed in two acres to the country. Farmers and Farmer Producer Organizations will be able to do direct marketing of their products in the 'Pusa Agri Krishi Haat Complex'. With this facility, consumers will be able to buy the products of farmers directly, which will free them from middlemen. There is a provision of 60 stalls, haats and shops in the complex to promote farmer entrepreneurship. During the mela, nearly 40,000 farmers from different regions of the country participated and learned about varieties and technologies of IARI and 100 ICAR institutes, Krishi Vigyan Kendras. IARI gave live exhibition on drone technology, precision farming, wheat varieties, fruits, vegetables, flowers, different agricultural models and farmer advisory services. The major attractions of the fair were: Smart/Digital Agriculture, Agri Startups and Farmer Producer Organization (FPO). Innovative technologies of IARI, such as the solar powered Pusa-Farm Sun Fridge; Pusa Decomposer, Pusa Complete BioFertilizer (unique liquid formulation providing nitrogen, phosphorous and potasssium) were also showcased. About 1500 quintals of Pusa seeds were purchased by the farmers. On the second day of the Krishi Vigyan Mela 4 technical sessions were held. In these sessions, farmers were informed about Smart Agriculture; Natural Farming; Hydroponic and Aeroponic Agriculture for High Productivity; and Agriculture exports for prosperity. Seeds of three varieties of basmati rice; Pusa Basmati 1847, Pusa Basmati 1885 and Pusa Basmati 1886 were also distributed to the farmers so that they can produce seeds of these new varieties themselves. On the final day of the fair, two technical sessions, one on "Innovative farmers meet" and second on "Agri-start-up and Farmer Producers Organization" were also conducted. The 93rd Annual General Meeting of the ICAR Society chaired by Hon'ble Union Minister of Agriculture & Farmers Welfare, Shri Narendra Singh Tomar was organized at the National Agricultural Science Centre Complex, New Delhi on 26th March, 2022. The Minister in his address underlined the establishment of the ICAR in 1929 and the pivotal role played by the Council through its research and technology development in creating the food and nutritional security in the country with the untiring cooperation of farmers and scientists over the years. He urged the Council to start the preparations for its Centenary celebrations (in the Year - 2029) at the national and international levels. Mentioning the Indian Natural Farming Method, he also regarded the Waste-toWealth as the principle of the nature. Shri Tomar said that while the ICAR is making farmers aware of the new techniques and methods, the Union Ministry of Agriculture & Farmers Welfare is committed to take forward the Digital Agriculture Mission. This, he stated, will reduce the farmers' cost of cultivation and increase the facilities. National conclave on 'Production of Bees Wax' A National Conclave on "Production of Bees Wax" was organized by National Dairy Development Board (NDDB), Gujarat in collaboration with the National Bee Board (NBB), Ministry of Agriculture and Farmers Welfare on 30th March, 2022. The conclave was supported by the National Agricultural Cooperative Marketing Federation of India Ltd. (NAFED) & Tribal Co-Operative Marketing Development Federation of India Limited (TRIFED). The objective of this conclave was to create awareness about the production of other high-value beekeeping products viz.; bees wax, bee pollen, royal jelly, propolis, bee venom, etc. Addressing the conclave, Dr. Abhilaksh Likhi, Additional Secretary, Department of Agriculture & Farmers Welfare said that beekeeping, besides pollination support, also provides extra income and creates employment opportunities for rural/landless farmers and beekeepers. Through the implementation of the National Beekeeping and Honey Mission (NBHM), Government of India has taken so many initiatives to strengthen the beekeeping industry in the country. He highlighted that under NBHM, thrust is being given to setting up infrastructural facilities for collection, processing, trading, testing and branding of honey and other beehive products.



He also informed that NDDDB, NAFED & TRIFED have been identified as implementing agencies under NBHM for implementing beekeeping activities through a cluster-based approach by making Farmers Producer Organizations (FPOs) on beekeeping. Shri Abhijit Bhattacharjee, General Manager, NDDDB informed that NDDDB is always committed to bringing policies/schemes beneficial to farmer/ milk producers with the aim to uplift the economy of rural farmer/milk producers. NDDDB has a wide approach that the economy of Indian farmers/ milk producers will only increase if farmers/ milk producers will utilize the resources present in their local area and do not import resources from outside. He added that NDDDB is actively involved in the promotion of beekeeping through their network of cooperative institutions and the conclave regarding an important by-product of beekeeping i.e., bees wax is the step in this direction.[20]

V. CONCLUSIONS

With the participation of Central and State Governments, corporate, and startups, Expo-2020 Dubai has helped the Nation to explore new areas of collaboration for Indian entities and position itself as a global economic hub. India Innovation Hub at the India Pavilion also helped in building on India's strength as the third-largest incubator of unicorns and has displayed innovations of many Indian startups so far. The platform captured the attention of Indian as well as global investors, assisting the startup ecosystem bloom. This platform offered a massive opportunity for exploring business prospects and laying the foundation for future strategic engagements. The expo was meant to showcase India's potential and strength with respect to different sectors including food and agriculture.[21]

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SJIF Scientific Journal Impact Factor
Impact Factor: 8.118



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