“A STUDY OF NUTRIENT BASED SUBSIDY POLICY OF FERTILIZERS IN INDIA AND ITS IMPACT ON DRIVERS OF BUYING BEHAVIOUR OF FARMERS.”

SYNOPSIS OF THE Ph.D. THESIS

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LIST OF ABBREVIATIONS

- GDP: Gross Domestic Product
- MT: Metric Tons (or Tons)
- N :Nitrogen
- P: Phosphorus
- K: Potash
- HYV: High Yielding Varieties
- DAP: Di-ammonium Phosphate
- MOP: Muriate of Potash
- MRP: Maximum Retail Pricee
- RPS: Retention Price Scheme
- SSP: Single Super Phosphate
- ONGC: Oil and Natural Gas Corporation
- CIL: Coal India Limited
- FAI: Fertiliser Association of India.
- P_2O_5: Di-phosphorus Pentoxide
- K_2O: Potassium Oxide

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Chapter 1

INTRODUCTION

Agriculture accounts for nearly 20 percent of India's GDP and more importantly, more than 60 percent of the country's population is dependent on agriculture and allied activities for their livelihood. This reality compelled Mahatma to emphasize that India lived in her villages. The huge population made food security a national imperative. The five-year plans during earlier periods have stressed self-sufficiency and self-reliance in food grains production and concerted efforts in this direction have resulted in a substantial increase in food grain production and productivity. This is evident from the fact that from a very modest level of 52 million tons in 1951-52, food grain production rose to more than 206 million tons in 1999-2000. Behind India's success story of not only meeting the total requirement of food grains but also exporting the surplus lays the significant role played by chemical fertilizers.

Chemical fertilizers have played a very important role in the success of India's green revolution along with irrigation and credit and extension services provided by the Government. The increase in fertilizer consumption has added significantly to the continuous production of food grains in the country. The Government of India has been consistently following policies conducive to increased availability and consumption of fertilizers in the country. The production of Nitrogen (N) and Phosphorus (P) fertilizer together was mere 0.3 Lakh MT in 1950-51, the estimated production of all the Fertilizers during the year 2017-18 is expected to be 462.20 Lakh MT showing an increase of more than 11% in comparison with the previous year. Since there are no commercially viable sources of Potash (K) in the country, its entire requirement is fulfilled through imports. Fertilizer, being a major source of plant nutrient is one of the most essential agro-input required for enhancing farm production. It is estimated that fertilizer contributes about 50 to 60 percent to incremental agriculture production.

Indian farmers used 338 thousand tons of NPK in 1960-61, in 1970-71 about 6.7 times as much was used. The nutrient used in 1980-81, 1990-91 and 1998-99 was 16.3, 37.1 and 49.5 times more as compared to 1960-61. In 2003/04, total nutrient consumption was 16.8 million tons. This increases in the nutrients applied to crops have been essential to support the agricultural revolution which began in India during mid-sixties after the introduction of High Yielding Varieties (HYV) and development of irrigation infrastructure.

The desired level of N P K for the Indian soils is 4:2:1. Prior to the decontrol of P and K segments of the fertilizer industry during 1992 the NPK usage was close to the 4:2:1 level. However subsequent to partial decontrol the prices of P and K fertilizers increased owing to the import component and as a result the NPK consumption ratio soared to 9.7:2.9:1 in 1993. The government had to initiate a series of ad hoc measures to achieving the parity among the price of N in relation to that of P and K and as result, the ratio has come down to 7.9:2.9:1 in the year 1997-98.

1.1 KEY CONCEPTS

i. **Fertilizers**: Fertilizers are a substance added to soil to improve plant growth and yield.

ii. **Subsidy:** It is a Government incentive in the form of financial aid or supports extended to an economic sector; which can be business or individual. The main aim of subsidy is promoting economic and social policy.

iii. **NPK**: NPK stands for the 3 key components of the fertilizers which are Nitrogen which promotes vegetation, Phosphorous which encourages root growth and Potassium which promotes flower and fruit growth. It is a balanced fertilizer that is good for all-round use in the field.

iv. **DAP**: Di-ammonium phosphate, is manufactured by the reaction of ammonia and phosphate acid. Its nitrogen to phosphate ratio makes it an excellent direct application product or one that blends well with other fertilizer materials to produce a variety of NPK fertilizers.

v. **UREA**: Synthetic urea is produced commercially from ammonia and carbon dioxide. Urea is widely used in the agriculture sector both as a fertilizer and animal feed additive, which makes the production of urea considerably high in comparison to other fertilizer.

vi. **MOP:** Muriate of Potash has a high nutrient concentration and is therefore relatively price competitive with other forms of potassium. The chloride content of MOP can also be beneficial where soil chloride is low.

1.2 FERTILIZERS IN INDIAN AGRICULTURE

During the 50s declining agriculture growth in India compelled to embark upon many development strategies to improve agriculture growth one among them being the. introduction of the New Agricultural strategy, which propagates the use of critical inputs like a high yielding variety of seeds; fertilizers ‘manures etc. in achieving self-sufficiency in food grains production which later became increasingly evident over the years. Further experiences of other countries show that increased use of fertilizers in a proper proportion increases agricultural productivity and production. Thus, the use of chemical fertilizers has become an integral part of Indian agriculture not only from the viewpoint of improving yield levels but also economic development at large.

‘Fertilizer’ is an input that provides plant nutrients and restores soil fertility loss due to the continuous cultivation of the lands. Plants contain 92 natural elements, but need only 16 for growth; thirteen of these are essential mineral nutrient elements, commonly referred to as ‘nutrients’. They need to be sustained either through the soil system or by animal manure or chemical fertilizers. Essential nutrients required by plants include nitrogenous fertilizer (N), phosphate fertilizer (p) and potassic fertilizer (k).

Since soil system by themselves cannot supply all the nutrients to meet the requirements of the high-yielding crops, it is necessary to supplement the same by adding fertilizers and or manures depending upon the type of crop and soil and climatic conditions that help determine the optimal mix of essential nutrients. The practice of using fertilizers that help first introduced more than a century ago has contributed greatly to the agriculture, through improving yield levels, as well as providing better resistance to some diseases and climatic stresses besides improving farmer's economic returns.

Going back to the origin of fertilizer use in Indian agriculture, it was in the year 1928 , that the Royal Commission on Agriculture emphasized the importance of fertilizer as a vital input in the development of agriculture, but the actual use of fertilizes began in the 1930s, initially with respect to plantation crops like tea and later on sugarcane and rice; and by 1940s the use of fertilizers spread to all crops, and later on other than plantation crops the immediate factors contributing to the use of fertilizers include 1) development of sugar industry 2) fixation of minimum price for sugarcane 3) efforts of some fertilizer units to develop a market for fertilizers outside the plantation crops. By the end of the year 1940, the country was using nearly 20,000 tons of nutrients mainly because of the establishment of 2 factories, one at Alappuzha in Kerala and the other at Sindri in Bihar.

The need for fertilizer use had been recognized by Dr. John Augustus Volker way back in 1889 who was there a consulting chemist to the royal agricultural society; he had been deputed by the secretary of state to India to advise the Imperial Government on the application of Agricultural chemistry to Indian Agriculture. In his report submitted to the Royal Agricultural Society of England on the improvement of Indian Agriculture, had observed that Indian Agriculture was in need of actual improvement rather than a mere suggestion. Further, while recognizing the problem of plant nutrient deficiency in respect of the Indian soil system he had stressed the use of plant nutrients.

Soil fertility depletion has been a cause of concern for Indian agriculture. The use of plant nutrients to offset the deficiency per hectare for remains relatively low and unbalanced, there exists a gap of 10 million tons of nutrients removed by crops and their addition through fertilizers, and this is one of the major reasons for low crop yields in India which calls for the use of fertilizers. However, to augment the importance of fertilizer use it is necessary to ensure that the availability of nutrients does not become a constraint on plant development as fertilizers are substances that supply plant nutrients or restore soil fertility that has depleted due to continuous cultivation of lands.

Many western scientists had observed that Indian Agriculture was less productive, not because of primitive or inferior practices, but an interruption in the flow of resources. Later due to the spread of colonialism, many factors had (cash crop cultivation, reservation of forest area, etc.) contributed to the scarcity of local inputs, water, manure, etc. adversely affecting the productivity of agriculture in the process.

Chemical fertilizers have played a historic role in agricultural development, particularly in respect of the developing world. Its contribution has not remained confined just to raising crop productivity, but also to creating a dynamic technological base for the agricultural sector. The importance of fertilizer use has grown phenomenally in terms of its contribution to the development of Indian agriculture. Initially there was scope to bring additional land under cultivation, but consequently, the emphasis shifted to improving the productivity of land through intensive cultivation strategies, with fertilizer emerging as the main component of the package of practices for increasing agricultural productivity.

The use of Chemical Fertilizers is indispensable for accelerating the growth of agricultural output particularly in the short period. According to an estimate, the use of one ton of plant nutrients would be equivalent to adding about 4 hectares of cropland in terms of additional production. Thus, it is one of the profitable means of land use and sustained agricultural production. In this regard, the National Commission on Agriculture has rightly observed, “It has been the experience throughout the world that increased agricultural production is related to increased consumption of fertilizers”.

1.3 EVOLUTION OF FERTILIZER SUBSIDY REGIME

The Fertilizer subsidy concession regime has a long and chequered history, dating back to 1957, as summarized below:

Period	Event
1957	Fixing of Maximum Retail Price (MRP) of Urea through Fertilizer Control Order, 1957
1973	Fertilizer (Movement) Control Order issued for Government control of fertilizer distribution and its inter-state movement
November 1977	Retention Price Scheme (RPS) for Nitrogenous fertilizer introduced
February 1979	RPS for complex fertilizers introduced
May 1982	Single Super Phosphate (SSP) brought under RPS
August 1992	Phosphate (P) and Potash (K) fertilizers decontrolled, based on the recommendations of JPC
October	Concession on decontrolled P and K fertilizers introduced

Period	Event
1992	
April 2003	Replacement of RPS by stage wise New Pricing Scheme (Stage I)
April, 2004	NPS State II – 1.4.2004 to 30.9.2006
October 2006	NPS Stage III – 1.10.2006 onwards
April 2010	Nutrient Based Subsidy (NBS) for decontrolled fertilizers ¡n replacement of existing concession scheme

Table 1: Chronology of Key Events relating to Fertilizer Subsidy and Control

1.4 IMBALANCED USE OF NUTRIENTS

While finalizing NBS Policy in February 2010, it was brought out in the Cabinet Note that the aggregated application of ‘N’, ‘P’, & ‘K’ nutrients in Indian agriculture was 5.3**:**2.2**:**1 as against the preferred ratio of 4**:**2**:**1. As per the Report of Inter-Ministerial Group (discussed in the meeting of Committee of Secretaries on July 2009) on rationalization of Fertilizer Subsidy, the highly subsidized price of Urea (which contains ‘N’ as compared to that of DAP, which contains ‘P’), was considered one of the contributing factors leading to imbalanced application in favor of ‘N’. Details of consumption ratio of N, P & K during the period 2007-08 to 2017-18 are given in Table

Year	Consumption ratio (N:P:K)
2007-08	5.5 **:** 2.1 **:** 1

2008-09	4.6 **:** 2.0 **:** 1
2009-10	4.3 **:** 2.0 **:** 1
2010-11	4.7 **:** 2.3 **:** 1
2011-12	6.7 **:** 3.1 **:** 1
2012-13	8.2 **:** 3.2 **:** 1
2013-14	8.0 **:** 2.7 **:** 1
2014-15	6.7 : 2.4 : 1
2015-16	7.2 : 2.9 : 1
2016-17	6.7 : 2.7 : 1
2017-18	6.1 : 2.5 : 1

Table: Consumption ratio of N, P & K

Source: Fertiliser Statistics, FAI, New Delhi

As against the preferred ratio of 4**:**2**:**1 (N:P:K), 'N', jumped to a ratio level of 8.2 in 2012-13 from 4.3 in 2009-10. The ratio is 2017-18 stood at 6.1:2.5:1. This was mainly due to the fact that farmers preferred Urea, containing 'N' because it was cheaper than P&K fertilizers though such a practice had an adverse effect on soil fertility. Thus, it is clear that NBS Policy did not succeed in controlling the imbalanced use of N, P and K nutrients in the soil which indicates that the efforts to promote balanced fertilization were not well directed and publicized.

The fallout of the fertilizer subsidy is that chemical fertilizers are cheaper than organic fertilizers. Thus, farmers have moved away from using organic manure, which is very critical for preserving good soil health, as organic carbon is the key fuel for keeping the soil microbial activities in a good state. Good soil health is required to ensure the quality of food and for food and nutritional security. To address malnutrition in India, it is more economical and efficient to address food quality issues through soil health and diet diversification rather than through bio-fortification and nutritional amendments externally. Imbalance in fertilizer use also leads to depletion of particular nutrients in the soils as well as causing environmental degradation. It also substantially increases the cost of cultivation and also lowers its efficiency.

1.5 PRODUCTION, IMPORT, AND CONSUMPTION OF FERTILIZER PRODUCTS IN 2017-18

1.5.1. Production of Fertilizers in 2017-18

Due to the adjustment in N and P capacities, the total capacity of N marginally reduced from 14.32 million tons as of 1st November 2017 to 14.30 million tons as of 1st November 2018. The capacity of P_2O_5 capacity marginally increased from 7.28 million tons to 7.31 million tons during 2017-18.

The production of N increased from 13.38 million tons from 2016-17 to 13.42 million tons during 2017-18. Likewise, the production of P_2O_5 increased from 4.55 million tons to 4.72 million tons during 2017-18.

Among all the major fertilizer products, the production of urea was 24.03 million tons, production of DAP was 4.65 million tons, NP/NPK complex fertilizers 8.24 million tons and for SSP it was 3.91 million tons in 2017-18.

Source: Annexure 3

1.5.2. Imports of Fertilizers in 2017-18

The import of N, P_2O_5, and K_2O in the year 2017-18 was 3.62, 2.04 and 2.93 million tons, respectively. Among the major fertilizers, the import of Urea was 5.98 million tons. The import of DAP, NP/NPK and MOP was 4.22, 0.50 and 4.74 million tons, respectively. K_2O

Source: Annexure 2

1.5.3. Consumption of Fertilizers in 2017-18

The consumption of total nutrients was 26.59 million tons in 2017-18 as against 25.95 million tons in the previous year. The consumption of N, P_2O_5, and K_2O was 16.96, 6.85 and 2.78 million tons, respectively in the year 2017-18. Among the major fertilizer products, the consumption of urea was 29.89 million tons, DAP 9.29 million tons, NP/NPK complex fertilizers 8.60 million tons, SSP 3.44 million tons and MOP (for direct application) 3.16 million tons during 2017-18.

Source: Annexure 1

Chapter 2

2. REVIEW OF RELATED LITERATURE

This chapter examines various empirical studies with reference to the impact of change in fertilizer prices on consumption, production and cropping pattern, in order to put light on various issues and facts related to fertilizer pricing policies.

2.1 Introduction

The introduction of the New Agriculture Strategy in the 1960s accorded a high priority to the use of "critical inputs" i.e. irrigation, fertilizer, and HYV for increasing agricultural production with a particular emphasis on the use of chemical fertilizers. Realizing the importance of chemical fertilizers in augmenting agricultural production, the government has come out from time to time with more conducive policies mainly to promote fertilizer use in the cultivation of all crops across all regions, leading to a spectacular increase in the fertilizer consumption from 69, 8000 tons in 1950- 51 to 414.41 Lakh MT in 2016-17.

If one observes the trends in fertilizer consumption over a period of time, it becomes evident that there was a sharp decrease in consumption levels in the 1970s, when prices shot up in the face of the oil crisis. However, Later, in 1977, a sharp increase was noted in the consumption of fertilizers when the government extended support to the fertilizer sector in the form of subsidies, particularly with a view to making it more affordable to the poor farming community. This subsequently led to a tangible increase in the use of fertilizers in the 1990s. However, the new economic policies re-examined the policy of continuing subsidies to the fertilizer sector, and finally, a reduction in fertilizer subsidies in a phased manner was considered, leading to changes in the fertilizer prices in the latter year. The changes in fertilizer prices evoked huge criticisms from many sections of the society that it would have an adverse impact on fertilizer consumption, agriculture production, cropping pattern, agriculture income, and particularly the poor and marginal farmers. The policy of withdrawing subsidy on fertilizers and the resultant increase in its prices evoked interesting discussions, arguments, and inferences. Arguments in favour of an increase in the fertilizer prices was on the contention that it was leading to wasteful consumption causing environmental and others problems, while, arguments against an increase in fertilizer prices were on the ground that the small farmers would be affected thereby their production and yield, and that as soil fertility had got reduced over the years because of sustained cultivation of lands, it was necessary to restore soil fertility by the application of fertilizers and hence necessary to promote its use at affordable prices. Further, the policy of decontrolling P and K has seriously distorted the nutrients use ratios and inclined towards N which is relatively priced less.

While keeping in view the distortions in the fertilizer pricing scenario and the resultant adverse impacts, a brief review of literature would help provide insights into various issues like the role of fertilizers in agricultural development, fertilizer subsidy, balanced use of fertilizers, factors influencing fertilizer consumption, improving fertilizer use efficiency, the role of fertilizers in determining output levels, farming practices, impact of fertilizers prices etc. An endeavor has been made in this chapter to understand various issues relating to the impact of changes in fertilizer prices on consumption, production and cropping patterns through various empirical studies. The literature has been reviewed issue wise under the following subheads.

2.2 Factors influencing fertilizers consumption

Gunvant M.Desai (1991) examines the issues in the growth of fertilizer usage in India focusing on how to sustain the rapid growth in fertilizer consumption with minimum adverse impacts on the environment. He analyses the factors behind the growth of fertilizer consumption in developing counties and the factors governing the past growth of fertilizer use in India for examining the possible further growth in fertilizer use and its implications for future research and policies. He points out that sustained growth in fertilizer consumption is the only alternative for meeting the ever-increasing food grain requirement of the growing population and the increasing yield levels per hectare is the only way out in this respect since no other cost-effective alternative measures are available. More importantly, he cautions the policymakers against the potentially adverse environmental implications if we just concentrate on pushing through a high rate of chemical fertilizer consumption without addressing the "Flawed Fertilizer Practices". India's experience reveals that it was the government's policies aimed at achieving the national objective of self-sufficiency in food production that exerted greater influence on demand for and supply of fertilizers than factors like irrigation, HYVs, and prices of fertilizers. Indian agriculture has reached a stage that any further increase in fertilizer consumption appears remote is very difficult since major crops dominating fertilizer consumption have reached a plateau and any further increased application can turn out to be uneconomical besides adversely affecting yield levels and soil systems. Any further growth in fertilizer consumption, he claims, is dependent on improvements in the technology and economic efficiency of use and broadening of technology-based growth in agriculture especially in non-irrigated areas with an emphasis on support systems and that rigorous government policies are quite imperative. The author emphasizes on guiding principles such as growth in agriculture production as a means to achieving the basic national objective of self-sufficiency in food production and elimination of poverty besides employment-oriented growth and balanced regional development. The author also recognizes the ever-increasing cost of cultivation which is pushing agriculture to uneconomical levels and that it is the need of the hour to move towards Cost-efficient agriculture with a continuous up-gradation of technology and judicious use of modern inputs.

C. H. Hanumantha Rao and Ashok Gulati (1994) observed that the ongoing reforms have opened up Indian agriculture to the world market, which is likely to turn the terms of trade in favour of agriculture. To make the most of the prevailing conditions, they identify certain crucial drivers of agricultural growth like diffusion of technology, irrigation, fertilizer, infrastructure, institutional reforms, agrarian reforms, participation of women, and poverty alleviation programs, which helps increase an appropriate aggregate supply response in the agrarian production system in addition to accelerating the growth of Indian Agriculture. In the case of fertilizers, the reforms suggested relate to a wider distribution of the fertilizer production system i.e., the domestic production system should be exposed to foreign competition in addition to the gradual reduction in fertilizer subsidy. They also suggest that the resultant savings be diverted towards irrigation and soil and water conservation schemes

P.V.Sarma (1981) argues that a steady increase in fertilizer prices without a commensurate increase in the prices of agricultural output results in a fall in fertilizer consumption because the consumption of fertilizers depends on the revealing price of fertilizers and the expected prices of crop output. The study further reveals that the quantum of increase in procurement prices is not in proportion to the very high fertilizer prices so as to offset the impact of a rise in fertilizer prices. This might lead to an adverse impact on fertilizer consumption. Hence, the study suggests the use of bio-fertilizer and green manure, the promoting efforts towards growing green manure, and also the promoting biogas units with a view to restoring soil nutrients (without sacrificing the fuel requirements) based on cattle shed waste.

2.3 Issues pertaining to subsidies;

2.31 Studies in favor of subsidy

Gulati and Pradeep K. Sharma (1999) examined issues pertaining to fertilizer pricing and subsidy in the Indian context from an economic perspective to know whether a farmer is net subsidized or not. The study results indicate only 60 percent of fertilizer subsidies going to farmers, while the remaining 40 percent to the fertilizer industry. Indian cultivators would have been better off under free trade conditions rather than under a controlled trade regime. As far as relative crop fertilizer price ratios for wheat, rice, and cotton are concerned, the study implies that Indian farmers are not taxed and not net subsidized in view of crop fertilizer pricing. The fertilizer subsidies shared by well-endowed regions and better-off farmers tend to deprive other regions of their legitimate share in resources for infrastructure development further, the potential yield of paddy with an optimum dose of NPK for the eastern region works out to 407 percent as against 155 percent in respect of the North region and 152 percent for the southern region (1981-82). Therefore, to optimize social gains, large quantities of fertilizer should be given to regions with an untapped potential which in turn requires intervention on the non-price front such as improving the distribution network. He further argues that irrigation has a more decisive influence on the pattern of fertilizer consumption than price fluctuations.

Vijay Paul Sharma and Hrima Thaker (2009) while examining the trends in subsidies and issues pertaining to the distribution of subsidies between farmer and the fertilizer industry, across regions/states, crops and different farm seizes, find fertilizer subsidies increasing from 0.85 percent of the GDP in the year1991 to 1.52 percent in 2008 - 2009. They also disprove the misconception that the fertilizer industry gobbling up a major share of subsidies while observing that subsidies remained largely confined to a few states and t crops like Paddy, Wheat, Sugarcane and Cotton together account for two thirds of the total fertilizer subsidies, with small and marginal farmers deriving a larger share of fertilizer subsidy. While justifying subsidy to fertilizers, this study concludes that a decrease in subsidies will have an adverse impact on on-farm production and incomes of small and marginal farmers.

R.K.Khatkar, C.R.Kaushik and Chamola S.D (1992) examine the extent and impact of input subsidies on Indian agriculture, using secondary data. The findings show that input subsidies have increased over the years mainly to offset the increasing prices of inputs and also to encourage the use of modern inputs. The study observes a higher subsidy received by agriculturally developed states that account for about 60 percent of the total fertilizer subsidy. The share of fertilizer subsidy to cultivators is found to have declined from 93 percent in the triennium ending 1982-83 to about 55 percent in the triennium ending 1986-87 whereas in respect of the fertilizer industry, it is found to have increased from 7 to 45 percent over the corresponding periods and a decrease in returns per hectare ranging from 10 percent to 56 percent and cautions against withdrawal of input subsidy. The study suggests the continuation of input subsidies for increasing agricultural output by way of plugging leakages.

T.R. Satish Chandhran (1993) in his paper titled "Pricing of Feedstocks in India" finds a 99 percent net increase in fertilizer subsidy getting offset by a steep increase in the cost of indigenous feedstock and inputs besides increased railway freights. He further observes the bulk of the fertilizer subsidy being in the nature of intra-economy transfer and, therefore, not a drain on the exchequer.

2.32 Studies in favor of removal of subsidy

Anjan Roy's (1992) paper justifies the government's move regarding the decontrol of fertilizer prices on the following grounds that since price of Urea (N) remains uncontrolled, which small and marginal farmers mainly use, it will not affect the use of N. considering that decontrolled varieties of fertilizers P& K are mostly used in commercial crops, any increase in prices of fertilizer can be offset by increasing procurement prices. Balanced use of NPK can be restored by introducing some checks, and at least by reducing subsidy would help the government free from some fiscal burden.

A partial equilibrium analysis reveals that the removal of fertilizer subsidy leads to a decrease in retention price which will only marginally reduce the incomes of domestic producers and will not have an adverse impact on employment in the fertilizer industry. A general equilibrium analysis finds importing of food grains a better alternative for increasing per capita cereal consumption rather than relying on short term measures such as fertilizer subsidy. It also suggests irrigation as a better alternative; as an investment in it leads to an increase in GDP, fertilizer use, production of food grains and welfare of rural and urban poorer classes. Any decrease in retention price would only marginally

56 reduce the Industry's profits without affecting retail prices through fertilizer consumption and retail prices still need to be reviewed to allow for greater competition and efficiency. A subsidiary on fertilizer prices ultimately plays a marginal role in promoting consumption in that whenever there has been a decrease in fertilizer prices, an impressive increase in consumption of fertilizers is also observed. Therefore, efforts should be focused on removing structural bottlenecks in fertilizer use through the strengthening of distribution networks, and promotional efforts through extension programs.

D.T.Nanjegowda (1992) observes that the continuation of subsidies to food grains and fertilizers has more disadvantages, as it erodes into government resources besides accentuating inflation and also various forms of subsidy to the agricultural sector has not brought about any expected returns. Thus, the extension of subsidies to the agricultural sector should be judged not only from the agricultural productivity point of view but also its effects on the economy as a whole.

Ashok Gulati and A.N.Sharma (1992*)* examine the degree of distortions in subsidies in the agricultural sector across several countries during the 1980s, with respect to the possible implications of subsidy reduction, and trace the origin of distortions in terms of policies followed by major countries; they also measure the degree of distortions on a country and commodity-specific basis, and estimate in terms of "Producers subsidy equivalent" and present the position of various countries on subsidy reduction and liberalization. The finding at the macro level reveals Japan emerging as the highest protector of its farm sector followed by the European community. It is shown that India would gain if it lowered its protection to the farm sector. Further, highly protected commodities like rice, wheat, and cotton can find a significant export market if protection is removed. The study suggests the reallocation of resources from highly protected crops to those crops not protected; however, the potential for export market is very low, but these crops are very important interview of meeting food requirements at the domestic level, since commodities such as wheat, rice fruits, and vegetables have the potential to become major foreign exchange-earners. On the whole, agriculture would be greatly benefited and would fetch higher incomes if reforms at the global level are carried out effectively, the very demand pattern in the country would change.

The increasing burden of fertilizer subsidy made **Ashok Gulati (1990)** examine the issue of whether Indian farmers are subsidized or not and also examines the relationship between Crop- fertilizer prices. He finds fertilizer subsidy to cultivators amounting to only 48 percent with the remaining 52 percent assumed to be going to the fertilizer industry in the form of intra economy transfers within the government agencies such as from ONGC to CIL and state Electricity Boards and as such cannot be called a subsidy. With regard to crop fertilizer ratio (In respect of major crops such as wheat, rice and cotton which account for a major share of fertilizer consumption) under a free and controlled trade regime (wheat, rice and cotton), it is found that Indian farmers stand to gain more under a free trade scenario rather than under a controlled trade regime. Under a controlled trade situation, Indian cultivators face unfavorable crop fertilizer price ratios when compared to ratios prevailing in most Asian and Pacific countries. Thus, it is inferred that Indian farmers are net taxed rather than net subsidized despite a large quantum of subsidy extended to fertilizers with no economic relevance.

Vidya Sagar (1996) observes that an increase in the price of fertilizers is the only available alternative for reducing fertilizer subsidies. He supports a dual pricing policy of fertilizers to save the interests of small and marginal farmers.

D.S.Tyagi (1993) in his paper titled “Pricing of Fertilizer,” argues that the benefits of subsidies are being enjoyed by all sections of consumers. He is of the view that a large part of the increased burden on the part of farmers must be shared by all sections of consumers of agricultural produce.

Gunvant M. Desai (1993) in his paper on fertilizer policies raises the question of how to sustain the growth of fertilizer consumption with a minimum adverse impact on fiscal resources and environment. He points out that it can be achieved through better management of demand for and supply of fertilizers.

2.4 Studies about Nutrient Based Subsidy

Sachdeva (2011) examined the NutrientBased Subsidy (NBS) impact on Indian agriculture. This study analyzed the positive and negative impacts. NBS is applicable only for N, P, K, Sulpher, Zinc, and Boron. According to this study, industries raised the prices of DAP, MOP by Rs 600 per tonne after the introduction of the NBS scheme. Nutrient Based Subsidy scheme has promoted balanced and integrated use of plant nutrients and also addresses the problem of multi-nutrient deficiency in Indian soils. The study observed that the subsidy helps to promote the efficient use of fertilizer and increase agricultural production.

Vijay Paul Sharma, Hrima Thaker, (2011) analyzed that by the introduction of nutrient-based pricing scheme and programs like the national project on Management of Soil and Fertilizer Health to promote balanced use of fertilizer nutrients, the demand for SSP and complex fertilizer might increase at a faster rate in the coming years. The country had achieved near self-sufficiency in N and P, with the result that India could manage its requirement of these fertilizers from the indigenous industry and imports of all fertilizers except K were nominal.

Raghuvansh Prasad Singh (2011) stated that in the mad rush to balance the chemical fertilizer kitty with global prices, policymakers are forgetting a huge problem that is staring us in the face — the deteriorating soil in the country and the resultant threat to food security. However, farmers are aware of the crisis but are helpless in the absence of support systems from the government.

Chakraborty, K (n.d) stated that the rising demand for fertilizers, it is imperative for the Indian government to construct subsidy policies that encourage sustainable and environment-friendly agricultural growth. His study made an attempt to estimate a demand function for fertilizers and explore the impact of various non-price factors on demand. Unlike past studies, his study used data entirely from the post-reform era (after 1991) and captured the impact of recent government subsidy policies and other non-price factors on the rising demand for fertilizer.

2.5 Fertilizers use efficiency

Bundyopadhya (1992) examines the efficiency of chemical fertilizers (NPK use) in terms of yield per unit of plant nutrients applied for paddy cultivation in states of Assam, Orissa and West Bengal with two sets of villages, one set of villages were provided with vital production inputs, training, improved production techniques, and free soil testing, while the Second set of villages were kept as control villages without providing any such inputs. Surprisingly, contrary to the expected results, there was no significant difference between the two sets of villages in terms of fertilizer use efficiency and output realized; in both the villages, fertilizer use efficiency was found appreciably high. These unexpected results clearly reveal that farmers use their own rationale in choosing their production technology, i.e., given the suitability of any technology, farmers would adopt them even without the support of any extension support or subsidized inputs. This puts the onus on the researchers and policymakers to develop region-specific production technologies.

Frank Notes (1985*)*, emphasize fertilizer use efficiency in order to increase agricultural production. He observes that given the limitation of further expansion of the cultivable area it is inevitable to increase productivity per unit area through intensive use of external plant nutrients, particularly chemical fertilizers. However, intensive use of costly chemical fertilizers is accompanied by the increased cost of cultivation. Hence, optimizing the use of fertilizers would lead to an increase in profit through higher yield. He further observes that there is a need for proper agronomical practices through an appropriate combination of different nutrients depending on soil and climatic conditions. Under an intensive cropping system, balanced use of all essential nutrients including secondary nutrients assumes greater significance he observes that in this respect, the use of micronutrients, proper soil conservation measures, watershed management, etc. need to be encouraged for increasing fertilizer use efficiency.

Duxbury (2000) uses a composite index for the imbalance in use of N- P-K that indicates Punjab and Haryana topping the imbalance list in fertilizer use followed by Bihar, Kerala, and Rajasthan. The overuse of synthetic fertilizers (particularly N fertilizers) is the main reason behind the imbalanced use of synthetic fertilizers. Further, Discrepancy and overuse of fertilizers are highly problematic especially because they cause extreme levels of soil degradation and associated losses in yield level. While analyzing the data from several long-term experiments on intensive rice-wheat systems, the study finds that there has been a significant decline or stagnation in yield level especially in respect of rice. For example, rice yields in respect of the highest yielding treatments in eight out of 11 long-term (over eight years) rice-wheat experiments in India and Nepal have declined, while in three cases, wheat yields have declined.

Chapter 3

3. RESEARCH METHODOLOGY

3.1 Importance of the study

This study will explore the different factors which influence the farmer while buying the fertilizer for his land; it will also try to understand the behavioral changes in farmers after the implementation of the NBS subsidy regime. It will put light on the affordability of fertilizers by the farmers, whether their buying capacity has increased or decreased after the implementation of the NBS subsidy. This study is also important to know whether the farmer is well informed about the importance of soil testing and its advantages. It has been seen in past years that the soil quality has been hampered because of not using the required nutrients that are needed for the better fertility of the soil. This study will overall try to gain knowledge about the production, consumption pattern and impact of utilization pattern of fertilizers after the implementation of the Nutrient-Based subsidy (NBS).

3.2 Objectives

- To study the factors which influence farmers while buying fertilizers.
- To study the behavioral change in farmers for fertilizers.
- To study the usage of urea & non-urea fertilizer by the farmer.
- To study the affordability of fertilizers by the farmers, due to the NBS policy.
- To study the post effect of the NBS policy on the agriculture sector.
- To study the production & consumption pattern of Fertilizers in India.

- To study the impact on utilization pattern of fertilizers after the implementation of Nutrient-Based subsidy (NBS).

3.3 Study area

The study area for this research will be 4 regions of Gujarat State of India, i.e. North region, South region, Centre region, and Saurashtra region.

3.4 Data collection

There are two main sources of data: primary data and secondary data. In this study both the types of research data will be used.

a) Primary data

i. Qualitative Research Method

- In-Depth Personal Interviews

  In-Depth Personal interviews will be conducted on a one-to-one basis with the Farmers, Dealers, Distributors, Industry Players, and Market Watchers.

ii. Quantitative Research Method

- Surveys

  A structured questionnaire will be used for collecting data from the farmers, Industry Players, and Market Watchers.

- Observation method

  Observing buyers in the market while they buy fertilizers.

b) Secondary data

- **External Data**
  - Published materials like newspapers, journals, and magazines by FAI, etc.
  - E-database of the Ministry of Chemical & Fertilizers, Department of Fertilizer, etc. can be used for getting the authentic facts and figures.

Chapter 4

4. DATA PROCESSING AND ANALYSIS

The collected primary and secondary data will be analysed using appropriate statistical techniques like Descriptive, Tabular Analysis besides averages, ratios, etc.; Mathematical and Statistical tools like simple ratios, percentage, compound growth, standard deviation, Likert scale, Garrett Technique, etc. will be appropriately used for the purpose of analysing data in the light of the objectives of the study.

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Annexure: 1

ALL INDIA CONSUMPTION OF N, P_2O_5 & K_2O

(1950-51 to 2017-18)

(`000 tonnes)

Year		N	P_2O_5	K_2O	Total ($N+P_2O_5+K_2O$)
1950-51		55.0	8.8	6.0	69.8
1951-52		58.7	6.9		65.6
1952-53		57.8	4.6	3.3	65.7
1953-54	I Plan	89.3	8.3	7.5	105.0
1954-55		94.8	15.0	11.1	120.9
1955-56		107.5	13.0	10.3	130.8
1956-57		123.1	15.9	14.8	153.7
1957-58		149.0	21.9	12.8	183.7
1958-59	II Plan	172.0	29.5	22.4	223.8
1959-60		229.3	53.9	21.3	304.6
1960-61		211.7	53.1	29.0	293.8
1961-62		249.8	60.5	28.0	338.3
1962-63		333.0	82.8	36.4	452.2
1963-64	III Plan	376.1	116.5	50.6	543.2
1964-65		555.2	148.7	69.3	773.2
1965-66		574.8	132.5	77.3	784.6
1966-67		737.8	248.6	114.2	1,100.6
1967-68		1,034.6	334.8	169.6	1,539.0
1968-69		1,208.6	382.1	170.0	1,760.7
1969-70		1,356.0	416.0	210.0	1,982.0
1970-71		1,479.3	541.0	236.3	2,256.6
1971-72	IV Plan	1,798.0	558.2	300.6	2,656.8
1972-73		1,839.0	581.3	347.6	2,767.9
1973-74		1,829.0	649.7	359.8	2,838.6
1974-75		1,765.7	471.5	336.1	2,573.3
1975-76		2,148.6	466.8	278.3	2,893.7
1976-77	V Plan	2,456.9	634.7	319.2	3,410.9
1977-78		2,913.0	866.6	506.2	4,285.8
1978-79		3,419.5	1,106.0	591.5	5,116.9
1979-80		3,498.1	1,150.9	606.4	5,255.4
1980-81		3,678.1	1,213.6	623.9	5,515.6
1981-82 (Feb./January)		4,068.7	1,322.3	676.2	6,067.2
1982-83 (Feb./ January)		4,224.2	1,435.9	726.5	6,386.6
1982-83 (April/March)	VI Plan	4,242.5	1,432.7	726.3	6,401.4
1983-84		5,204.4	1,730.3	775.4	7,710.1
1984-85		5,486.1	1,886.4	838.5	8,211.0
1985-86		5,660.8	2,005.2	808.1	8,474.1
1986-87		5,716.0	2,078.9	850.0	8,644.9
1987-88	VII Plan	5,716.8	2,187.1	880.5	8,784.3
1988-89		7,251.0	2,720.7	1,068.4	11,040.1
1989-90		7,385.9	3,014.2	1,168.0	11,568.2
1990-91		7,997.2	3,221.0	1,328.0	12,546.2
1991-92		8,046.3	3,321.2	1,360.6	12,728.0
1992-93		8,426.8	2,843.8	883.9	12,154.5
1993-94		8,788.3	2,669.3	908.7	12,366.3
1994-95	VIII Plan	9,507.1	2,931.7	1,124.8	13,563.6
1995-96		9,822.8	2,897.5	1,155.8	13,876.2
1996-97		10,301.8	2,976.8	1,029.6	14,308.1
1997-98		10,901.8	3,913.6	1,372.5	16,187.8
1998-99		11,353.8	4,112.2	1,331.5	16,797.5
1999-2000	IX Plan	11,592.5	4,797.9	1,678.4	18,068.9
2000-01		10,920.2	4,214.6	1,567.5	16,702.3
2001-02		11,310.2	4,382.4	1,667.1	17,359.7
2002-03		10,474.1	4,018.8	1,601.2	16,094.1
2003-04	X Plan	11,077.0	4,124.3	1,597.9	16,799.1
2004-05		11,713.9	4,623.8	2,060.7	18,398.4
2005-06		12,723.3	5,203.7	2,413.3	20,340.3
2006-07		13,772.9	5,543.3	2,334.8	21,651.0
2007-08		14,419.1	5,514.7	2,636.3	22,570.1
2008-09	XI Plan	15,090.5	6,506.2	3,312.6	24,909.3
2009-10		15,580.0	7,274.0	3,632.4	26,486.4
2010-11		16,558.2	8,049.7	3,514.3	28,122.2

2011-12		17,300.3	7,914.3	2,575.5	27,790.0
2012-13		16,820.9	6,653.4	2,061.8	25,536.2
2013-14		16,750.1	5,633.5	2,098.9	24,482.4
2014-15	XII Plan	16,949.6	6,098.9	2,532.9	25,581.3
2015-16		17,372.3	6,978.8	2,401.5	26,752.6
2016-17		16,735.9	6,705.5	2,508.5	25,949.9
2017-18 (P)		16,959.3	6,854.4	2,779.7	26,593.4
(P) = Provisional.			Note : Total may not exactly tally due to rounding off.		

Source : The Fertiliser Association of India. (2018). All-India Consumption of Fertiliser Nutrients - 1950-51 to 2017-18 . All-India Consumption of Fertiliser Nutrients - 1950-51 to 2017-18 (63rd ed., pp. I-73). New Delhi.

Annexure: 2

ALL INDIA PRODUCTION, IMPORT AND CONSUMPTION OF FERTILISER PRODUCTS

2016-17 and 2017-18 (April - March)

(`000 tonnes)

	Fertiliser		Production		Import		Consumption	
			2016-17	2017-18 (P)	2016-17	2017-18 (P)	2016-17	2017-18 (P)
I.	**Straight `N'**							
	1. Ammonium Sulphate (20.6 % N)		632.3	688.7	114.6	137.9	426.1	573.6
	2. Urea (46% N)		24,200.8	24,026.0	5,481.0	5,975.0	29,613.6	29,894.4
	3. CAN (25% N)		-	-	-	-	7.1	0.1
	4. Ammonium Chloride (25% N)		40.8	43.0	-	-	4.1	19.3
II.	**Straight `P_2O_5'**							
	1. Single Superphosphate (16% P_2O_5)		4,296.8	3,905.9	-	-	3,756.8	3,439.4
	2. Triple Superphosphate (46% P_2O_5)		-	-	-	-	-	3.8
	3. Rock Phosphate (for direct application)		-	-	-	-	36.2	31.0
III.	**Straight `K_2O'**							
	1. Muriate of Potash (60% K_2O)		-	-	3,736.0	4,736.0	2,863.2	3,158.2
	2. Sulphate of Potash (50% K_2O)		-	-	46.0	68.1	5.7	5.2
IV.	**NP/NPK Fertilisers**							
	16-20-0-13 (APS)		98.1	131.6	-	-	91.4	119.4
	20-20-0-13 (APS)		3,298.9	3,262.5	177.0	239.0	3,713.7	3,546.7
	20-20-0 (ANP)		220.3	216.6	-	-		
	15-15-15		465.3	478.3	19.0	22.0	515.9	510.2
	14-35-14		244.8	306.8	-	-	250.5	303.3
	18-46-0 (DAP)		4,333.4	4,654.0	4,385.0	4,217.0	8,963.5	9,294.1
	24-24-0		217.8	197.1			205.9	215.6
	24-24-0-8		9.0	29.2	-	-		
	11-52-0 (MAP)		-	-	-	-	-	-
	28-28-0		424.6	555.8	-	-	392.8	484.7
	14-28-14		-	-	-	-	0.2	6.2
	19-19-19		67.9	65.6	-	-	67.2	61.4
	17-17-17		68.6	83.1	-	-	38.0	78.6
	13-33-0-6(S)		-	-	-	-	0.1	0.2
	16-16-16		-	-	111.0	110.0	97.2	78.3
	12-32-16		1,081.2	1,048.9	-	46.0	1,243.6	1,221.3
	10-26-26		1,727.2	1,863.4	215.0	82.0	1,797.9	1,970.5
I.	**Total Product**		**41,427.8**	**41,556.5**	**14,284.6**	**15,633.0**	**54,090.6**	**55,015.5**
	Total Complex (Other than DAP/MAP)		**7,923.7**	**8,238.9**	**522.0**	**499.0**	**8,414.3**	**8,596.4**
II.	**(a) Total (Straight)**	**N**	**11,272.8**	**11,204.6**	**2,544.9**	**2,776.9**	**13,712.8**	**13,874.4**
			(84.3)	(83.5)	(74.6)	(76.7)	(81.9)	(81.8)
							@	@
			687.5	**624.9**	**-**	**-**	**608.3**	**558.2**
			(15.1)	(13.2)	-	-	(9.1)	(8.1)
			-	**-**	**2,264.6**	**2,875.7**	**1,720.8**	**1,897.5**
					(96.7)	(98.3)	(68.6)	(68.3)
		P_2O_5						
		K_2O						
	(b) Total (through NP/NPKs)	**N**	**2,104.0**	**2,218.0**	**866.8**	**841.5**	**3,023.1**	**3,084.9**
			(15.7)	(16.5)	(25.4)	(23.3)	(18.1)	(18.2)
			3,865.2	**4,098.8**	**2,129.0**	**2,044.6**	**6,097.2**	**6,296.1**
			(84.9)	(86.8)	(100.0)	(100.0)	(90.9)	(91.9)
			-	**-**	**76.5**	**49.5**	**787.7**	**882.2**
					(3.3)	(1.7)	(31.4)	(31.7)

	P_2O_5						
	K_2O						
(c) Grand Total [II(a)+II(b)]	**N**	**13,376.8**	**13,422.6**	**3,411.7**	**3,618.4**	**16,735.9**	**16,959.3**
	P_2O_5	**4,552.7**	**4,723.7**	**2,129.0**	**2,044.6**	@ **6,705.5**	@ **6,854.4**
	K_2O	**-**	**-**	**2,341.1**	**2,925.2**	**2,508.5**	**2,779.7**
Total Nutrients ($N+P_2O_5+K_2O$)		**17,929.5#**	**18,146.3 #**	**7,881.8**	**8,588.2**	**25,949.9**	**26,593.4**

(P) = Provisional. # = $N+P_2O_5$.

@ = Includes rock phosphate for direct application.

( ) = Per cent share to total nutrients.

Source: The Fertiliser Association of India. (2018). All-India Production, Import and Consumption of Fertiliser Products - 2016-17 and 2017-18 . All-India Production, Import and Consumption of Fertiliser Products - 2016-17 and 2017-18 (63rd ed., pp. I-154). New Delhi.

Annexure: 3

ALL INDIA PRODUCTION OF N AND P_2O_5 1951-52 to 2017-18 (April-March) ('000 tonnes)								
Year		N			P_2O_5			Total
		Through straight N	Through complex fertilisers$	Total*	Through straight P_2O_5	Through complex fertilisers$	Total#	Product (all fertilisers)
1951-52	I Plan	28.9	—	28.9	9.8	—	9.8	201.6
1955-56		76.9	—	76.9	12.4	—	12.4	450.4
1956-57	II Plan	78.8	—	78.8	17.6	—	17.6	492.4
1960-61		110.9	1.1	112.0	52.4	1.3	53.7	846.5
1961-62	III Plan	152.2	2.1	154.3	62.8	2.6	65.4	1,113.5
1965-66		226.9	11.0	237.9	106.2	12.6	118.8	1,781.3
1966-67		285.3	23.7	309.0	121.0	24.7	145.7	2,114.4
1967-68		374.0	28.6	402.6	157.7	49.4	207.1	2,595.6
1968-69		479.9	83.1	563.0	110.7	102.2	213.2	3,200.2
1969-70	IV Plan	625.3	105.3	730.6	103.2	120.5	223.7	3,063.5
1970-71		725.6	106.9	832.5	102.2	125.2	228.1	3,226.2
1971-72		807.4	141.8	949.2	127.6	162.7	290.3	3,741.2
1972-73		886.7	168.7	1,054.5	127.3	203.0	330.3	4,108.4
1973-74		889.4	160.5	1,049.9	126.9	197.6	324.5	4,077.4
1974-75	V Plan	1,030.1	156.5	1,186.6	134.9	196.3	331.2	4,451.1
1975-76		1,300.0	208.0	1,508.0	75.0	244.7	319.7	5,046.6
1976-77		1,608.8	253.6	1,862.4	127.0	351.3	478.3	6,328.9
1977-78		1,659.3	340.5	1,999.8	161.3	508.6	669.9	7,644.5
1978-79		1,769.8	403.2	2,173.0	186.8	591.2	778.0	7,840.3
1979-80		1,834.5	389.9	2,224.3	178.0	585.1	763.1	7,798.2
1980-81	VI Plan	1,758.7	405.2	2,163.9	196.7	644.8	841.5	7,854.5
1981-82		2,773.1	469.5	3,143.3	215.4	734.6	950.0	10,374.7
1982-83		2,938.8	490.9	3,429.7	222.1	761.6	983.7	11,024.3
1983-84		2,978.5	513.0	3,491.5	248.4	815.7	1,064.1	11,341.8
1984-85		3,291.7	625.6	3,917.3	308.2	1,009.7	1,317.9	13,101.8
1985-86	VII Plan	3,663.1	659.8	4,322.9	342.3	1,087.8	1,430.1	14,445.8
1986-87		4,635.8	776.4	5,412.2	321.0	1,340.9	1,661.9	16,989.3
1987-88		4,763.7	702.9	5,465.6	398.1	1,268.0	1,666.1	17,381.1
1988-89		5,728.8	983.6	6,712.4	471.1	1,781.4	2,252.5	21,461.0
1989-90		5,990.6	756.8	6,747.4	502.1	1,293.2	1,795.3	20,930.3
1990-91		6,148.0	845.1	6,993.1	584.0	1,467.1	2,051.1	22,231.5
1991-92		6,156.1	1,145.4	7,301.5	477.6	2,084.1	2,561.6	23,295.9
1992-93	VIII Plan	6,320.9	1,109.7	7,430.6	372.7	1,948.1	2,320.8	22,800.3
1993-94		6,376.3	854.9	7,231.2	361.2	1,513.1	1,874.3	21,684.2
1994-95		6,800.6	1,143.7	7,944.3	483.7	2,073.0	2,556.7	24,862.7
1995-96		7,558.8	1,210.0	8,768.8	513.2	2,080.3	2,593.5	26,973.9
1996-97		7,454.0	1,139.1	8,593.1	509.9	2,068.7	2,578.6	26,354.9
1997-98	IX Plan	8,806.1	1,276.9	10,083.0	613.2	2,462.9	3,076.2	30,728.4
1998-99		9,120.3	1,357.0	10,477.3	610.5	2,594.3	3,204.8	31,826.5
1999-200		9,335.0	1,538.2	10,873.2	565.2	2,882.5	3,447.7	33,192.5
2000-01		9,236.4	1,706.5	10,942.8	438.8	3,295.4	3,734.2	32,920.2
2001-02		8,925.4	1,764.1	10,689.5	400.7	3,436.6	3,837.3	32,336.3
2002-03	X Plan	8,740.9	1,766.7	10,507.6	385.2	3,522.5	3,907.7	31,922.2
2003-04		8,936.1	1,620.7	10,556.8	406.9	3,219.7	3,626.6	31,617.2
2004-05		9,503.6	1,801.3	11,304.9	393.8	3,644.6	4,038.4	34,013.8
2005-06		9,429.9	1,903.1	11,332.9	447.2	3,755.4	4,202.6	35,071.4
2006-07		9,510.2	2,014.7	11,524.9	475.5	3,964.5	4,440.0	36,122.5
2007-08	XI Plan	9,259.0	1,643.8	10,902.8	359.4	3,354.9	3,714.3	32,746.4
2008-09		9,313.6	1,586.6	10,900.2	405.4	3,011.9	3,417.3	33,006.2
2009-10		9,869.1	2,054.9	11,924.0	494.9	3,879.4	4,374.3	37,242.2
2010-11		10,223.0	1,955.6	12,178.6	594.0	3,777.2	4,371.2	38,650.0

2011-12		10,287.4	2,000.9	12,288.3	691.8	3,671.9	4,363.7	38,858.3
2012-13	**XII Plan**	10,547.2	1,690.1	12,237.3	709.6	3,116.4	3,826.0	37,606.9
2013-14		10,592.2	1,816.4	12,408.6	673.8	3,298.2	3,972.0	38,180.6
2014-15		10,522.5	1,911.2	12,433.7	676.7	3,442.2	4,118.9	38,718.8
2015-16		11,379.0	2,096.9	13,475.9	692.7	3,733.1	4,425.8	41,597.7
2016-17		11,272.8	2,104.0	13,376.8	687.5	3,865.2	4,552.7	41,427.8
2017-18		11,204.6	2,218.0	13,422.6	624.9	4,098.8	4,723.7	41,556.5

* Excludes N meant for non-agricultural purposes. # Excludes P_2O_5 through direct application of phosphate rock.

Note: Entire requirement of K_2O is met through imports. $ = DAP and NP/NPKs.

Source : The Fertiliser Association of India. (2018). All India Production of Fertiliser Nutrients - 1951-52 to 2017-18 . All India Production of Fertiliser Nutrients - 1951-52 to 2017-18 (63rd ed., pp. I-47). New Delhi.

Annexure: 4

NUTRIENT BASED SUBSIDY FOR P & K FERTILISERS - 2010-11 to 2018-19

A. NBS for nutrient N, P, K and S (Rs. per kg.)

Nutrient	2010-11		2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
	w.e.f. 1.4.2010	w.e.f. 1.1.2011	w.e.f. 1.4.2011	w.e.f. 1.4.2012	w.e.f. 1.4.2013	w.e.f. 1.4.2014	w.e.f. 1.4.2015	w.e.f. 1.4.2016	w.e.f. 1.4.2017	w.e.f. 1.4.2018
N	23.227	23.227	27.153	24.000	20.875	20.875	20.875	15.854	18.989	18.901
P	26.276	25.624	32.338	21.804	18.679	18.679	18.679	13.241	11.997	15.216
K	24.487	23.987	26.756	24.000	18.833	15.500	15.500	15.470	12.395	11.124
S	1.784	1.784	1.677	1.677	1.677	1.677	1.677	2.044	2.240	2.722

B. NBS for different P & K fertilisers (Rs. per tonne)

Fertilisers	w.e.f. 1.4.2010	w.e.f. 1.1.2011	w.e.f. 1.4.2011	w.e.f. 1.4.2012	w.e.f. 1.4.2013	w.e.f. 1.4.2014	w.e.f. 1.4.2015	w.e.f. 1.4.2016	w.e.f. 1.4.2017	w.e.f. 1.4.2018
DAP (18-46-0)	16,268	15,968	19,763	14,350	12,350	12,350	12,350	8,945	8,937	10,402
DAP Lite (16-44-0)	-	14,991[1]	18,573	13,434	11,559	11,559	-	-	-	-
DAP Lite II (14-46-0) (30.8.2011 to 29.8.2012)			18,677	13,390	-	-	-	-	-	-
MAP	16,219	15,879	19,803	13,978	12,009	12,009	12,009	8,629	8,327	9,991
MAP Lite II (11-44-0) (30.8.2011 to 29.8.2012)			17,216	12,234	-	-	-	-	-	-
TSP	12,087	11,787	14,875	10,030	8,592	8,592	8,592	6,091	5,519	6,999
SSP	4,400[2]	4,296	5,359	3,673	3,173	3,173	3,173	2,343	2,166	2,734
MOP	14,692	14,392	16,054	14,400	11,300	9,300	9,300	9,282	7,437	6,674
16-20-0-13	9,203	9,073	11,030	8,419	7,294	7,294	7,294	5,451	5,729	6,421
20-20-0-13	10,133	10,002	12,116	9,379	8,129	8,129	8,129	6,085	6,488	7,177
20-20-0-0	9,901	9,770	11,898	9,161	7,911	7,911	7,911	5,819	6,197	6,823
28-28-0-0	13,861	13,678	16,657	12,825	11,075	11,075	11,075	8,147	8,676	9,553
16-16-16-0	11,838[3]	11,654	13,800	11,169	9,342	8,809	8,809	7,130	6,941	7,239
17-17-17-0	12,578	12,383	14,662	11,867	9,926	9,359	9,359	7,576	7,375	7,691
19-19-19-0	14,058	13,839	16,387	13,263	11,094	10,460	10,460	8,467	8,242	8,596
23-23-0-0	11,386	11,236	13,683	10,535	-	-	-	-	-	-
10-26-26-0	15,521	15,222	18,080	14,309	11,841	10,974	10,974	9,050	8,241	8,739
12-32-16-0	15,114	14,825	17,887	13,697	11,496	10,962	10,962	8,615	8,101	8,917
14-28-14-0	14,037	13,785	16,602	12,825	10,789	10,323	10,323	8,093	7,753	8,464
14-35-14-0	15,877	15,578	18,866	14,351	12,097	11,630	11,630	9,020	8,593	9,529
15-15-15-0	11,099	10,926	12,937	10,471	8,758	8,258	8,258	6,685	6,507	6,786
15-15-15-09	11,259[4]	11,086	13,088	10,622	8,909	8,409	8,409	6,869	6,709	7,031
24-24-0-0	11,881[4]	11,724	14,278	10,993	9,493	9,493	9,493	6,983	7,437	8,188
24-24-0-8*	-	-	-	-	-	9,493	9,493	6,983	7,437	8,188
13-33-0-6 (30.08.2011 to 29.8.2012)	-	-	14,302	10,416	-	-	-	-	-	-
18-46-0-4 (1.4.2013 to 7.11.2013)					12,350	-	-	-	-	-
Ammonium Sulphate (20.6-0-0-23)[5]	5,195	5,195	5,979	5,330	4,686	4,686	4,686	3,736	4,408	4,501

[1] = w.e.f.1.2.2011.	[2] = w.e.f. 1.5.2010.	* = Subsidy on Sulphur not included.
[3] = w.e.f.1.7.2010.	[4] = w.e.f. 1.10.2010.	[5] = Manufactured by GSFC and FACT.

C. Per tonne additional subsidy for fortified fertilisers with secondary and micro-nutrients (as per FCO) for 2010-11 to 2018-19

Nutrients for fortification (as per FCO)	Additional subsidy per tonne of fortified fertilisers (Rs.)
Boron 'Bn'	300
Zinc 'Zn'	500

Source : The Fertiliser Association of India. (2018). Nutrient Based Subsidy for P & K fertilisers - 2010-11 to 2018-19 . Nutrient Based Subsidy for P & K fertilisers - 2010-11 to 2018-19 (63rd ed., pp. I-186). New Delhi.