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Indian Fertilizer Industry: Unique Contribution Of Cooperative Sector

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Abstract: For decades, farmers have been using biological or chemical fertilizers to enhance crop production and soil fertility. They also play a crucial role in meeting food requirement. To meet the demand for fertilizers, the fertilizer industry emerged in India. The Indian fertilizer industry, established in 1906, has consistently accelerated its growth over the years. Every nutrient requirement of the soil is either fulfilled domestically or imported to meet demands. This industry encompasses private, public, and cooperative sectors, each making significant and collaborative contributions to the agricultural and economic development of India.

This study primarily focused on the distinctive contribution of cooperative sector in conventional form of fertilizer and development of Nano fertilizer, which effectively alleviate logistical burdens.

Key words: *Fertilizer, Indian Fertilizer industry, Nano fertilizer, Cooperative sector, Public sector, Private sector*

I. INTRODUCTION

Agriculture is the foundation of the Indian economy. India is known for its greenery (Pathak et al., 2014). It is promoting green sustainable agriculture practices for global environmental benefit and conservation of critical biodiversity (PIB, 2023). India ranks second in farm output (Praveen et al., 2020). According to a report by The Hindu dated July 17, 2023, the agriculture and allied sector contributes 17.5 to 18 percent to the country's GDP. Agriculture depends mainly on the quality of seeds, irrigation, fertilizers, pesticides, and scientific farming techniques. Fertilizers provide additional nutrients to plants for better yield (Waghmode et al., 2020). By the year 2030, it is anticipated that the total demand for fertilizers will soar to 573.0 Lakh Metric Tonnes (LMT). Concurrently, there could be a notable increase in the consumption rate, potentially rising to 277 kg per hectare (Jadhav and Ramappa, 2021). Since chemical fertilizers adversely affect soil fertility, the use of bio fertilizers is being recommended by agricultural experts. The fertilizer industry comprises companies with an entire supply chain, spanning from production to sale, to deliver fertilizers to farmers in a safe, timely, and sustainable manner. The Indian Fertilizer Industry had its humble beginnings in 1906 when the first Single Super Phosphate manufacturing unit was established at Ranipet near Madras (now Chennai), with a capacity of 6000 MT/year. Subsequently, the Indian fertilizer industry underwent significant modifications in terms of quality, quantity, types, technology, and feedstock. This broad development propelled the fertilizer industry into the core sector, becoming the second-highest sector in terms of investment after the steel industry. Before independence, the sole major fertilizer complex established was by Fertilizers and Chemicals Travancore (FACT) at Udyogamandal, Kochi, Kerala, in 1943. It began production of Ammonium Sulphate with an installed capacity of 50,000 MT per year in 1947. Initially established as a private company promoted by M/s Seshasayee Brothers, FACT underwent a transformation into a Public Sector company in the 1960s, with the Government of

India becoming its major shareholder in 1962. Concurrently, the Fertilizer Company at Sindri was established in 1951. Prior to the establishment of Fertilizer Corporation of India Limited (FCIL), India primarily produced straight nitrogenous fertilizers such as Ammonium Sulphate (AS), Urea, Calcium Ammonium Nitrate (CAN), Ammonium Chloride, and Single Super Phosphate (SSP) (www.fao.org). In the year 1960-61, production of NP Complex fertilizers in various grades (ratios) began.

Major players of different sectors in Fertilizer Production

Public sector: FCIL (Fertilizer Corporation of India Limited) was incorporated on January 1, 1961, as the first state-owned Central Public Sector undertaking. It underwent reorganization, incorporating the National Fertilizer Corporation (NFC) into five companies: FCI, National Fertilizers Limited (NFL), Hindustan Fertilizer Corporation Limited (HFCL), Rashtriya Chemicals and Fertilizers Limited (RCF), and Projects and Development India Limited (PDIL). Presently, there are nine Central Public Sector undertakings in the country.

- a) FCI: Reorganized with units at Sindri (Jharkhand), Gorakhpur (Uttar Pradesh), Ramagundam (now in Telangana), and Talcher (Odisha), with a total annual capacity of 5.87 Million Metric tonnes (MMT) of Nitrogen. Units at Korba (Chhattisgarh) were abandoned.
- b) HFCL: Incorporated on March 14, 1978, with units at Barauni, Durgapur, Haldia (West Bengal), and Namrup (Assam).
- c) BVFCL: The Namrup unit of HFCL was hived off in 2002 to form a new entity, Brahmaputra Valley Fertilizer Cooperative Limited (BVFCL).
- d) RCF: Incorporated on March 6, 1978, with its unit at Trombay, including T01V and T-V expansion. The Thal Vaishet Fertilizer complex, 100km from Trombay, commenced operations in 1985.
- e) NFL: Incorporated on August 23, 1974, to set up nitrogenous fertilizer plants at Bhatinda (Punjab) and Panipat (Haryana) with LSHS as raw material, having a capacity of 5-11 LMT/annum. Due to the rescheduled FCI, its Nangal unit and expansion project were transferred to NFL. Gas-based plants have been commissioned at Vijaypur (Madhya Pradesh).
- f) PDIL: Registered as a separate entity in March 1978.
- g) FACT: Initially incorporated in 1943, it commissioned production of Ammonium Sulphate in 1947 at Udyoga Mandal near Cochin. In 1980, FACT converted into a PSU and diversified into allied fields.
- h) MFL: Incorporated in December 1966 as a joint venture between the Government of India (GOI) and AMOCO India Limited of USA (AMOCO). Later converted into an Indian PSU in 1985.
- i) FAGMIL: Incorporated on February 14, 2003, as a result of hiving off the Jodhpur Mining Organization (JMO) of FCI.
- j) HURL: Incorporated on June 15, 2016, as a joint venture company by Coal India Limited (CIL), NTPC (National Thermal Power Corporation), and IOCL (Indian Oil Corporation Limited) as lead promoters, with FCIL and HFCL as other partners. CIL, NTPC, and IOCL hold equity shares in an equal ratio, while FCIL and HFCL hold the remaining 11% share in the form of their unused assets, opportunity cost, and land on a lease basis at plant locations. This joint venture aims to revive sick units of FCIL and HFCL at Gorakhpur, Sindri, and Barauni, with complexes producing 2200 MTPD of Ammonia and 3850 MTPD of urea at each location. These units prioritize eco-friendliness and energy efficiency, using natural gas as a feedstock.

Cooperative sector: Pioneer visionary of cooperative sector concept in fertilizer industry materialized by (Late) Paul Pothan, the founder Managing Director of FEDO (FACT Engineering & Design Organization), IFFCO and KRIBHCO. He used to say "The cooperation is the only way of becoming self-reliant, independent and progressive" (kribhco.net)

The cooperative sector entered the fertilizer business during the Plan Holiday period (1966-69), coinciding with the operation of the Green Revolution (Sharma and Thaker, 2010). In the history of Indian fertilizers, the cooperative sector is represented primarily by Indian Farmers Fertilizer Cooperative Limited (IFFCO) and Krishak Bhartiya Cooperative Limited (KRIBHCO).

IFFCO was founded in 1967 with 57 member cooperative societies and has since grown to become one of the largest fertilizer manufacturers in the world. IFFCO currently holds a significant market share, contributing 29% to the complex fertilizer market and 19% to the urea market.

KRIBHCO, established as a multinational cooperative society, aimed to establish the first gas-based high-capacity fertilizer complex. This complex consists of two units of 1350 MTPD Ammonia and four units of 1100 MTPD Urea plants, with an annual installed capacity of 14.52 lakh metric tons (LMT) of Urea.

Additionally, IFFCO and KRIBHCO have a joint venture known as OMIFCO (Oman India Fertilizer Company) with Oman Oil Company SAOC (OQ). Cooperative sector contributes effectively in Urea, DAP, Complex fertilizer and Nano fertilizers.

Private sector: Contributes in the production of various types of fertilizers, including Urea, DAP, and complex fertilizers. Notably, it holds a monopoly in SSP production, with over 100 units across the country.

With more than 29 companies involved, the private sector contributes approximately 15% to the GDP through gross domestic capital formation. Among these companies are Coromandel International Limited (CFL), Chambal Fertilizers and Chemicals (CFC), Deepak Fertilizers and Petrochemicals Corporation Limited, Gujarat Narmada Valley Fertilizers & Chemicals Limited (GNFC), Gujarat State Fertilizers & Chemicals Limited (GSFC), Yara Fertilizers India Private Limited, Zuari Agro Chemicals Limited, Nagarjuna Fertilizers and Chemicals Limited (Nagarjuna), Paradip Phosphates Limited (PPL), and Southern Petrochemical Industries Corporation (SPIC).

II. OBJECTIVE

To assess and evaluate the contribution of Cooperative sector in Fertilizer industries.

III. DATA ANALYSIS

For this study, secondary data have been collected from the websites and annual reports of the Department of Fertilizer, IFFCO, and KRIBHCO. The commercial production of Nano Urea by various units was collected from the Press Information Bureau.

IV. DISCUSSION

Distribution of Fertilizer Production

While significant domestic production exists, India still faces a shortfall in meeting its national fertilizer requirements. Approximately 75% of urea, 40% of DAP, and 85% of NPKs are produced domestically, with the remainder being imported on behalf of the Government of India. Nevertheless, India stands as the world's second-largest consumer and third-largest producer of fertilizer (Sharma and Thaker, 2010). The total fertilizer production during the year 2022-23 (up to December 2023) amounted to 362.73 LMT, consisting of 210.98 LMT of urea, 31.80 LMT of DAP, and 76.50 LMT of NPK (Table 1).

Calculations reveal that the cooperative sector contributed 26.20% to urea, 63.65% to DAP, and 19.79% to complex fertilizer production during the year 2021-22 (Fig.1). These figures changed to 25.33% for urea, 73.71% for DAP, and 16.45% for complex fertilizer in the year 2022-23 (Fig.2). Overall, the cooperative sector's contribution to fertilizer production remained at 28.23%.

Nano Urea and DAP: Recently, the Government of India, under the Fertilizer Control Order 1985, notified the specifications of Nano Nitrogen. Nano fertilizers hold great promise for plant nourishment due to their size-dependent qualities, high surface volume ratio, and excellent optical properties. They provide high nutrient efficiency without any loss. Nano fertilizers are nutrients encapsulated or coated within nanomaterials to enable controlled release for slow diffusion into the soil. IFFCO Nano Urea, based on nanotechnology, provides nitrogen to plants, while Nano DAP serves as an efficient source of nitrogen (N) and phosphorus (P_2O_5) for all crops. Field trials on 94 crops conducted by ICAR and KVs recorded an 8% increase in crop yield due to the application of Nano Urea fertilizer. Historically, the production of Nano fertilizer in India was initiated by the global cooperative giant IFFCO at its Kalol Unit on August 1, 2021. By December 2022, IFFCO had produced 5 crore bottles of Nano Urea. National Fertilizers Limited (NFL) and Rashtriya Chemicals and Fertilizer Limited (RCF) have signed Non-disclosure Agreements (NDAs) and Memoranda of Understanding (MoUs) with the Indian Farmers Fertilizer Cooperative Limited (IFFCO) to transfer the technology of Nano Urea. This initiative aims to meet the proposed capacity of 44 crore

Nano Urea bottles per annum through 8 Urea plants by 2025, equivalent to 220 LMT of conventional Urea. The cooperative sector deserves full credit for Nano Urea production to date (Table 2).

According to a Press Information Bureau report dated April 26, 2023, a 500ml bottle of Nano Urea is equivalent to 45kg of conventional Urea. This significant innovation has led to a remarkable reduction in Urea imports. Furthermore, IFFCO has achieved success in producing liquid DAP, containing 8% Nitrogen and 16% Phosphorus. The commercial production of Liquid DAP was inaugurated in April 2023 by Union Minister Amit Shah in New Delhi. This achievement adds another feather to the Cooperative Cap of Success.

V. CONCLUSION

The fertilizer industry plays a vital role in India's agricultural sector, contributing significantly to the nation's self-sufficiency in food production and economic growth. Among all sectors, the cooperative sector stands out for its notable contributions, accounting for 28% of urea production and 18% of complex fertilizer production, as well as playing a key role in marketing and importing raw materials through overseas joint ventures. The production of Nano Fertilizers (Nano Urea and Nano DAP) for the first time in the world by the global cooperative giant IFFCO signifies the excellence of the cooperative sector. This pioneer achievement creates a historic footprint in the nation's agricultural revolution.

Figures and Tables

Table 1: Sector wise production of major fertilizer (in lmt)

S. No.	Sector	2021-2022			2022-2023		
		Urea	DAP	Complex fertilizer	Urea	DAP	Complex fertilizer (up to December, 2022)
1.	Public sector	63.84	-	14.23	51.07	-	10.99
2.	Cooperative sector	65.68	26.87	16.48	53.45	23.44	11.64
3.	Private sector	121.19	15.34	52.56	106.46	8.36	48.15
	Total	250.71	42.21	83.27	25.33	31.80	70.77
	Percentage Contribution of Cooperative sector	26.20	63.65	19.79	25.33	73.71	16.45

(Source: Annual report 2022-2023 of Department of Fertilizer)

Table 2: Commercial production of Nano Urea by various units

Location	Production Bottles/Year (in Crore)	Commercial Production
IFFCO Kalol, Gujarat	5.0	August 2021
IFFCO Phulpur & Aonla, UP	6.0	January 2023
IFFCO Bengaluru, Karnataka	6.0	March 2024
RCF Trombay, Maharashtra	5.0	March 2024
NFL Nangal, Punjab	5.0	July 2024
IFFCO Deoghar, Jharkhand	6.0	November 2024
IFFCO Assam	5.0	November 2025
Total capacity by 2025	44.0 Crore Bottles Per Year	

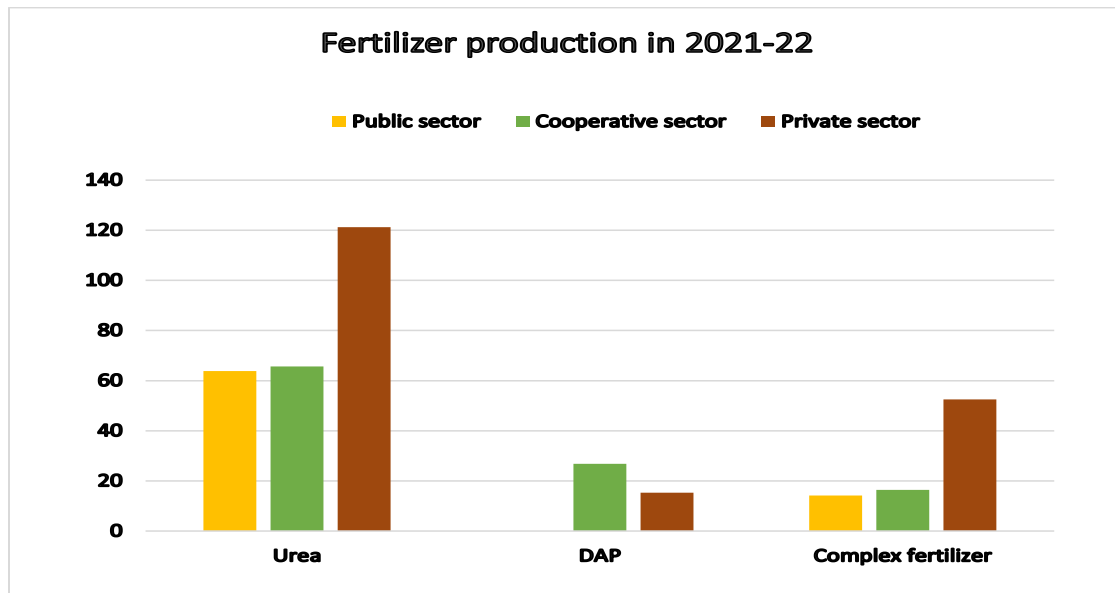


Figure1: Production of Urea, DAP& Complex Fertilizer in FY 2021-22

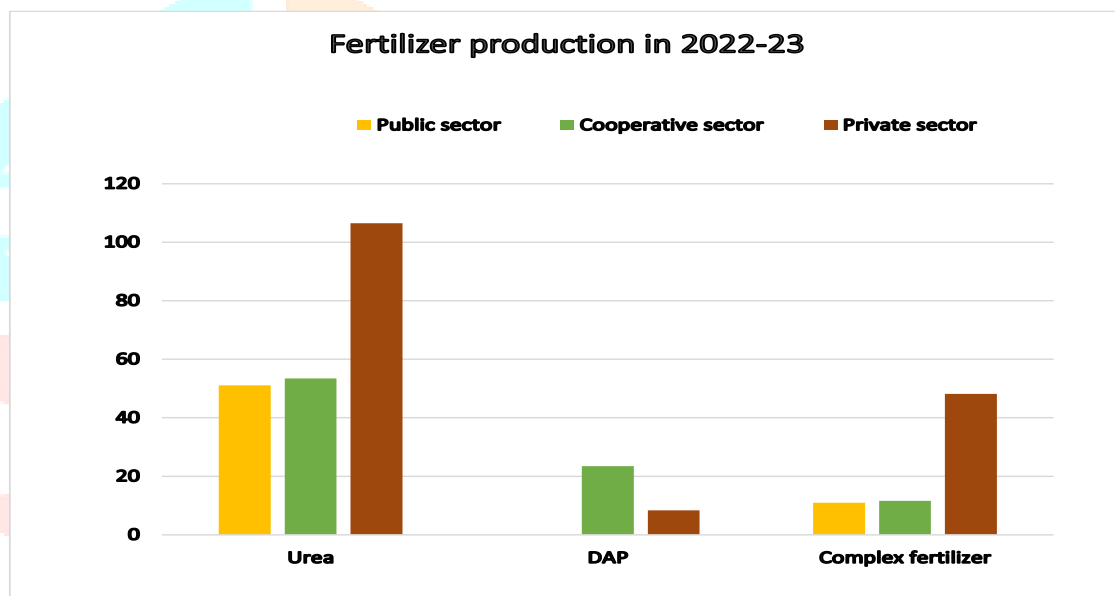


Figure2: Production of Urea, DAP& Complex Fertilizer in FY 2022-23

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