AGRICULTURE AND FOOD MANAGEMENT: PLENTY OF UPSIDE LEFT IF WE GET IT RIGHT

09

CHAPTER

In the last five years, the agriculture sector has grown at an average growth rate of 4.18 per cent per year. The country also has a comfortable stock of foodgrains, around 40 per cent[1] of which is distributed to two-thirds of the population free of cost. India exports more than 7 per cent[2] of its food grains. The growth in the agriculture and allied sectors has contributed positively to the growth of the Indian economy.

However, specific challenges remain. Low productivity levels, the impact of variability in weather, fragmented land holdings and inadequate marketing infrastructure affect agriculture performance. The chapter discusses these aspects while also focussing on government interventions in the crop, livestock, animal husbandry and fisheries to enhance investment and productivity, provide reasonable returns to farmers through the minimum support price (MSP), improve access to high-quality inputs and enable better extension services. Looking ahead, the digitalisation initiatives in Agriculture are expected to empower farmers through better decision-making tools. The chapter also discusses welfare schemes like PM Gareeb Kalyan Yojana (PMGKAY), the National Food Security Act (NFSA) and India's food management programme, including food procurement and allocation.

INTRODUCTION

9.1 The Indian agriculture sector provides livelihood support to about 42.3 per cent of the population and has a share of 18.2 per cent in the country's GDP[3] at current prices. The sector has been buoyant, which is evident from the fact that it has registered an average annual growth rate of 4.18[4] per cent at constant prices over the last five years. Several initiatives and measures taken by the government in the form of assured remunerative prices through MSP improving access to institutional credit, enabling crop diversification, promoting digitisation, and mechanisation, encouraging adoption of sustainable practices through organic and natural farming, and focusing on productivity enhancement have had a positive impact on the sector. As per provisional estimates for 2023-24, the growth rate of the agriculture sector stood at 1.4

1 Chand, R., Joshi, P., & Khadka, S. (2022). Indian agriculture towards 2030: pathways for enhancing farmers' income, nutritional security and sustainable food and farm systems (p. 311). Springer Nature link available at https://link.springer.com/book/10.1007/978-981-19-0763-0

2 Ashok Gulati and Ritika (2022) Indian agriculture towards 2030: pathways for enhancing farmers' income, nutritional security and sustainable food and farm systems (p. 311). Springer Nature link available at https://link.springer.com/book/10.1007/978-981-19-0763-0

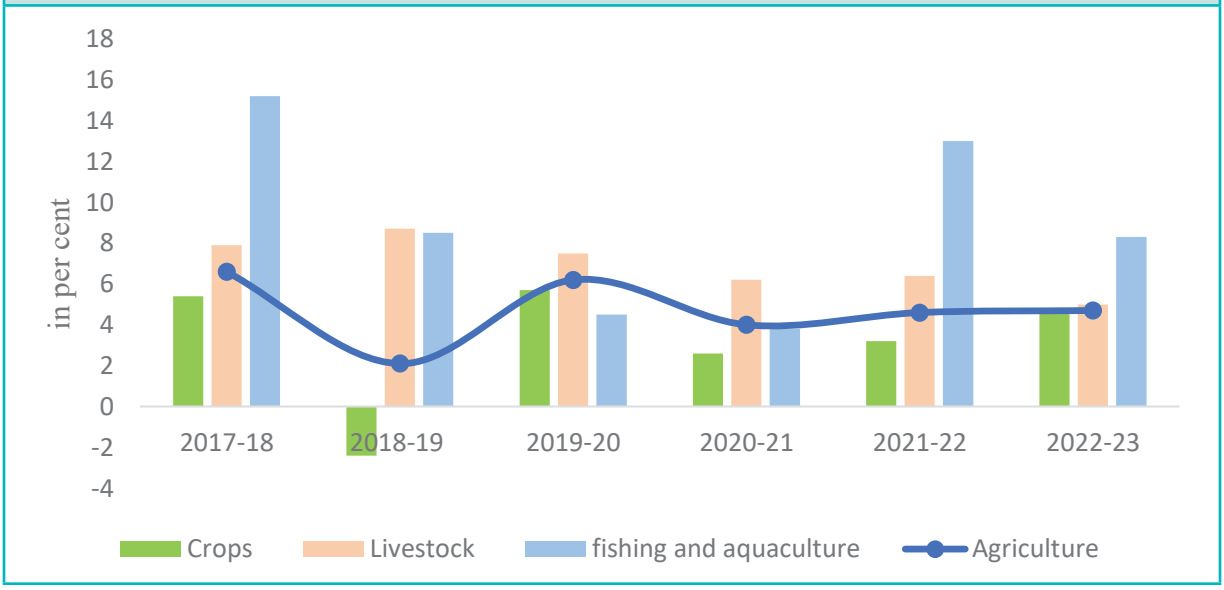
3 National Statistical Office (NSO) M/o Statistics & Programme Implementation

4 ibid

per cent,[5] which is below 4.7 per cent in 2022-23[6], mainly because of a drop in the foodgrain production due to delayed and poor monsoons caused by El Nino. The allied activities - livestock and fisheries have performed better than the traditional crops such as cereals[7], which is evident from an increase in their share in agriculture Gross Value Added (GVA) at current prices from 24.38 per cent and 4.44 per cent in 2014-15 to 30.23 per cent and 7.25 per cent in 2022-23[8] respectively. The share of the crops sector in Agriculture GVA at current prices in 2022-23[9] was 55.28 per cent as compared to 61.75 per cent in 2014-15.

9.2 While the country is a major agriculture producer, being the second largest producer in rice, wheat, cotton, among other crops, and the largest producer of milk, pulses and spices[10], the crop yields in the country are much lower than the other major producers (Fig IX.2). That this is so despite the fact that the bulk of the government support goes to rice and wheat if a cause for reflection. Fragmented land holdings, low farm investment, lack of farm mechanisation, insufficient access to quality inputs, and inadequate marketing infrastructure leading to post-harvest losses, dependency on rains and short growing seasons are a few reasons for the low yields.

Chart IX.1: Growth of agriculture and allied sectors

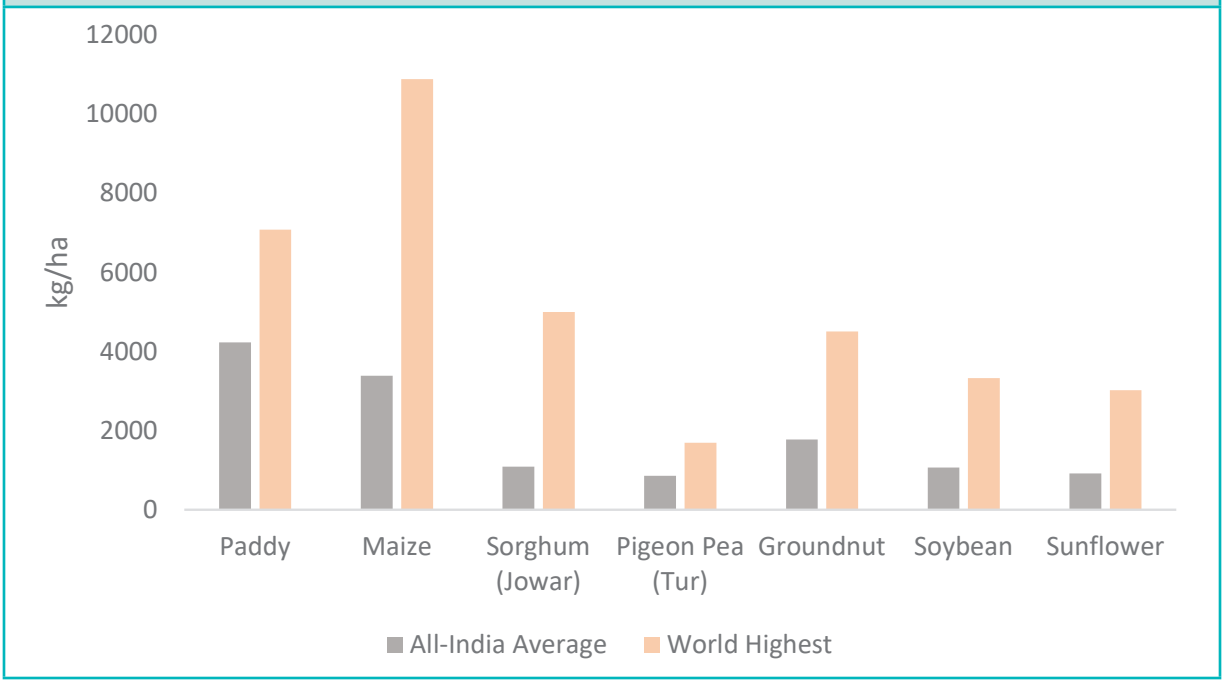


Source: National Statistical Office (NSO) M/o Statistics & PI

9.3 Several interventions are being undertaken to improve productivity in agriculture in line with the recommendations of the Doubling Farmers Income Report (DFI) 2016, which identified strategies to increase crop and livestock productivity, enchancing cropping intensity, diversify to high-value agriculture and provide remunerative prices on farmers' produce. The decision in 2018-19 to fix MSP at one and half times the all-India weighted average cost of

5 ibid
6 ibid
7 Understanding the Farm Acts, Working Paper 1/2020, Niti Ayog, November 2020
8 Department of Animal Husbandry and Dairying (Ministry of Fisheries and Animal Husbandry and Dairying)
9 National Statistical Office (NSO) M/o Statistics & Programme Implementation
10 https://www.fao.org/india/fao-in-india/india-at-a-glance/en/

Chart IX.2: International productivity comparison for major kharif crops (2022)



Source: Price Policy Report for Kharif Crops 2024-25

production was a step towards providing assured remunerative prices to farmers. Other interventions include income support through Pradhan Mantri Kisan Samman Nidhi (PM-KISAN), which gives the farmer a direct financial benefit of ₹6000/- per year. Promotion of greater efficiency in the use of inputs and sustainable production methods through Per Drop More Crop (PDMC), a micro irrigation scheme and the actions under the National Mission on Sustainable Agriculture (NMSA), including the use of alternative and organic fertilisers are a few examples on other initiatives being undertaken to improve productivity and sustainability. In addition, digital initiatives such as the Digital Agriculture Mission and e-National Agriculture Market (e-NAM) have also been taken up to facilitate the adoption of smart agriculture technologies, with the latter allowing better price discovery.

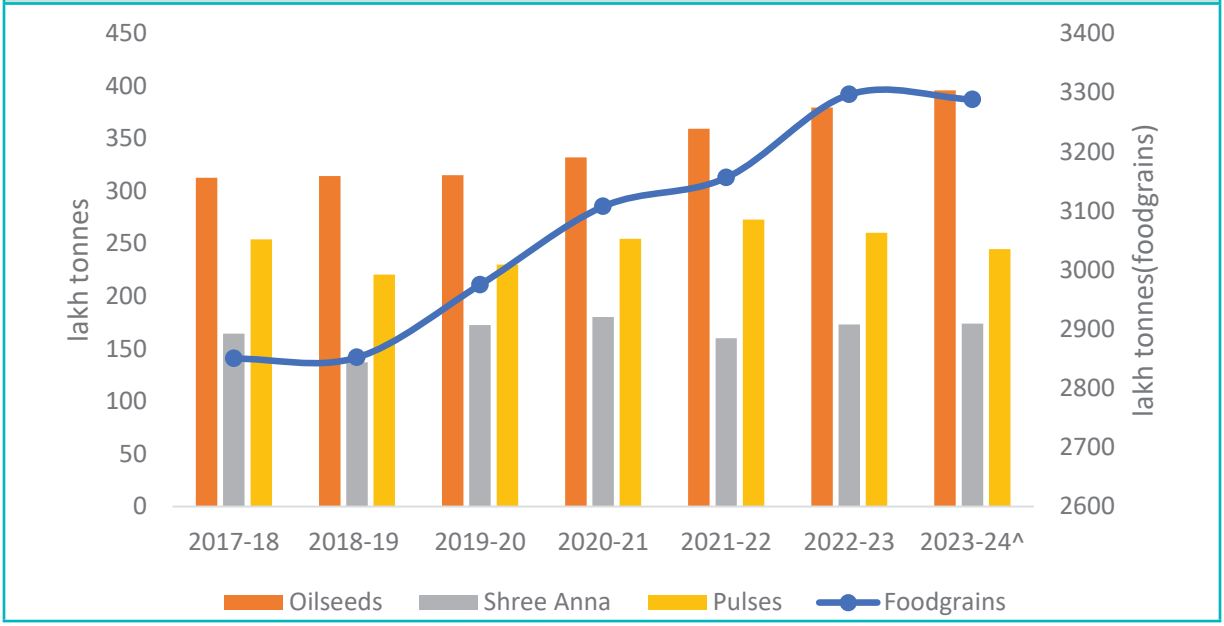
9.4 The roles, animal husbandry and fisheries play in improving farmers' income, especially when agriculture holdings are reduced, is duly recognised. The scheme such as the Rashtriya Gokul Mission(RGM), National Digital Livestock Mission[4] (NDLM), and National Programme for Dairy Development (NPDD) include interventions to improve quality, enable access to the organised markets and the development of indigenous breeds. The fisheries sector has been supported through programmes for improving productivity, access to institutional credit, and infrastructure development through the Fisheries Infrastructure Development Fund (FIDF) with a total fund size of ₹7.52 Thousand Crore. Similarly, Pradhan Mantri Matsya Sampada Yojana (PMMSY) introduced in May 2020 aimed at strengthening fisheries infrastructure, enable technology infusion and promote optimal water management. These interventions in fisheries sector have resulted in increasing fish production by an average annual growth of 7.4 per cent in 2022-23 from 2020-21[11].

11 Department of Fisheries

AGRICULTURE PRODUCTION: PERFORMANCE AND PROMOTING CROP DIVERSIFICATION

9.5 In 2022-23, foodgrain production hit an all-time high of 329.7 million tonnes, and oilseeds production reached 41.4 million tonnes. In 2023-24, food grain production is slightly lower at 328.8 million tonnes [12], primarily because of poor and delayed monsoons. Production of other crops such as Shree Anna/nutri cereals and total oilseeds marked a slight increase. The nutri-cereals increased marginally by 1 per cent from the previous year, as did Tur, with a production estimated at 33.85 lakh tonnes (LT) as compared to last year's production of 33.12 LT. With the harvesting still in progress, there may be further changes in successive estimates. The production of lentil (Masur) is estimated at 17.54 LT, which is higher by 1.95 LT than the previous year's production of 15.59 LT.

Chart IX.3: Production of major crops



^As per third advance estimates
Source: Ministry of Agriculture and Farmers Welfare

9.6 In recent years, the Government has promoted crop diversification to address sustainability challenges and shift production from water-intensive crops to others such as pulses, oilseeds, and Nutri-cereals/ Shree Anna. The government is implementing the Crop Diversification Programme (CDP) under the Rashtriya Krishi Vikas yoajna (RKVY) to demonstrate and promote better production technologies of alternate crops for the diversion of paddy cultivation and to restore soil fertility through the cultivation of legumes. The National Food Security Mission (NFSM) is implemented across the country to enhance the production and productivity of foodgrain and commercial crops through the demonstration of crop production and protection technologies, access to high-yielding varieties, integrated nutrient and pest management techniques, efficient water saving devices, and capacity building of farmers etc. The government's push towards crop diversification is facilitated through a higher increase in

12 Third Advance estimates, Ministry of Agriculture accessed at https://desagri.gov.in/wpcontent/uploads/2024/06/English.pdf

MSP over the average cost of production for oilseeds and pulses with lentils (masur), getting the highest among pulses at 89 per cent over the cost of production, followed by tur at 58 per cent in 2023-24 while MSP for coarse cereal/millets such as bajra was 82 per cent over the cost of production. The increase in MSP for safflower and soybean (yellow) was 52 per cent over the cost of production in 2023-24. This needs to be persisted with to address the imbalance between the production of rice and wheat and the production of pulses and oilseeds.

9.7 The Government has been implementing a National Food Security Mission- Oilseeds & Oil Palm (NFSM-OS&OP), from 2018-19 to augment the availability of vegetable oils through improved productivity and increase in acreage under cultivation. The total area coverage of all oilseeds has expanded significantly, increasing from 25.60 million hectares in 2014-15 to 30.08 million hectares in 2023-24 (17.5 per cent growth). The domestic availability of edible oil has risen from 86.30 lakh tonnes in 2015-16 to 121.33 lakh tonnes in 2023-24. This has reduced the percentage share of imported edible oil, from 63.2 per cent in 2015-16 to 57.3 per cent in 2022-23, despite rising domestic demand and consumption patterns. A remunerative minimum support price for rapeseed and mustard (which was at 98 per cent over cost in 2022-23) is also providing the incentive to farmers to diversify production[13].

Promoting Investment and Access to credit in Agriculture and allied sectors

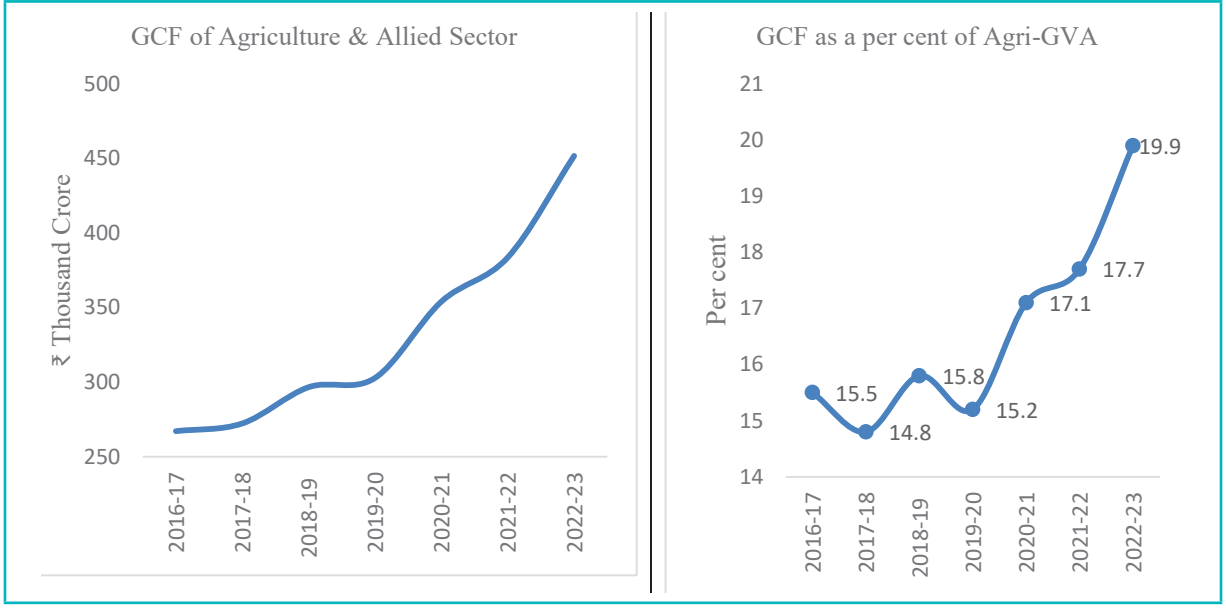
9.8 Gross capital formation (GCF) refers to the total investment in physical assets over a specific period. It includes new and existing fixed assets, such as machinery, buildings, land improvements, equipment purchases, and inventory changes[14]. This metric is a crucial indicator of investment in modernising agriculture, enhancing productivity, and ensuring sustainability. The development of infrastructure, particularly post-harvest facilities, can significantly reduce waste, preserve produce quality, and increase farmers' income. The GCF of the agriculture sector and the share of GCF in the agriculture and allied sectors as a percentage of Gross Value Added (GVA) has been growing steadily, mainly due to increased public investment. The GCF of the agriculture sector grew at the rate of 19.04 per cent in 2022-23, and the GCF as a percentage of GVA rose from 17.7 per cent in 2021-22 to 19.9 per cent in 2022-23, suggesting an increase in investment in agriculture[15]. The average annual growth in GCF from 2016-17 to 2022-23 was 9.70 per cent[16].

9.9 However, despite the increasing trend in GCF, there is a need to further boost agriculture investment, especially in the context of doubling farmers' income. The DFI 2016 report indicated that to double farmers' income over the period of 2016-17 to 2022-23, income would need to grow at an annual rate of 10.4 per cent in the farm sector, which in turn would require an annual growth rate in agriculture investment of 12.5 per cent[17]. One significant challenge

13 Ministry of Agriculture
14 World Bank (https://databank.worldbank.org/metadataglossary/world-development indicators/series/NE.GDI.TOTL.ZS)
15 Investments in agriculture mainly refers to land, input and production related investments. It does not include investments in markets, storage, transport, grading and other post-harvest infrastructure.
16 Survey calculations based on data from NSO
17 Volume XIV of Doubling Farmers income Report 2018 (https://foodprocessingindia.gov.in/uploads/publication/MoFPI1609496430agriculture2.pdf)

in this area is the fragmentation of agricultural land, which has adversely affected farmers' investments. On the other hand, the private corporate sector's share has remained below 2 per cent.[18]

Chart IX.4: GCF of agriculture & allied sector and GCF as a per cent of Agri GVA



Source: Second Advance Estimates of National Income, National Statistical Office (PIB Press release (various issues Office

9.10 Subsidies have also played a significant role in influencing farmer behaviour towards adopting better quality seeds, encouraging the use of appropriate composition and quantity of fertiliser, and improving access to farm machines from custom hiring centres. Subsidies to the agriculture sector more than doubled between 2011-12 and 2020-21, with the fastest increase seen in fertiliser and power. As a result, while public investments grew at the same rate as the subsidies, they remained at about one-third of the subsidies[19].

9.11 Input subsidies support short-term increases in agricultural productivity and farmer incomes.[20] Higher investment levels, on the other hand, are required for the long-term modernisation of this sector, for which active participation from private corporate entities is needed, especially in post-harvest infrastructure.

9.12 Recognising the need to crowd in private investments, the government, since 2014, has been implementing the Agriculture Marketing Infrastructure (AMI) sub-scheme of the Integrated Scheme for Agricultural Marketing (ISAM), under which capital subsidy is provided, with the objective to improving the extent of storage infrastructure. It is a demand-driven, credit-linked scheme offering subsidies of 25 per cent (for the plains) and 33.33 per cent (for North-East and

18 Chand, R., & Singh, J. (2023). From Green revolution to Amrit Kaal. National Institution for Transforming India. GoI.
19 Chand, R., & Singh, J. (2023). From Green revolution to Amrit Kaal. National Institution for Transforming India. GoI.
20 Chand, R. (2017). Presidential Address: Doubling farmers' income: Strategy and prospects. Indian Journal of Agricultural Economics, 71(1), 1-23 and Chand, R. (2022). Agricultural challenges and policies for the 21st century. NABARD Research and Policy Series, (2), 36.

hilly regions) to individuals, farmers, FPOs, cooperatives, and state agencies. As of 30th April 2024, 48357 projects were sanctioned for storage infrastructure with ₹4570 Crore released as subsidy, and 20878 other projects[21] are also under progress with ₹2084 Crore released as subsidy. To give further fillip to farm gate infrastructure and also involve the private sector more actively, the Agriculture Infrastructure Fund (AIF) was launched with a financing facility of ₹1 lakh Crore to be disbursed between FY 2020-21 to FY 2025-26 with support extending till FY 2032-33. The AIF provides medium-term debt financing for post-harvest management and community farming projects, offering interest subvention and credit guarantee support. As of 5th July 2024, AIF mobilised an investment of ₹73194 Crore, supporting 17196 custom hiring centres, 14868 primary processing units, 13165 warehouses, 2942 sorting and grading units, 1792 cold storage projects, and 18981 other projects. In addition, the Pradhan Mantri Kisan SAMPADA Yojana (PMKSY) introduced credit-linked financial assistance through grants-in-aid to build efficient supply chain management from farm to retail to reduce the wastage of perishable produce and extend food shelf life. Under PMKSY 1044 projects were completed till end March 2024. A total of 1685 projects with project cost ₹ 32.78 Thousand Crore and approved subsidy of ₹ 9.3 Thousand Crore have been approved till end March 2024.

Empowering farmers through affordable and enhanced access to credit

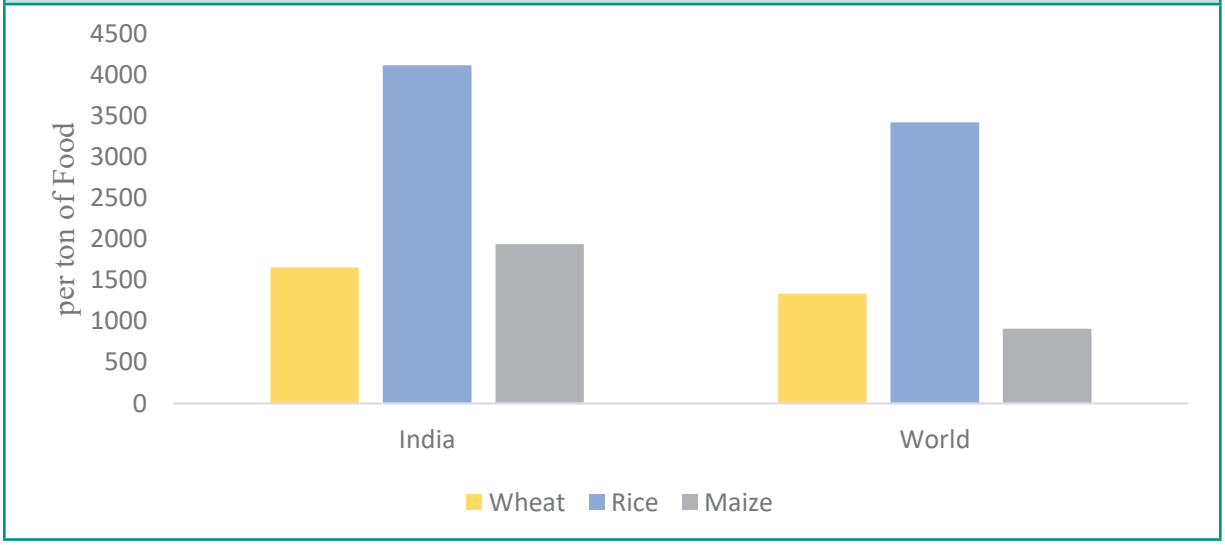
9.13 Indian agriculture continues to be dominated by small landholders. About 89.4 per cent of farm households own less than 2 hectares of land.[22] The ability of the farmers to invest in their farmlands directly depends on access to affordable credit. The government's priority has been to provide timely, cost-effective, and adequate credit that reduces the dependence on non-institutional credit and increases investment. The measures have reduced the share of non-institutional credit from 90 per cent in 1950 to 23.40 per cent in 2021-22[23]. As of 31 January 2024, the total credit disbursed to agriculture amounted to ₹ 22.84 lakh Crore, with ₹13.67 lakh Crore allocated to crop loans (short term) and ₹ 9.17 lakh Crore to term loans[24].

9.14 The Kisan Credit Card (KCC) has streamlined agricultural credit accessibility. As of January 31, 2024, banks issued 7.5 crores KCC with a limit of ₹9.4 lakh crores. As a further measure, the KCC was extended to meet the working capital needs of fisheries and animal husbandry activities in 2018-19, along with the enhancement of the limit for collateral-free loans to ₹1.6 lakh. In the case of a Tri-Partite Agreement (TPA) among borrowers, milk unions, & banks, the collateral-free loan can go up to ₹3 lakh.[25] As of March 31, 2024, 3.49 lakh KCC and 34.5 lakh KCC were issued to fisheries and animal husbandry activities, respectively. In addition, Joint Liability Groups (JLGs)[26] have emerged as an essential source of credit for tenant farmers. JLG accounts have grown at a compound annual growth rate (CAGR) of 43.76 per cent over the past five years, emerging as a vital source in meeting the credit needs of tenant farmers and marginalised segments.

21 Other projects refer to storage infrastructure that is cleaning, grading, sorting, packing, etc.
22 Situation Assessment Survey, NSO, NSS 77th round
23 NABARD National Financial Inclusion Survey 2.0
24 https://www.rbi.org.in/scripts/PublicationReportDetails.aspx?UrlPage=&ID=942
25 https://financialservices.gov.in/beta/en/agriculture-credit
26 Joint Liability Groups (JLGs) serve as informal associations comprising four to ten individuals united by the common goal of accessing bank loans through collective or individual endeavours under a shared guarantee.

9.15 Insurance schemes such as the Pradhan Mantri Fasal Bima Yojana (PMFBY) offer a safety net against crop losses due to natural calamities, pests, or diseases, ensuring financial stability for farmers. These schemes safeguard farmers' livelihoods and encourage them to adopt modern farming practices and technologies. PMFBY is the largest crop insurance scheme in the world in terms of farmer enrolment and is the third largest scheme in terms of insurance premiums. The scheme provides a simple and affordable crop insurance product to ensure comprehensive risk cover for crops to farmers against all non-preventable natural risks from pre-sowing to post-harvest. The overall insured area in 2023-24 reached 610 lakh ha compared to 500.2 lakh ha in 2022-23. A total of 5549.40 Lakh farmer applications were insured under the scheme since 2016-17, and ₹150589.10 Crore has been paid as claims. High premium costs compared to insurance claims, delays in settling claims, lack of transparency, and uniform premium rates that do not account for different conditions across states have impacted the performance of the scheme.[27] Another study also indicates that cumbersome procedure of paying premiums, lack of bank facilities near the village and poor awareness of the scheme among small and marginal farmers have limited the impact of the scheme.[28]

Chart IX.5: Water use per ton of food for major crops (2022) India and World Average



Source: FAOSTAT,WDI,UNESCO(for water)

27 Report on Crop feasibility study to recommend appropriate mechanisms for providing farmers with rational compensation on occurrence of crop looses and identifying vulnerable districts for risk coverage under Pradhan Mantri Fasal Bima Yojna (PMFBY) Department of Agriculture & Farmers Welfare, Ministry of Agriculture & Farmers Welfare. (2022).

28 A study on Evaluation of Mega Awareness Campaign of Pradhan Mantri Fasal Bima Yojana, (National Institute of Agriculture Extension Management (2023)

Box-IX.1: Recent technology interventions in PMFBY

- **Digi-Claim-Payment Module** – A new module has been launched to integrate the National Crop Insurance Programme (NCIP) with public financial management system (PFMS) end-to-end. Now, the government will have visibility of the quantum of eligible claims, claims paid by the Insurance Company and actual claims transferred to beneficiary farmers.
- **Yield Estimation Based on Technology (YES-Tech)** is a technology-based yield estimation mechanism developed after two years of rigorous testing and a pilot that runs across 100 country districts. Nine states, namely, Assam, Haryana, Rajasthan, Madhya Pradesh, Maharashtra, Andhra Pradesh, Tamil Nadu & Karnataka & Odisha, are implementing Yes-Tech from the Kharif 2023 season onwards.
- **Weather Information Network & Data System (WINDS)-** is a pioneering initiative to set up a network of Automatic Weather Stations & Rain Gauges at Taluk/ Block and Gram Panchayat (GP) levels for use of all farmer and farming-oriented services. It is proposed that an automatic rain gauge (ARG) would be installed at every GP and an automatic weather station (AWS) at every block covered under PMFBY.
- **Collection of Real-time Observations and Photographs of Crops (CROPIC)-** is an initiative that has been taken up to collect periodic photographs of crops during their life cycle. These photographs will validate sown and insured crops, assess crop damage when any localised and widespread calamity or climatic condition affects the crops, and act as an input for Technology-based yield estimation models.

Agriculture Marketing-Reaping prosperity

9.16 A comprehensive and diversified marketing network enables the farmer to bring the produce to the market most efficiently and timely. It reduces post-harvest losses, enhances competition, and allows price discovery. With the increase in marketable surplus, it has become all the more essential to provide the farming community with better marketing facilities. Delays in farmers accessing formal institutions, including for government procurement at the Agricultural Price Marketing Committee (APMC), enhance reliance on intermediaries[29].

9.17 The average area served by mandis in the country is 434.48 sq. km against the recommendation of the National Commission on Farmers (2006) of the market within a radius of 5 Km (corresponding market area of about 80 sq. km.). The physical constraints in transporting produce to mandis present another layer of difficulty, particularly for small and marginal farmers who may have to travel long distances[30].

9.18 To Promote efficiency in agriculture marketing, and improve price discovery, the government implemented the e-NAM Scheme. Under the e-NAM Scheme, the Government

29 The Standing Committee on Agriculture (2018-19): Agriculture Marketing and role of Weekly Gramin Haats, Sixty Second Report

30 Final Report of Committee of State Ministers, In-charge of Agriculture Marketing to Promote Reforms(2013)

provides free software and assistance of ₹75 Lakh per APMC mandi for related hardware, including quality assaying equipment and the creation of infrastructure for cleaning, grading, sorting, packaging, etc. As of 14th March 2024, more than 1.77 Crore farmers and 2.56 Lakh traders have been registered on the e-NAM portal. The Government of India launched the scheme to form and promote 10,000 FPOs in 2020 with a budget outlay of ₹6.86 Thousand Crore till 2027-28. As of 29 February 2024, 8,195 FPOs have registered under the new FPO scheme, and equity grants of ₹157.4 Crore were released to 3,325 FPOs. Credit guarantee cover worth ₹278.2 Crore was issued to 1,185 FPOs.

9.19 Studies have evaluated the performance and prospects of the e-NAM[31] and concluded that the initiative has generally had a positive impact on farmers by enabling higher price realisation for their crops, thus fulfilling one of its primary objectives. Farmers who participated in e-NAM reported receiving higher prices for their crops post-implementation. About 66 per cent of farmers from the surveyed states found the quality testing procedures transparent[32]. A significant proportion of farmers (82 per cent, 79 per cent, 64 per cent, and 89 per cent) in states like Gujarat, Haryana, Maharashtra, and Telangana, respectively, observed better pricing and reduced transaction costs. Overall, farmers expressed satisfaction with the e-NAM facilities, including cleaning, drying, weighing, assaying, bid management, and e-auction. Similarly, it is seen that 54 per cent of the farmers prefer transactions through the eNAM portal over traditional markets due to the multiple benefits derived through this portal[33]. Implementation challenges of e-NAM still exist, such as limited awareness, lack of trust and infrastructure issues related to setting up assaying facilities.

Box IX. 2: Futures market for agriculture commodities in India

The establishment of a forward market in commodities was driven by the recognition that while the production of agricultural products was largely seasonal and subject to various risks, consumption was not. The forward market serves as a mechanism that brings the prospects of future production and consumption to influence today's price in a logical manner. This process, among other things, establishes a link between present and future production and consumption cycles, thereby facilitating the inter-temporal smoothing of prices. This understanding of the forward market is crucial in comprehending the evolution and current state of the Indian agricultural commodity markets (Bhattacharya, 2007).

31 Nuthalapati, C. S. R. (2020). Institute of Economic Growth. Link to access. https://desagri.gov.in/wp-content/uploads/2024/04/2020-21-Electronic-National-Agricultural-Market-e-NAM-A-Review-of-Performance-and-Prospects.pdf
Shah, B et,al(2023). Electronic National Agriculture Market (e-NAM): A Review of the game changing Marketing Platform. Link to access https://www.researchgate.net/publication/374975907_Electronic_National_Agriculture_Market_e-NAM_A_Review_of_the_game_changing_Marketing_Platform
Performance Evaluation of e-National
Agriculture Market (2020) CCS National Institute of Agricultural Marketing: Link to access:https://ccsniam.gov.in/images/pdfs/Evaluation.pdf

32 Nuthalapati, C. S. R. (2020). Institute of Economic Growth. Link to access.https://desagri.gov.in/wp-content/uploads/2024/04/2020-21-Electronic-National-Agricultural-Market-e-NAM-A-Review-of-Performance-and-Prospects.pdf

33 https://ccsniam.gov.in/images/pdfs/Evaluation.pdf

Evolution: The Indian commodity derivatives market has a long history. India had around 300 commodity exchanges during the 1940s. Until 1952, trading in these exchanges was not regulated by a standard policy or a market regulator. After independence, the GoI formulated the Forward Contracts (Regulation) Act of 1952 and set up the Forward Market Commission (FMC) in 1953 as the regulator. In 1966, a comprehensive ban on futures trading was imposed to control price volatility. At different times, the GoI appointed different committees to look into the feasibility of reintroducing commodity derivatives trading.

Agriculture futures trade in India got a major revival in 2003 with the setting up of national exchanges such as the National Commodity and Derivative Exchange (NCDEX), Multi Commodity Exchange (MCX), and National Multi Commodity Exchange (NMCE). A significant development in the Indian commodity regulatory landscape happened in 2015 when the GoI repealed the Forward Contracts Regulation Act 1952 (FCRA), and Commodity derivatives markets were brought under the Securities Contracts (Regulations) Act (SCRA), 1956 with the Securities and Exchange Board of India (SEBI) taking over from the Forward Market Commission as the commodity market regulator in September 2015. In parallel, e-NAM were introduced by the GoI in 2016 to provide farmers with an electronic online marketplace for agricultural produce. Electronic spot markets for commodities are crucial in integrating localised physical markets, establishing a direct link between the buyer and seller and providing a transparent price discovery mechanism.

Current state of play: The commodity futures market can effectively contribute to price discovery only when many consumers, producers, traders, and aggregators use these markets to hedge their risk. The interplay of these participants, speculators, and arbitrageurs provides liquidity and helps price discovery for longer periods. However, given that most Indian farmers are marginal with fragmented land holdings, they are often left without the necessary wherewithal to engage/participate in these markets effectively, leading to reduced depth in the Indian commodity futures market. Further, it is also observed that the requirement of standardised exchange contracts with specified quality parameters and delivery requirements has also impeded the majority of Indian farmers from effectively engaging in the commodity futures market since the Indian farmers produce different varieties of commodities in widely varying qualities due to varied geographical, weather, and soil conditions. Additionally, periodic bans imposed by GoI on futures trading on agri-commodities as one of the measures to counter food inflation have also had implications on the traded value and price volume in Indian commodity and derivative exchanges.

The way forward: Studies point out that the Indian commodity market can be strengthened through a sequenced diversification of agri-future portfolio. As is highlighted in the 2008 Abhijit Sen Committee Report, "combining prudence with the benefit of the doubt, the best course of action would be to identify those commodities where there is the possibility of futures trading affecting expectations that may influence inflation in essential commodities and insulate these from futures." Sensitive commodities (e.g., common rice, wheat, most pulses, etc.) may be kept outside the ambit of the futures market until the markets are developed and the regulator has a higher degree of comfort in diversifying the portfolio. The agriculture futures market may focus on less sensitive commodities like oilseed complex (oilseeds, meals, and oils), feed (maise), cotton, basmati rice, spices, etc.

As part of recent policy initiatives to broaden the commodity derivatives market, the

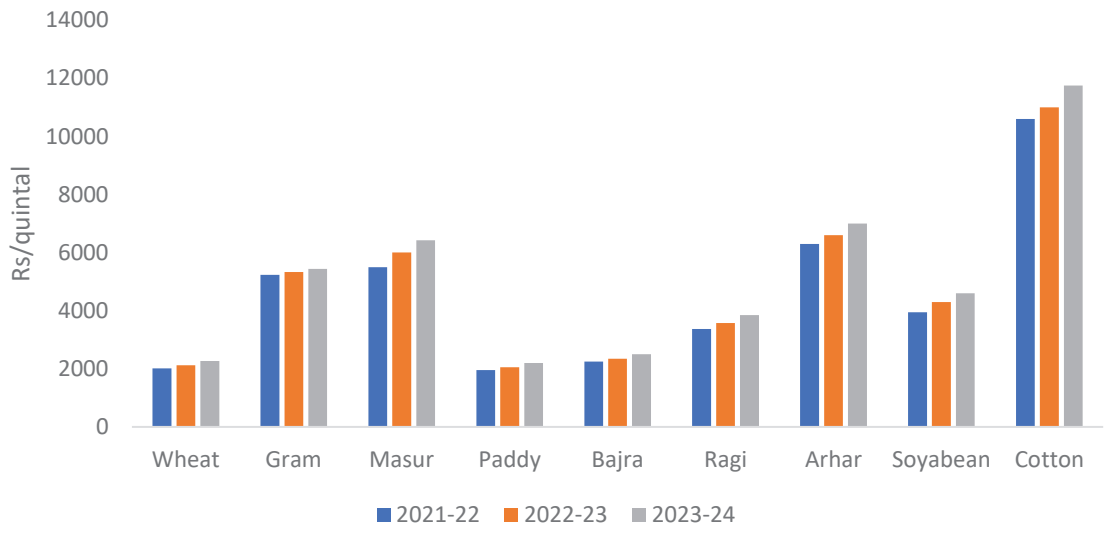
Government of India, on March 1, 2024, expanded the list of commodities eligible for derivatives trading from 91 to 104. The new commodities added to the list include Apples, Cashews, Garlic, Skimmed Milk Powder, White butter, Weather, Processed timber products, Processed bamboo products, etc.

Once the regulators provide clear direction regarding the choice of commodities, they must stay the course by adopting a stable policy with minimal interventions. Farmer Producer Organisations can play a significant role in effectively linking small and dispersed farmers in India and the Commodity markets eco-system. The role of Government, SEBI, and Commodity Exchanges in promoting FPOs in various segments of agri-commodities across the country is pivotal. Skilling and hand-holding the FPOs through financial literacy initiatives can go a long way in encouraging the farmers to benefit from the Agri-derivative markets. As the depth and liquidity in the agri-derivative market increases in the long -run, banning futures trading may no longer be required to stabilise prices unless there is data-backed evidence of futures trading driving up price volatility. The regulator should closely watch the futures market and undertake regular reviews given the fluctuations in domestic production, consumption, and global trade.

Assured Remunerative Prices and Other Income Support Measures

9.20 Agricultural price support assures farmers of remunerative returns and allows the Government to ensure a stable supply of staples at reasonable prices. Minimum Support Price is a factor farmers take into account when making sowing decisions. In India, the government has implemented price policies to encourage the production of food grains, pulses, oilseeds, and nutri-cereals. These policies are designed to provide a safety net to farmers by guaranteeing a minimum price for their produce, thus protecting them from the volatility of market prices. The Union Budget for 2018-19 announced that farmers in India would be given an MSP of at least one and a half times the cost of production. Accordingly, the Government has been increasing the MSP for all 22 Kharif, Rabi and other commercial crops with a margin of at least 50 per cent over the all-India weighted average cost of production since the agricultural year 2018-19.

Chart IX.6: MSP of major crops from 2021-22 to 2023-24



Source: Commission for Agricultural Costs & Prices (CACP)

9.21 Another initiative towards increasing farmers' income is PM-KISAN - a central sector scheme launched on 24 February 2019 to supplement the financial needs of land-holding farmers, subject to exclusions. Under the scheme, an economic benefit of ₹6000/- per year is transferred in three equal four-monthly instalments into the bank accounts of farmers' families across the country through Direct Benefit Transfer (DBT) mode. More than ₹3.24 lakh Crore has been released to more than 11 crore farmers as of 10 July 2024.

9.22 To provide social security to the most vulnerable farmer families, the Government implements Pradhan Mantri Kisan Maandhan Yojna (PMKMY). The scheme offers a monthly pension of ₹3,000 to the enrolled farmers on the attainment of 60 years of age, based on a nominal premium between ₹55 to ₹200 per month paid by the applicant (in the age group 18 to 40 years) subject to exclusion criteria. As per the Ministry of Agriculture, as of 07 July 2024, 23.41 lakh farmers have enrolled under the scheme.

Farm Mechanisation- Powering agriculture

9.23 Agricultural mechanisation covering simple hand tools to more complex machinery has become essential to modern agriculture and contributes towards productivity. Considering that most farmers in India are small and marginal, providing machinery through custom hiring can enhance the adoption of farm mechanisation among these farmers and in regions where mechanisation levels are currently low. The Sub Mission on Agricultural Mechanization (SMAM) provides assistance to the State Government for training and demonstration of agricultural machinery, setting up of Custom Hiring Centres (CHC) and assists farmers in procuring various farm machinery and equipment. The total funds allocated under SMAM from 2014-15 to 2023-24 was ₹7.26 Thousand Crore. In 2023-24, the allocation was ₹859.45 Crore. Further, Farm Machinery Banks promote access to high-tech machinery for small and marginal farm holdings and farm holdings under challenging areas with low levels of mechanisation. During the period 2014-15 to 2023-24, 25527 CHC were established under the scheme, and 607 CHC were set up in 2023-24.

Making Agriculture Sustainable

9.24 A growing challenge in agriculture pertains to sustainability issues like overexploitation, degradation of natural resources, and addressing the impact of climate change. The agricultural methods and inputs used have also had significant implications for sustainable agriculture. For example, increased use of fertiliser and chemicals, overexploitation, and unsustainable use of water resources have affected soil health and fertility. Variability in weather conditions and the relative predominance of rainfed agriculture also impact production and productivity. Sustainability in agriculture is highly relevant to securing the long-term productivity of land holdings, ensuring sufficient farm-based incomes and food security. With 11 of the 17 Sustainable Development Goals (SDGs) directly linked to agriculture, securing improvements in crop yields and ensuring income stability is vital for the country as it strives to achieve the Agenda 2030 goals.

9.25 The climate change impact assessment carried out by the government underscores the need for adaptation in the sector. In the absence of the adoption of adaptation measures, rainfed rice yields in India are projected to drop by 20 per cent in 2050 and 47 per cent in 2080 scenarios, while irrigated rice yields are projected to reduce by 3.5 per cent in 2050 and 5 per

cent in 2080 scenarios. Climate change is projected to reduce wheat yield by 19.3 per cent in 2050 and 40 per cent in 2080 scenarios[34].

9.26 National Mission for Sustainable Agriculture, a part of the National Action Plan on Climate Change (NAPCC), aims to evolve and implement strategies to make Indian agriculture more resilient to the changing climate. One of the most critical interventions in the face of changing climate is to ensure that farmland gets assured irrigation. In this context, Rainfed Area Development (RAD), implemented under the NMSA to enhance productivity and minimise risks associated with climatic variability, is germane. An amount of ₹1.74 Thousand Crore has been released & an area of 7.33 Lakh hectares has been covered under the RAD programme. Pradhan Mantri Krishi Sinchayee Yojana (PMKSY), consisting of two major components, the Accelerated Irrigation Benefit Programme (AIBP) and Har Khet Ko Pani (HKKP), promote the extension of areas under irrigation and water efficiency. Irrigation area coverage increased from 49.3 per cent of gross cropped area (GCA) in 2015-16 to 55 in 2020-21. Similarly, irrigation intensity (ratio of gross irrigated area to net irrigated area) recorded a rise of 10.3 percentage points, from 144.2 per cent in 2015-16 to around 154.5 per cent in 2021-22, while cropping intensity increased by 12.8 percentage points during this period[35]. A Micro Irrigation Fund (MIF) of an initial corpus ₹5 thousand Crore has also been created with NABARD to facilitate the States in mobilising the resources for expanding coverage of micro irrigation. Further, PDMC scheme also supports micro-level water harvesting, storage, management, etc. An area of 90.0 Lakh hectares has been covered under micro irrigation in the country under the PDMC from 2015-16 to 2023-24 as of 6th February 2024[36].

Box-IX.3: Policy led interventions to improve water management-National and International Experience[37]

Automation of Irrigation System: Narayanpur Left Bank Canal System (Karnataka)

The Narayanpur Left Bank Canal (NLBC) system in Karnataka was facing significant challenges such as inadequate water regulation, manual control of gates, and inequitable water distribution. To address these issues, the government implemented an automation system that included over 4,000 automated control and regulating gates, solar-powered integrated gates, and a master VSAT communication system. These interventions have optimised water use efficiency, improved equitable distribution, and enhanced overall agricultural productivity in the region.

Diversion-Based Irrigation System

In the hilly and undulating regions of Barwani and Khargone districts in Madhya Pradesh, the Aga Khan Rural Support Programme (AKRSP) has initiated the development of diversion-

34 https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1909206
35 CACP report on Kharif Price Policy 2024-25
36 ibid
37 Compendium of Best Practices in Water Management NITI Aayog(2023): Link to access; https://www.niti.gov.in/sites/default/files/2023-08/COMPENDIUM-OF-BEST-PRACTICES-IN-WATER-MANAGEMENT-3.0_Water-Resources-Vertical_2_8_23.pdf

based irrigation (DBI) systems. These systems use gravity flow to divert water from streams to agricultural fields. Since 2016, 13 DBI systems have been operationalised, bringing 111 hectares of land under irrigation and benefiting 93 farmers. The cost-effective nature of these systems, requiring approximately ₹300 per running meter, makes them a viable solution for enhancing irrigation coverage in hilly terrains.

Growing Tomatoes Without Soil Using Vertical Farming in Hydroponics

Vertical farming with hydroponics allows the cultivation of tomatoes without soil, offering numerous benefits such as space efficiency, reduced water usage, and year-round production. This method has been implemented in Port Augusta Farm, South Australia, which features a 4.5-hectare greenhouse powered by a 51,500 m^2 concentrated solar power plant. This plant includes 23,000 mirrors that direct sunlight to a 127-meter-high tower weighing 234 tons. The generated heat serves three purposes: maintaining optimal temperatures in 20 hectares of greenhouses, generating electricity via a turbine to power farm systems, and desalinating seawater drawn from the nearby Spencer Gulf. The farm produces one million liters of fresh water daily by desalinating seawater from 3 kilometers away. It grows 7,000 tonnes of tomatoes annually, which accounts for 15 per cent of Australia's total crop, on arid land. In addition, 180,000 tomatoes are grown hydroponically in stacks without soil, saving 2 million liters of diesel and reducing CO2 emissions by 15,000 tons compared to traditional farming methods.

This method entails growing plants in nutrient-rich water solutions customized to their specific requirements. Vertical hydroponic systems can be employed in urban areas, reducing the environmental impact of transportation and offering locally sourced fresh produce.

Temporary Flood Water Storage in Agricultural Areas in the Middle Tisza River Basin

In the Middle Tisza River Basin, temporary floodwater storage in agricultural areas is being used to reduce flood risks and provide extra irrigation. By storing excess floodwater in specific agricultural fields, the region can better control water levels, decreasing the risk of flooding downstream. This method not only safeguards infrastructure but also improves soil fertility by depositing nutrients from the floodwaters, leading to increased agricultural productivity.

These interventions demonstrate innovative water management and agricultural productivity approaches, addressing specific regional challenges with tailored solutions.

9.27 Another area of intervention is focused on reducing the use of chemical fertilisers in Indian agriculture. Even while the per-hectare usage of agricultural chemicals in India remains significantly lower than in most developed countries, its use of chemical fertilisers has increased over the years[38]. In fact, here it may be noted that the current subsidy structure has contributed to an increased application of urea, which has impacted the nutrient imbalance in the use of major plant nutrients, nitrogen-phosphorus-potassium (NPK), affecting the efficiency of fertiliser use, the quality of soil and output[39]and environment. Revising subsidy policies to support all

38 Chand, R., & Singh, J. (2023). From Green revolution to Amrit Kaal. National Institution for Transforming India. GoI.

39 https://www.epw.in/journal/2023/52/letters/nutrient-imbalance-india.html

major nutrients (N, P, K) can incentivise farmers to use a more balanced approach. While the composition is important, so is the quantity of application. With the view to building knowledge and capacity among farmers, demonstrations to administer precise fertiliser application were carried out with more than 1.79 Lakh drones across several states.

9.28 The PM Programme for Restoration, Awareness Generation, Nourishment, and Amelioration of Mother Earth (PM-PRANAM) initiative incentivises states to reduce chemical fertiliser use. It promotes sustainable methods such as the use of alternative fertilisers, viz. Nano Urea, Nano DAP, and organic fertiliser. Under the said scheme, 50 per cent of the fertiliser subsidy saved by a State/UT in a particular financial year by way of a reduction in consumption of chemical fertilisers (Urea, DAP, NPK, MOP) compared to the previous three years' average consumption, will be passed on to that State/UT as a grant. In addition to these initiatives, the Soil Health Card Scheme was introduced to optimise the usage of nutrients. The introduction of "Urea Gold", which is urea infused with sulphur to address sulphur deficiencies, has been another measure to improve the nutrient balance in the soil.

9.29 Organic and natural farming provides chemical-free fertiliser and pesticide-free food grains and other crops, improving soil health and reducing environmental pollution. About 68.05 Lakh ha was brought under organic farming by 2022-23. Sikkim became the first state in the world to become fully organic, and other states, including Tripura and Uttarakhand, have set similar targets. The Government has also been promoting organic farming by implementing two dedicated schemes, i.e., Paramparagat Krishi Vikas Yojana (PKVY) and Mission Organic Value Chain Development for North Eastern Region (MOVCDNER) since 2015 through cluster/ FPO formation. PKVY Scheme is being implemented in a cluster mode (with a minimum of 20 ha size). Financial assistance of ₹31,500 per ha for three years, out of which ₹15,000 is given as an incentive for organic inputs provided directly through DBT. Under PKVY, as of 2022-23, 48,144 clusters totalling 13.98 Lakh ha area and 24.22 Lakh farmers have been covered.

Box-IX.4: Flexible, farmer-friendly and ecologically sustainable fertiliser subsidy: A suggested way forward

The Lok Sabha Standing Committee on Chemicals & Fertilisers, in their Thirty-Ninth Report, titled 'Nano-Fertilisers for sustainable crop production and maintaining soil health', presented on March 29, 2023, underscored the urgency of the following issue: Fertiliser consumption in India is imbalanced, and Urea accounts for more than 82 per cent of the nitrogenous fertilisers applied to the majority of the crops. As a result, the Nitrogen, Phosphorus and Potassium (NPK) consumption ratio has widened from 4:3.2:1 in 2009-10 to 7:2.8:1 in 2019-20. This imbalance, leading to the deterioration in soil quality and health hazards, necessitates an immediate re-examination of urea subsidy management in agriculture while also considering the sustainability aspects in the long run.

The current design of fertiliser subsidy in India: Based on the recommended dose of nutrients (RDN) calculated by each state[40], the Government of India calculates the recommended dose of fertiliser (RDF) and allocates fertilisers to States for each season.

The States, in turn, sell the fertiliser to the farmers through dealers and primary agriculture

40 The RDN is calculated by each state based on crops grown and soil nutrient status.

cooperative societies using POS devices. Based on the quantity of fertilisers sold to farmers, the Department of Fertilisers pays fertiliser subsidies to the fertiliser companies. However, there are some critical issues with the current design. This includes the following:

- PoS devices at fertiliser outlets are not integrated with land record data
- Any person having an Aadhaar, whether a farmer or not, can buy any quantity of fertilisers
- No limit on the sale of fertiliser to one person or one family
- Adverse financial and ecological impacts such as diversion of subsidised fertiliser for non-agriculture purposes; overuse of fertilisers which adversely affect the soil health; shortage of fertiliser; waste of public resources and health hazards.

Using Agri Stack to improve the targeting of fertiliser subsidy: Agri Stack is the digital foundation set up by the government to make it easier to bring various stakeholders together to improve agriculture in India and enable better outcomes and results for the farmers by using data and digital services. It is now fairly well developed in the major Indian States and can provide the right tool through which the fertiliser subsidy may be better targeted. This will ensure that subsidised fertilisers are sold to only those identified as farmers or authorised by the farmer, and the quantity of subsidised fertiliser is fixed based on parameters such as land ownership and prominent crops of the district (comprising at least 70 per cent of sown area in a season). The parameters may be later refined based on crop grown and soil nutrient status (in convergence with the Soil Health card scheme and provisions may be made to provide top-up entitlement in case of crop damage or calamities caused by volatilities in weather conditions, in convergence with State diaster response fund (SDRF) / National diaster response fund (NDRF).

E-RUPI, a seamless one-time payment mechanism, can be utilised to provide the necessary subsidy to the farmer directly. This system ensures that the Subsidy can only be used through registered PoS devices at authorised fertiliser outlets. Suppose a farmer purchases a quantity of fertilisers that is less than their entitlement. In that case, the remaining subsidy can be used to purchase other agricultural inputs, such as seeds and pesticides, also sold at these outlets. Any unused subsidy at the end of the year can also be converted into a small savings instrument in the farmer's name at a post office. This system not only streamlines the subsidy distribution process but also prevents the misuse of subsidies for non-agricultural purposes. This will give an incentive to the farmer not to use excessive Urea on account of being cheaper than the other NPK fertiliser and may lead to balanced use of fertilisers as per the requirement of the crop & soil.

Some fundamental aspects that would be required to ensure the efficiency of the new mechanism will be as follows:

- Integration of PoS devices with farmer's registry in Agri Stack and the farmer's registry will include the Aadhaar number of each farmer, details of all agricultural lands owned by the farmer as per Record of Rights (RoR), and dynamic updation of land ownership data through mutation module
- Facility to include name, Aadhaar number and other details of family members and any other person authorised to buy subsidised fertilisers
- Facility to update bank details, mobile numbers and other details of farmers, family members, and authorised persons
- Crop sown registry based on digital crop survey to be integrated at a later stage

Way Forward

Fertiliser administration reforms have been carried out in other countries, wherein the fertiliser requirement has been based on standard norms. In India, as it involves a paradigm shift and fertiliser is a sensitive subject, it may be prudent to carry out pilots in one district of a few States, which have relatively robust and well-developed agri-stack systems. Based on the results of these pilots, the decision on the future mode of fertiliser subsidy administration may be made, considering all the relevant factors.

9.30 The government is implementing the Crop Residue Management Scheme from 2018-19 to support the efforts of the Punjab, Haryana, Uttar Pradesh and NCT of Delhi to address air pollution and subsidise machinery required to manage crop residue. Under the scheme, financial support is also given to take up large-scale demonstrations of the Bio-Decomposer on farmers' fields, a microbial consortium of fungal species that accelerates the in-situ decomposition of paddy straw. During the 2023 season, the bio-decomposer was used by the States in an area of around 7.00 lakh hectares. During the period from 2018-19 to 2023-24, the funds amounting to ₹ 3.34 Thousand Crore have been released to Punjab, Haryana, UP, NCT of Delhi and Implementing Agencies like the Indian Council for Agriculture Research(ICAR) etc. The states have established more than 40,000 CHCs of crop residue management machines, and more than 2.95 lakh crop residue management machines have been supplied to these CHCs and individual farmers in these states. Through these initiatives of the Government for in-situ and ex-situ management of paddy straw, the paddy stubble burning incidences in the States of Punjab, Haryana and Uttar Pradesh were lower by 24 per cent in the 2023 season as compared to the year before.

Box IX.5: Digital Agriculture: Path to digital revolution

India's agricultural sector is undergoing a significant transformation with the integration of digital technologies. The Digital Agriculture Mission 2021–2025 aims to modernise agriculture through advanced technologies like AI, remote sensing, drones, etc. Further, per the Budget Announcement for 2023-24, the government has taken various initiatives to build Digital Public Infrastructure (DPI) for agriculture as an open source, open standard and interoperable public good. DPI 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 growth of agri- tech industry and start-ups.

Agri Stack is one of the prominent DPIs with three foundational registries (databases) i.e. Farmers' Registry/Database, Geo-referenced village maps and the Crop Sown Registry/ Database, along with several Support Registries/Databases. The 3 foundational Registries will enable digitally authenticable Identities and non-repudiable digital assets for the farmer in the form of Farmer IDs, geo-tagged farm plots and Crop crop-sown data. The Krishi Decision Support System (Krishi-DSS) is another DPI, which aims to integrate and store in a standardized form relevant geospatial and non-geospatial data, such as remote-sensing data, weather data, soil data, crop signature library, reservoir data, groundwater data, and data pertaining to Government schemes.

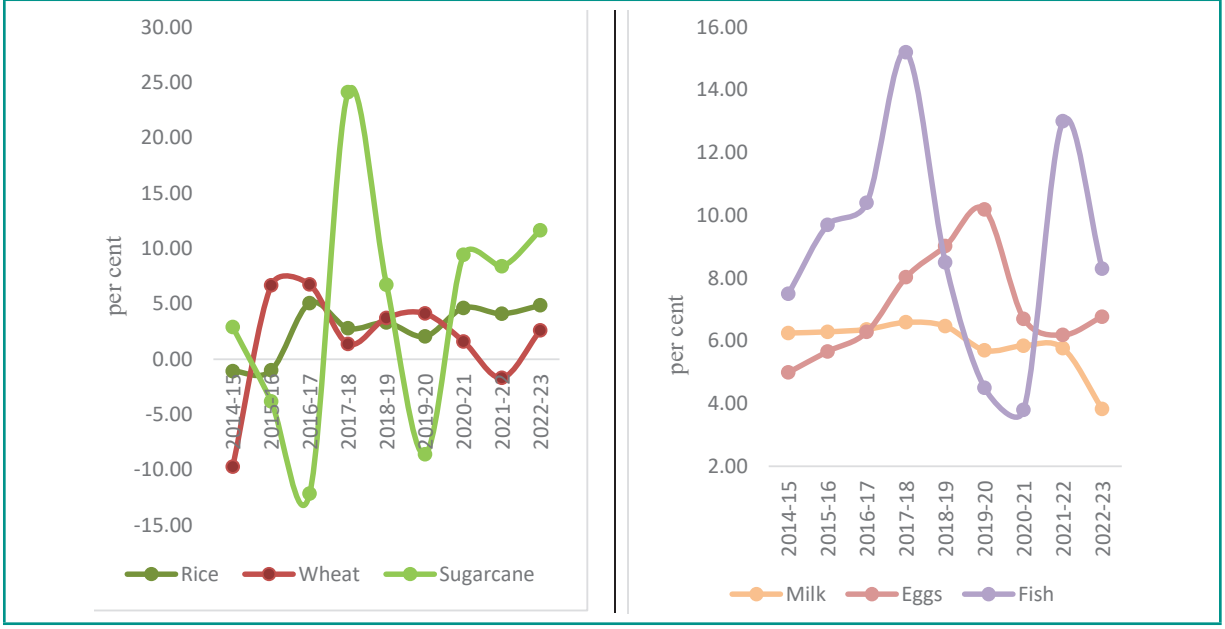
Further, other initiatives have been taken to strengthen the agriculture sector, such as (i) Krishi Mapper - a geospatial mobile application for all the land-based schemes, which enables geo-fencing (polygon creation / latitude-longitude) capture also incorporating Geo-tagged photographs from the current location of survey / inspection, (ii) Comprehensive Soil Fertility and Profile Mapping – for suitable soil health-related interventions, (iii) Digital General Crop Estimation Survey - accurately measure crop yields, through crop cutting experiments on randomly selected plots.

The push towards digital agriculture in India is supported by a robust ecosystem which visualises support of over 1,000 agri-tech startups in agriculture and allied sectors. As of 9 February, 2024, 554 agri-start-ups, including 387 women-led start-ups, are working in the agriculture & allied sector.

ALLIED SECTORS: ANIMAL HUSBANDRY, DAIRYING AND FISHERIES ARE SIGNIFICANT GROWTH DRIVERS

9.31 The allied sectors of Indian agriculture are steadily emerging as robust growth centres and promising sources for improving farm incomes. From 2014-15 to 2022-23, the livestock sector grew at an impressive Compound Annual Growth Rate (CAGR) of 7.38 per cent at constant prices. The contribution of livestock to the total GVA (at constant prices) in agriculture and allied sectors increased from 24.32 per cent in 2014-15 to 30.38 per cent in 2022-23. In 2022-23, the livestock sector contributed 4.66 per cent of the total GVA, significantly boosting the per capita availability of milk, eggs, and meat. The fisheries sector, a crucial contributor to the Indian economy, makes up about 6.72 per cent of the agricultural GVA and has grown at compound annual rate of 8.9 per cent between 2014-15 and 2022-23 (at constant prices). This "sunrise sector" supports approximately 30 million people, particularly marginalised and vulnerable communities.

Chart IX.7: Growth of cereals and poultry products



Source: Third Advance Estimate, Ministry of Agriculture and Department of Animal Husbandry and Department of Animal Husbandry & Dairying

9.32 Recognising the increasing relevance of the allied sector in agricultural growth and as a buoyant source of farm income, several government initiatives are being implemented to enhance productivity, ensure animal health, and facilitate infrastructure development. The interventions include a focus on improving animal health (Livestock Health and Disease Control Programme), nurturing entrepreneurship development and per-animal productivity (National Livestock Mission) and promoting FPOs and Self-Help Groups. The Animal Husbandry Infrastructure Development Fund (AHIDF) facilitates investments from individual entrepreneurs, private companies, FPOs, and Section 8 companies and Diary Cooperative (included by merging Dairy Processing and Infrastructure Development Fund in AHIDF) in key areas like dairy processing, meat processing, animal feed plants, and breed improvement technology. The government provides a 3 per cent interest subvention to the borrower and a credit guarantee of up to 25 per cent of total borrowing. As of May 2024, 408 projects have been sanctioned by the lending banks/ NABARD/NDDB worth ₹13.861 Crore, generating 40,000 direct employment opportunities and benefiting more than 42 lakh farmers.

9.33 In 2022-23, India achieved a record fish production of 17.54 million tons, ranking third globally and accounting for 8 per cent of global production. To bolster this sector, a comprehensive intervention has been developed in the form of Pradhan Mantri Matsya Sampada Yojana (PMMSY) with the objective to enhance seed and fish production and other extension services. To address the sector's infrastructure needs, the Fisheries and Aquaculture Infrastructure Development Fund (FIDF) was introduced in 2018-19 with a total fund size of ₹7.52 Thousand Crore. So far, 121 proposals have been recommended for ₹5.59 Thousand Crore as a concessional rate[41].

Cooperative Societies- Empowering farmers by strengthening communities

9.34 Cooperatives are vital in aggregating produce, enhancing bargaining power, and ensuring better market access to small and marginal farmers, thereby preventing exploitation by middlemen and traders. This was seen in the case of the dairy cooperative's movement, which focused on small rural producers (those with 1-2 hectares of land holding)[42]. There is a realisation that Primary Agriculture Credit Societies (PACS) can be useful vehicles for facilitating the convergence of various schemes intended for farmers' welfare, improving their effectiveness and reach through better participation of the small and marginal farmers in development programmes. The government approved a scheme in 2023 with the target of setting up PACS in the next five years in the Panchayats/Villages yet to be covered.

9.35 There has also been an increase in the number of single-state and multi-state cooperatives[43] (MSCs). As of March 2024, there are 8.03 lakh single-state and 1614 multistate cooperatives. Further, under the Multistate Cooperative Societies Act 2002, three new MSCs - National Cooperative Exports Limited (NCEL), Bhartiya Beej Sahakari Samiti Limited (BBSSL) and

41 Department of Fisheries
42 https://amul.com/m/a-note-on-the-achievements-of-the-dairy-cooperatives
43 Cooperative societies with objects confined to one State only are governed by the Cooperative laws of the respective State Government and the cooperative societies with objects confined to more than one State are governed by the central law, namely, the Multi-State Co-operative Societies.

National Cooperative Organics Limited (NCOL)-have been established at the national level. The new cooperatives seek to promote exports, facilitate access to improved seeds under a single brand name, and work toward the production, distribution, and marketing of certified and authentic organic products. The response to the setting of the three national-level cooperatives has been promising both in terms of the acceptance evident from applications received for membership and the permissions already received for the export of cereals to several countries. As of 31 March 2024, NCEL has received 7,318 applications for membership from 19 States & 03 UTs. It has so far got permission for exports of 15.02 LMT non-basmati white rice to 16 countries, 9.99 LMT broken rice to 07 countries, 50,000 MT sugar to two countries, and 14,184 MT wheat grain, 5326 MT wheat flour & 15.22 lakh MT maida/semolina to one country. As of 31 March 2024, BBSSL has received 16,775 applications for membership from 32 States/UTs. As of 31 March 2024, 5,154 applications for membership have been received from 26 States/UTs. NCOL has launched 11 products- arhar, chana, moong, kabuli chana, masoor, rajma, jaggery powder, sugar, besan, daliya, and jowar atta, under the Bharat Organics Brand.

Box IX.6: Initiatives to address scope and functioning of PACS

Several initiatives taken to improve the functioning and scope of work of the PACS include the following:

- With the view to improving efficiency, the PACS/Large Area Multipurpose Societies (LAMP) are being linked with the National Bank for Agriculture and Rural Development (NABARD) through a single National Software Network. So far, proposals for the computerisation of 67009 PACS have been sanctioned across 30 states/UTs, and ₹654 Crore to the States and ₹141 Crore to NABARD have been released.
- A grain storage programme, which will be the world's largest decentralised storage program, is planned in the cooperative sector to ensure food security and reduce wastage. Under this scheme, agricultural infrastructure, such as godowns, custom hiring centres, processing units, fair price shops, etc., are being created through the convergence of various existing schemes of the Government of India at the PACS level. The pilot project in 11 PACS of 11 States has been initiated while the construction of godowns in 500 additional PACS is approved.
- The scope of work of the PACS has been increased to allow them to function as common service centres for better access to e-services, provide LPG distributorship to increase employment opportunities and improve the financial strength of the PACS, to convert bulk consumer petrol pumps operated by PACS into retail outlets and to give priority for new petrol/diesel pump dealership.
- PACS will function as Janaushadhdi Kendra and Pradhan Mantri Kisan Samridihi Kendra, including as drone entrepreneurs. Further, PACS will be eligible as 'paani samiti' to undertake operations and maintenance work for the piped water supply and will be responsible for setting up decentralised solar power plants at the panchayat level.

9.36 In addition to the above, steps have also been taken to strengthen the governance of the cooperatives. The Multistate Cooperative Societies (Amendment) Act, 2023, which came into effect on 03 August 2023, seeks to enhance transparency and accountability and improve the election process in the multistate cooperative societies by supplementing existing legislation and incorporating the provisions of the 97th constitutional amendment that addresses several aspects such as the appointment of an ombudsman, introduction of concurrent audit, and stipulation of criteria of appointment of chief executive officer.

Chart IX.8: Number of single state and multi-state cooperatives registered by major states

Source: Ministry of Cooperation

Agriculture Research and Education: Pushing the frontiers of technology

9.37 Investment in agriculture research and support of enabling policies have contributed substantially to food security. It is estimated that for every rupee invested in agricultural research (including education), there is a payoff of ₹13.85. In 2022-23, ₹19.65 Thousand Crore was spent on agriculture research, equalling 0.43 per cent of the agricultural GVA.[44] There is a need to further strengthen research given the number of abiotic and biotic pressures the agriculture sector faces.

9.38 The Indian Council on Agricultural Research (ICAR), is the apex organisation in agriculture research in the country. It has worked in diverse areas of research covering crop and seed production, bio-fortified varieties of grains and oils, promotion of millets, animal production and health, agricultural mechanisation and post-harvest management, and fisheries. Farmers' outreach for agricultural technologies demonstration and skill upgradation are important aspects of the work carried out by ICAR. During 2022-23, 347 varieties/hybrids of 44 crops were released, and 99 varieties of horticultural crops were notified for commercial cultivation. In addition, 27 bio-fortified varieties of rice, wheat, maize, finger millet, mustard, soybean and

44 Department of Agriculture Research and Education (DARE)

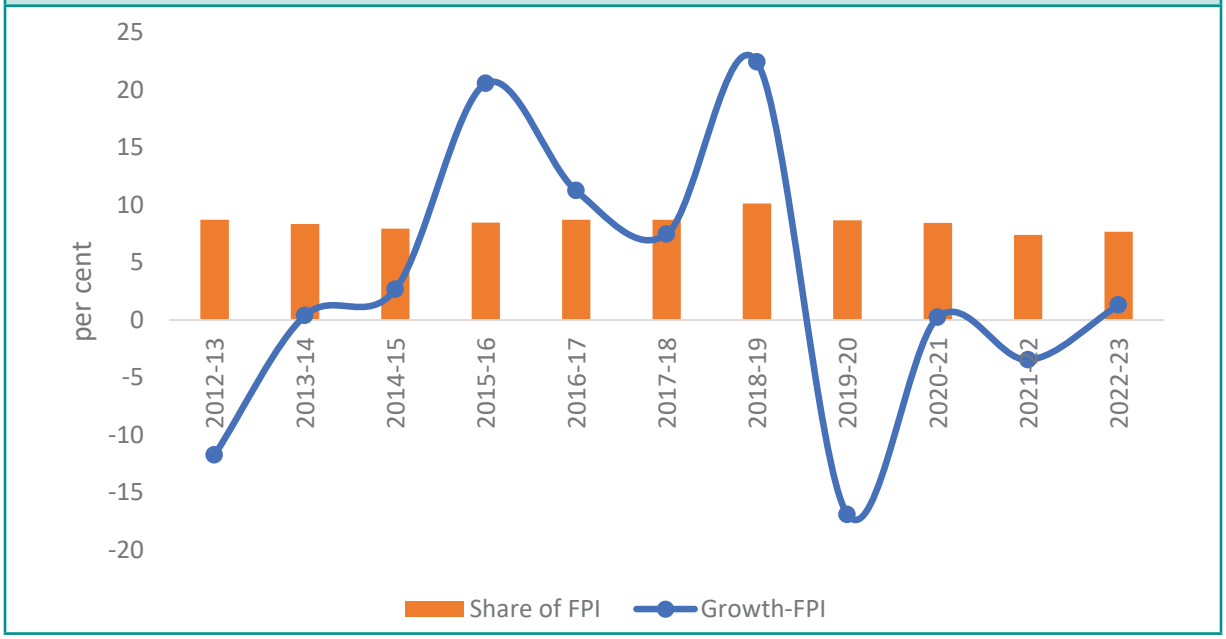
groundnut were released. Many of the rice varieties that India now exports to the rest of the world came out of research at the International Rice Research Institute. It is a reminder that agricultural research offers one of the highest returns on investment. Hence, reinforcing the agricultural research ecosystem with human and financial resources will continue to pay rich dividends to farmers and to the nation.

FOOD PROCESSING SECTOR (FPI): PROCESSING POTENTIAL

9.39 India is the largest producer of milk and the second largest producer of fruits, vegetables and sugar. The availability of reasonably priced agricultural inputs, the vast labour force, and continuously growing consumer demand provide the essential elements for a robust food processing industry. The sector also plays a vital role in reducing the wastage of perishable agricultural produce, enhancing the shelf life of food products, ensuring value addition to agricultural produce, and incentivises diversification & commercialisation of agriculture. True to that, the food processing industry in India is one of the largest employers in organised manufacturing, with a 12.02 per cent share in the total employment in the organised sector[45]. The value of agri-food exports, including processed food exports during 2022-23, was USD46.44 Billion, accounting for about 11.7 per cent of India's total exports. The share of processed food exports also increased from 14.9 per cent in 2017-18 to 23.4 per cent in 2022-23.

9.40 It is an important industry because it has strong linkages with the agriculture sector and can employ surplus workforce released from the agriculture sector. During the last eight years ending 2022-23, the food processing industries has been growing at an average annual growth rate (AAGR) of around 5.35 per cent at 2011-12 prices. Being labour-intensive, the pandemic adversely affected the sector and it is now recovering. GVA in the food processing sector has increased from ₹1.30 lakh Crore in 2013-14 to ₹1.92 lakh Crore in 2022-23. The sector constituted 7.66 per cent of GVA in Manufacturing in 2022-23 at 2011-12 prices.

Chart IX.9: Share of FPI in manufacturing GVA and growth of FPI in per cent



Source: MoFPI

45 Ministry of Food Processing(MoFPI)

9.41 The Government has taken several initiatives to improve the supply chain management from farm gates to retail outlets. The Production Linked Incentive Scheme for the Food Processing Industry (PLISFPI) supports the creation of global food manufacturing champions, branding and marketing abroad. It is expected to create off-farm employment and provide better prices for farm produce and higher income to farmers. Presently, 173 applications are covered under the PLI Scheme. The beneficiaries of the scheme have invested ₹7.69 Thousand Crore. An incentive amount to the tune of ₹1.07 Thousand Crore was released in FY 2021-22 and FY 2022-23.

9.42 The PM Formalization of Micro Food Processing Enterprises (PMFME) scheme with a total outlay of ₹10 Thousand Crore provides credit-linked subsidy and capacity building, including marketing and branding support. Convergence is being sought with the existing ecosystem to support and complement other schemes such as the National Rural Livelihood Mission, National Urban Livelihood Mission, One District One Product, AIF, and PMKSY implementation. All State/UTs have appointed a state nodal agency, constituted state level approval committee & district level committee for implementation of the scheme. Further, 2 national level technical institutes and 44 state level technical institutes in 36 States/ UTs have also been approved. Against the target of two lakhs, 3,53,608 applications were received, and a loan amount of ₹6.94 Thousand Crore to 86,342 applicants was sanctioned. 522 Master Trainers from 35 States/UTs and 1068 District Level Trainers from 26 States/UTs and 70,936 beneficiaries from 30 States/UTs have been trained.

9.43 The scheme for developing the Tomato, Onion and Potato (TOP) value chain was launched in 2018-19. The coverage of Operation Green has been expanded from 3 crops (tomato, onion & potato) to 22 perishables crops, which include 10 fruits, 11 vegetables (including TOP) and one marine, i.e. shrimp. The scheme's objectives include enhancing farmers' value realisation, reducing post-harvest losses, increasing food processing capacities, and adding value. The scheme has two-pronged strategies: Price Stabilization Measures (short-term measures) and Integrated Value Chain Development Projects (long-term). Under the short-term interventions of the scheme, there is a provision for a 50 per cent subsidy on the cost of transportation and storage for fruits & vegetables for evacuation of surplus production from production centres during the glut situation. For the long-term, grant-in-aid is provided in the range 35 per cent to 50 per cent for setting up food processing project for eligible crops in the identified production clusters in major producing states.

FOOD MANAGEMENT[46]: SOCIAL NET FOR FOOD SECURITY

9.44 The main objectives of food management are the procurement of foodgrains from farmers at remunerative prices, the distribution of foodgrains to consumers, particularly to the vulnerable sections of society, at affordable prices, and the maintenance of food buffer stocks for food security and price stability. The instruments used are procurement at MSP from farmers and Central Issue Price (CIP) for consumers. The nodal agency that undertakes the procurement, distribution, and storage of food grain is the Food Corporation of India (FCI).

46 Food Price Inflation is covered under Chapter 5- Prices and Inflation

For prudent management of foodgrain stock and for ensuring adequate availability of wheat and rice in the central pool, the Central Government implements a decentralized procurement scheme.

9.45 As of 24 May 2024, procurement of wheat during the Rabi Marketing Season(RMS) 2024-25 is going smoothly in the major procuring States nationwide, with 263.33 LMT of wheat already procured for the central pool, surpassing last year's total procurement of 262.02 LMT. A total of 22.42 lakh farmers have been benefitted during RMS 2024-25. Similarly, 489.20 LMT of rice was procured directly from 98.26 lakh farmers during the Kharif Marketing Season (KMS) 2023-24. With the above procurement quantity, the combined stock of wheat and rice in central pool has surpassed 600 LMT, which puts the country in a comfortable position to meet its requirements for food grains.

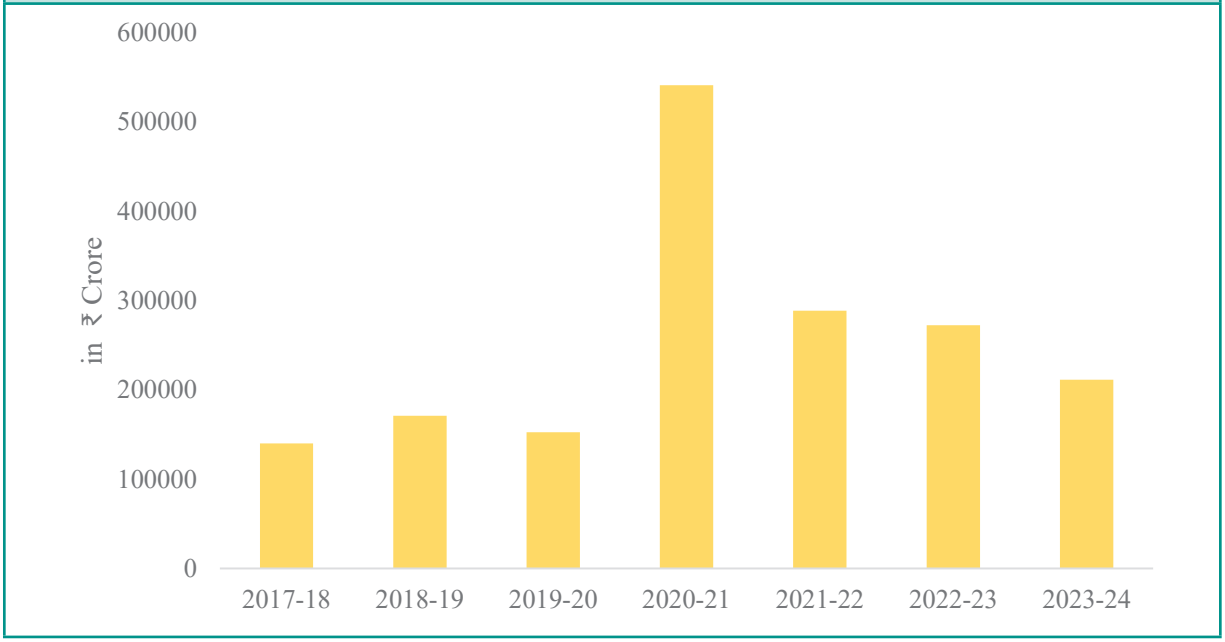
9.46 The distribution of food grains is undertaken primarily under the National Food Security Act, 2013 (NFSA) and other welfare schemes of the Government of India, including PMGKAY. The government has addressed the issue of food security at the household level for a long time through the public distribution system and the targeted public distribution system, as well as the enactment of the NFSA 2013. Further, the Government decided to continue to provide free food grains to about 81.35 crore beneficiaries (i.e., Antyodaya Anna Yojana (AAY) households and Priority Households (PHH) beneficiaries) under the PMGKAY for a further period of five years with effect from 01 January 2024, with an estimated total financial outlay of ₹11.80 lakh Crore to be borne by Central Government. The scheme provides a unified institutional mechanism with uniform prices and quantities across the country and removes difficulties for beneficiaries, especially migrants, under the One Nation One Ration Card (ONORC). Through this system, migrant beneficiaries can claim from any Fair Price Shop (FPS) of their choice, anywhere in the country, based on existing/same ration card in a seamless manner by using either their ration card or Aadhaar number after biometric/ Aadhaar authentication on ePoS device.

9.47 The procurement of foodgrains at MSP and distribution of foodgrains at less than economic cost have financial implications for the government. The economic cost[47] of both wheat and rice witnessed a significant increase during the last few years due to an increase in MSPs and a proportionate increase in the incidentals. The economic cost of rice and wheat for the year 2023-24(RE) is at ₹ 3931.34 per quintal and ₹ 2709.59 per quintal, respectively[48].

47 The economic cost of foodgrains consists of three components, namely, pooled cost of grains, procurement incidentals and the cost of distribution.

48 Based on FCI food bulletin data April, 2024

Chart: IX.10: Food subsidy released



Source: Department of Food and Public Distribution
Note:

- In addition to net subsidy released to FCI, Repayment of NSSF loan of ₹25,000 Crores in FY 2016-17, ₹ 40,000 Crore in FY 2017- 18, ₹70,000 Crore in FY 2018-19 & ₹44,l64.02 Crore in FY 2019-20 by FCI. ₹3,39,236 Cr for FY 2020-21 released from food subsidy has been adjusted for repayment of NSSF loan. Excludes ₹11,436 crore repaid to FCI from DCP States Head.
- The RE, 2019-20 was ₹33508.35 crore. The subsidy released includes ₹11,436 crore (as part of the NSSF loan), released from FCI to DCP States and returned to FCI in 2020-21.
- During FY 2023-24, ₹336.64 Crores were re-appropriated in favour of NESA Division for Central Assistance.

CONCLUSION

9.48 The performance of the agriculture sector remains critical for the economy's growth and has been growing at an average growth rate of 4.18 per cent over the last five years. The growing significance of allied sectors such as animal husbandry, dairying, and fisheries in enhancing farmers' income suggests that greater emphasis should be placed on tapping into the potential of these activities to boost farmers' incomes. Smallholder farmers' incomes cannot be increased by producing rice, wheat, or even millets, pulses and oilseeds. They need to move to high-value agriculture – fruits and vegetables, fisheries, poultry, dairy and buffalo meat. Once the incomes of smallholders increase, they will demand manufactured goods, spurring a manufacturing revolution. That is what happened in China between 1978 and 1984 when the real incomes of farmers doubled in just 6 years. India is well-placed to emulate this.

9.49 Promoting crop diversification towards oilseeds, pulses, and horticulture requires addressing critical issues such as investment in agri-infrastructure, credit accessibility and appropriate market institutions. MSP has incentivised crop diversification and there is evidence that MSP has a positive and statistically significant effect on retail prices of all crops, with a stronger effect for those crops where procurement is substantial, such as paddy and wheat.[49]

49 https://rbidocs.rbi.org.in/rdocs/AnnualReport/PDFs/0ANREPORT201718077745EC9A874DB-38C991F580ED14242.PDF

Efforts must be made to encourage production patterns and practices in various geographies that are consistent with their agro-climatic characteristics and natural resources. Research and development and promotion of digital technologies in agriculture, as well as improving the quality of seeds, including promoting organic and natural farming, can play a significant role in the realisation of sustainable agriculture practices that efficiently improve farm income and influence farmer behaviour.

9.50 Enhancing private sector investment in agriculture is vital to provide impetus to the agriculture sector. Investment in technology, production methods, marketing infrastructure, and reduction in post-harvest losses need to be scaled up. A greater focus on post-harvest infrastructure and the development of the food processing sector can reduce wastage/loss and increase the length of storage, ensuring better prices for the farmers. Productivity of the crop sector can also be enhanced through greater investment, including from the private sector.

9.51 E-NAM, promoting FPOs, and allowing cooperatives to participate in agri-marketing can improve the market infrastructure and allow better price discovery. Improving the market infrastructure by incentivising states can be explored. This can be done by creating an index to rank states, allowing the participation of cooperatives, and enabling remunerative returns to investors according to the functioning of their APMCs and other market institutions. Such a competitive framework can drive states to strive for improved agricultural marketing. It is also worth considering providing financial incentives for states to undertake necessary interventions to modernise agriculture marketing as recommended by the 15th Finance Commission.

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