

# **Growth and Equity in Fertilizer Subsidy in India**

Dissertation submitted to the Central University of Punjab

For the award of  
**Master of Philosophy**  
In  
**Economic Studies**

By  
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**May, 2017**

## Declaration

I declare that the dissertation entitled "**Growth and Equity in Fertilizer Subsidy in India**" has been prepared by me under the guidance of Dr. Naresh Singla, Assistant Professor, Center for Economic Studies, School of Social Sciences, Central University of Punjab. No part of this dissertation has formed the basis for the award of any degree or fellowship previously.

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## CERTIFICATE

I certify that Karamjit Singh has prepared his dissertation entitled "**Growth and Equity in Fertilizer Subsidy in India**", for the award of M.Phil. degree of the Central University of Punjab, under my guidance. He has carried out this work at the Centre for Economic Studies, School of Social Sciences, Central University of Punjab.

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## **ABSTRACT**

### **Growth and Equity in Fertilizer Subsidy in India**

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Key words : Fertilizer subsidy, GDP, Distribution, States, Crops,  
Farm Sizes, Disparities

The present study examines the growth and performance and distribution of fertilizer subsidy among major states, crops and different farm size holdings in India. The CAGR used to measure the annual growth rate for multiple time periods of various variables in the study. The fertilizer subsidy has increased significantly in order to make sure the availability of fertilizers at an affordable price to farmers to encourage the consumption of fertilizers and to ensure the adequate returns on investment for entrepreneurs. The study shows that fertilizer subsidy has increased in actual terms but fertilizer subsidy as a percentage share of GDP showed both increasing and decreasing trends till 2008-09 but after that the fertilizer subsidy as a percentage share of GDP has been decreasing continuously. The study also calculated the distribution of fertilizers subsidy to examine the equity which showed the disparities in the distribution of fertilizers fertilizer among major states, crops and different farm size holdings. The coefficient of variation also showed the inconsistency in the distribution of fertilizer across major states. The study concluded that there is inequality in the distribution of fertilizer subsidy because the major share of subsidy cornered by only few states, few crops and few categories of farmers.

Karamjit Singh

Dr. Naresh Singla

# Dedicated to My Beloved Parents

## **ACKNOWLEDGEMENT**

I express my sincerest gratefulness to Dr. Naresh Singla my supervisor for this dissertation. I remain honestly indebted to him, who nurtured and sculpted me as a researcher. This dissertation would not have seen the light of the day without his invaluable advice, scrupulous supervision, incessant inspiration and overall moral support.

I would like to give my special thanks to Dr. R. K. Kohli, Vice-Chancellor of the University, Prof. P. Ramarao, Dean, Academic Affairs. I would also like to thank Dr. P.K. Mishra (COC, Centre for Economic Studies), Dr. Sandeep Kaur, Dr. J.K. Parida, and Dr. J.K. Verma, for their constant help, valuable advice, suggestions, continuous inspirations and encouragement.

I am also thankful to the Registrar of the Central University of Punjab and other non-teaching staffs for their kind help and support without which this dissertation would not have been possible.

I take this opportunity to thank my friends specially to Harpreet, Mandeep and Pushap for their encouragement, support, love and affection, which always act as a catalyst for my research work. I thank them all for standing with me in every step (odd and even) of my life.

A special thanks to my parents for their blessings, encouragement, moral support. I express my heartfelt thanks to him for standing with me always as a friend, philosopher and guide.

Karamjit Singh

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## LIST OF ABBREVIATIONS

| <b>S.no</b> | <b>Full form</b>                | <b>Abbreviation</b> |
|-------------|---------------------------------|---------------------|
| 1           | Fertilizer Association of India | FAI                 |
| 2           | Government of India             | GOI                 |
| 3           | Retention Price Scheme          | RPS                 |
| 4           | Nutrient Based Subsidy          | NBS                 |
| 5           | Gross Cropped Area              | GCA                 |
| 6           | Compound Annual Growth Rate     | CAGR                |
| 7           | Coefficient of variation        | CV                  |
| 8           | Reserve Bank of India           | RBI                 |

## **Chapter-1**

### **Introduction**

#### **1.1 Introduction**

Agriculture plays an important role in economic growth of Indian economy since independence. Almost all the activities revolve around agriculture. The agriculture sector is the pillar of the economy, contributing 17.4 percent to India's gross domestic product in 2015-16 as compared to 18.3 percent in 2014-15 (Economic Survey, 2016). More essentially, more than the half of the labor force of India is involved in agriculture and allied activities as principle occupation for their livelihood and employment. As per the National Sample Survey Office, in 2011-12, the employment share of agriculture sector was 48.9 percent in India. But the growth rate of the agriculture sector is going down for past decades and it is estimated just 1.1 percent in 2015-16 (Economic Survey, 2016). In developing and developed countries, the governments come forward to intervene in agriculture with a vision to attaining a wide range of economic and social objectives. The reasons for government intervention are inverse and varied. Some of the of cited reasons for the intervention are self-sufficiency, employment generation, support to small-scale producers to use modern technologies and inputs, reduction of price instability and development of farm household's income. In India, the Sequential Five Year Plans have laid emphasis on self-sufficiency and self-reliance in the production of food grains and intensive efforts in this direction have resulted in the significant increase in agriculture production and productivity. The main source of growth in agricultural production and productivity is through improvement in yield per unit of cropped area through improved seeds, fertilizers, irrigation facilities, availability of rural credit, product price support and other formal and policy interventions. The yield of food grains has increased to 2056 kg per hectare in 2015-16 from 1380 kg per hectare in 1990-91 and the production of food grains has increased from 176.39 million tonnes in 1990-91 to 252.22 million tonnes in 2015-16 (RBI,2016). The production of oilseeds, sugarcane, rice and wheat has also increased over the period reaching 25.30 million tonnes, 352.16 million tonnes, 104.32 million tonnes and 93.50 million tonnes respectively in 2015-16 (RBI,2016) The fertilizer consumption has been playing important role to

enhance the production of these crops because these crops are mostly fertilizer intensive.

Fertilizers are the vital essentials of modern technology and have been playing an imperative role in Indian agriculture. During the last decades of the 1970s and 1980s, food grain production and fertilizer consumption registered substantial growth but in the 1990s, there has been a slowdown in growth rate of food grains production and fertilizer consumption. This slowing down in agriculture sector happened in almost all states and almost all sub-sectors such as horticulture, livestock, and fisheries where the growth was estimated to be high. Though, during last decades, there has been some improvement in their growth but still less than expected. In order to achieve 4 percent growth in agriculture sector during the 12<sup>th</sup> Five Year Plan, there is a need to sustain this momentum and put this vital sector on a high growth path. With the limited arable land resources and burden of increasing future population, development of new technologies and efficient use of new technologies and input will continue to play an important role in sustaining food security in India. Subsidizing inputs such as fertilizers and providing irrigation facilities has, encouraging increased agricultural production in order to meet the growing demand, has been the key element of India's food policy (Rabbi, 1986). The arable land in India has been declining continuously. It has been declined to 157 million hectares in 2013 from 163.82 million hectares in 1991 (World Bank, 2016). So, the only way to improve food security is to increase the yield of crops through the precise use of fertilizers along with other inputs like high yielding variety seeds, irrigation, etc. using the limited arable land.

In order to increase the production and productivity of agriculture sector, more importantly of food grains, fertilizer consumption has been increasing since last decades. India ranks second in the consumption of fertilizers after China in the world and ranks fifth in production of fertilizers. The share of India in the world consumption and production of fertilizers was 14.8 percent and 5.2 percent respectively in 2014-15 (Agrium, 2016). The consumption of fertilizers in India has increased to 25576 thousand tonnes in 2014-15 from 12546 thousand tonnes in 1990-91. The production of fertilizers has also increased but its increase is less than the consumption of fertilizers. Increased fertilizer consumption has been helpful in the success of the green revolution and helped to improve agricultural productivity and farm incomes in the country.

With the increase in fertilizer consumption, the global prices of fertilizers have also increased. Due to the increased fertilizer prices, the farmers are facing the problems to use fertilizer in the field. So, the government is providing the subsidy on fertilizers to encourage the consumption of fertilizers.

## **1.2 Subsidy**

A subsidy is a form of financial assistance or supports drawn-out to an economic sector, institution, business or individual, generally with the objective of promoting economic and social policy (Myres & Kent, 2001).

There are two different types of subsidies:

(a) Welfare Oriented Subsidies

(b) Growth Oriented Subsidies

To reduce the costs of fuel and food is an example of welfare oriented subsidy. On the other hand, financial support given by the government to companies and farmers for working in certain industries is an example of growth oriented subsidies. These subsidies encourage companies to function in industries that may have high business costs but are still important for the public and the economy.

### **1.2.1. Major Subsidies offered by Indian Government**

The government of India mainly offers subsidy on food, fertilizers, and petroleum. The subsidy bill on food, fertilizer, and petroleum is projected at Rs 2,31,781.61 crore (GOI,2016) for 2016-17.

**Food Subsidy:** The government of India offers food subsidy with the objective to make sure access to food for those who cannot afford a basic meal. The government outlay on food subsidy has significantly increased in India since the past decade. The government of India has allocated Rs 1,34,834.61 crore for food security for 2016-17 fiscal year (GOI,2016).

**Fertilizer Subsidy:** The fertilizer subsidy is given to the farmers with an objective to provide fertilizers to farmers at affordable prices and to make sure returns on investment for entrepreneurs. The fertilizer subsidy is the third largest subsidy offered by the government and it has accounted for Rs 70000 crore (GOI, 2016) for 2016-17 fiscal in Union Budget.

**Petroleum Subsidy:** The government of India also allocates subsidy on fuel. It included diesel, petrol, and kerosene as well LPG. The amount of Rs 26947

crores (GOI, 2016) has been allocated for petroleum subsidy for the current fiscal year.

### **1.3 Agricultural Subsidies in India**

Agriculture is the crucial sector of the Indian economy. But the growth of this sector is going slow since past decades. In order to accelerate the growth of agriculture and allied activities, the government of India has been providing different types of subsidies to the agriculture sector. An agricultural subsidy is not peculiar to India; all over the world farmers are protected and in developing countries, through these farmers, the benefits of a stable agricultural growth are extended to the consumers of the food grains (Rabbi, 1986). Following are the main subsidies given to agriculture sector-

1. Fertilizer Subsidy
2. Irrigation Subsidy
3. Power Subsidy
4. Seed Subsidy
5. Credit Subsidy
6. Price Subsidy

All these subsidies are given by central and state governments to farmers with the objectives to improve the output of agriculture and to improve the income of farmers. Fertilizer subsidy, given by the central government, is playing very important role in the development of agriculture sector.

### **1.4 Fertilizer Subsidy in India**

Fertilizer is one of the major input uses to increase the agriculture production and productivity. At producer and farm level, the prices of fertilizers are determined by the government in the most of the countries and such government originations mostly have the basic purposes (1) to make available fertilizers to farmers at reasonable prices in order to encourage higher consumption of fertilizers (2) to increase agriculture production and productivity and (3) to encourage domestic production and to make sure returns on investment for entrepreneurs. The government of India introduced Retention Price-cum Subsidy Scheme (RPS) in November 1977 for nitrogen fertilizers and extends to complex fertilizers in February 1979 in order to provide fertilizers to farmers at affordable prices and to make sure adequate returns on the investments to entrepreneurs. The RPS scheme also aimed at

assuring an equitable return on investment and to interact further investment in the fertilizer sector. Under the RPS, the difference between the retention price<sup>1</sup> and notified sale price minus the distribution margin is paid as subsidy to the individual manufacturing units.

The introduction of high yielding variety of seeds in mid-sixties and rational policies implemented in mid-seventies and eighties led to growth in the consumption of fertilizers and agriculture production over the years. New Pricing Scheme for urea units was implemented in April 2003, with an objective to bring transparency, equality, and proficiency and thus decrease the cost of production. The government of India fixed subsidy on fertilizer nutrients 'N'-Nitrogen, 'P'-Phosphorous, 'K'-Potash and 'S'-Sulphur contents present in the fertilizer which is known as Nutrient Based Subsidy (NBS) from April 2010. Under the NBS scheme, the selling prices of fertilizers at farm gate level will be deregulated and determined by market powers and the retail price of subsidized fertilizers will be decided by the companies. Under this policy, the subsidy on Phosphatic and Potassic (P&K) fertilizers are declared by the government on annual basis for each nutrient on per kg basis which is converted into subsidy per tonne depending upon the nutrient content in each grade of the fertilizer. NBS would encourage the balanced use of plant nutrients and thus decline the demand and increase agricultural production. The Cabinet Committee on Economic Affairs, chaired by the Prime Minister has approved fixation of Nutrient Based Subsidy (NBS) rates for Nitrogen (N), Phosphatic (P) and Potassic (K) fertilizers for the year 2016-17 (Table 1.1).

Table 1.1:  
Per Kg Subsidy Rate (in Rs.)

| Year    | N      | P      | K      | S     |
|---------|--------|--------|--------|-------|
| 2016-17 | 15.854 | 13.241 | 15.470 | 2.044 |

Source: Press Information Bureau (2016)

Even though considering the fertilizer subsidy, the government is providing subsidy on urea and decontrolled (P&K) fertilizers. A sizable share is allocated to the fertilizer subsidy in the budget. The following table presents the detail

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<sup>1</sup> . Retention price is the normative cost of production of urea is determined the government plus 12 percent post cost return on net worth (Department of Fertilizer, GOI)



on expenditure met by the government in order to subsidize fertilizers during the period 1990-91 to 2015-16.

Table: 1.2

Details of Expenditure of Subsidy/Concession during the Year 1990-91 to 2015-16. (Rs. In crore)

| Year    | Subsidy on P&K Fertilizers | Subsidy on Urea | Total Subsidy |
|---------|----------------------------|-----------------|---------------|
| 1990-91 | -                          | 4389            | 4389          |
| 1991-92 | -                          | 4800            | 4800          |
| 1992-93 | 340                        | 5796            | 6136          |
| 1993-94 | 517                        | 4399            | 4916          |
| 1994-95 | 528                        | 5241            | 5769          |
| 1995-96 | 500                        | 6235            | 6735          |
| 1996-97 | 1672                       | 5906            | 7578          |
| 1997-98 | 2596                       | 7322            | 9918          |
| 1998-99 | 3790                       | 7806            | 11596         |
| 1999-00 | 4500                       | 8744            | 13244         |
| 2000-01 | 4319                       | 9481            | 13800         |
| 2001-02 | 4504                       | 8091            | 12595         |
| 2002-03 | 3225                       | 7790            | 11015         |
| 2003-04 | 3326                       | 8521            | 11847         |
| 2004-05 | 5142                       | 10737           | 15879         |
| 2005-06 | 6596                       | 12793           | 19389         |
| 2006-07 | 10298                      | 17721           | 28019         |
| 2007-08 | 16934                      | 26385           | 43319         |
| 2008-09 | 65555                      | 33940           | 99495         |
| 2009-10 | 39452                      | 24580           | 64032         |
| 2010-11 | 41500                      | 24337           | 65837         |
| 2011-12 | 36108                      | 37683           | 73791         |
| 2012-13 | 30576                      | 40016           | 70592         |
| 2013-14 | 29427                      | 41824           | 71251         |
| 2014-15 | 24670                      | 47400           | 72070         |
| 2015-16 | 22469                      | 50500           | 72969         |

Source: Fertilizer Association of India, 2016

It is noted from Table 1.2 that the amount of subsidy distributed during the year 1990-91 was Rs 4389 crores and it has increased to Rs 72969 crores in 2015-16 in order to make available fertilizers to farmers at affordable prices and to ensure the adequate returns on the investments to the producers.

### 1.5 Statement of the Problem

Governments of both developing and developed countries offer many kinds of subsidies to achieve various social and economic objectives. In India also

government offers subsidies for the development and welfare of various sections of the society. Fertilizer subsidy is one of the most prominent instrument to develop the agriculture sector in terms of increasing agriculture production and productivity and to increase the income of farm households. But, the problem here is that fertilizer subsidy has concentrated largely to the fertilizer producers. Moreover, there is an unequal distribution of fertilizer subsidy among the various size groups of farmers, among various crops as well as among various states due to many socio-economic and political reasons. In India, more than 82 percent of the holdings are of small and marginal farmers. The equity in fertilizer subsidy can have implications for the viability of this large chunk of farmers. This study is, therefore, attempted to evaluate the trends in fertilizer subsidy and mainly to check whether fertilizer subsidy is distributing equally to all size groups of land holding, all states, and various crops or not.

### **1.6 Importance and Objectives of the study**

The study of fertilizer subsidy in India has achieved a high importance during the recent period. Popularized during the Green Revolution of the 1960s and 1970s, fertilizers helped to boost crop yields and transformed India into a nation that could feed itself. India ranks second in the consumption of fertilizers in the world after China. So, the government of India has been providing subsidized fertilizers to farmers to encourage the consumption of fertilizers. Besides, looking the trends in fertilizer subsidy at the national level, it is important to evaluate the distribution of subsidy at the state level, across the crops, and across different farm size holding. The study aimed at the issue, is there equity in the distribution of fertilizer subsidy across regions, crops and different farm sizes? Finding out whether all states, crops and different farm sizes benefiting equally from fertilizer subsidy or only concentrated by powerful interest groups, on relatively few crops and on a relatively large group of farmers will have important policy implications for the balanced growth of farm sector.

The present study is conducted on the basis of following objectives:

- 1) To study the growth in fertilizer subsidy in India during the period of 1990-91 to 2015-16;
- 2) To examine the share of major states in the fertilizer subsidy;

- 3) To assess equity in the distribution of fertilizer subsidy among different farm categories and major crops;
- 4) To suggest suitable policy suggestions for the welfare of the small and marginal farmers in the presence of fertilizer subsidy.

### **1.7 Hypothesis**

- Fertilizer subsidy is increasing over a period of time, thus benefitting the farmers equally.
- The fertilizer subsidy is distributed equally among all crops.
- There are wide variations in fertilizer usage across the states and therefore, fertilizer subsidy varies across different regions.

### **1.8 Chapter Scheme**

The present study has been divided into six chapters. The first chapter of the study provides introduction to the concept and role of fertilizer subsidy. The second chapter is related to the literature review of past studies conducted by various national and international authors. In the third chapter, database and the methods to analyze the data are mentioned in detail. The analysis of the study is carried out in chapter 4 and 5. The fourth chapter is the first part of the analysis of present study which describes the growth and performance of fertilizer subsidy in India after 1991. The fifth chapter describes the distribution of fertilizer subsidy across the major states, crops and different size groups of land holding. The last and the sixth chapter of the study describes the summary and policy suggestions in the present study.

## Chapter-2

### Review of Literature

The present chapter of the study describes the review of literature of the past theory and practice which is necessary when conducting any research work. It makes available information of the work done in the related area and the theoretical framework on which the proposed solution of the problem can be based. Thus, the relevant literature was reviewed in detail to understand the nature and extent of the work done on the related topic. An effort is made to examine the nature of the work done during past in the related field. The brief review of literature has been given as under:

**Rai et al., (1982)** in their study, made a comparative analysis of the programs of price support and fertilizer subsidy for attaining self-sufficiency in the country. They assessed that the total cost to the government in the case of price support program was nearly five times than that of fertilizer subsidy. Based on the total social benefit and cost of the two programs, the fertilizer subsidy program did better. Only the net savings in foreign exchange were higher in the case of price support program as compared to fertilizer subsidy. Thus, on the whole, fertilizer subsidy program was found to be more effective in attaining self-sufficiency.

**Yadav et al., (1982)** made an attempt to determine the impact of Agricultural subsidies on the incomes of small and marginal farmers in Ajiwal block in Etawah district of Uttar Pradesh in 1980. In this study, data was collected from 30 beneficiaries and 30 non-beneficiary small and marginal farmers from five villages. Data were collected randomly. The authors compared the beneficiary and non-beneficiary farmers and found due to subsidizing the income of farmers increased. The study revealed that income beneficiary farmers were about 70 percent more than of non-beneficiary farmers. At the end, the author suggested the provision of subsidy for small and marginal farmers only.

**Sinha and Prasad (1982)** in their study, "Impact of Farm Subsidies on Production, Income, and Employment in Bihar: A Case study in Masahara Block, District: Muzaffarpur, Bihar", made an effort to examine the impact of subsidies on agricultural productivity, income, and employment. The study

revealed that marginal farmers are not benefited much from the subsidies for irrigation and agricultural inputs because of their resourcelessness and small size of land holdings. It was found in this study that cropping intensity on beneficiary farms increased after the use of subsidy. Farm productivity was found to be higher in all categories of farm households after the use of subsidy. The authors also perceived that the highest increase in income was shown by the farmers in the size group of less than one acre.

**Sharma (1982)** observed the impact of agricultural subsidies on national income and the production of the agriculture sector. He used the time period from 1970-71 to 1981-82 and a general equilibrium model to fulfill the objective of his study. The study exposed that during this period, agricultural subsidies affected the national income and agriculture production positively. He assessed that the coefficient of fertilizer subsidy was not statistically significant, even at the low level of probability. The study suggested that money to different subsidies should be allotted according to the productivity of various subsidies and in developing country, there may be a possibility of misapplication of agricultural subsidies and consequently, their continuance finally led to inflationary pressure in the economy.

**Gupta (1984)** made an attempt to examine the agricultural subsidies in India from 1970-71 to 1982-83. The study revealed that during this period, the use of agricultural subsidies increased at a faster rate but there was a large inter-state inequality. It was observed in the study that Punjab, Uttar Pradesh, and Maharashtra used about half of the total agricultural subsidies but accounted for only 30 percent of the gross cropped area of the nation. While Rajasthan, Madhya Pradesh, and Orissa received just 9 percent of agricultural subsidies but claimed 27 per cent of the gross cropped area of the nation. It was also revealed in the study that there was an inter-state disparity in the use of agricultural subsidies per hectare of gross cropped area. The use of agricultural subsidies per hectare of gross cropped area was found to be the highest in Punjab (Rs. 216.18) and lowest in Rajasthan (Rs. 12.45). The study concluded that the benefits of fertilizers subsidies were found to be biased against the small and marginal farmers and the author suggested that more

agricultural subsidies should be given to poor states and small and marginal farmers to encourage them to utilize more inputs.

**Rabbi (1986)** conducted a study to measure the fertilizer subsidy. The study has conducted to analyze the growth of fertilizer industry in the pre-subsidy period and post-subsidy period. The study observed the positive impact of fertilizer subsidy on fertilizer industry as well as farm sector. In the post-subsidy period, the production and consumption level of fertilizer has increased. Average consumption of nutrients per hectare and average yield per hectare of fertilizer-intensive crops (paddy and wheat) has also increased after started the fertilizer subsidy. The study reveals that growth rate of fertilizer consumption is higher in countries with subsidies than countries without subsidy. The study concludes that any attempt to increase farm gate price of fertilizers for reducing subsidies can have a harmful impact on the output of food grains and yield per hectare.

**Singh and Chand (1986)** in their study, "Inequalities in the use of Agricultural Input Subsidies in India", examined the growth, regional disparity and chronological changes in the use of agricultural input subsidies. The results of the study revealed that the benefits of fertilizer input subsidy were not in favor of the small and marginal farmers. It was observed in the study that there were large variations in the distribution of agricultural input subsidies among the different size groups of farmers. The share of small and marginal farmers in total fertilizer subsidy was just 30 per cent. They suggested that more input subsidies should be given to small and marginal farmers, which will help them as well as encourage the poor regions to utilize more inputs at lower costs.

**Gulati (1989)** estimated the distribution of input or agricultural subsidies across states in India. This study covered three major inputs of modern agriculture: fertilizers, irrigation, and electricity. The study showed that total input subsidy, averaged over seven years, 1980-81 to 1986-87, turns out to be about Rs. 9,000/- crores at all India level which is near about 17 percent of net value added in Indian agriculture. The author examined that there is a disparity in the distribution of agricultural subsidies as well as in Gross Cropped Area. The study revealed that at the state level, the percent share of Uttar Pradesh, Andhra Pradesh, and Punjab in total subsidy accounted for about one-third

while they account for only one-fourth of all total gross cropped area. The study also revealed that Input subsidies as a percentage of State Domestic Product (SDP) in agriculture averaged over 1980-81 to 1986-87, are highest for Tamil Nadu (31.7 per cent), followed by Punjab (24.5 per cent), Haryana (23 per cent), Andhra Pradesh (21.3 per cent) and Uttar Pradesh (18.2 per cent).

**Khatkar et al., (1992)** examined the extent and impact of input subsidies on Indian agriculture. They observed that the input subsidies have increased over the years mainly to neutralize the boom of prices and to encourage the use of modern inputs for increasing agricultural production. They found in the study that the agriculturally developed states got the larger share of fertilizer subsidy, which constituted about 60 per cent of the total fertilizer subsidy. They found the similar trend in case of irrigation, electricity and credit subsidy. They were of the view that the fall in per hectare returns ranging from 10 per cent to 59 per cent attentions against the removal of input subsidies. They concluded that to withstand the present pace of growth of agricultural production there is a need to continue the input subsidies by controlling leakages.

**Sengupta (2004)** identified that India is the third largest producer and consumer of fertilizer in the world. The world fertilizer consumption is 142 million tones and growing at 2 per cent per annum. International trade in fertilizer accounts for approximately 62 million tonnes out of current world consumption of 142 million tonnes i.e. approximately 43 per cent of the total consumption. In order to make sure the availability of fertilizers at an affordable price to farmers, the major thrust of Indian Fertilizer Policy is based on subsidy. The study found that the developed states have got a higher share of fertilizer subsidy, which constituted about 60 per cent of total fertilizer subsidy and the parallel trends shown in the case of irrigation and electricity subsidy. The study revealed that on an average, the total input subsidies constituted about 16 per cent of the gross domestic product. The author suggested that to sustain the present pace of growth of agricultural production, there is a need for continuing the input subsidies by controlling leakages.

**Singh (2004)** made an attempt to study equity in the distribution of fertilizer subsidy. She examined the issue of inter-crop, inter-regional and inter-class

equity in fertilizer distribution in terms of shares of different farm size holdings, crops and states in total fertilizer consumption as well as per hectare fertilizer consumption across the farm. Data has been taken from the Agricultural Input Survey carried out along with the Agriculture census of 1991-92. The study argues about the equity issue in fertilizer subsidy distribution only. She found that interstate disparity in fertilizer consumption remains high, however, it has been decreasing over the year. The more significant result is that there prevails a fair degree of inter-class equity in the distribution of fertilizer subsidy, opposing to the widely prevailing impression. The study also reveals that there is a high degree of inequality in crop wise distribution of fertilizer subsidy. Paddy and wheat account for over half of the fertilizer subsidy. Likewise, a uniform approach to reduction of all types of subsidies is justified. She suggested that a well throughout property sequenced gradualist and regionally differentiated approach to reduction of subsidy needs to be implemented.

**John (2006)** discussed in his study that on the one hand, there is a need to get rid of the subsidies, on the other if they were all withdrawn at once, thousands of farmers would go out of business. Farm subsidies came in with Roosevelt's New Delhi Policies, the same thing that gave us welfare payments to the poor. Agricultural subsidies are geared to help farmers keep their production cost low and governments cannot cut all welfare because thousands of people would be malnourished. Both systems are going to have to be drawn down regularly until hopefully they can be done away with altogether without harm to people and our country. The author in his study recommended that there should be a shift in the way subsidies are handed out, that would help small size category farmers using sustainable farming practices to make a decent living off of the land. This would tend to encourage more diversity of crops, better use of farmland and higher quality of production available to the consumer.

**Gulati (2007)** studied the trends in government subsidies and investments in and for Indian agriculture. The author developed a theoretical framework and model to evaluate the impact of different subsidies and investments on agricultural growth and poverty reduction and also presented several reform options with regard to re-prioritizing government expenditure and improving institutions and governance. The study revealed that initial subsidies in



fertilizer and irrigation have been essential for small farmers to adopt modern technologies. Small farmers are frequently losers in the initial adoption stage of a new technology since prices of the agricultural products are typically being pushed down by greater supply of products from large farms, which adopted the new technology. The author has drawn several policy lessons in this study. Agricultural input and output subsidies have shown to be unproductive, fiscally unsustainable, and ecologically unfavorable in recent years and contributed to increasing disparity among the rural Indian States. The author suggested in his study that to sustain long-term growth in agricultural production and consequently make available a long-term solution to reduce poverty, the government should cut down subsidies of fertilizer, irrigation, power and credit and increase investments in agricultural research and development, rural, infrastructure, and education.

**Sud (2009)** suggested the policy of direct transfer of fertilizer subsidy to farmers is misconceived. He examined that per-hectares subsidy on marginal farms is more than per-hectare subsidy on large farms. The study revealed that the average subsidy was the highest (Rs 916.2 per hectare) on marginal farms and the lowest (Rs 405.8 per hectare) on large farms. It was observed in the study that the percentage share of marginal farmers in the total fertilizer subsidy was the highest, followed by small farms. Though, state-wise distribution of fertilizer is skewed. The study found that more than half of the total fertilizer subsidy is restricted by five top fertilizer consuming States-Uttar Pradesh, Andhra Pradesh, Maharashtra, Madhya Pradesh and Punjab. Because these states grow fertilizer-intensive crops, such as rice, wheat, cotton, and sugarcane. However, the percentage share of these states in the total fertilizer use is falling. The other major beneficiary states are Gujarat, Karnataka, West Bengal, Bihar, Haryana and Tamil Nadu. The percentage share of these states in total fertilizer subsidy increased from 31.7 percent in 1992-93 to 36 percent in 2007-08. The study revealed that over half of the total subsidy cornered by rice and wheat crops. Rice is the biggest beneficiary of fertilizer subsidy, receiving 32.2 percent of the total in 2001-02 followed by wheat (20.3%), sugarcane (6.3 percent) and cotton (5.9 per cent). The author has concluded that a reduction in the subsidy is probable to have a negative effect on agricultural production and income of small and marginal farmers, as

they don't benefit from higher output prices but do benefit from lower input costs.

**Ammani et al., (2010)** using a multiple regression model conducted a study on effects of liberalization of the fertilizer sector in Nigeria given that there existed dual fertilizer distribution channels. The study found that there was a decrease in total maize production after the Government liberalized the fertilizer sector in 1997, they concluded that the maize production reduced as a result of a decrease in fertilizer use during that period. This points to liberalization having left farmers to the market forces, which resulted in reduced use of fertilizer by farmers.

**Halmandage and Munde (2010)** specified that subsidies are the most influential tool for manipulating or balancing the growth rate of production and trade in various sectors for an impartial distribution of income for the protection of the weaker segments of the society. The support and procurement prices of major agricultural production are some of the important measures which are done to defend the interest of farmer and a weaker segment of consumers. Substantial additional growth in agricultural production is needed to meet basic necessities for a larger growing population. It is also needed to generate agricultural surplus required for economic development with emphasis on employment equity. The agricultural production increased in initial period gradually after that the fertilizer subsidies were reduced, the overall economy affected. The government policy of subsidy is mainly for protection of weaker sections and marginal farmers. The author observed that if the government of India withdraws the subsidy of fertilizer, it will affect the overall economy, agricultural production, equity of giving me to regional imbalance, problems like employment and poverty.

**Sharma and Thaker (2010)** conducted a study on fertilizer subsidy focused on the issues whether fertilizer subsidy is going to the farmers or to the industry and is there equity in the distribution of fertilizer across regions, crops and difference farm sizes. The study shows that the share of fertilizer subsidy in total subsidy allocated by the government of India has increased over time. They observed that interstate disparity in the distribution of fertilizer subsidy is

still high, however it has declined over the years. Fertilizer subsidy is concentrated in a few states namely Uttar Pradesh, Andhra Pradesh, Maharashtra, Madhya Pradesh and Punjab. The study reveals that there is inequality in the crop wise distribution of fertilizer subsidy because over half of the total fertilizer subsidy is cornered by wheat and paddy crops. An inverse relationship between farm size and proportion of fertilizer area to gross cropped area was witnessed during the years and the intensity of fertilizer use was significantly higher on small and marginal farmers compared to large farms was observed in the study. The study found that the fertilizer subsidy is equitably distributed among different land size holdings, the small and marginal farmers have a larger share in fertilizer subsidy in comparison to their share in cultivated area. The study concluded that a reduction in fertilizer subsidy likely to have an adverse impact on farm production and income of small and marginal farmers.

**Kaur and Sharma (2012)** in a research paper “Agricultural Subsidies in India Boon or Curse” established a relation between subsidies including fertilizers, electricity, and irrigation distributed in zone and productivity of zone in India. During pre as well as post economic reform periods, at national level as well as zone level, the total subsidies have increased in absolute terms, while at India level as well as in south, west, north, north-east zones, productivity has also increased except in 1996-97 and in east zone pre-economic reform period (1990-91), it is observed that in India, subsidies have increased 8.32 times, while productivity increased by only 1.1 times. While comparing the same time period, as zone level analysis shows that in west zone, subsidies have increased the maximum number of times (11.95) followed by south zone (8.93 times), east zone (7.67 times), north zone (7.49 times) and north-east zone (6.28 times). In 1990-91, the south zone has got near about three times of total subsidies and has near about two times of productivity; while in 2006-07, it has received 3.37 times of subsidies and about two times of productivity as compared to east zone.

**Sharma (2012)** conducted a study to analyze who benefiting from current system of fertilizer subsidy and to estimate the impact of policy changes and proposed removal of fertilizer subsidies on fertilizer prices, consumption, and farm income. The study showed that fertilizer subsidy has increased significantly. The study revealed that small and marginal farmers have a

significant share in fertilizer subsidy than their share in total cropped area thus small and marginal farmers are benefiting more from fertilizer subsidy than large farmers. The study also reveals that per hectare use of fertilizer is higher in among small and marginal farmers. It has been observed that over a half of total fertilizers consumed by small and marginal farmers. The findings of the study show that withdrawal of subsidies will make farming unprofitable, particularly for small and marginal farmers and in less developed states/regions. The study suggests that there is a need for a periodic and affordable increase in fertilizer prices, particularly urea, to contain subsidy and promote balanced use of nutrients.

**Mala (2013)** made an attempt to understand the fertilizer scenario in India. The author observed that India made remarkable gains in the field of agriculture production. The introduction of HYV's and hybrid varieties brought optimism about fertilizer response superiority of modern varieties. The total nutrient consumption (N+P<sub>2</sub>O<sub>5</sub>+K<sub>2</sub>O) has increased and touched the level of 264 lakhs million tonnes during 2009-10. Since the rain-fed areas, which constitute 70 percent of cultivated areas, consume only 20 percent of total fertilizers, the government has been taking steps in recent years to increase the consumption of fertilizers in these areas. The use of fertilizers is affected by a number of factors such as irrigation, high yielding variety seeds and the size of farm credit. The study observed that efficiency of fertilizer use could be improved through fertilization practices that include an application of macronutrients and micronutrients according to crop requirements. The study suggests that an adequate supply of credit for farmers and distributors to ensure the availability of fertilizers when and where they are required.

## Chapter-3

### Database and Methodology

Various data sources, choice and construction of various variables and the techniques adopted for the analysis are the major components covered under methodology. The present chapter describes the various sources of data used in the study and methodology to analyze the data.

#### 3.1. Period of Study

The present study attempted to analyze the fertilizer subsidy after economic reforms. The study divided into two parts, in first part trends in fertilizer subsidy and its impact on consumption and agriculture production and productivity measured in the study for the period of 1990-91 to 2015-16 and in the second part of the study, distribution of fertilizer subsidy is measured for the period of 1991-92 to 2011-12.

#### 3.2. Database

The present study is entirely based on secondary data. Various types of time-series and cross-sectional data have been used in this study. The secondary data on different variables used in the study is taken from different sources. Following are the sources which have used to take secondary data:

- Fertilizer Association of India
- Department of Chemical and Fertilizer, GOI
- Economic Survey of India
- Reserve Bank of India
- Agrium`s Fact Book
- All India Reports on Input-Survey
- World Bank

#### 3.3. Methodology

The present study is related to fertilizer subsidy in India from 1990-91 to 2015-16. In this study, subsidy on fertilizer is discussed during the post-economic reforms period. This study is attempted to assess the trends in fertilizer subsidy and to assess its impact on fertilizer consumption, production and productivity of food grains; and to analyze the distribution of fertilizer subsidy among various sections of the country. The fourth chapter of present study describes the trends and performance of fertilizer subsidy. To analyze the trends in

fertilizer subsidy, data was taken from the annual reports of fertilizer department of India and Economic Survey of India and to measure the fertilizer subsidy as a percent share of gross domestic product, gross domestic product is used which is taken from the Economic Survey, 2015-16. The impact of fertilizer subsidy on consumption and production of fertilizer and on the food grain production and productivity was measured in this study using the time series data taken from Fertilizer Association of India, Directorate of Economics and Statistics and Reserve Bank of India. The Compound Annual Growth Rate (CAGR) was used to measure the annual growth rate of various variables taken in the study.

The distribution of fertilizer subsidy in India was measured to understand who benefits from the subsidy. This part of the study was divided mainly into three parts (1) Distribution of fertilizer subsidy across major states (2) Distribution of fertilizer subsidy among different farm size holdings and (3) Distribution of fertilizer subsidy among major crops. The distribution of fertilizer subsidy has been examined in terms of the shares of different farm classes, crops, and states in total fertilizer use as well as in terms of per hectare fertilizer use on different categories of farms. The assumption is that fertilizer subsidy is distributed in proportion to fertilizer used. To measure the share of major states in total fertilizer subsidy, 19 states of India have been taken. The data on the share of states in total fertilizer subsidy was not available directly so it was measured indirectly on the basis of total fertilizer (N+P+K) consumption in the state. To analyze the distribution of fertilizer subsidy among different farm size holding, operational holdings were divided into five groups such as Marginal, Small, Semi-medium, Medium and Large. This data was also computed on the basis of total fertilizer consumption by size group. In the distribution of fertilizer among major crops, eight major fertilizer-intensive crops namely paddy, wheat, cotton, sugarcane, maize, jowar, bajra, and groundnut have been taken in the study. The share of subsidy across the crops in the study was also calculated on the basis of fertilizer used to grow that particular crop.

### 3.4 Key Terms

#### 3.4.1 Fertilizer

Fertilizer is a natural or chemical element which is spread on the land or given to plants, to make plants grow well.

#### 3.4.2 Operational Holding

All land which is used wholly or partially for agriculture production and is operated as one technical unit by one person alone or with others without regard to the title, legal farm size or location refers to operational holding. Operation holdings are grouped into five size groups given below:

| Operated Area                    | Size group of holding |
|----------------------------------|-----------------------|
| Below 1 ha.                      | Marginal              |
| 1 ha. and above but below 2 ha.  | Small                 |
| 2 ha. and above but below 4 ha.  | Semi-medium           |
| 4 ha. and above but below 10 ha. | Medium                |
| 10 ha. and above                 | Large                 |

Source: GOI, 2011-12

#### 3.4.3 Gross Cropped Area (GCA)

The total area is sown once and/or more than once in a particular year, i.e. the area is counted as many times as there are sowing in a year. This total area is known as gross cropped area. The GCA is used in the study to calculate the per hectare consumption of fertilizer among major states and different size groups of land holding.

#### 3.4.4 Net Sown Area

It is the total area sown with crops and/or chards counting area sown more than once in the same year only once. The net sown area is used in present study to measure the per hectare fertilizer subsidy.

#### 3.4.5 Gross Domestic Product (GDP)

Gross domestic product is the monetary value of all the finished goods and services produced within a country's borders in a specific time period. In this study GDP at current prices is used to measure the fertilizer subsidy as a percentage of GDP.

The following formula is used to measure the fertilizer subsidy as percentage of GDP

$$\text{Fertilizer subsidy as per cent share of GDP} = \frac{\text{Total Fertilizer Subsidy}}{\text{GDP at currnt prices}} \times 100$$

#### 3.4.6 Per hectare subsidy

It represents the ratio of total fertilizer subsidy to net sown area. Following formula was used to find the per hectare subsidy in the study

$$\text{Per Ha. Subsidy} = \frac{\text{Total Fertilizer Subsidy}}{\text{Net Sown Area}}$$

#### 3.4.7 Yield

Yield is the measurement often used for a cereal, grain or legume and is normally measured in metric tonnes per hectare or kilogram per hectare.

#### 3.4.8 Irrigated and Unirrigated Land

Agricultural irrigated land refers to agricultural area purposively delivered with water, including land irrigated by controlled flooding. On the other hand, unirrigated land is the supply of land with water by artificial resources such as by diverting streams, flooding, or spraying

#### 3.4.9 Equity

Equity implies giving as much advantage, consideration or latitude to one party as, it's given to another along with the economy, effectiveness, and efficiency. Equity is essential for ensuring that extent and cost of funds, goods and services are fairly divided among their recipients.

### **3.5 Analytical Tools**

#### 3.5.1 Coefficient of Variation

It is a relative measure of dispersion based on standard deviation. The coefficient of variation was used to test the consistency. There is an inverse relationship between the coefficient of variation and consistency. More the value of the coefficient of variation lesser is the consistency and vice versa.



It is determined as follows:

$$C.V. = \frac{\sigma}{\bar{X}} \times 100$$

*C.V. = Coefficient of Variation*

*$\sigma$  = Standard Deviation*

*$\bar{X}$  = Mean*

### 3.5.2 Compound Annual Growth Rate (CARG)

The compound annual growth rate (CAGR) is a suitable measure of growth over multiple time periods. Compound Annual Growth Rate is a year-over-year growth rate of a variable over a specified period of time. The CAGR has been worked out in the analysis of the different variables used in the study by using the following formula

$$CAGR(\%) = [\logest(Y_{t1} + Y_{t2} + Y_{t3} + \dots + Y_{tn}) - 1] \times 100$$

*Y = Variable under Study*

*T = Time*

## Chapter 4

### Growth and Performance of Fertilizer Subsidy in India-A Post-Reform Analysis

#### 4.1 Trends in Fertilizer Subsidy

According to the Budget Proposals presented by Finance Minister Arun Jaitley in Parliament subsidy on food, fertilizers, and petroleum have been pegged lower by over 4% to nearly Rs 2.31 lakh crore for 2016-17. In fertilizer subsidy, the government has allocated Rs.70000 crore (Rs 51000 crore for Urea and Rs.19000 crore for decontrolled phosphoric and potassic fertilizers) for 2016-17 fiscal year. The fertilizer subsidy seeks out to stimulate fertilizer consumption, increase agricultural productivity and maintain national food security. However, there has been a growing concern about the steep increase in the subsidy during last few years. Table 4.1 shows the increasing trends in fertilizers subsidy in India. There is no allocation of subsidy on decontrolled fertilizers ( Phosphoric and Potassic) in India till 1991-92. Fertilizers subsidy was just given to nitrogen fertilizer (Urea) till 1991-92. In 1992-93, government of India first time introduced the subsidy on decontrolled fertilizers and it accounted for Rs. 340 crores which were only 5.5 percent of total fertilizer subsidy in India. Subsidy on Urea has been witnessed an increasing trend in actual terms but in terms of share in total subsidy, ups and downs has been observed throughout the time. The amount of subsidy on decontrolled fertilizers was only Rs 340 crores in 1992-93 and it has increased to Rs 22469 crores in 2015-16. Subsidy on urea has increased to Rs 50500 crores in 2015-16 from Rs 4380 crores in 1990-91. The total amount of subsidy allocated by the government of India has increased to Rs 72969 crores in 2015-16 from Rs 4380 crores in 1990-91. It can be observed from following table (Table 4.1) that the share subsidy of gross domestic product (GDP) is showing the increasing as well as decreasing trends till 2008-09. Table is showing the continuous decreasing trends of fertilizer subsidy as a percentage share of GDP from 2008-09 to 2015-16. In 2008-09 the share of subsidy of GDP was 1.77 percent and it has decreased to 0.55 percent in 2015-16. The compound annual growth rate of decontrolled subsidy is greater than subsidy on urea and total subsidy. This analysis shows that the total fertilizer subsidy has been increased after economic reforms in India with the objective of providing

fertilizers to farmers at an affordable price and to make sure adequate returns on the investment to entrepreneurs.

Table.4.1

Trends in Fertiliser Subsidy in India

(Rs.Crore)

| Year    | Subsidy on P&K fertilizer | Subsidy on Urea (N) | Total | % Share of fertilizer subsidy in GDP |
|---------|---------------------------|---------------------|-------|--------------------------------------|
| 1990-91 | -                         | 4389 (100)          | 4389  | 0.75                                 |
| 1991-92 | -                         | 4800 (100)          | 4800  | 0.71                                 |
| 1992-93 | 340 (5.5)                 | 5796 (94.5)         | 6136  | 0.79                                 |
| 1993-94 | 517 (10.5)                | 4399 (89.5)         | 4916  | 0.55                                 |
| 1994-95 | 528 (9.2)                 | 5241 (90.8)         | 5769  | 0.55                                 |
| 1995-96 | 500 (7.4)                 | 6235 (92.6)         | 6735  | 0.55                                 |
| 1996-97 | 1672 (22.1)               | 5906 (77.9)         | 7578  | 0.53                                 |
| 1997-98 | 2596 (26.4)               | 7322 (73.8)         | 9918  | 0.63                                 |
| 1998-99 | 3790 (32.7)               | 7806 (67.3)         | 11596 | 0.64                                 |
| 1999-00 | 4500 (34)                 | 8744 (66)           | 13244 | 0.65                                 |
| 2000-01 | 4319 (31.3)               | 9481 (68.7)         | 13800 | 0.63                                 |
| 2001-02 | 4504 (35.8)               | 8091 (64.2)         | 12595 | 0.53                                 |
| 2002-03 | 3225 (29.3)               | 7790 (70.7)         | 11015 | 0.43                                 |
| 2003-04 | 3326 (28.1)               | 8521 (71.9)         | 11847 | 0.42                                 |
| 2004-05 | 5142 (32.4)               | 10737 (67.6)        | 15879 | 0.49                                 |
| 2005-06 | 6596 (34)                 | 12793 (66)          | 19389 | 0.52                                 |
| 2006-07 | 10298 (36.8)              | 17721 (63.2)        | 28019 | 0.65                                 |
| 2007-08 | 16934 (39.1)              | 26385 (60.9)        | 43319 | 0.87                                 |
| 2008-09 | 65555 (65.9)              | 33940 (34.1)        | 99495 | 1.77                                 |
| 2009-10 | 39452 (61.6)              | 24580 (38.4)        | 64032 | 0.99                                 |
| 2010-11 | 41500 (63)                | 24337 (37)          | 65837 | 0.85                                 |
| 2011-12 | 36108 (48.9)              | 37683 (51.1)        | 73791 | 0.82                                 |
| 2012-13 | 30576 (43.3)              | 40016 (56.7)        | 70592 | 0.73                                 |
| 2013-14 | 29427 (41.3)              | 41824 (58.7)        | 71251 | 0.65                                 |
| 2014-15 | 24670 (34.2)              | 47400 (65.8)        | 72070 | 0.60                                 |
| 2015-16 | 22469 (30.8)              | 50500 (69.2)        | 72969 | 0.55                                 |
| CAGR    | 22.79                     | 11.25               | 14.06 |                                      |

Note: Figures in the brackets are the percentages of total

Source: FAI (2016) & Economic Survey (2015-16)

Figure 4.1 shows the trends in fertilizer subsidy in India from 1990-91 to 2015-16. Figure shows the increasing trends in fertilizer subsidy till 2008-09 after this it started to decline. Subsidy on decontrolled fertilizer was greater than urea subsidy till 2010-11, but after that, the share of urea subsidy in total subsidy is more than the share of decontrolled fertilizers. The figure shows that total subsidy on fertilizer has increased substantially from 1990-91 to 2008-09.

Figure: 4.1  
Trends in Fertilizer Subsidy in India

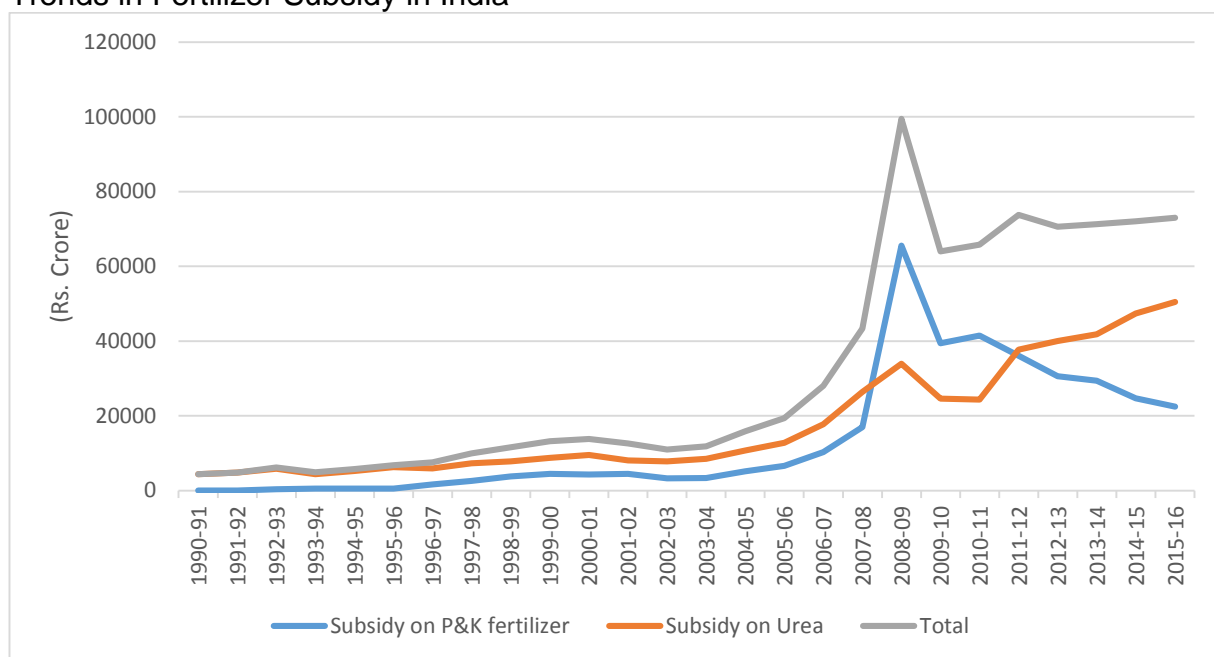
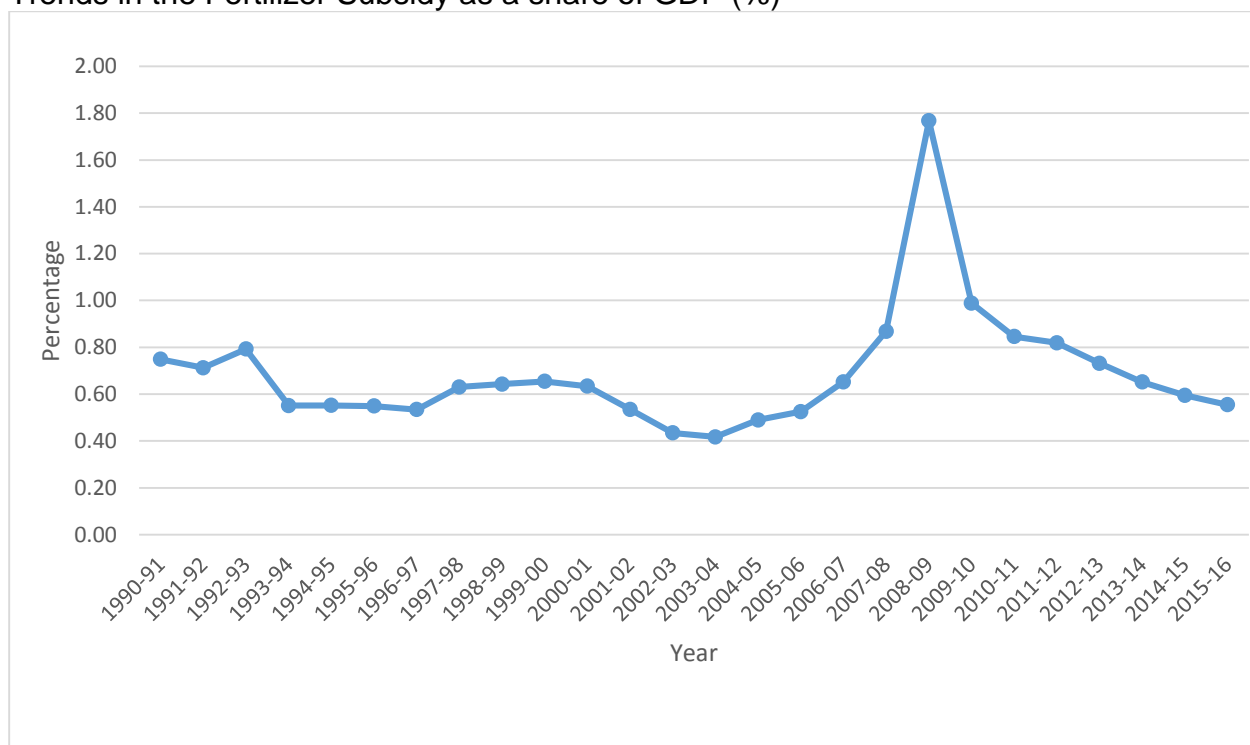


Figure 4.2 shows the trends in fertilizer subsidy as a per cent share of the gross domestic product. The figure shows both increasing and decreasing trends from 1990-91 to 2008-09. In 2008-09 the percentage share of subsidy (1.77%) of GDP was highest. But after 2008-09, the percentage share of fertilizer subsidy of GDP has been decreasing continuously.

**Figure 4.2**  
Trends in the Fertilizer Subsidy as a share of GDP (%)



#### 4.2. Fertilizer Consumption

India is the second largest consumer of fertilizers in the world, after China (Agrium, 2016). India consumes 14.8 percent of fertilizers in the world. It accounted for 16.0 percent of the world’s nitrogenous (N), 11.6 percent of phosphatic (P) and 7.4 percent of potassic (K) fertilizers in 2014-15 (Agrium, 2016). Table 4.2 shows consumption trends of fertilizer in India from 1990-91 to 2014-15. In terms of total fertilizer consumption, India is among the top in the world with total consumption of 25576 thousand tonnes in 2014-2015. Though, India’s rank is low in terms of intensity of fertilizer use in comparison to most of the developing and developed countries in the world. The overall consumption of fertilizer in India has increased from 12546 thousand tonnes in 1990-91 to 25576 thousand tonnes in 2014-15. The overall consumption in India has increased by two times since last twenty-five years. The table shows that the share of nitrogen fertilizer (N) is largest, followed by phosphate (P) fertilizer, in total consumption of fertilizer. In 1990-91, the share of nitrogen fertilizer in total consumption was 63.7 percent and the share of phosphate was 25.7 percent, but in 2011-12 the share of nitrogen fertilizer has increased to 66.3 percent and the share of phosphate fertilizer has decreased to 23.3 percent. On the other hand, the share of potassic fertilizer in total consumption

has decreased slightly from 10.6 percent in 1990-91 to 9.9 percent in 2014-15. But in terms of compound annual growth rate, the growth in the consumption of potassic fertilizer (4.85%) is higher than nitrogen (3.33%) and phosphate fertilizers (4.26%). While the compound annual growth rate of total fertilizer consumption from 1990-91 to 2014-15 is 3.68 per cent in India. Data shows the increasing trends in fertilizer consumption in India. Thus the results show that there is a positive relationship between fertilizer subsidy and fertilizer consumption in India. The increased fertilizer subsidy encourages the farmers to use more fertilizers on crops to increase the production.

### **4.3. Production of Fertilizers**

India ranks fifth in the production of fertilizer in the world after China (31.8%), Canada (8.1%), Russia (7.7%) and USA (7.0%) in 2014-15. India produces 5.2 percent of world's fertilizer in 2014-15. India ranks second in the production of nitrogen (16.0%) and phosphate (11.6%) fertilizer in the world (Agrim, 2016). Table 4.3 shows the trends in the production of fertilizer in India and we can observe the positive relation between fertilizer consumption and fertilizer subsidy in India. With the increase in fertilizer subsidy (Table 4.1) the production of fertilizer subsidy has also increased throughout the time. The share of nitrogen fertilizers (N) is more than the share of phosphate fertilizers (P) in total production. In 1990-91, the total production of fertilizers was 9045 thousand tonnes and in 2014-15, it has been increased to 16269 thousand tonnes. Total fertilizer production in India has been increased by about 80 percent from 1990-91 to 2014-15. The compound annual growth rate shows that the total production in India has been growing by 2.47 per cent from 1990-91 to 2014-15.

Table 4.2  
Fertilizer Consumption in India

(‘000 Tonnes)

| Year    | Nitrogenous<br>Fertilizers (N) | Phosphatic<br>Fertilizers (P) | Potassic<br>Fertilizers (K) | Total |
|---------|--------------------------------|-------------------------------|-----------------------------|-------|
| 1990-91 | 7997 (63.7)                    | 3221 (25.7)                   | 1328 (10.6)                 | 12546 |
| 1991-92 | 8046 (63.2)                    | 3321 (26.1)                   | 1361 (10.7)                 | 12728 |
| 1992-93 | 8427 (69.3)                    | 2844 (23.4)                   | 883 (7.3)                   | 12154 |
| 1993-94 | 8788 (71.1)                    | 2669 (21.6)                   | 909 (7.3)                   | 12366 |
| 1994-95 | 9507 (70.1)                    | 2932 (21.6)                   | 1124 (8.3)                  | 13563 |
| 1995-96 | 9823 (70.8)                    | 2897 (20.9)                   | 1156 (8.3)                  | 13876 |
| 1996-97 | 10302 (72)                     | 2977 (20.8)                   | 1029 (7.2)                  | 14308 |
| 1997-98 | 10902 (67.3)                   | 3914 (24.2)                   | 1372 (8.5)                  | 16188 |
| 1998-99 | 11354 (66.6)                   | 4112 (24.5)                   | 1331 (7.9)                  | 16797 |
| 1999-00 | 11592 (64.2)                   | 4799 (26.5)                   | 1678 (9.3)                  | 18069 |
| 2000-01 | 10920 (65.4)                   | 4215 (25.2)                   | 1567 (9.4)                  | 19702 |
| 2001-02 | 11310 (65.2)                   | 4382 (25.2)                   | 1667 (9.6)                  | 17360 |
| 2002-03 | 10474 (65.1)                   | 4019 (25)                     | 1601 (9.9)                  | 16094 |
| 2003-04 | 11076 (65.9)                   | 4124 (24.6)                   | 1598 (9.5)                  | 16798 |
| 2004-05 | 11714 (63.7)                   | 4624 (25.1)                   | 2060 (11.2)                 | 18398 |
| 2005-06 | 12723 (62.6)                   | 5204 (25.6)                   | 2413 (11.9)                 | 20340 |
| 2006-07 | 13773 (63.6)                   | 5543 (25.6)                   | 2335 (10.8)                 | 21651 |
| 2007-08 | 14419 (63.9)                   | 5515 (24.4)                   | 2636 (11.7)                 | 22570 |
| 2008-09 | 15090 (60.6)                   | 6506 (26.1)                   | 3313 (13.3)                 | 24909 |
| 2009-10 | 15580 (58.8)                   | 7274 (27.5)                   | 3632 (13.7)                 | 26486 |
| 2010-11 | 16558 (58.9)                   | 8050 (28.6)                   | 3514 (12.5)                 | 28122 |
| 2011-12 | 17300 (62.2)                   | 7914 (28.5)                   | 2576 (9.3)                  | 27790 |
| 2012-13 | 16821 (65.9)                   | 6653 (26)                     | 2062 (8.1)                  | 25534 |
| 2013-14 | 16750 (68.4)                   | 5633 (23)                     | 2099 (8.6)                  | 24482 |
| 2014-15 | 16946 (66.3)                   | 6098 (23.8)                   | 2532 (9.9)                  | 25576 |
| CAGR    | 3.33                           | 4.26                          | 4.85                        | 3.68  |

Note: Figures in the brackets are the percentages of total  
Source: GOI (Various Issues)

Table 4.3:

*Production of Fertilizer in India*

('000 tonnes)

| Year    | Nitrogenous<br>Fertilizers (N) | Phosphatic<br>Fertilizers (P) | Potassic<br>Fertilizer<br>s (K) | Total |
|---------|--------------------------------|-------------------------------|---------------------------------|-------|
| 1990-91 | 6993 (77.3)                    | 2052 (22.7)                   | -                               | 9045  |
| 1991-92 | 7301 (74)                      | 2562 (26)                     | -                               | 9863  |
| 1992-93 | 7430 (76.3)                    | 2306 (23.7)                   | -                               | 9736  |
| 1993-94 | 7231 (79.9)                    | 1816 (20.1)                   | -                               | 9047  |
| 1994-95 | 7945 (76.1)                    | 2493 (23.9)                   | -                               | 10438 |
| 1995-96 | 8777 (77.4)                    | 2558 (22.6)                   | -                               | 11335 |
| 1996-97 | 8599 (77.1)                    | 2556 (22.9)                   | -                               | 11155 |
| 1997-98 | 10086 (77.2)                   | 2976 (22.8)                   | -                               | 13062 |
| 1998-99 | 10480 (76.9)                   | 3144 (23.1)                   | -                               | 13624 |
| 1999-00 | 10890 (76.2)                   | 3399 (23.8)                   | -                               | 14289 |
| 2000-01 | 10961 (74.5)                   | 3743 (25.5)                   | -                               | 14704 |
| 2001-02 | 10768 (73.6)                   | 3860 (26.4)                   | -                               | 14628 |
| 2002-03 | 10561 (73)                     | 3904 (27)                     | -                               | 14465 |
| 2003-04 | 10634 (74.5)                   | 3632 (25.5)                   | -                               | 14266 |
| 2004-05 | 11339 (73.6)                   | 4064 (26.4)                   | -                               | 15403 |
| 2005-06 | 11354 (72.9)                   | 4221 (27.1)                   | -                               | 15575 |
| 2006-07 | 11578 (71.9)                   | 4517 (28.1)                   | -                               | 16095 |
| 2007-08 | 10900 (74.1)                   | 3807 (25.9)                   | -                               | 14707 |
| 2008-09 | 10870 (75.8)                   | 3464 (24.2)                   | -                               | 14334 |
| 2009-10 | 11900 (73.4)                   | 4321 (26.6)                   | -                               | 16221 |
| 2010-11 | 12156 (74.2)                   | 4222 (25.8)                   | -                               | 16378 |
| 2011-12 | 12259 (74.9)                   | 4101 (25.1)                   | -                               | 16360 |
| 2012-13 | 12194 (77.5)                   | 3541 (22.5)                   | -                               | 15735 |
| 2013-14 | 12378 (76.9)                   | 3714 (23.1)                   | -                               | 16092 |
| 2014-15 | 12394 (76.2)                   | 3875 (23.8)                   | -                               | 16269 |
| CARG    | 2.36                           | 2.85                          |                                 | 2.47  |

Note: Figures in the brackets are the percentages of total

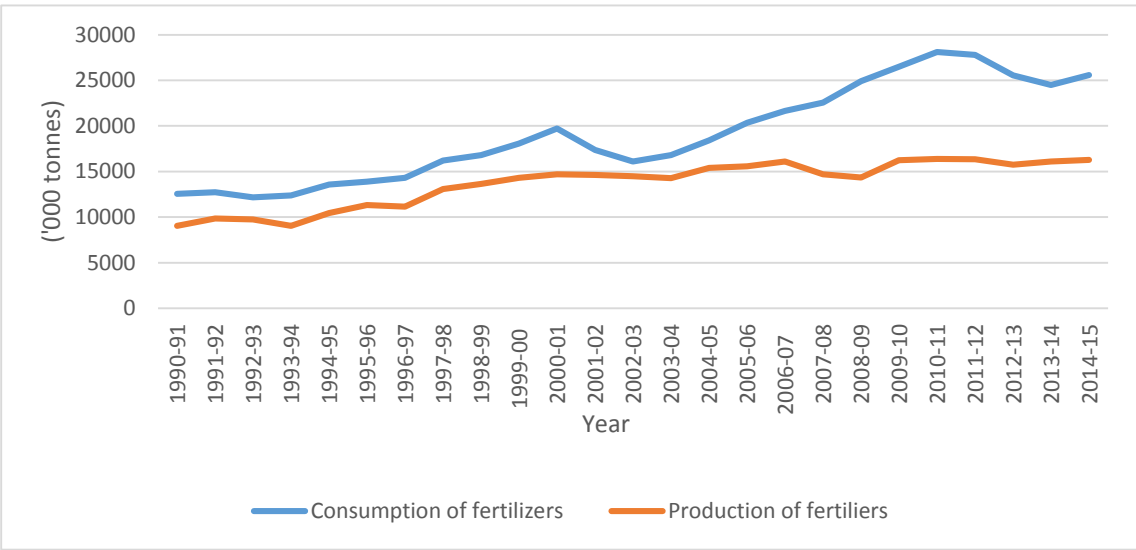
Source: GOI (Various Issues)

Figure 4.3 shows that there is a positive and linear relationship between production and consumption of fertilizers in India. It is clear from the figure that



the consumption of fertilizers is more than the production of fertilizers. India only produces nitrogen and phosphate fertilizers. The figure shows that the gap between consumption and production of fertilizers has been increasing since 2002-03. This gap is largest in 2010-11 and 2011-12. These results show that the demand for fertilizers has been increasing due to increase in fertilizer subsidy.

Figure 4.3  
Trends in the consumption and production of fertilizers in India



**4.4. Import of Fertilizers in India**

It is observed that the production of fertilizers is less than the consumption of fertilizers due to the shortage of raw material, gas, and other sources. To fill this gap, India has to import fertilizers from other countries of the world. India ranks second in the import of urea (15.8%), Ammonia (13.1%) and DAP and MAP (16.0%) and fourth in the import of potash (8.8%) in the world (Agrium,2016). Table 4.4 shows the trends in the import of fertilizers in India. In terms of potassic fertilizers, India totally depends on imports. Data shows the ups and downs in imports of fertilizer. However, the import of fertilizer in India has increased from 2758 thousand tonnes in 1990-91 to 9135 thousand tonnes in 2014-15. The compound annual growth rate of import of fertilizer is 6.55 per cent which is more than the compound annual growth rate of fertilizer consumption in India from 1990-91 to 2014-15.

Table 4.4:

*Import of Fertilizers in India*

('000 tonnes)

| Year    | Nitrogenous Fertilizers (N) | Phosphatic Fertilizers (P) | Potassic Fertilizers (K) | Total |
|---------|-----------------------------|----------------------------|--------------------------|-------|
| 1990-91 | 414 (15)                    | 1016 (36.8)                | 1328 (48.2)              | 275   |
| 1991-92 | 566 (20.4)                  | 967 (34.9)                 | 1236 (44.7)              | 2769  |
| 1992-93 | 1137 (39.1)                 | 689 (23.7)                 | 1082 (37.2)              | 2908  |
| 1993-94 | 1588 (50.1)                 | 722 (22.8)                 | 857 (27.1)               | 3167  |
| 1994-95 | 1476 (49.8)                 | 380 (12.8)                 | 1109 (37.4)              | 2965  |
| 1995-96 | 1993 (50.4)                 | 647 (16.4)                 | 1315 (33.2)              | 3955  |
| 1996-97 | 1167 (52.9)                 | 426 (19.3)                 | 613 (27.8)               | 2206  |
| 1997-98 | 1362 (42.9)                 | 672 (21.2)                 | 1140 (35.9)              | 3174  |
| 1998-99 | 635 (20.2)                  | 968 (30.8)                 | 1542 (49)                | 3145  |
| 1999-00 | 833 (20.4)                  | 1503 (36.9)                | 1734 (42.7)              | 4075  |
| 2000-01 | 154 (7.4)                   | 396 (18.9)                 | 1541 (73.7)              | 2091  |
| 2001-02 | 269 (11.2)                  | 429 (17.9)                 | 1701 (70.9)              | 2399  |
| 2002-03 | 67 (3.8)                    | 170 (9.7)                  | 1520 (86.5)              | 1757  |
| 2003-04 | 132 (6.5)                   | 338 (16.7)                 | 1548 (76.8)              | 2018  |
| 2004-05 | 411 (14.9)                  | 296 (10.8)                 | 2045 (74.3)              | 2752  |
| 2005-06 | 1385 (26.4)                 | 1121 (21.3)                | 2747 (52.3)              | 5253  |
| 2006-07 | 2688 (44.2)                 | 1323 (21.8)                | 2069 (34)                | 6080  |
| 2007-08 | 3677 (48.5)                 | 1253 (16.5)                | 2653 (35)                | 7583  |
| 2008-09 | 3751 (36.7)                 | 3067 (30)                  | 3403 (33.3)              | 10221 |
| 2009-10 | 3447 (37.7)                 | 2756 (30.1)                | 2945 (32.2)              | 9148  |
| 2010-11 | 4492 (36.3)                 | 3802 (30.8)                | 4069 (32.9)              | 12363 |
| 2011-12 | 5240 (40.3)                 | 4427 (34.1)                | 3335 (25.6)              | 13002 |
| 2012-13 | 4690 (53.9)                 | 2778 (31.9)                | 1230 (14.2)              | 8698  |
| 2013-14 | 3808 (56.6)                 | 1590 (23.6)                | 1333 (19.8)              | 6731  |
| 2014-15 | 4766 (52.2)                 | 1832 (20.1)                | 2537 (27.7)              | 9135  |
| CAGR    | 8.70                        | 6.83                       | 4.38                     | 6.55  |

Note: Figures in the brackets are the percentages of total

Source: GOI (Various Issues)

**4.5. Per Hectare Subsidy**

Per hectare subsidy means that how much of subsidy has distributed to one hectare for the use of fertilizer. We have seen above (Table 4.1) that fertilizer subsidy in India has been increasing during the time period of 1990-91 to 2015-16. To understand whether the per hectare subsidy is increasing or not due to increase in total fertilizer subsidy, we calculated per hectare subsidy. We have calculated per hectare subsidy by dividing the total fertilizer subsidy released in India with net sown area in India.

$$\text{Per Hectare Fertilizer Subsidy} = \text{Total fertilizer subsidy} / \text{Net sown area}$$

Table 4.5 shows the growth in per hectare fertilizer subsidy in India from 1990-91 to 2012-13. Data shows the increasing trends in per hectare subsidy throughout the time. In 1990-91, per hectare fertilizer subsidy was only Rs.307. But in 2012-13, per hectare fertilizer subsidy has increased to Rs.5045. The compound annual growth rate on total fertilizer subsidy and per hectare subsidy is almost same. The increase in per hectare subsidy encourages the farmers to use more fertilizers in the field to increase the production of crops. The increased per hectare fertilizer subsidy increases the production of crops for specific level after that it inversely affected in terms of decrease in soil fertility, degradation of the environment and decrease the quality of food grains etc. Thus, the increased per hectare subsidy has the positive as well as negative effects.

#### **4.6. Fertilizer Subsidy and Yield of Foodgrains**

The Indian Fertilizer Industry has given its strategic importance in realizing self-sufficiency of food grains production for decades. For this purpose, the Indian government has been increasing fertilizer subsidy to provide an adequate quantity of fertilizers to farmers at affordable prices. Table 4.6 shows the growth in per hectare fertilizers subsidy and per hectare yield of food grains in India. The data shows that there is a positive relationship between per hectare fertilizer subsidy and per hectare yield of food grains. The per hectare fertilizer subsidy has increased to Rs.5044 in 2012-13 from Rs.307 in 1990-91 and the per hectare yield of food grains has increased to 2129 kg. in 2012-13 from 1380 kg. in 1990-91. The per hectare subsidy effects the per hectare yield of food grains very less, because the increase in per hectare subsidy is greater than the increase in per hectare increase in yield of food grains. It can also be observed from the compound annual growth rate. The compound annual growth rate of per hectare fertilizer subsidy (15%) is greater than the per hectare yield of food grains (1.64%) from 1990-91 to 2012-13.

Table 4.5:  
Growth in Per Hectare subsidy in India

| Year    | Net sown area<br>(‘000 ha) | Total subsidy<br>(Rs. Crores) | Per hectare<br>subsidy<br>(Rs./ha) |
|---------|----------------------------|-------------------------------|------------------------------------|
| 1990-91 | 142870                     | 4389                          | 307.20                             |
| 1991-92 | 141632                     | 4800                          | 338.91                             |
| 1992-93 | 142645                     | 6136                          | 430.16                             |
| 1993-94 | 142419                     | 4916                          | 345.18                             |
| 1994-95 | 142960                     | 5769                          | 403.54                             |
| 1995-96 | 142197                     | 6735                          | 473.64                             |
| 1996-97 | 142931                     | 7578                          | 530.19                             |
| 1997-98 | 141945                     | 9918                          | 698.72                             |
| 1998-99 | 142753                     | 11596                         | 812.31                             |
| 1999-00 | 141063                     | 13244                         | 938.87                             |
| 2000-01 | 141336                     | 13800                         | 976.40                             |
| 2001-02 | 140734                     | 12595                         | 894.95                             |
| 2002-03 | 131943                     | 11015                         | 834.83                             |
| 2003-04 | 140708                     | 11847                         | 841.96                             |
| 2004-05 | 140642                     | 15879                         | 1129.04                            |
| 2005-06 | 141162                     | 19389                         | 1373.53                            |
| 2006-07 | 139823                     | 28019                         | 2003.89                            |
| 2007-08 | 141016                     | 43319                         | 3071.92                            |
| 2008-09 | 141899                     | 99495                         | 7011.68                            |
| 2009-10 | 139173                     | 64032                         | 4600.89                            |
| 2010-11 | 141563                     | 65837                         | 4650.72                            |
| 2011-12 | 140974                     | 73791                         | 5234.37                            |
| 2012-13 | 139932                     | 70592                         | 5044.74                            |
| CAGR    | -0.09                      | 14.90                         | 15.00                              |

Source: RBI (2016) & FAI (2016)

Table 4.6:

Growth in per hectare subsidy and per hectare Yield of Foodgrains in India

| <b>Year</b> | <b>Per hectare subsidy (Rs./ha)</b> | <b>Yield per hectare (Kg./ha)</b> |
|-------------|-------------------------------------|-----------------------------------|
| 1990-91     | 307.20                              | 1380                              |
| 1991-92     | 338.91                              | 1382                              |
| 1992-93     | 430.16                              | 1457                              |
| 1993-94     | 345.18                              | 1501                              |
| 1994-95     | 403.54                              | 1546                              |
| 1995-96     | 473.64                              | 1491                              |
| 1996-97     | 530.19                              | 1614                              |
| 1997-98     | 698.72                              | 1552                              |
| 1998-99     | 812.31                              | 1627                              |
| 1999-00     | 938.87                              | 1704                              |
| 2000-01     | 976.40                              | 1626                              |
| 2001-02     | 894.95                              | 1734                              |
| 2002-03     | 834.83                              | 1535                              |
| 2003-04     | 841.96                              | 1727                              |
| 2004-05     | 1129.04                             | 1652                              |
| 2005-06     | 1373.53                             | 1715                              |
| 2006-07     | 2003.89                             | 1756                              |
| 2007-08     | 3071.92                             | 1860                              |
| 2008-09     | 7011.68                             | 1909                              |
| 2009-10     | 4600.89                             | 1798                              |
| 2010-11     | 4650.72                             | 1930                              |
| 2011-12     | 5234.37                             | 2078                              |
| 2012-13     | 5044.74                             | 2129                              |
| CAGR        | 15                                  | 1.64                              |

Source: FAI (2016) &amp; RBI (2016)

#### 4.7. World Fertilizer Market

Table 4.7 shows the fertilizer consumption of top ten countries of the world and their share in World's fertilizer consumption in 2014-15. The data shows that India ranks second in world fertilizer consumption in the world after China. China ranks first in the fertilizer consumption in 2014-15. It can

be seen that three-fourth of world fertilizer has been consumed by top ten countries.

Table 4.7:  
Consumption estimated 2014-15 – Top Ten Countries (*'000 metric tonnes*)

| Rank  | Country   | N               | Country    | P               | Country    | K               | Country    | Total            |
|-------|-----------|-----------------|------------|-----------------|------------|-----------------|------------|------------------|
| 1     | China     | 34628           | China      | 11354           | China      | 5494            | China      | 51476            |
| 2     | India     | 17665           | India      | 7065            | Brazil     | 5180            | India      | 27085            |
| 3     | USA       | 11720           | Brazil     | 4710            | USA        | 4225            | USA        | 19845            |
| 4     | Brazil    | 3900            | USA        | 3901            | India      | 2355            | Brazil     | 13790            |
| 5     | Indonesia | 3609            | Canada     | 949             | Bangladesh | 600             | Indonesia  | 5016             |
| 6     | Pakistan  | 3314            | Indonesia  | 884             | Indonesia  | 524             | Pakistan   | 4119             |
| 7     | Canada    | 2575            | Australia  | 824             | France     | 500             | Canada     | 3924             |
| 8     | France    | 2130            | Pakistan   | 778             | Poland     | 472             | France     | 3100             |
| 9     | Russia    | 1861            | Bangladesh | 700             | Russia     | 418             | Russia     | 2907             |
| 10    | Turkey    | 1365            | Argentina  | 650             | Canada     | 400             | Bangladesh | 2500             |
| Total |           | 82767<br>(75.2) |            | 31815<br>(78.4) |            | 20168<br>(63.2) |            | 133762<br>(73.3) |
| World |           | 110058          |            | 40590           |            | 31923           |            | 182571           |

Source: Agrium (2016)

Table 4.8:  
Concentration of World Fertilizer Consumption, Production and Trade

| Particulars | Fertilizer/<br>Product | Countries   | %Share of<br>Top 10 in<br>World |
|-------------|------------------------|---|---------------------------------|
| Consumption | N                      | China (31.5%), India (16.0%), USA (10.6%), Brazil (3.5%), Indonesia (3.3%)                      | 75.2                            |
|             | P                      | China (27.8%), India (11.6%), Brazil (11.6%), USA (9.6%), Canada (2.3%)                         | 78.4                            |
|             | K                      | China (17.2%), Brazil (16.2%), USA (13.2%), India (7.4%), Bangladesh (1.9%)                     | 63.2                            |
|             | N+P+K                  | China (28.2%), India (14.8%), USA (10.9%), Brazil (7.5%), Indonesia (2.7%)                      | 73.3                            |
| Capacity    | N                      | China (36.2%), Russia (7.2%), India (7.1%), USA (5.8%), Indonesia (2.9%)                        | 71.1                            |
|             | P                      | China (36.3%), USA (15.2%), Morocco (9.9%), Russia (5.6%), India (3.8%)                         | 83.6                            |
|             | K                      | Canada (36.4%), Belarus (14.6%), Russia (11.7%), China (11.4%), Germany (8.1%)                  | 96.9                            |
|             | N+P+K                  | China (31.8%), Canada (8.1%), Russia (7.7%), USA (7.0%), India (5.2%)                           | 70.8                            |
| Exports     | Urea                   | China (28.6%), Russia (11.1%), Qatar (10.5%), Saudi Arabia (7.0%), Oman (5.9%)                  | 79.1                            |
|             | Ammonia                | Trinidad and Tobago (23.6%), Russia (19.7%), Saudi Arabia (8.1%), Algeria (6.0%), Canada (5.1%) | 81.0                            |
|             | MAP and DAP            | China (29.8%), USA (18.7%), Morocco (14.3%), Russia (12.9%), Saudi Arabia (10.0%)               | 97.9                            |
|             | Potash                 | Canada (36%), Russia (20.4%), Belarus (18.7%), Israel (8.7%), Germany (8.7%)                    | 99.1                            |
| Import      | Urea                   | USA (16.9%), India (15.8%), Brazil (9.0%), Thailand (4.7%), Australia (3.8%)                    | 64.9                            |
|             | Ammonia                | USA (27.7%), India (13.1%), Korea Republic (6.0%), Belgium (4.9%), Morocco (4.5%)               | 72.9                            |
|             | MAP and DAP            | Brazil (19.8%), India (16.0%), USA (5.6%), Pakistan (5.0%), Australia (4.6%)                    | 66.1                            |
|             | Potash                 | USA (17.7%), Brazil (17.4%), China (15.8%), India (8.8%), Indonesia (6.2%)                      | 77.9                            |

Source: Agrium (2016)

Table 4.8 shows the concentration of world fertilizer consumption, production, and trade. It is clear from the table that India ranks second in total fertilizer consumption, fifth in production and almost second rank in the import of fertilizers in the world. The production of fertilizer in India is less than consumption. So to fulfill this gap, India has to import fertilizers from other countries. India ranks second in the import of urea (15.8%), Ammonia (13.1%) and MAP & DAP (16.0%). The primary source for the import of urea and MAP & DAP was China and for ammonia primary source was Iran in 2014. India ranks fourth in the import of potash and the primary source for the import of ammonia was Russia in 2014. These results show that concentration on fertilizers in India is higher than other developed and developing countries of the world.



## Chapter-5

### Distribution of Fertilizer Subsidy in India

#### 5.1 Equity Issues in the Distribution of Fertilizers

This part of analysis shows the benefits from fertilizer subsidies to the farmers at the different farm size levels, across the major states and among various major crops. To understand who benefits from fertilizer subsidies is important not only to define the fairness of policy, but also to find out how policy changes farmers' behavior. There is a common view in policy and academic circles that the benefits of fertilizer subsidies are confronted by powerful interest groups that subsidies are concentrated geographically, and they are concentrated on relatively few crops and on relatively few producers. Hence, there is a need to study the fertilizer subsidy distribution patterns to evaluate whether the policy benefits all regions and categories of farmers. For this purpose, the data has compiled from five All India Reports on Input Survey from 1991-92 to 2011-12 by Agriculture Census Division of Ministry of Agriculture, Government of India. Table 5.1 shows the pattern of fertilizer consumption by farm size in India from 1991-92 to 2011-12. The data is categorized in four sub titles in the table such as distribution of holding, share in gross cropped area, proportion of fertilized area to gross cropped area and share in total fertilizer consumption of different farm sizes. Table 5.1 shows that marginal farmers (57.1%) have the highest share of operational holding in total operational holdings followed by small farmers (20.3%), but the large farmer have just 1.6 per cent of operational holdings in 1991-92. The share of operational holdings of marginal farmers have been increasing continuously but the share all other farms sizes have been decreasing. Operational holding of marginal farmers has been increased to 67.11 percent in 2011-12 from 57.1 per cent in 1991-92. The share of small farms, semi-medium farms, medium farms and large farms has been decreasing due to many reasons but growth in urbanization and growth in population is the major reason for decreasing land holdings in India. It has been observed from the above data that the share of marginal farmers in operation holdings increased by 10 per cent from 1991-92 to 2011-12. In gross cropped area, medium farmers (25.8%) had the largest share followed by semi-medium and small farmers in 1991-92. But in 2011-12, marginal farmers (24.8%) have the largest share in gross cropped area and large farmers (8.4%) have the smallest share in gross cropped area. These results show that share

of marginal, small and semi- medium farms have been increasing but the share of medium and large farms in total gross cropped areas have been declining in India. The proportion of fertilized area to gross cropped area has also been dominated by marginal farms (63.6%) followed by small farms (46.9%) in 1991-92. The similar trends have been observed in 2011-12. The proportion of fertilized area to gross cropped area of all groups has increased from 1991-92 to 2011-12. This shows that the fertilizer use intensity in India has increased from 1991-92 to 2011-12. It is quite clear from Table 4.2 that the consumption of fertilizers has increased throughout the time in India. The table shows that the per cent share of fertilizer consumption of marginal and small farms in total fertilizer consumption has been increasing. On the other hand, the per cent share of large farms` fertilizer consumption in total fertilizer consumption has been decreasing continuously from 1991-92 to 2011-12. The per cent share of marginal and small farms in total fertilizer consumption has been increased from 20.6 per cent and 21.1 per cent (1991-92) to 35.8 per cent and 22.4 per cent (2011-12) respectively. But the share of large farms in total fertilizer consumption has been decreased from 10.2 per cent in 1991-92 to 5.6 per cent in 2011-12. Small and marginal farmers, who accounted for 85.1 per cent of total operational holdings in 2011-12, has 47.3 per cent share in gross cropped area. On the other hand, the proportion of large farmers in total operational holdings is just 0.7 per cent and their share in gross cropped area is 8.4 per cent in 2011-12. However, it is interesting to note that share of small and marginal farmers in total fertilizer consumption is much higher (58.2%) than their share in gross cropped area (47.3%) in 2011-02. While in case of large farmers, share in fertilizer consumption is lower (5.6%) than their share in total cropped area (8.4%). Thus, these results show that small and marginal farmers have a substantial share in fertilizer subsidy (higher than their share in total cropped area).

Table 5.1:  
Pattern of Fertilizer Consumption by Farm Size in India (1991-92 to 2011-12)

| Year/Farm Size | Marginal  | Small | Semi-medium | Medium | Large | All groups |
|----------------|---|-------|-------------|--------|-------|------------|
|                | Distribution of Holding (%)                             |       |             |        |       |            |
| 1991-92        | 57.1  | 20.3  | 13.7        | 7.3    | 1.6   | 100        |
| 1996-97        | 60.7  | 18.9  | 12.5        | 6.5    | 1.4   | 100        |
| 2001-02        | 64.0  | 18.2  | 11.0        | 5.6    | 1.2   | 100        |
| 2006-07        | 63.9  | 18.6  | 11.2        | 5.3    | 1.0   | 100        |
| 2011-12        | 67.2  | 17.9  | 10.0        | 4.2    | 0.7   | 100        |
|                | Share in gross cropped area (%)                         |       |             |        |       |            |
| 1991-92        | 17.3  | 19.6  | 23.8        | 25.8   | 13.5  | 100        |
| 1996-97        | 19.0  | 19.1  | 23.5        | 25.1   | 13.3  | 100        |
| 2001-02        | 22.3  | 20.3  | 22.8        | 22.9   | 11.7  | 100        |
| 2006-07        | 23.5  | 21.0  | 22.9        | 22.4   | 10.2  | 100        |
| 2011-12        | 24.8  | 22.5  | 23.6        | 20.7   | 8.4   | 100        |
|                | Proportion of fertilized area to gross cropped area (%) |       |             |        |       |            |
| 1991-92        | 63.6  | 62.6  | 60.9        | 58.0   | 46.9  | 59.1       |
| 1996-97        | 64.1  | 62.7  | 60.8        | 57.4   | 45.0  | 58.8       |
| 2001-02        | 77.1  | 74.2  | 71.3        | 65.1   | 49.7  | 69.2       |
| 2006-07        | 73.62   | 76.6  | 75.5        | 71.5   | 58.1  | 72.62      |
| 2011-12        | 77.7  | 78.4  | 77.7        | 74.1   | 63.2  | 75.9       |
|                | Share in total fertilizer consumption (%)               |       |             |        |       |            |
| 1991-92        | 20.6  | 21.1  | 24.2        | 23.9   | 10.2  | 100        |
| 1996-97        | 25.6  | 20.4  | 23.0        | 22.2   | 8.8   | 100        |
| 2001-02        | 28.3  | 23.0  | 23.3        | 19.1   | 6.3   | 100        |
| 2006-07        | 29.1  | 23.8  | 22.0        | 19.0   | 6.1   | 100        |
| 2011-12        | 35.8  | 22.4  | 20.5        | 15.7   | 5.6   | 100        |

Source: GOI (Various Reports)

Table 5.2:  
Pattern of fertilizer use intensity by farm size in India

| Year/Farm Size  | Marginal       | Small         | Semi-Medium   | Medium        | Large           | All groups      |
|---|----------------|---------------|---------------|---------------|-----------------|-----------------|
| Fertilizer consumption per hectare of gross cropped area (kg) |                |               |               |               |                 |                 |
| 1991-92   | 72.2           | 65.5          | 61.7          | 56.3          | 46.0            | 60.7            |
| 1996-97   | 103.8          | 82.6          | 75.3          | 68.1          | 51.1            | 77.1            |
| 2001-02   | 126.2          | 100.6         | 88.8          | 75.8          | 55.9            | 92.7            |
| 2006-07   | 139.7          | 128.3         | 108.3         | 95.1          | 67.6            | 112.7           |
| 2011-12   | 188.6<br>(161) | 130.6<br>(99) | 113.6<br>(84) | 99.4<br>(76)  | 84.7<br>(84)    | 130.7<br>(115)  |
| Fertilizer consumption per hectare of fertilizer area (kg)    |                |               |               |               |                 |                 |
| 1991-92   | 113.4          | 104.6         | 101.3         | 97.0          | 98.1            | 102.8           |
| 1996-97   | 162.1          | 131.8         | 123.9         | 118.6         | 113.6           | 131.1           |
| 2001-02   | 164.7          | 134.7         | 122.8         | 113.3         | 108.4           | 131.7           |
| 2006-07   | 189.8          | 167.5         | 143.4         | 133.1         | 116.5           | 155.3           |
| 2011-12   | 242.8<br>(114) | 166.7<br>(59) | 146.2<br>(44) | 134.2<br>(38) | 134.1<br>(36.7) | 172.2<br>(67.5) |

Note: Figures in parentheses show per cent increase in the consumption from 1991-92 to 2011-12.

Source: GOI (Various Reports)

The prevalence of benefits from fertilizer subsidy is explored using five All India Reports on Input Survey by Agriculture Census Division of Ministry of Agriculture, Government of India- Input Survey Report 1991-96, Input Survey Report 1996-97, Input Survey Report 2001-02, Input Survey Report 2006-07 and Input Survey Report 2011-12. It is obvious from Table 5.2 that marginal and small farmers use more fertilizers per hectare of gross cropped area. In 2011-12, the marginal farmers (188.6 kg/ha) used twice as much fertilizers per hectare than large farmers (84.7 kg/ha) whereas the average use of fertilizer in 2011-12 for all groups was recorded 130.7 kg/ha. The table shows that the average consumption per hectare of gross cropped area on marginal holdings was two times higher than large farms. In case of small farmers, average

consumption was about 55 per cent higher than large farmers. The average fertilizer consumption per hectare of gross cropped area was the highest (72.2 kg) on marginal holdings and lowest on large farms (46 kg) in 1991-92. The similar trends were observed between 1995-56, 2001-02, 2006-07 and 2011-12. In 2011-12, the average consumption per hectare of gross cropped area of fertilizers was highest on marginal holdings (188.6 kg) followed by small holdings (130.6kg) and lowest on large farms (84.7). The average consumption per hectare of fertilizers was 130.7 kg for all groups in 2011-12 whereas it was 60.7kg per hectare in 1991-92. The average consumption per hectare of fertilizers has been increased significantly for all groups from 1991-92 to 2011-12. The table shows that the average consumption per hectare of gross cropped area was higher on marginal and small holdings than large farms. The average fertilizer consumption per hectare of gross cropped area on marginal holdings has been increased about 160 per cent from 1991-92 (72.2 kg) to 2011-12 (188.6 kg). In case of small holdings, the average fertilizers consumption per hectare has been increased about 100 per cent from 1991-92 (65.5 kg) to 2011-12 (130.6 kg). The increase in the average fertilizers consumption per hectare of gross cropped area was lowest in case of large holdings, however it was recorded 84 per cent from 1991-92 (46 kg) to 2011-12 (84.7 kg). It was observed that there was about 115 per cent increase in the average consumption of fertilizers from 1991-92 to 2011-12 for all groups. The data on fertilizer consumption shows that marginal and small farmers use more fertilizers compared to large farmers.

It is observed from Table 5.2 that the average consumption per hectare of fertilized area is also higher on marginal and small holdings than large holdings. In 1991-92 average fertilizer consumption per hectare of fertilized area was highest of marginal farmers (113.4 kg) and on the other hand, average fertilizer consumption for large farmers was 98.1 kg. In 2011-12 marginal farmers were also the largest consumer of fertilizer followed by small farmers. It is observed from the table that the average fertilizer consumption per hectare of fertilized area of marginal farmers (242.8 kg) was 80 per cent more than that of large farmers (134.1 kg). The increase in average fertilizer consumption from 1991-92 to 2011-12 was also largest for marginal farmers and lowest for large farmers. The average fertilizer consumption per hectare of fertilized area for marginal farmers has been increased by about 114 per

cent and for large farmers it has been increased by just 36.7 per cent from 1991-91 to 2011-12. For all groups, average fertilizer consumption was increased by 67.5 per cent from 1991-91 to 2011-12. These results show the inverse relationship between the farm size and intensity of fertilizer use per hectare. These results show that small and marginal farmers have a significant share in fertilizer subsidy in India.

## **5.2 State-wise Distribution of Fertilizer Subsidy**

At state level distribution of subsidy, mostly the trends of inverse relationship between farm size and fertilizer use per hectare of gross cropped area has observed (Table 5.3). Mostly the inverse relationship has observed between the size of holding the intensity of fertilizer use. The only exception was the states of Odisha and Kerala where the large farmers showed the marginally higher fertilizer use intensity compared with marginal and small farmers. While all other states almost showed that marginal and small farmers showed higher fertilizer use intensity compared with large farmers in 2011-12. The average fertilizer consumption was highest in Punjab (245.6 Kg/ha), followed by Tamil Naidu (210.1 kg/ha), Haryana (197.5 kg/ha) and Andhra Pradesh (181.5 kg/ha) and the lowest was Arunachala Pradesh (2.9 kg/ha). Marginal farmers (464.4 kg/ha) showed highest in fertilizer use intensity in Gujarat, whereas the large farmers used only 39.3 kg/ha. The data shows that marginal and small farmers use greater quantity of fertilizers than large farmers. These results show that the marginal and small farmers are getting the larger share of subsidy than large farmers.

Table 5.3:  
State-wise Fertilizer Use Per Hectare of Gross Cropped Area by Size of Holding: 2011-12 (kg/ha)

| State/Farm Size    | Margin al | Small | Semi-Medium | Medium | Large | All Groups |
|--------------------|-----------|-------|-------------|--------|-------|------------|
| Andhra Pradesh     | 193.3     | 181.2 | 175.4       | 171.8  | 147.4 | 181.5      |
| Arunachala Pradesh | 8.8       | 4.0   | 2.7         | 2.1    | 2.6   | 2.9        |
| Assam              | 91.0      | 54.6  | 35.8        | 28.2   | 29.1  | 58.2       |
| Bihar              | 163.2     | 118.4 | 113.7       | 107.7  | 104.4 | 144.1      |
| Chhattisgarh       | 122.6     | 104.9 | 92.3        | 80.7   | 55.2  | 95.9       |
| Goa                | 127.0     | 78.1  | 57.1        | 37.0   | 19.5  | 75.7       |
| Gujarat            | 464.4     | 213.0 | 139.5       | 83.8   | 39.3  | 165.0      |
| Haryana            | 244.0     | 223.4 | 209.3       | 159.0  | 199.8 | 197.5      |
| Himachal Pradesh   | 71.3      | 57.5  | 45.1        | 34.4   | 12.6  | 54.3       |
| Jammu& Kashmir     | 123.9     | 78.8  | 58.1        | 46.2   | 27.2  | 93.4       |
| Jharkhand          | 114.2     | 79.6  | 70.6        | 67.2   | 53.1  | 80.2       |
| Karnataka          | 178.8     | 133.3 | 132.8       | 135.3  | 137.0 | 140.9      |
| Kerala             | 69.2      | 81.5  | 90.3        | 104.5  | 100.6 | 76.1       |
| Madhya Pradesh     | 102.1     | 88.9  | 84.9        | 83.0   | 86.5  | 87.5       |
| Maharashtra        | 214.2     | 138.2 | 108.3       | 86.6   | 56.4  | 130.1      |
| Manipur            | 42.3      | 36.9  | 35.6        | 32.7   | 32.4  | 37.5       |
| Meghalaya          | 18.7      | 17.3  | 13.7        | 10.6   | 16.6  | 15.4       |
| Mizoram            | 17.1      | 9.9   | 4.2         | 2.1    | 4.6   | 9.9        |
| Nagaland           | 0.9       | 4.5   | 8.3         | 3.3    | 2.6   | 3.9        |
| Odisha             | 77.4      | 69.8  | 73.6        | 85.3   | 85.1  | 75.1       |
| Punjab             | 256.8     | 246.0 | 246.2       | 249.6  | 237.3 | 245.6      |
| Rajasthan          | 66.4      | 57.6  | 49.7        | 38.9   | 25.0  | 41.5       |
| Tamil Naidu        | 228.1     | 214.6 | 197.9       | 173.9  | 136.3 | 210.1      |
| Tripura            | 74.9      | 58.7  | 49.4        | 41.9   | 54.9  | 64.7       |
| Uttarakhand        | 95.6      | 115.9 | 156.5       | 201.3  | 165.2 | 127.5      |
| Uttar Pradesh      | 243.9     | 124.8 | 89.6        | 56.1   | 26.4  | 161.2      |
| West Bengal        | 211.1     | 144.6 | 137.1       | 127.4  | 160.7 | 180.8      |

Source: Computed from All India Report on Input Survey (2012)

Table 5.4 demonstrates the share of major state in fertilizer subsidy in India. The share of each state in fertilizer subsidy has calculated by consumption of fertilizers in the state. Higher the consumption of fertilizers in state higher will be the share in subsidy of that state. The data shows that the maximum share of fertilizer subsidy has concentrated by top seven states. As the table shows, more than half of the total fertilizer subsidy is restricted by top five states

namely Uttar Pradesh, Maharashtra, Andhra Pradesh, Punjab and Madhya Pradesh. Most of these states grow fertilizer-intensive crops such as rice, wheat, cotton and sugarcane. The share of less developed states like Rajasthan, Odisha, Assam and Jammu Kashmir was low and they accounted for only 6.9 percent of the total subsidy in 2011-12. Uttar Pradesh (16.7%) was getting maximum share of fertilizer subsidy in 2011-12 followed by Maharashtra (12.1%), Andhra Pradesh (10.4%) and Punjab (7.7%). It can be observed from the data that Punjab has consuming maximum fertilizers (245.6 kg/ha) but getting only 5.6 percent of total fertilizer in 2011-12. While in UP the average consumption of fertilizer was only 161.2 kg/ha and getting 16.7 percent share of total fertilizer subsidy.

Table 5.4:  
Share of Major States in Fertilizer subsidy in India in 2011-12

| State           | Percentage Share in Total fertilizer Subsidy |
|-----------------|--|
| Uttar Pradesh   | 16.7   |
| Maharashtra     | 12.1   |
| Andhra Pradesh  | 10.4   |
| Punjab          | 7.7  |
| Madhya Pradesh  | 7.7  |
| Karnataka       | 7.1  |
| Gujarat         | 7.0  |
| West Bengal     | 6.5  |
| Haryana         | 5.2  |
| Tamil Naidu     | 4.7  |
| Bihar           | 4.2  |
| Rajasthan       | 4.1  |
| Chhattisgarh    | 2.2  |
| Odisha          | 1.6  |
| Assam           | 0.7  |
| Uttrakhand      | 0.6  |
| Others          | 0.6  |
| Jammu & Kashmir | 0.5  |
| Kerala          | 0.4  |
| C.V. (%)        | 84.96  |

Source: Computed from All India Report on Input Survey (2012)

### 5.3 Distribution of Subsidy across the Crops

Table 5.5 shows the concentration of fertilizer subsidy in 2011-12 across the major agricultural crops in India. It is evident from the table that paddy and wheat are the major user of fertilizer subsidy accounting for over half of the total fertilizer subsidy in India. About 50.6 percent (Table 5.5) of total subsidy



has been used by paddy and wheat. Paddy is the biggest beneficiary of the fertilizer subsidy receiving 29.9 percent of fertilizer subsidy in 2011-12. Wheat is the second biggest user of fertilizer subsidy receiving 21.3 percent of fertilizer subsidy in 2011-12 followed by cotton (8.8%). Sugarcane is the another fertilizer intensive crop which accounted for 5.7 percent of fertilizer subsidy. It is observed from the table that paddy (149.3 kg) and wheat (178 kg) is using the less amount of fertilizer per hectare than sugarcane (319.6 kg) but receiving the share of subsidy more than that of sugarcane. It is clear from the data that food grains receive a big share of fertilizer subsidy while coarse cereals receive a small share of fertilizer subsidy. The farmers growing the fertilizer intensive crops like paddy, wheat, cotton and sugarcane are the major recipients of fertilizer subsidy. So there is a high degree of concentration of fertilizer subsidies in terms of crops as four crops (paddy, wheat, cotton, and sugarcane) use nearly two-third of the total fertilizer subsidy in India in 2011-12.

Table 5.5:

Concentration of Fertilizer Subsidy on Major Crops in India: 2011-12

| Crop      | Total Fertilizer used ('000 tonnes) | % Share in total subsidy | Per Ha fertilizer Use (Kg) |
|-----------|-------------------------------------|--------------------------|----------------------------|
| Paddy     | 7268.1                              | 29.3                     | 149.3                      |
| Wheat     | 5273.9                              | 21.3                     | 178.0                      |
| Cotton    | 2151.9                              | 8.8                      | 153.4                      |
| Sugarcane | 1394.9                              | 5.7                      | 319.6                      |
| Maize     | 1201.3                              | 4.8                      | 112.2                      |
| Jowar     | 547.6                               | 2.2                      | 87.5                       |
| Bajra     | 394.3                               | 1.4                      | 49.3                       |
| Groundnut | 338.8                               | 1.4                      | 102.1                      |
| Others    | 6231.6                              | 25.1                     | 96.2                       |
| All crops | 24802.5                             | 100.0                    | 130.7                      |

Source: Compiled from All India Report on Input Survey (2012)

#### 5.4 Distribution of Subsidy across Farm Size

Fertilizer subsidies are mostly criticized because they are supposed to be far from universally distributed and concentrated on relatively few producers, mainly large farmers. In order to evaluate whether the subsidy policy benefits only large farmers or all groups of farmers, subsidy distribution pattern across different farm size groups in India has been analyzed. We have computed the share of different farm size groups in total subsidy and results are presented in Table 5.6 Here we can see that there is an inverse relationship between

farm size and their share in total fertilizer subsidy. The share of marginal farmers in subsidy has been increasing. While medium and large farmers` share has been decreasing in subsidy. In 1991-92, the share of marginal farmers (20.6%) was almost double to the share of large farmers (10.2%). Small farmers` share in total subsidy has also been increasing but it is less than that of marginal farmers. In 2011-12, marginal farmers` share has increased to 35.8 percent from 20.6 percent in 1991-92, whereas share of large farmers has declined to 5.6 percent from 10.2 percent in 1991-92. These results show that the fertilizer subsidy is distributed equitably among different farm sizes.

Table 5.6:  
Share in Total Fertilizer Subsidy on Different Farm Size Holding in India (%)

| Year/Farm Size | Marginal | Small | Semi-medium | Medium | Large | All groups |
|----------------|----------|-------|-------------|--------|-------|------------|
| 1991-92        | 20.6     | 21.1  | 24.2        | 23.9   | 10.2  | 100        |
| 1996-97        | 25.6     | 20.4  | 23          | 22.2   | 8.8   | 100        |
| 2001-02        | 28.3     | 23    | 23.3        | 19.1   | 6.3   | 100        |
| 2006-07        | 29.1     | 23.8  | 22          | 19     | 6.1   | 100        |
| 2011-12        | 35.8     | 22.4  | 20.5        | 15.7   | 5.6   | 100        |

Source: GOI (Various Reports)

### 5.5 Distribution of Fertilizer Subsidy According the Nature of Land in India

To measure the benefits of fertilizer subsidies in irrigated and un-irrigated areas, we analyzed fertilizer consumption trends in irrigated and un-irrigated areas from 1991-92 to 2011-12. It is clear from the following information (Table 5.7) that farmers in irrigated area use more fertilizers (187.1 kg/ha) than unirrigated areas (82.1 kg/ha). On the other hand, fertilizer consumption has increased at much higher rate in unirrigated areas (129.1%) compared with irrigated areas (44.4%) between 1996-97 and 2011-12. It can be observed from these results that the share of unirrigated areas is much higher than irrigated areas. There are so many factors which affects the consumption level of fertilizers of the farmers of unirrigated areas. These areas mostly depend upon monsoon due to lack of irrigation facilities. But the monsoon is not performing well in India from last some years. That's why the fertilizer consumption level of farmers in unirrigated areas has been increasing rapidly than irrigated areas. It is quite obvious from the above discussion that benefits

of fertilizer subsidy are not limited to resource-rich areas but have spread to other areas as well.

Table 5.7:  
Growth in the Consumption of Fertilizers (N+P+K) on Irrigated and Unirrigated Land (Kg/ha)

| Year    | Irrigated Land | Unirrigated Land | Total |
|---------|----------------|------------------|-------|
| 1996-97 | 129.8          | 35.8             | 77.1  |
| 2001-02 | 145.7          | 50.9             | 92.6  |
| 2006-07 | 171.7          | 58.9             | 112.7 |
| 2011-12 | 187.1 (44.4)   | 82.1 (129.1)     | 130.7 |

Note: Figures in Parentheses show percent increase in consumption on irrigated and unirrigated land between 1996-97 and 2011-12

Source: Compiled from All India Reports on Input Survey (2012)

## **Chapter-6**

### **Summary and Conclusion**

#### **6.1 Summary**

Fertilizer is one of important input underlying the growth in food grains and other crops during last four decades. It embraces the key to future growth in agricultural output in the country because irrigation facilities are not available properly in the country except some regions that's why agriculture sector depends upon fertilizers nowadays. Fertilizer use has observed remarkable growth in some parts of the country but its use is quite low in many states where it offers extensive scope to raise agricultural production. Some researchers stress to the extent that these subsidies are causing adverse impact on production. On the other hand, there is concern about decline in production if subsidies are reduced. Thus, if subsidy on fertilizer is taken away in one go it is going to cause very serious adverse effect on food grain production, on food security and on farm income. Food grain production of India is growing at a slow rate compare to growth rate in demand and there are serious anxieties to accelerate growth in food grain production. On the other hand, expanding subsidy bill is a matter of concern and, slow growth in fertilizer production is another matter of serious concern. One way out to keep some check on further growth of subsidy without adverse impact on food grain and agricultural production is to increase fertilizer prices at a rate lower than the increase in food grain prices received by farmers. However, subsidy has contributed to an increase in fertilizer consumption that has helped in attaining self-sufficiency in food grains production but on the other hand, it has caused in an overuse, which has an adverse effect on productivity.

In order to analyze the growth and performance of fertilizer subsidy in India, the analysis is divided in two parts in present study. In the first part of the analysis, trends in fertilizer subsidy and its impact on consumption and production of fertilizer, impact on yield of food grains and per hectare fertilizer subsidy has measured for the period 1990-91 to 2015-16. In the second part of the analysis, distribution of fertilizer subsidy among different farm sizes, major states and major crops has measured to understand who benefits from fertilizer subsidies for the period of 1991-92 to 2011-12. The fertilizer subsidy seeks out to encourage fertilizer consumption, increase agriculture

productivity, enhance farm income and to make sure the adequate returns on the investment to entrepreneurs. There has been a growing concern about steep increase in the fertilizer during last few years with the objective to provide fertilizers to farmers at affordable price and to make sure adequate returns on the investment to entrepreneurs.

The growth and performance of fertilizer subsidy was measured by subsidy allocated by the government of India in expenditure budget. The fertilizer subsidy has increased significantly from 1990-91 to 2015-16 in India with the objective to provide fertilizers to farmers at an affordable price and to make sure the adequate returns on investment for producers. The subsidy on fertilizers has increased to Rs.72969 crores in 2015-16 from Rs.4389 crores in 1990-91. No doubt, the fertilizer subsidy in actual terms has increased throughout the study period but fertilizer subsidy as a percentage share of gross domestic product has been decreasing in India. Increased fertilizer subsidy has the positive impact on consumption and production of fertilizers in India. The consumption and production of fertilizers has increased to 25576 thousand tonnes and 16269 thousand tonnes respectively in 2014-15. India ranks second in consumption of fertilizers and ranks fifth in the production of fertilizers in the world. India has consumed 14.8 per cent and produced 5.2 per cent of world fertilizers. It shows that there is a big gap between consumption and production of fertilizers, so India has to import fertilizers from other countries namely China and Iran. India's fertilizer import has increased to 9135 thousand tonnes in 2014-15 from 275 thousand tonnes in 1990-91. These results shows that concentration on fertilizers of India is higher than other developed and developing countries of the world. The per hectare fertilizer subsidy has also increased. It was observed in the study that there is positive relation between fertilizer subsidy and food grain production and productivity in India because increased subsidy encourages the farmers to use more fertilizers on crops at lower cost. The yield of food grains has increased to 2129 kg/ha in 2012-13 from 1380 kg/ha in 1990-91.

The study also analyzed the distribution of fertilizer subsidy across major states, crops and different farm size holdings. In order to examine the share of major states in total fertilizer subsidy in India, 19 major states i.e. Uttar

Pradesh, Maharashtra, Andhra Pradesh, Punjab, Madhya Pradesh, Karnataka, Gujarat, West Bengal, Haryana, Tamil Nadu, Bihar, Rajasthan, Chhattisgarh, Odisha, Assam, Uttarakhand, J&K and Kerala are taken in the study. The per hectare fertilizer consumption in states of India has also analyzed in the study. It was found in the study that Punjab is the largest consumer of fertilizers in the country followed by Tamil Nadu and Haryana. However, there has been observed inequality in the distribution of subsidy across the states because Punjab is the largest consumer of fertilizers per hectare (245 kg) but receiving only 7.7 per cent of total fertilizer subsidy. On the other hand, in Uttar Pradesh per hectare fertilizer consumption was found 161.2 kg but receiving the highest share (16.7) of total fertilizer. Thus the higher value of coefficient of variation indicated that there is inequality in the distribution of fertilizer subsidy across the states.

The distribution among major crops i.e. Paddy, Wheat, Cotton, Sugarcane, Maize, Jowar, Bajra and Groundnut was found the similar trends as found in the distribution of subsidy across the states. It was found in the study that almost half of the total subsidy cornered by two major crops i.e. wheat and paddy. The wheat and paddy crops are receiving the 21.3 per cent and 29.3 per cent of total fertilizer subsidy respectively. While the sugarcane is the largest consumer per hectare of fertilizer but receiving only 5.7 per cent of subsidy. It is clear from the analysis that food grains received a big share of fertilizer subsidy while coarse cereals received a small share of fertilizer subsidy. The farmers growing the fertilizer intensive crops like paddy, wheat, cotton and sugarcane are the major recipients of fertilizer subsidy.

The distribution of fertilizer subsidy has also analyzed among the different farm size holding in terms of fertilizer consumption in the study. The inverse relation was observed between farm size and their share in total fertilizer subsidy. It found that the share of marginal and small farmers has been increasing in fertilizer subsidy and the share of large farmers has been decreasing in the study period. Marginal and small farmers, who accounted for 85.1 per cent of total operational holding in 2011-12 but received the 58.2 per cent of fertilizer subsidy, whereas large farmers have only 0.7 per cent of total operational holdings but they accounted for 5.6 per cent of total fertilizer subsidy. Although

the share of the marginal and small farmers in total fertilizer subsidy is less than their share in total operational holding, but at some extent distribution of fertilizer subsidy among different farm sizes found equitable.

## **6.2 Policy Suggestions**

1. The increased fertilizer subsidy encourages the farmers to use more fertilizers on plants or crops to increase the production, but after a certain level of use, it degrades environment and reduces the fertility of soil. Thus, fertilizer subsidy should be given in such a manner so as to discourage the additional consumption of fertilizer after an optimum level of its consumption. For this purpose, the fertilizer subsidy can also be reduced depending upon the consumption.
2. The existing model of subsidizing fertilizers through the manufacturing firms should be replaced by giving directly to farmers.
3. The marginal and small farmers should be subsidized more for fertilizers as they cannot afford to use the modern technology and inputs in farm activities due to poor economic conditions. This would also reduce the unproductive expenditure on fertilizers.
4. It was found in the study that major share of the subsidy is cornered by fertilizer intensive crops like wheat and paddy. But, the fertilizer subsidy should be given separately for other commercial crops to encourage the farmers to grow other commercial crops. Thus, it will also lead to the diversification of agriculture.

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