

Original Research Article

To Analyze the Prices, Import and Subsidies of NPK Fertilizers

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ABSTRACT

The present study was conducted to analyze the prices, import and subsidies of NPK fertilizers in India. Secondary data on prices, import and subsidies of NPK fertilizers from 1988-89 to 2017-18 were collected. The average price of urea was 2931.8/tonne in period-I (1988-89 to 1997-98), which rose to 4669/tonne in period-II (1998-99 to 2007-08) and 8413/tonne in period-III (2008-09 to 2017-18). The average prices of DAP was highest in the period-III (18996/tonne), followed by 9155/tonne in period-II and 6610/tonne in period-I. The average prices of MOP were only 3052.2/tonne in period-I, which rose to 4264/tonne and 11849.1/tonne in period-II and period-III, respectively. The prices of SSP were lower than other nutrients. The average prices of SSP were highest in period-III (6609.8/tonne), followed by 3155.2/tonne in period-II and 2154.5/tonne in period-I. In period-I (1988-89 to 1997-98) the average import of nitrogenous fertilizers from other countries was only 10.44 lakh M.T. which decreased to 10.25 lakh M.T. in period-II (1998-99 to 2007-08) and increased to 42.36 M.T. in period-III (2008-09 to 2017-18). The average import of phosphorus fertilizers were increased about 7.79 lakh M.T and 27.17 lakh M.T. in period-II and III respectively, which was only 7.23 lakh M.T. in period-I. The average import of potassic fertilizers were more compared to import of nitrogenous and phosphorus fertilizers. The potassic fertilizers imported by India from other countries were 10.94 lakh M.T., 19.1 lakh M.T., and 26.12 lakh M.T. in period-I, II and III respectively.

Keywords

Consumption,
fertilizer, Import,
Production

Introduction

Chemical fertilizers are key element of modern technology and have played an important role in agricultural productivity growth in India. However, the demand-supply gap of fertilizers in India has increased in recent times, thereby leading to increased dependency on inputs. Indian imports, which were about 2 million tonnes in early part of 2000, increased to 10.2

million tones of fertilizers in 2008-09. In view of importance of fertilizers in agricultural growth and the possibility of an emerging demand supply gap, there is need to forecast future demand.

India is second largest consumer of fertilizers in the world after China, consuming about 26.5 million tonnes. However, average intensity of fertilizers use in India remains much lower than most countries in the world

but is highly skewed, with wide inter-regional, inter-state and inter-districts variations. The result shows that non-price factors such as irrigation, high yielding varieties, were more important than price factors in influencing demand for fertilizers.

The major element like NPK plays an important role in plant development. Nitrogen contributes to the enzymatic creation of proteins and is critical to the photosynthetic process. Crops will move nitrogen around their plant systems from high-nitrogen density to areas deficient in the nutrient. Phosphorous plays an important role in crop growth by aiding in fruit production, stock growth and root growth. A lack of phosphorous in crop soil will produce weak plants that are prone to wilting, discoloration, and inadequate fruit. Potassium is vital to the retention and absorption of water in the crop soil. Proper water saturation leads to strong and healthy plants that resist disease and harm from heat.

Urea is the major consumed fertilizer in India followed by DAP. According to the department of fertilizer of India, the production of DAP and complex fertilizers is increasing in the country. The production of DAP reached 4.3 million metric and the production of complex fertilizers reached 7.9 million metric tonne in 2017, which was estimated to reach 5.03 million metric tonne and 9.03 million metric tonne in 2018. The production of DAP has increased in the period of 2017-2018 when the global prices for phosphate raw material fell. This boosted the production of DAP in the country owing to the higher demand for fertilizers.

In the green revolution that occurred in India during 1960s, the use of fertilizer was one of the important factors coupled with fertilizer responsive hybrids and high yielding varieties and irrigation water that resulted in quantum

jump of food grain production. For this reason green revolution is also called as “seed-cum-fertilizer revolution”. The contribution of fertilizer, water, improved seeds and plant protection measures to the increased agricultural production was respectively to the extent of 45 per cent, 28 per cent, 12 per cent and 15 per cent.

Balanced use of fertilizer is essential to stabilize crop yields and sustain high crop productivity. The new strategy of integrated nutrient management seeks to make the best use of the available nutrient sources, both organic and inorganic as also the complementary agricultural practice so that maximum crop yields can be obtained with fertilizer inputs.

Selection of fertilizer

For the present study the NPK (Nitrogenous, Phosphate, and Potash) fertilizer use in India was selected purposively.

Selection of period

For the price, subsidies, and import of NPK fertilizer use in India - an economic analysis the period selected was 30 years and divided into 10 years and overall as shown below.

Period-I - 1988-89 to 1997-98.

Period-II - 1998-99 to 2007-08.

Period-III - 2008-09 to 2017-18.

Overall period - 1988-89 to 2017-18

Nature and sources of data

In the present study secondary data were used for evaluating the specific objectives of the study. The secondary data on production of major chemical fertilizer prices, import and

subsidies were collected from the publication of Fertilizer Association of India, Department of Fertilizers Ministry of Chemicals and Fertilizers Government of India, Agricultural Statistics at a Glance, Directorate of Economics and Statistics, Department of agriculture, Cooperation and Farmers Welfare, Ministry of Agriculture, Government of India, www.Indiastat.com, www.fert.nic.in etc.

Analytical tools employed

Keeping in view the specific objective of the study, the data collected were subjected to following statistical analysis.

Tabular analysis

Compound Growth rate analysis

Instability analysis

Tabular Analysis

Tabular analysis involving the computation of means, percentages etc., were employed to present the data regarding all-India production and consumption of fertilizer.

Compound Growth rate analysis

In order to analyze the growth in all- India prices import and subsidies of major chemical fertilizers. The compound growth rate analysis was carried out.

$$Y = ab^t$$

$$\text{Log } Y = \text{Log } a + t \text{ log } b$$

$$\text{CGR} = (\text{Antilog}(\text{log } b) - 1) \times 100$$

Where,

Y = Fertilizer prices/import/subsidies

t = Time period-In year

b = Regression parameters

a = Intercept

Instability analysis

The coefficient of variation (CV) was used as a measure to study the variability in all-India prices import and subsidies of major chemical fertilizers. The coefficient of variation or indices of instability were computed by using the following formula.

$$\begin{aligned} \text{CV (\%)} \\ \text{Standard deviation} \\ = \frac{\text{-----}}{\text{Mean}} \times 100 \end{aligned}$$

Results and Discussion

The study aims at evaluating the price, import, subsidies performance of chemical fertilizers in India. In consistence with the objectives of the study the necessary data collected from different sources were analyzed and presented in the form of tables. The results of the investigation and analysis are presented under the following heads.

Prices of fertilizer

Import of fertilizer

Subsidies of fertilizer

Prices of fertilizer

The growth rate and co-efficient of variation of maximum retail prices of fertilizers in India (1988-89 to 2017-18) has been presented in Table 1. The average price of urea was 2931.8/tonne in period-I (1988-89 to 1997-98), which rose to 4669/tonne in period-II (1998-99 to 2007-08) and

8413/tonne in period-III (2008-09 to 2017-18). Compared to all fertilizers products the prices of DAP was highest. The average prices of DAP was highest in the period-III (18996/tonne), followed by 9155/tonne in period-II and 6610/tonne in period-I. The average prices of MOP were only 3052.2/tonne in period-I, which rose to 4264/tonne and 11849.1/tonne in period-II and period-III, respectively. The prices of SSP were lower than other nutrients. The average prices of SSP were highest in period-III (6609.8/tonne), followed by 3155.2/tonne in period-II and 2154.5/tonne in period-I. All the fertilizer products together (Urea+DAP+MOP+SSP), the highest average price was shown in period-III, which was 45,867.9/tonne, followed by period-II (21,243.2/tonne) and period-I (14,748.5/tonne). Overall (1988-89 to 2017-18) the average prices of urea, DAP, MOP and SSP were 5337.93/tonne, 11,587/tonne, 6388.43/tonne and 3973.16/tonne, respectively.

The growth rates of prices of all the fertilizer products were increased over the periods. The prices of urea was shown the highest growth rate of 13.40 per cent in period-III with one per cent level of significance, followed by 5.16 per cent (one per cent level of significance) in period-I and 2.59 per cent in period-II and the growth rate of prices of DAP was 11.68 per cent (one per cent level of significance) in period-I, which decline to 1.01 per cent (one per cent level of significance) in period-II, but it rose to 12.93 per cent in period-III with one per cent level of significance.

The growth rate of prices of MOP was the highest in period-III 16.41 per cent, followed by 15.45 per cent with one per cent level of significance in period-I and 2.04 per cent in period-II with one per cent level of significance. Whereas growth rate of prices

of SSP was 13.67 per cent in period-I which decline to 2.08 per cent with one per cent level of significance in period-II but it again rose to 10.68 per cent in period-III (significance at one per cent level). Overall (1988-89 to 2017-18) growth rates of prices of urea, DAP, MOP and SSP were 5.26 per cent, 5.65 per cent, 7.31 per cent and 6.14 per cent, respectively.

Nutrient/period wise instability index has been presented in a Table 1. The results revealed that the growth in prices of urea was more in period-III (40.59 per cent), followed by 16.45 per cent in period-I and 8.60 per cent in period-II. And the instability index of DAP in period-I, II and III were 33.18 per cent, 3.86 per cent and 35.81 per cent, respectively. The prices of MOP having a instability index of 42.61 per cent, 7.22 per cent and 45.38 per cent respectively in period-I, II and III. Whereas, growth of prices of SSP was more in period-I (36.14 per cent), followed by 32.08 per cent in period-III and 6.75 per cent in period-II.

The instability index of prices of all the nutrients together (urea, DAP, MOP and SSP) was more in period-III (36.71 per cent) followed by 30.91 per cent and 5.56 per cent in period-I and II respectively. Overall (1988-89 to 2017-18), the instability index of prices of urea, DAP, MOP and SSP were 56.67 per cent, 58.15 per cent, 78.58 per cent and 58.30 per cent, respectively.

Import of fertilizer

The import of the fertilizers in the country influenced by the fertilizer production in the country and consumption trend. Here the performances of import of fertilizers are explained. Growth rate and co-efficient of variation of nutrient-wise import of fertilizer materials in India (1988-82 to 2017-18) has been presented in Table 2.

Table.1 Growth rates and co-efficient of variation of maximum retail prices of fertilizers in India (1988-89 to 2017-18)

Periods	Nutrients	Average (lakh tonne)	CGR	CV
Period-I (1988-1989 to 1997-98)	Urea	2931.8	5.16**	16.45
	DAP	6610	11.68**	33.18
	MOP	3052.2	15.45**	42.61
	SSP	2154.5	13.67**	36.14
	Total	14748.5	11.14**	30.91
Period-II (1998-99 to 2007-08)	Urea	4669	2.59**	8.60
	DAP	9155	1.01**	3.86
	MOP	4264	2.04**	7.22
	SSP	3155.2	2.08**	6.75
	Total	21243.2	1.71**	5.56
Period-III (2008-09 to 2017-2018)	Urea	8413	13.40**	40.59
	DAP	18996	12.93**	35.81
	MOP	11849.1	16.41**	45.38
	SSP	6609.8	10.68**	32.08
	Total	45867.9	13.37**	36.71
Overall (1988-89 to 2017-18)	Urea	5337.93	5.26**	56.67
	DAP	11587	5.65**	58.15
	MOP	6388.43	7.31**	78.58
	SSP	3973.16	6.14**	58.30
	Total	27286.53	6.00**	61.40

Source: Fertilizer Statistics, FAI. www.indiastat.com

Note: ** Significant at 1 per cent level, * Significant at 5 per cent level

Table.2 Growth rates and co-efficient of variation nutrient-wise import of fertilizer materials in India (1988-89 to 2017-18)

Periods	Nutrients	Average (lakh tonne)	CGR	CV
Period-I (1988-1989 to 1997-98)	Nitrogen	10.44	22.23**	56.05
	Phosphorus	7.23	-4.94	41.36
	Potash	10.94	-2.64	20.68
	Total	28.62	3.57	21.73
Period-II (1998-99 to 2007-08)	Nitrogen	10.25	25.09	119.65
	Phosphorus	7.79	3.83	64.34
	Potash	19.1	5.97**	24.21
	Total	37.14	10.10	53.37
Period-III (2008-09 to 2017-18)	Nitrogen	42.36	-0.33	16.34
	Phosphorus	27.17	-5.66	32.52
	Potash	26.12	-4.23	34.69
	Total	95.65	-2.96	20.10
Overall (1988-89 to 2017-18)	Nitrogen	21.01	8.95**	83.46
	Phosphorus	14.06	5.92**	79.05
	Potash	18.72	3.71**	45.80
	Total	53.81	5.94**	63.48

Source: Department of Fertilizer and Department of Agriculture, Cooperation & Farmer Welfare (DAC&FW)

Note: ** significant at 1 per cent level, * significant at 5 per cent level

Table.3 Growth rates and co-efficient of variation of central subsidy on fertilizers in India (1988-89 to 2017-18)

Periods	Nutrients	Average (Rs in Crores)		CGR	CV
		Imported	Indigenous		
Period-I (1988-1989 to 1997-98)	N	Imported	951.3	12.15	50.03
		Indigenous	4231.9	6.01**	23.53
		Total	5183.2	6.91**	22.56
	P & K fertilizers		942.6	67.44**	139.93
	On all fertilizers		6125.8	12.10**	38.89
Period-II (1998-99 to 2007-08)	N	Imported	1241.4	63.60**	171.26
		Indigenous	9997.4	6.98**	27.58
		Total	11238.8	10.17**	42.98
	P & K fertilizers		12439.9	27.73**	153.77
	On all fertilizers		23678.7	18.49**	100.34
Period-III (2008-09 to 2017-2018)	N	Imported	9950.7	0.55	36.94
		Indigenous	26451.2	10.00**	33.61
		Total	36401.9	7.59*	27.21
	P & K fertilizers		27285.8	-7.77	34.03
	On all fertilizers		63687.7	0.20	10.81
Overall period (1988-89 to 2017-18)	N	Imported	4047.8	13.88**	120.27
		Indigenous	13560.2	9.23**	80.41
		Total	17608	9.94**	85.59
	P & K fertilizers		13556.1	17.77**	119.21
	On all fertilizers		31164.1	12.43**	90.30

Source: Annual Review of Fertilizer Production, Indian J. Fert. Statistics, FAI,

Note: ** Significant at 1 per cent level, * Significant at 5 per cent level.

In period-I (1988-89 to 1997-98) the average import of nitrogenous fertilizers from other countries was only 10.44 lakh M.T. which decreased to 10.25 lakh M.T. in period-II(1998-99 to 2007-08) and increased to 42.36 M.T. in period-III (2008-09 to 2017-18). The average import of phosphorus fertilizers were increased about 7.79 lakh M.T and 27.17 lakh M.T. in period-II and III respectively, which was only 7.23 lakh M.T. in period-I. The average import of potassic fertilizers were more compared to import of nitrogenous and phosphorus fertilizers. The potassic fertilizers imported by India from other countries were 10.94 lakh M.T., 19.1 lakh M.T., and 26.12 lakh M.T. in period-I, II and III respectively. The total average import of NPK fertilizers were increased about more

than three times which was 28.62 lakh M.T. in period-I to 95.65 lakh M.T. in period-III. Overall (1988-89 to 2017-18) the average import of nitrogenous, phosphorus and potassic fertilizers by India were 21.01 lakh M.T., 14.06 lakh M.T. and 18.72 lakh M.T. respectively.

The growth rate of import of nitrogen was positive in period-I (22.23 per cent) with one per cent level of significance. Followed by period-II (25.09 per cent) but there was a more decrease in growth rate of import of nitrogen in period-III, which shows growth rate of (-0.33 per cent) whereas, the growth rate of import of phosphorus was the highest in period-II (3.83 per cent) followed by (-4.94 per cent) in period-I and (-5.66 per cent) in

period-III. The growth rate of import of potash was the highest in period-II (5.97 per cent) with one per cent level of significance and lowest in period-III (-4.23 per cent). In the import of total NPK fertilizers the highest growth rate was observed in period-II (10.10 per cent) followed by period-I and period-III which were having growth rates of -2.64 per cent and -2.96 per cent respectively. Overall (1988-89 to 2017-18) the growth rates of imports of nitrogen, phosphorus and potash were shown positive growth rates of 8.95 per cent 5.92 per cent and 3.71 per cent (with one per cent level of significance) respectively. Nutrient-wise and period-wise instability index were presented in Table 2. The result revealed that the growth of import of nitrogen was less stable in period-III (16.34 per cent) followed by 119.65 per cent in period-II and 56.05 per cent in period-I. Whereas the growth of import of phosphorus was less stable in period-III (32.52 per cent), followed by period-II and period-I which were having the instability index of 64.34 per cent and 41.36 per cent respectively. The growth in import of potash was less stable in period-I (20.68 per cent), followed by 24.21 per cent in period-II and 34.69 per cent in period-III. In the import of overall NPK fertilizers, period-III was recorded as less stable (20.10 per cent), followed by 21.73 per cent in period-I and 53.37 per cent in period-II. Overall (1988-89 to 2017-18) the instability index of import of nitrogen, phosphorus and potash were 83.46 per cent, 79.05 per cent and 45.80 per cent respectively, in which instability index was very high in import of overall NPK (63.48 per cent).

Subsidies of fertilizer

The growth rate and product-wise subsidies of fertilizer announced by the government for various nutrients are discussed below. Central subsidy on fertilizers from 1988-89 to 2017-18, have been presented in Table 3. Growth

rate and co-efficient of variation of nutrient-wise subsidies of fertilizer materials in India (1988-89 to 2017-18) has been presented in Table 3. In period-I (1988-89 to 1997-98) the average subsidies of nitrogenous fertilizer was 5183.2 crore which rose to 11238.8 crore and 36401.9 crore in period-II (1998-99 to 2007-08) and period-III (2008-09 to 2017-18) respectively. The average subsidies of phosphorus and potassic fertilizers was increased about 12439.9 crore and 27285.8 crore in period-II and III respectively which was only 942.6 crore in period-I. The total average subsidies of nitrogenous phosphorus and potassic fertilizers were increased, which was 6125.8 crore in period-I to 63687.7 crore in period-III. Overall (1988-89 to 2017-18) the average subsidies of nitrogenous, phosphorus and potassic fertilizers in India were 17608 crore, 13556.1 crore and 31164.1 crore respectively. The growth rate of subsidies of nitrogenous, phosphorus and potassic fertilizers were shown positive growth rate (except P & K fertilizer in period-III).

The growth rate of subsidies of nitrogen was highest in period-II (10.17 per cent), followed by 9.94 per cent in period-III and 6.91 per cent in period-I with significant at one per cent. Whereas the growth rate of subsidies of phosphorus and potash was highest in period-I (67.44 per cent), followed by 27.73 per cent in period-II and -7.77 per cent in period-III. (One per cent level of significance in the period-I and II) In the total nitrogenous, phosphorus and potassic (18.49 per cent) followed by period-I and period-III, which were having the growth rates of 12.10 per cent (one per cent level of significance) and 0.20 per cent respectively. Overall (1988-89 to 2017-18) growth rate of subsidies of nitrogenous, phosphorus and potassic fertilizer were shown positive growth rate of 9.94 per cent and 17.77 per cent respectively with one per cent level of significance. Nutrient-wise

and period-wise instability index were presented in Table 4.7.1. The results revealed that the growth of subsidies of urea was in period-I (22.56 per cent) followed by 42.58 per cent in period-II and 27.21 per cent in period-III.

Whereas, growth of subsidies of phosphorus and potassic fertilizers was in period-I (139.93 per cent), followed by period-II and period-III which were having the instability index of 153.77 per cent and 34.03 per cent respectively. In the total nitrogenous, phosphorus, and potassic fertilizer subsidies period-I was recorded as (38.89 per cent) followed by 100.34 per cent in period-II and 10.81 per cent in period-III. Overall (1988-1989 to 2017-18) the instability index of nitrogen, phosphorus and potassic fertilizer were 85.59 per cent and 119.21 per cent respectively, in which instability index was high in overall nitrogenous, phosphorous and Potassic fertilizers subsidies together (90.30 per cent). The studies by Pravin *et al.*, (2017) also contributed similar findings. Since there a wide variation in price, import and subsidies on NPK fertilizers, hence the hypothesis is accepted. Compound growth rate for maximum retail prices of NPK fertilizers was recorded high in period-III (2008-09 to 2017-2018) in overall period.

Compound growth rate for import of NPK fertilizers was recorded high in period-II (1998-99 to 2007-08) in overall period. Compound growth rate for central subsidy on NPK fertilizers was recorded high in period-I (1988-1989 to 1997-98) in overall period.

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