

To Identify the Potential of Fertilizer Industry in India

Anupam Singh¹, Anmol Negi^{2*}, Riya Thakur³, Anshumant Sharma¹, Harshit Doda¹ and Sahil Alohia¹

¹Department of Business Management, Dr. Y.S. Parmar University of Horticulture and Forestry, Nauni, Solan (Himachal Pradesh), India.

²Department of Tree Improvement and Genetic Resources, Dr. Y.S. Parmar University of Horticulture and Forestry, Nauni, Solan (Himachal Pradesh), India.

³Department of Social Sciences, Dr. Y.S. Parmar University of Horticulture and Forestry, Nauni, Solan (Himachal Pradesh), India.

(Corresponding author: Anmol Negi*)

(Received 11 September 2022, Accepted 07 November, 2022)

(Published by Research Trend, Website: www.researchtrend.net)

ABSTRACT: Humanity's three basic requirements are for food, clothing, and shelter. The Indian Constitution addresses all three of these fundamental human requirements. Sadly, despite 68 years of independence, the food crisis has not been resolved. It has increased future demand for the food industry significantly. While more efficient farming methods have made it possible to boost agricultural yields, this has come at the expense of soil fertility. In this sense, using fertilizers has proven a workable approach to maintain the soil's nutritional level and boost soil fertility. The fertilizer industry is doing a great job of assisting farmers in raising overall output. The current paper provides a review of earlier marketing research for fertilizers, both domestically and internationally. The essay aims to give readers a comprehensive understanding of the Indian fertilizer industry. There have been attempts to analyze topics including demand and supply positions, consumption trends, and the growth factor of fertilizer in India using secondary data.

Keywords: Agriculture, Soil fertility, Fertilizer Industry, Growth, Data.

INTRODUCTION

The foundation of the Indian economy is agriculture. Meeting the needs of the nation's over a billion citizens has become more crucial. The goal of the "green revolution" is to make the nation completely self-sufficient in this area. Thus, the need for fertilizer has long been felt to boost the yield of food grains. Marketers in the private, public, and cooperative sectors are setting the standard for ensuring that the right consumers have access to the right products at the right location and time of need. When compared to organic methods, the usage of fertilizers speeds up the production of food grains. Instead of getting into a scholarly debate about whether fertilizer-based farming or organic farming is better, it's important to remember that a large portion of the population finds food to be extremely scarce. As a result, fertilizer production is crucial for feeding more than 50 per cent of our population. Therefore, fertilizer assumes a significant role in feeding the 1.3 billion-person country. Consequently, given the importance of fertilizers in the production of food grains, improving sector efficiency becomes a crucial concern because it can significantly lower the level of hunger in the population. Proper

input use can, like in any other manufacturing sector, significantly affect the growth or efficiency of output. When it comes to the home situation, a combination of public and private sector businesses produces fertilizers. There are approximately 68 large, 72 medium and 8 small fertilizer units in India, according to the Centre for Monitoring of Indian Economy (CMIE) Report 2012–2013. Among the big units, there are 3 cooperative entrepreneurs, 18 public entrepreneurs, and 47 private entrepreneurs running the plants. Even though there are only 18 public firms, they nonetheless account for the majority of production in this sector. The proportions of output, consumption, savings, market allocation, and other characteristics vary for each and every firm. Therefore, it is crucial to analyze all fertilizer firm categories and choose the most effective fertilizer firms from them in order to understand the finest outcome. The sector as a whole will gain if we are able to identify the most effective firms, inspiring other businesses to adopt the best practices. Additionally, more effective fertilizer production can aid in cutting the overall subsidy bill (assuming that less subsidy will be needed if the sector becomes more efficient). According to the Report of

Government on Subsidies, IOSR, 2015, our nation currently spends roughly 0.5 percent of its total GDP on fertilizer subsidies. By increasing sector efficiency, the country may undoubtedly lower its subsidy burden. Fertilizers are inorganic or organic compounds that enrich the soil with nutrients to promote the growth of plants, such as trees and crops. Certain quantities of these nutrients are reduced during each crop year and need to be restored in the soil to preserve fertility and guarantee continuing, healthy future crops. because the most crucial source of plant nutrients is fertilizer. In order to achieve economic and environmental efficiency, farmers will be able to give the plant nutrients at almost optimal levels through the careful selection of chemical fertilizers. The country currently needs to produce more food grains, which can only be done with the help of sound policy efforts and planning. Fertilizers must be made accessible to farmers at reasonable prices in order to encourage balanced nutrient application and sustained agricultural growth. The growth of the fertilizer sector is crucial for raising agricultural output. Despite the significance of the topic, little research has been done on it up to this point. The purpose of this study is to address the problems associated with farmers' use of chemical fertilizers in important crops in an effort to close the aforementioned gap. The foundation of the Indian economy is agriculture. Meeting the needs of the nation's over a billion citizens has become more crucial. The goal of the "green revolution" is to make the nation completely self-sufficient in this area. More than 65 per cent of Indians depend on agriculture and related industries either directly or indirectly. For farmers, "our Indian country is a dream land," and it provides food for more

than 1.2 billion people. It is crucial to enrich it with high-quality fertilizers in regulated quantities. The goal of the current study is to investigate the elements that affect how fertilizer is applied by farmers to different crops. The study primarily focuses on analyzing the variables affecting farmers' use of chemical fertilizers on crops.

Overview of Fertilizer Industry in India. India is prominent country from agricultural point of view. India is agricultural economy where 80 per cent of the people depend on agriculture. In other hand India is the second most populous country in the world. It has been projected to be the world's most populous country by 2025 surpassing china. To feed the population there is need to increase food grain production. To increase agricultural production and diversify the agricultural base, the government focuses on irrigation, adoption of new agricultural technologies, credit facilities to farmers and the use of various agriculture input like better quality seeds, efficient and balanced use of fertilizers and insecticides. Fertilizer is one of the main agriculture input for increasing food grain production. It strengthens the soil and enhances its fertility.

The productivity of agricultural land has to be necessarily improved with increased use of agricultural inputs like quality seeds, fertilizers, water, agro-chemicals etc., for better crop yields. Among the different agricultural inputs and practices required for good production, the use of the fertilizers together with quality seeds and water are the most important. Fertilizers provide plants with the food they need for their growth and development. Table 1 below elucidates the types of fertilizers produced in India (Ministry of chemicals and fertilizers, GOI, 2012-14).

Table 1: Types of fertilizers produced in India.

Type of fertilizers	Grade
Straight Nitrogenous	
Ammonium Sulphate (AS)	20.6% N
Calcium Ammonium Nitrate (CAN)	25% N
Ammonium Chloride	25% N
Urea	46% N
Straight Phosphate	
Single Super Phosphate (SSP)	16% P ₂ O ₅
Triple Super Phosphate (TSP)	46% P O
NP/NPK Complex Fertilizers	
Urea Ammonium Phosphate	24-24-0
	28-28-0
	14-35-14
Ammonium Phosphate Sulphate	16-20-0
	20-20-0
Diammonium Phosphate (DAP)	18-46-0
Mono Ammonium Phosphate (MAP)	11-52-0
Nitro Phosphate	20-20-0
	23-23-0
Nitro Phosphate with Potash	15-15-15
	17-17-17
NP/NPKs	14-28-14
	19-19-19
	10-26-26
	12-32-16

Source: Department of Fertilizers, ministry of chemicals and fertilizers government of India (2012-14)

Table 1 clearly shows that the fertilizers comprise nitrogen (N), phosphorous (P), and potassium (K), the three essential nutrients for agriculture (K). The main sources of nitrogen are fertilizers that are nitrogenous, like urea (46% N) or fertilizers that contain ammonia, such as ammonium sulphate (20.6% N). In addition, complex fertilizers that incorporate all three plant nutrients also contain additional amounts of nitrogen (NPK). Straight phosphate fertilizers, like single super phosphate (16% P_2O_5), are available as well as phosphate that is included in a complex fertilizer. Potassic fertilizer is available as a simple NPK fertilizer component or as a straight potassic fertilizer such as muriate of potash (60 K_2O) or sulphate of potash (50% K_2O).

Indian Fertilizer Market: Drivers

- Food demand is anticipated to increase significantly over the following five years, driven by the nation's population growth. On the other hand, it is anticipated that the amount of arable land will decrease as urbanisation levels rise.
- Despite great historical growth, fertilizer usage in India remains highly skewed, and we anticipate fertilizers to play a significant role in raising average crop yields per hectare. There are currently a few Indian states where the penetration of fertilizers is still very low. There is a tonne of room for expansion in the future.
- Many government and non-government awareness programmes are anticipated to inform farmers about the advantages of fertilizers. The consumption of fertilizers is also expected to rise in the upcoming years due to advertising of fertilizers on television, radio, and in-depth rural workshops.
- Rising rural incomes and easy access to credit are also likely to have a positive effect on the nation's fertilizer usage.
- Contract farming, where the food processor (contractor) is expected to provide inputs in the form of technology and training to the farmer, is also anticipated to have a positive impact on fertilizer usage.

Market Overview. The Indian Fertilizers Market is expected to witness a Compound annual growth rate (CAGR) of 11.9 per cent during the forecast period 2019-2024.

- With a yearly consumption of around 55 million metric tonnes, India is the second-largest user of fertilizers in the world. As a source of nitrogen, urea is one of the most commonly used fertilizers in India among the many different types. As of March 2018, the nation consumed 29 million tonnes of urea. The second most popular fertilizer in the nation is DAP.
- According to the Department of Fertilizers, DAP output in 2017 was 14.6 million metric tonnes, up 1.36

percent from the previous year, and overall urea production in India was 20.7 million metric tonnes.

Growth of fertilizer industry

- In reality, 414.41 LMT of fertilizers were produced in the 2016–17 fiscal year. The total estimated production of fertilizers for the 2017–18 fiscal year is anticipated to be 462.20 LMT, an increase of more than 11% from the prior year. The country's quick increase in fertilizer output has been made possible by supportive legislative conditions that encourage investments in the public, cooperative, and private sectors.
- To encourage new investment in the urea sector and to make India self-sufficient in the urea sector, the government released the New Investment Policy (NIP)-2012 on January 2, 2013, and its revision on October 7, 2014. A CBM-based Greenfield Ammonia Urea Complex with an Installed Capacity of 1.3 MMT Per Annum has been built at Panagarh, West Bengal by Matrix Fertilizers & Chemicals Limited (Matrix) in accordance with the aforementioned policy. As of October 1, 2017, Matrix is being produced for sale.
- In the country, 33 large-scale urea facilities will be operating in 2022; of those, 21 will generate DAP and complex fertilizers, and 2 will create ammonium sulphate as a by-product.

MATERIAL AND METHODS

Current study was carried out during 2018-2020 in the Department of Business Management, Dr. Y. S. Parmar University of Horticulture and Forestry, Nauni, Solan, Himachal Pradesh. Research design used for the study was "Descriptive and Exploratory". For conducting the study, secondary data's have been used. The study uses secondary data from published and unpublished sources such as journals, seminars, proceedings, newspaper, magazines etc. Tables and graphs were used to illustrate the data. Meaningful comparisons were drawn wherever required to interpret the same.

RESULTS AND DISCUSSIONS

Production of Major Fertilizers. A total of 242.01 LMT of urea and 123.31 LMT each of DAP and complex fertilizers were produced in the 2016–17 fiscal year. The expected production of DAP and Complex fertilizers would be 140.74 LMT, which would represent an increase of around 14% from the previous year, while the estimated production of urea would be 242.51 LMT, which is higher than the previous year (Annual Report: 2016-17 & 2017-18).

The table 2 lists the estimated production for 2017–18 as well as the sector-specific 2016–17 production of urea, DAP and complex fertilizers.

Table 2: Production of Major Fertilizers.

Sr. No.	Sector	2016-17			2017-18 (Estimated)		
		Urea	DAP	Complex fertilizers	Urea	DAP	Complex fertilizers
1.	Public Sector	71.41	-	11.72	69.71	-	13.10
2.	Cooperative Sector	66.81	17.87	23.50	64.00	19.84	20.62
3.	Private Sector	103.79	25.78	44.44	108.80	30.52	56.66
Total		242.01	43.65	79.66	242.51	50.36	90.38

(Fig. in LMT)

Consumption trend per nutrient

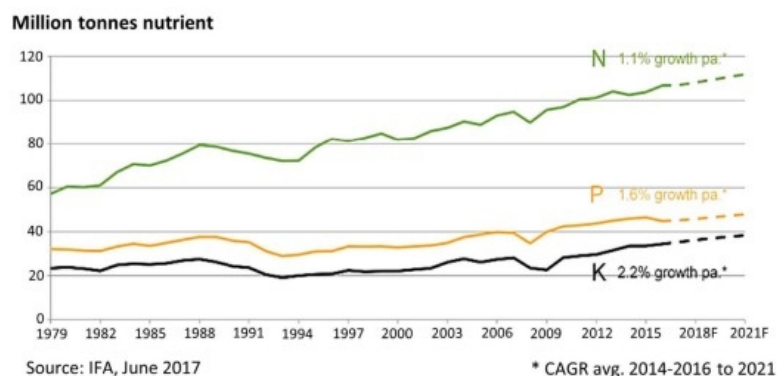
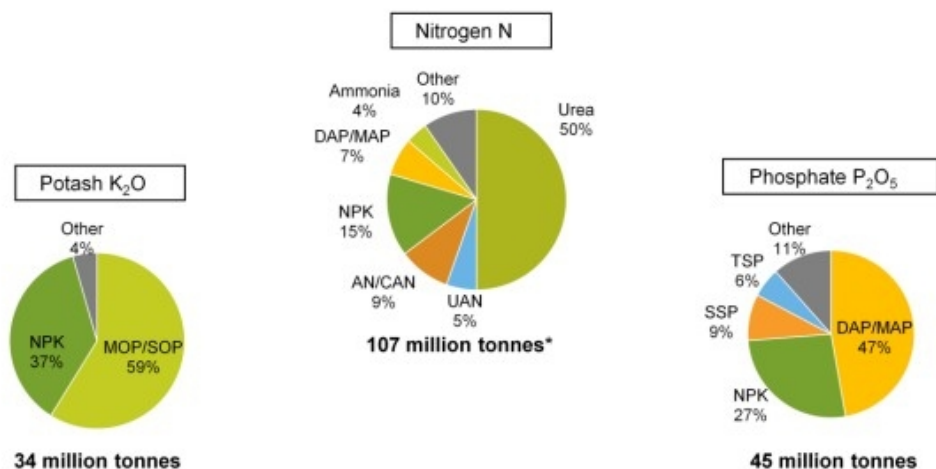


Fig. 1. Consumption trend per nutrient.

Fertilizer industry. The nutrient with the highest consumption has a predicted yearly growth rate of 1.1%, which is nitrogen. In comparison to 2015, nitrogen consumption climbed by 2.4%, phosphate demand increased by 4.5%, and potassium consumption increased by 2.5%. The average growth rates in consumption for the previous ten years (2006–16) were 1.4% for nitrogen, 1.24% for phosphate, and 2.3% for potassium (Fig. 1).

The International Fertilizer Association (IFA) predicts that from now until 2021, the demand for nitrogen fertilizer would increase by 1.1% annually. For phosphate and potassium, a growth rate of 1.6% and 2.2%, respectively, is predicted. Since urea makes up the majority of newly added N-capacity, a faster growth rate is anticipated for urea.

Key global fertilizer products



Source: IFA 2016 (nutrient totals) and 2015 (product split) * Does not include industrial nitrogen applications

Fig. 2. Key global fertilizer products.

Urea, DAP, and MOP are the principal phosphate, nitrogen, and potash products, respectively (Fig. 2). The main components for nitrogen, phosphorus, and potassium fertilizer are urea, DAP, and MOP, respectively. They trade significantly worldwide and have a sizable market share. Nitrogen is contained in urea to the extent of 46%, and urea demand is rising.

Urea makes up the majority of the world's new and pipelined nitrogen capacity. Di-ammonium phosphate (DAP) is composed of 18% nitrogen and 46% phosphate (measured in P_2O_5). Mono-ammonium phosphate (MAP) has a phosphate content of 46% and a nitrogen content of 11%. Potash, measured in K_2O , makes up 60% of potassium chloride (MOP).

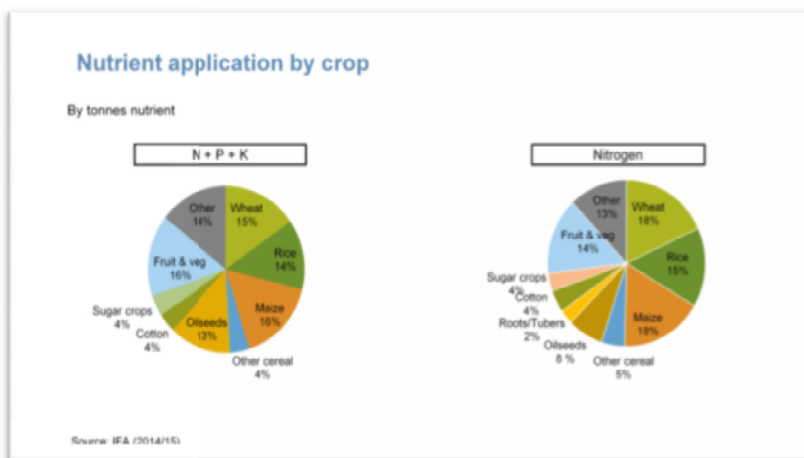


Fig. 3. Nutrient application by crop.

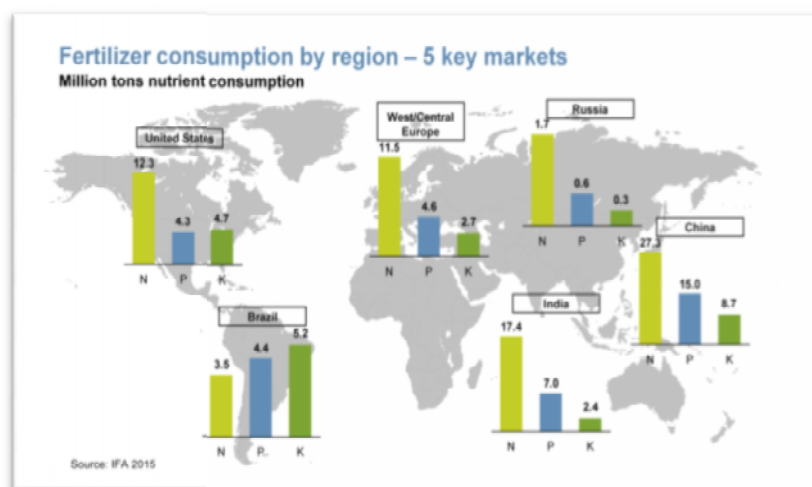


Fig. 4. Fertilizer consumption by region.

Approximately half of all fertilizer used worldwide is consumed by the three major grain crops: wheat, rice, and corn (maize) (Fig. 3). In addition to being a major market, the fertilizer sector is crucial to the production of food around the world. The main agricultural activity is grain production, with 2.61 billion tonnes of grain expected to be produced worldwide during the 2017 harvest (USDA). Without intensive farming and the use of mineral fertilizers, this level of production would not be conceivable. The main end-use market for fertilizers is grains, followed by cash crops such as fruits, vegetables, flowers, and vines. Both the grain market and the market for cash crops must be examined in order to fully comprehend the fertilizer industry.

Geographical variances in fertilizer application. The evolution of planted area and yields, the crop mix, crop pricing, fertilizer-to-crop price ratios, fertilizer subsidy regimes, nutrient management laws, nutrient recycling techniques, and innovation all have an impact on fertilizer consumption (Fig. 4). With over 60% of the total nutrient requirement, nitrogen is by far the most abundant. Fertilizers high in potassium and phosphate are typically used to raise crop quality. Since these two nutrients are absorbed and stored by the soil for a longer period of time than nitrogen, annual treatment is not always necessary. In order to keep yields and biomass stable, nitrogen must be applied annually. Brazil consumes a lot of phosphate and potash because it produces a lot of soybeans.

Nitrogen consumption in key regions

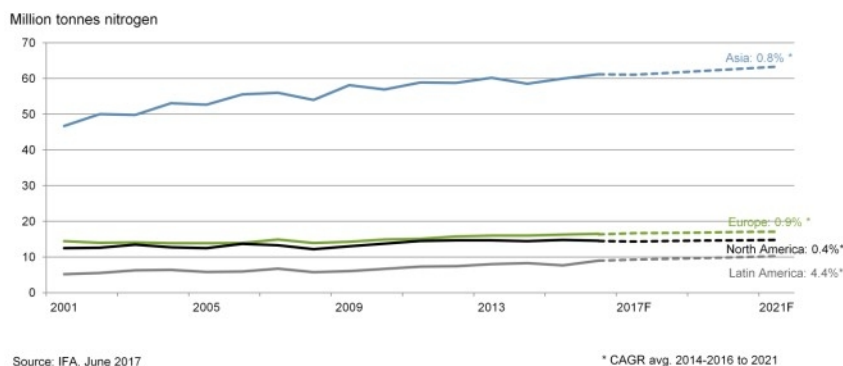


Fig. 5. Nitrogen consumption in key regions.

The largest fertilizer market is in Asia, while the fastest-growing region is Latin America. In 2016, Asia accounted for 60% of the world's nitrogen consumption, with China accounting for almost 50% of that proportion (Fig. 5). Going forward, sub-regions with recovering agriculture, like Eastern Europe and Central Asia, as well as those with significant potential to boost agricultural production, are anticipated to

experience the highest growth rates. Latin America fits into the latter category and, despite still making up a small portion of the total, is anticipated to continue to grow at the fastest rate. While consumption in China is anticipated to stagnate over the coming years, consumption in developed countries like North America and West Europe is predicted to expand at a slower rate.

The N industry is fragmented, while the P and K industries are more concentrated

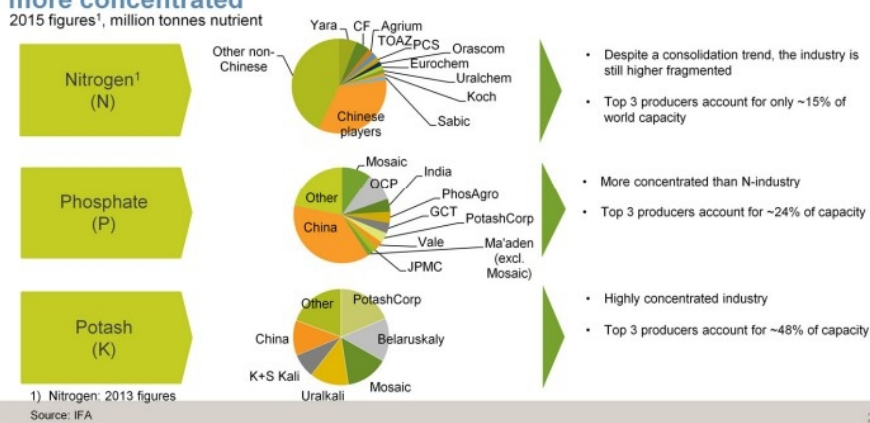


Fig. 6. Nitrogen industry.

Compared to the potash and phosphate markets, the nitrogen market is more fragmented. Because natural gas and air, two essential raw resources required for production, are widely available, nitrogen fertilizers are produced in a number of nations. As a result, there is less consolidation on the worldwide nitrogen market, although in some areas, like Europe and the US, there has been major restructuring and consolidation over the past ten years. Due to the limited availability of phosphate rock and potash mineral reserves throughout the world, there are fewer significant providers of phosphate and potash fertilizers. The fertilizer sector with the most consolidation is the potash sector (Fig. 6).

Geographical variances in nitrogen fertilizer product application. The use of nitrogen fertilizers varies greatly between different geographical areas and nations. In warmer areas, urea is the fastest-growing nitrogen product. While nitrates are primarily utilised in Europe, UAN is primarily used in North America. Ammonia is a source of nitrogen that is also utilised in agriculture in the US, particularly for fall applications (Fig. 7). Urea is widely used in China. Additionally, only China makes use of ammonium bicarbonate (ABC). Even though this product is increasingly being phased out, it still holds about 8% of the Chinese market. Due to its extensive soybean output, Brazil uses phosphate and potash relative to nitrogen.

Nitrogen fertilizer application by region and product

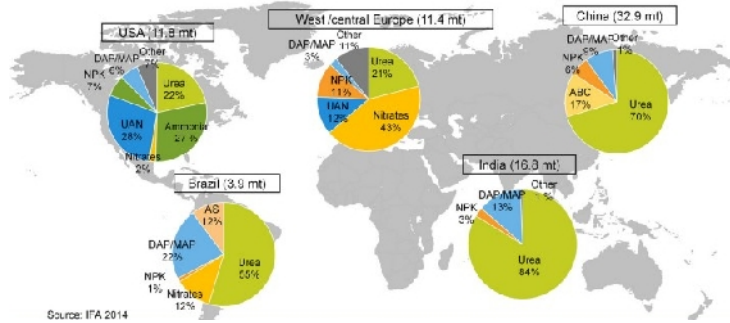
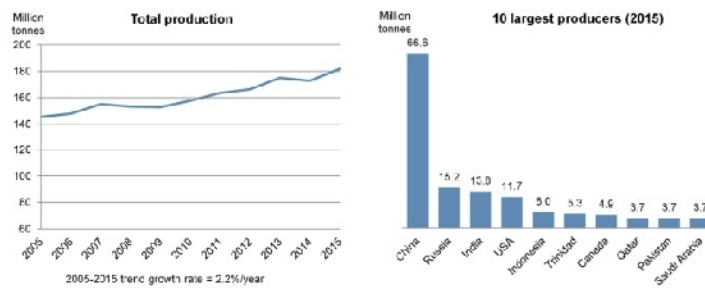


Fig. 7. Nitrogen fertilizer application by region and product.

Global ammonia production

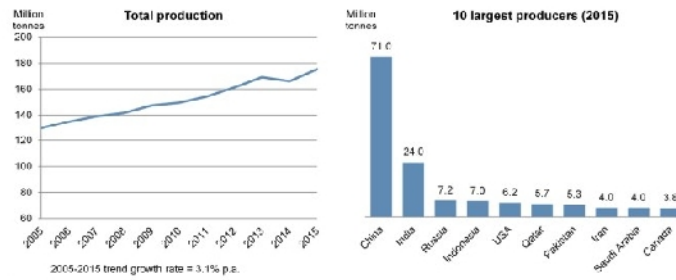


Source: IFA

India is the 3rd largest ammonia producer

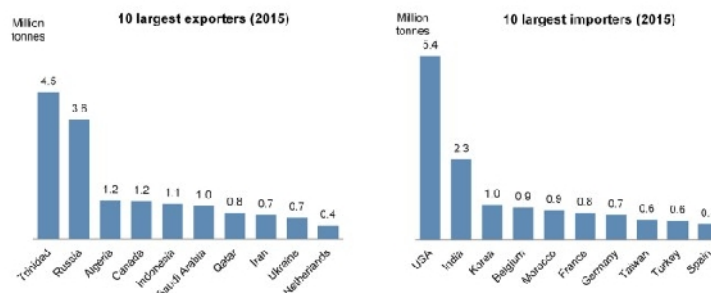
Fig. 8. Global ammonia production.

Global urea production



Source: IFA

Global ammonia trade



Source: IFA

Fig. 9. Global ammonia trade.

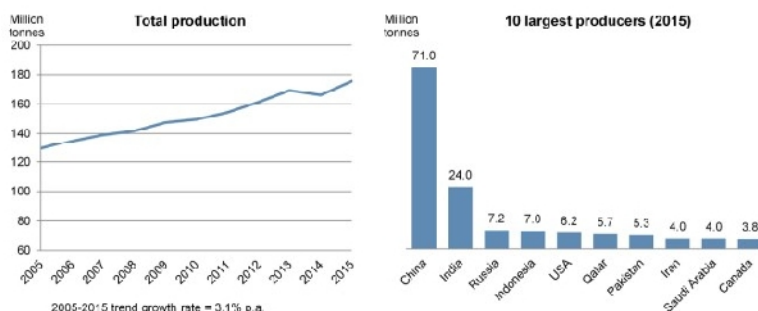
All nitrogen fertilizer products' primary intermediate is ammonia, which is also produced in great quantities in the majority of the world's nitrogen-consuming nations (Fig. 8). At its production facility, ammonia is mostly transformed into other nitrogen compounds. In 2016, just 18.5 million tonnes, or 11%, of the ammonia produced worldwide was traded. Production of ammonia fell by 1.2% from 2015 levels to 175 million tonnes. A growth rate of 1.9% per year may be seen in the trend from 2006 to 2016.

DAP is mostly produced in India using imported ammonia. Natural gas, the primary raw material used in the manufacturing of ammonia, is available to the major ammonia producers in the globe at reasonable prices. Natural gas reserves are abundant in Trinidad, which is also close to the US, the largest ammonia importer in

the world. Trinidad has sizable independent ammonia plants and first-rate maritime infrastructure that serve export markets. Two sizable ammonia production facilities are owned by Yara Fertilizer in Trinidad. The Middle East is also home to some of the biggest natural gas reserves in the world. Significant amounts of ammonia are produced at the QAFCO fertilizer complex in Qatar, but the majority of this ammonia is converted into urea. As a result, QAFCO is a significant urea exporter and the amount of surplus ammonia available for exports is minimal (Fig. 9). Imported ammonia is utilized in the US for the manufacturing of DAP/MAP, for several industrial uses, and directly as a nitrogen fertilizer.

UREA

Global urea production



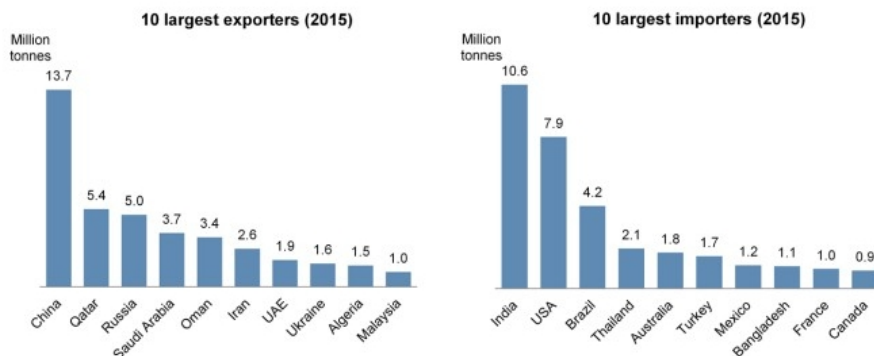
Source: IFA

Fig. 10. Global urea production.

The primary nitrogen fertilizer ingredient is urea. In 2016, urea production rose to 174.3 million tonnes, down 0.6% from 2015. The trend growth rate for urea production from 2006 to 2016 was 2.8% annually. China and India are the top producers as well as consumers. China has no need to import nitrogen fertilizer, whereas India has a sizable need. It is only logical that urea's production and consumption growth

rates are larger than those of ammonia and total nitrogen since urea accounts for the majority of the world's new nitrogen capacity. Due to urea's recent market share gains, the difference has recently been fairly significant. In contrast to other products, urea has a high nitrogen content (46%), making transportation comparatively affordable (Fig. 10).

Global urea trade



Source: IFA

Fig. 11. Global urea trade.

Large urea exporters are typically found in areas with abundant natural gas. More urea than ammonia is traded as a fertilizer on a global scale. In 2016, China's exports totaled 8.9 million tonnes, down from 13.7 million tonnes in 2015. Urea trade climbed globally in 2016 by 1.3% to 50.4 million tonnes (Fig. 11). Gas-rich nations and territories with constrained domestic markets are the leading urea exporters. There are a few

exceptions, though. China has a big domestic market. Although the primary goal is to service the home market, in recent years there has been an excess of capacity that has led to exports. But in 2017 and 2018, Chinese exports drastically decreased. The principal importing regions are North America, Latin America, and South and East Asia.

Compound NPK capacities

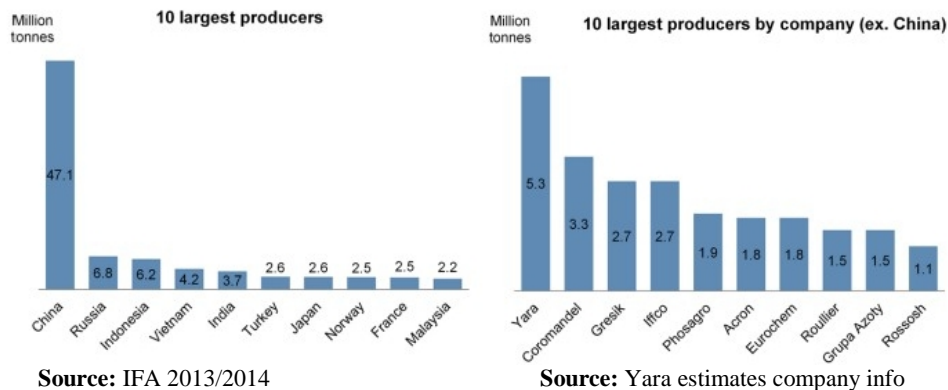


Fig. 12. Compound NPK capacities.

The greatest producer of NPK fertilizer worldwide is China (Fig. 12). Little to no compound NPK is shipped from China because export duties apply to all potassium-containing fertilizers. NPKs are subject to a 100 RMB/t (\$15/t) export tax in China for 2018, which

is a decrease from the flat 20% export tax imposed in 2017. Russia and Norway are the top exporters of compound NPKs among the top ten producers. Yara is the world's largest manufacturer of compound NPKs, excluding Chinese firms.

Global demand development of nitrogen chemicals for industrial applications is strong

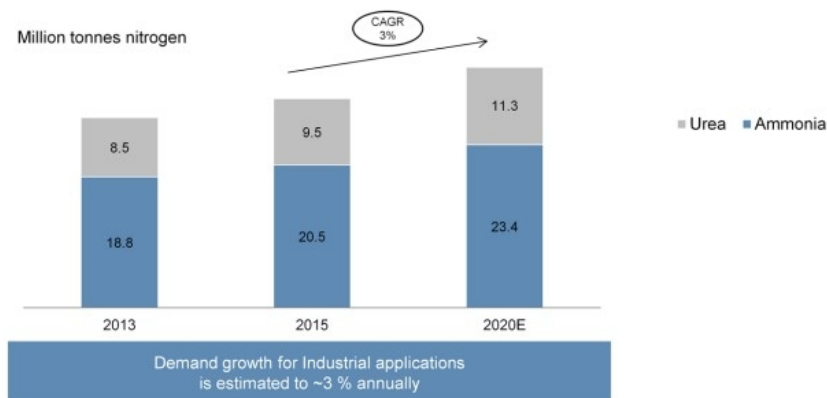


Fig. 13. Global demand development.

The pace of growth in nitrogen chemicals for Industrial applications is higher than for N-fertilizer growth.

Measures of support for fertilizer. At present, there are 31 urea manufacturing units in our country, out of which 28 urea units use Natural Gas (either domestic gas / LNG or both / CBM) as feedstock and fuel and remaining 3 urea units use Naphtha as feedstock and

fuel. The details of feed stock used and re-assessed capacity are placed (Fig. 13).

CONCLUSION

The marketing of fertilizers is a crucial component in meeting the needs of the farmer class. Marketers must develop appropriate policies to increase client goodwill, which fosters loyalty. In order to predict the expected

future demand for fertilizer products, there are still issues. Before creating important marketing rules, marketers must take into account fundamental issues faced by farmers. In the current fertilizer marketing environment, which is geared toward chemical fertilizers, marketers, academicians, and the farmer class are all included. Future potential for necessary fertilizer is enormous (Urea, N, P, K). Because organic fertilizers produce results slowly and take longer to complete than chemical fertilizers, their use is restricted.

FUTURE SCOPE

A brief review of the research in the field aids policymakers in developing practical tools that maximize the benefits to and happiness of the farmer class.

Acknowledgement. I extend my sincere thanks to Dr. K K Raina (major advisor) and to my advisory committee members for giving me proper guidance throughout the course of study. I also sincerely thank to Dr. Anmol Negi for

his contribution to make this manuscript to its best and also Dr. Y. S. Parmar University of Horticulture & Forestry, Nauni, Solan (Himachal Pradesh) for supporting the research. I would like to thank my juniors for helping me through out.

Conflict of Interest: None.

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How to cite this article: Anupam Singh, Anmol Negi, Riya Thakur, Anshumant Sharma, Harshit Doda and Sahil Alohia (2022). To Identify the Potential of Fertilizer Industry in India. *Biological Forum – An International Journal*, 14(4a): 138-147.