CHAPTER 1

INTRODUCTION AND METHODOLOGY

1.0 Introduction:

A greater emphasis on the development of agriculture assumes enormous significance not only from the viewpoint of its contribution to the overall development of the economy but also in terms of ensuring food security—issue being currently debated throughout the country. In fact, it is worth mentioning here that the central government is planning to make accessibility to food a fundamental right. Although the average growth rate of agricultural sector and its share in the gross domestic product (GDP) have been on the decline over time, its role as the main provider of food grains and employment to a larger section of the population, as a source of raw materials to the industrial sector, export earnings etc., cannot be underestimated, while on the other hand its social significance is justly reflected in our tradition, festivals, literature, customs, ceremonies, folk songs and dances.

Realizing the importance of this sector particularly after independence the government has put in tremendous efforts which transformed the Indian agriculture from a predominantly subsistence farming at the time of independence into one of the market oriented agriculture in the post independence period: and this sector grew at the rate of about 1 percent per annum during the fifty years before Independence, while at the rate of about 2.6 percent per annum in the post-Independence era (Tripati, 2009). Further, India witnessed prominent progress after the introduction of the new agricultural technology in form of a “package of
improved practices” which led to a spectacular growth in food grain production from 50 million tons in 1950-51 to 235 million tons in 2010-11. The tremendous agricultural progress can be attributed to the policy initiatives and programs of the government in terms redefining the role and place of agriculture in the Indian economy.

1.1 Initiatives in Indian Agricultural Development

At the time of Independence, the agricultural sector was primitive in nature despite being a major contributor to the GDP (approximately 55%) and the total workforce (70%); but still it was facing severe shortage of food grains and spiraling prices (Dantwala, 1986). Given its importance, the development of agriculture since 1950’s has been in the forefront of all economic policies aimed primarily at transforming into a vibrant sector, as aptly reflected in the remarks made by the then Prime Minister “everything else can wait, but not agriculture”. These policies initiatives can be distinguished into four phases:-

Agricultural development over the years 1947 to 1966 can be termed as the first phase, which started with Intensive Agricultural District Program (IADP) as recommended by Ford Foundation in select areas having favorable conditions for maximizing agricultural production. Sponsored by the Ford Foundation, second team of agricultural experts visited India during 1959 to give a definite shape to the recommendations made by the previous team, surveyed the area and in consultation with State and Central government developed a programme called “Ten-Point Pilot Programme” which is also called as intensive agriculture district program aimed at increase food production, called as Intensive Area.
Development Programme (IADP), with an ultimate objective of increasing farmers’ incomes, improving economic resources of villages and providing strong agriculture base to accelerate the process of economic development. Later, Intensive Agriculture Area Programme (IAAP) was introduced in the year 1965 for intensive development of important crops such as wheat, paddy, millets, cotton, sugarcane etc. which, later on was extended to other areas in the year 1966-67, covering 117 district and 1,600 blocks and programme activities through the usage of fertilizer, improved seeds, agricultural implements etc. A limited supply of inputs was an impending factor for the overall success of IAAP. Efforts were also initiated for regenerating Indian agriculture that had stagnated since 1950’s through agrarian reforms, institutional changes, development of major irrigation projects, strengthening of credit institution, abolition of intermediaries; particularly land reforms played an important role in increasing agricultural production during this phase along with the Community Development Programs and planning. Despite the institutional changes effected and the developmental programs introduced during this phase, food imports remained very high.

During the second phase (1967 to 1980), the development of agriculture shifted from extensive to intensive cultivation practices through launching of High Yielding Variety Seeds Program (HYVP) during 1966-67 in selected areas popularly called the “Green Revolution” which propagated the use of the package of complementary inputs like HYV seeds, fertilizers and pesticides, to improve input- output relationship and steadily spread to other areas, resulting in an increase in food grain production. The target of 25 million hectares under HYV of
rice, wheat, maize and bajra under HYVP was achieved over the period 1976-77 and later was extended to 37 million hectares. A national campaign was launched for increasing the productivity of rice, which included balance use of fertilizer, plant protection measures, intensive irrigation programme, and use of HYV seeds etc., in the year 1978-79, 42 million hectares were covered under the HYV program. This helped India realize its goal of achieving self-sufficiency in food grain production through an intensive and scientific use of input mix particularly fertilizer, which is crucial to improve agricultural productivity in India (FAO). Research, extension, input supply, credit, marketing, price support and spread of technology were the prime concern of policy makers during this period (Rao 1996).

The third phase of development in Indian agriculture was witnessed from the early 1980s to 1990s, during which the policy emphasis remained on research, extension, input supply, credit, marketing, price support and spread of technology, along with a substantial increase in input subsidies. This period also started witnessing the process of diversification resulting in a substantial growth in non-food grains output like milk, fishery, poultry, vegetables, fruits etc which inturn accelerated the agricultural GDP during the 1980s. Although there was considerable support to the agriculture sector during this period, the public sector investment on agriculture for infrastructure development started showing a decline in real terms while on the other side private investment by the farming community continued to show an upward trend.
The fourth phase of development can be linked to the initiation of the economic reforms process in 1991. The economic reforms process involved deregulation, reduced government participation in economic activities, in addition to indirectly influencing the growth of agriculture through devaluation of exchange rates, liberalization of external trade and non-protection to industry. During this period, subjecting of the domestic market to the international trade accord - WTO affected the overall growth rate of agriculture i.e. all crops from 2.93 percent in 1996-97 to 1.57 percent in 2007-08, more importantly the alarming stagnation in the growth rates of pulses and oilseeds necessitated the formulation of national agricultural policy (NAP) with a view to achieving an annual growth rate of 4 per cent. If agriculture fails to register the projected growth rate, it will be very difficult for other sectors already growing full-speed to compensate and would “expose the economy to needless vulnerability”.

Agricultural growth expectations made it imperative for the rapid implementation of new knowledge and innovative technology so as to reverse the declining agricultural growth trends which had thrown up new challenges to policymakers. However, during the 11th Plan, this sector has managed to register just about 3.3 to 3.5% growth as against the projected growth rate of 4%. While taking a serious note of this fall in growth rate, the Planning Commission has noted that although growth in production of food grains has been satisfactory, the country needs to improve the production of other crops, particularly pulses and oilseeds; and while keeping this in view, the Planning Commission projected a 4
per cent farm growth for the 12th Plan (2012-17), like it had done for the 11th Plan (2007-12).

1.2 Fertilizers in Indian Agriculture

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

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

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

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

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

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

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

Soon after independence, partition and expansion of commercial crops like sugarcane and groundnut occupied fertile lands, while pushing food grains to less fertile areas where yield per acre was low, ultimately leading to a severe food crisis. In order to rebuild and regenerate the ecological base of productivity in Agriculture, India’s first Agriculture minister, K N Munshi, had worked out a
detailed strategy based on decentralized and participatory methodology involving Private American foundation, American Govt. and World Bank for transferring the American model of Agriculture to India. On the other side the ford foundation was involved in training agricultural extension service providers in India from 1852 to 1952, largely based on the extensive use of fertilizers. And the famine enquiry commission in its reports recognized the problem of low productivity associated with low fertility of Indian soil systems.

In 1958, Indian Agriculture Research Institute was reorganized with a view to evolving suitable strategies for the development of agriculture under the headship of Ralph Cummings was who later succeeded by A B Joshi in 1960 followed by M S Swaminathan, in 1965. The occurrence of drought in 1966 causing a severe drop in food grain production in India, and the subsequent excessive imports of food grain from U. S.A influenced agricultural scientists and farmer’s to lean towards the American model of agricultural development whose impact spread to the entire 3rd world in the form of “Green Revolution”. With the introduction of the semi–dwarf high yield varieties (HYV) of wheat, in India by Dr M S Swami Nathan was developed by Dr Norman Borloug, in mid 60s and agricultural policies got reoriented to the new seed policy called New Agricultural strategy (N A S). According to Dr Palms (National Research for Social Development), the term ‘Higher yield variety’ refers to new seeds that are high yielding and also highly responsive to certain key inputs such as chemical fertilizers.
Initially it was applied to wheat covering 1/10th of the cultivable land and was later extended to other crops and areas. Green revolution called for the use of package of inputs with high applications of chemical fertilizers as they convert nutrients in to overall plant growth.

The National Commission on Agriculture, with respect to fertilizer uses, observes “Addition of plant nutrient in the form of fertilizers constitutes an essential step in agricultural production.” Because of the narrow land-man ratio, which might get still narrower in the coming years, the only hope for meeting the ever increasing needs of a burgeoning population would be through raising the productivity level. One of the important inputs for achieving this objective is fertilizer which has contributed to the economic development by way of bringing additional area under cultivation and adopting multiple cropping patterns, thus leading to the realization of new technology associated benefits, application of higher doses of agricultural inputs to the existing cultivated lands; this aspect has been well recognized.

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

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

Modern fertilizer practices, first introduced more than a century ago, have not only contributed substantially to the development of agriculture, by improving yield levels, but also providing better resistance to some diseases and climatic stresses. Furthermore, farmers’ economic returns have also increased over time. Studies support the fact that the production of wheat and paddy has increased in areas where fertilizer consumption has become fairly substantial and that there is a positive correlation between fertilizer consumption and agricultural yield.

Although the first five year plan viewed fertilizer as a supplementary input to organic manure, the real push to fertilizer came about in the 2nd five year plan and there onwards, leading to an increase in the total fertilizer consumption from 66,000 in 1950-51 tones to 84,000 tonnes in 1961-62 i.e., an average increment of about 38,000 tones of NPK. Later, from the 2nd five year plan onwards, a need
based approach to fixing targets of fertilizer use was evolved, and, since then, the importance and consumption of fertilizer has grown phenomenally in the context of Indian Agriculture.

India happens to be the 2nd largest consumer of N .P .K in the world,(2009) next only to China, fertilizer consumption has no doubt increased over the years, but when compared to developed countries like Japan, U. K., Korea and china, per hectare consumption rates are low, i.e.,395.1kgs, 320.5kgs, 370.7kgs and 465.6kgs, respectively. In India fertilizers consumption which was about 0.55kgs per hectare for the year 1951-52 increased to about 115.65 kg’s per hectare for the year 2008-09, while the projected consumption per hectare according to the 12th plan works out to 185.81kgs ,

1.3 An overview of Fertilizer pricing Policies

Identifying the importance of fertilizer, as a yield enhancing input, it has been the endeavour of the government to ensure availability of adequate quantity of fertiliser at reasonable prices for the greater use of it by farmers and also to give a reasonable return to industries so that production can keep pace with demand, With the ultimate objective of attaining rapid growth of agriculture to facilitate economic goals. The major objectives of the Fertilizer policies are classified as supply-side and demand side objectives, supply side aims at promoting investments in fertilizers sector, ensure reasonable return to manufacturing, adoption of efficient technology. Optimum utilization of recourses employ cost reduction techniques while demand side objective includes promote the use, encourage use in other backwards areas.
During the early phase of development the emphasis was laid more on promotion and popularisation of fertiliser, stepping up its indigenous production and equitable distribution. During the later stage, due to intensification of agriculture resulting in multi nutrient deficiencies, focus of the government shifted more towards balanced fertilisation besides addressing the issues relating to pricing and subsidy arising out of rising subsidy bill etc. Various committees were formed from time to time to suggest measures for promoting the increasing and balanced use of fertiliser, encourage indigenous production, ensure, timely supply of the products educate farmers about the fertilizers use efficiency quality products and enable equitable distribution of fertiliser to the farmers across the country. In this context the government of India established the “Central fertilizer pool” in 1944 with a view to ensuring an equitable distribution of all fertilizers at fair prices, which included pooling together of both domestic and imported fertilizers and distributed through state owned fair s hops all over the country and for regulating the sale, pricing and quality of fertilizers. Later in the year 1957, fertilizers was brought under the Essential Commodities Act (ECA).

‘Committee on Fertilisers’ (Sivaraman Committee: 1964) laid the foundation for indigenous production, promotion, distribution, and consumption of fertilisers in the country, under the leadership of Sri B. Shivaraman, Secretary Department of Agriculture, to examine the problems related to distribution, pricing, role of cooperatives in their marketing and popularizing the use of fertilizer. This Committee recommended liberalization of fertilizer market where partial production where marketed at the discretion of the manufacturer (50%).
and the concept of Half-yearly Zonal Conferences was introduced in 1972. Fertilisers were distributed by the manufacturers according to their ECA allocation for the two cropping (Kharif and Rabi) seasons, as per the supply plan fixed at the Zonal conferences. Fertiliser shortages in the early 70s led the government to pass the Fertiliser Movement Control Order in 1973, bringing fertiliser distribution and its inter-state movement under government control.

Later in the mid 70s, due to the oil crisis, prices of fertilisers and raw materials increased in astronomically proportions in the international market. As a result, retail prices of fertilisers shot up significantly. This led to a reduction in fertiliser consumption affecting NPK use ratio. As an immediate measure, Government started giving a subsidy of Rs.1250 per tonne of P2O5 phosphatic fertilisers effective from March 1976. Meanwhile, to resolve the dilemma of how to keep farm gate prices of fertilisers at an affordable level particularly in the face of rising production / import costs, the Government of India introduced the Retention Pricing Scheme (RPS) based on the recommendations of “Fertilizer Prices Committee,” headed by Shri S. S. Marathe. RPS was introduced in respect of urea in November 1977, complex fertilisers in February 1979 and SSP in 1982. However, the increase in the cost of production and imports without suitable adjustments in MRP led to a significant increase in subsidy bills and the retail prices were raised by 5 to 7% by G.V.K Rao committee, (1987“high powered committee on fertilizer consumer prices”).

The introduction of RPS led to a spectacular increase in fertiliser consumption as well as domestic production of fertilisers. Consumption of
fertiliser nutrients (N+P+K) increased close to 3 times from 4.29 million tonnes in 1977-78 to 12.73 million tonnes in 1991-92. Likewise, indigenous production of fertilisers (N+P) increased 3.7 times from 2.67 million tonnes to 9.86 million tonnes over the same period. Later the government experimented with “dual pricing policy” where small and marginal farmers with less than 2 hectares of land holidays were exempted from the hike, but this scheme was discontinued after 31st march 1992. Central subsidy on fertilisers increased from Rs.266 crore in 1977-78 to Rs. 4,800 crore in 1991-92. Concerned with the increasing subsidy burden, caused by rising costs of imports and domestic production, A Joint Committee on Fertilizer Pricing was formed in 1991 under the Chairmanship Shri Pratap Rao Bhosle, the then Member of Parliament (Lok Sabha), to review the method of computation of retention prices for manufacturers of fertilizers and to suggest whether was any scope for reducing fertilizer prices within the existing scheme or whether new methodology for fertilizer pricing could be evolved without causing undue strains to the exchequer. The main conclusions and recommendations of the committee were that the enormous rise in subsidies extended were mainly due to rise in the prices of inputs (which were not reflected in the farm gate prices), increase in the cost of imported fertilizers, devaluation of the rupee in July 1991 and the stagnant farm gate prices from 1980-1991. The Committee did not favor a total decontrol of the fertilizer sector, instead, recommended decontrol pricing of and distribution of phosphatic and potassium fertilizer along with a marginal 10 per cent reduction in the consumer prices of urea. The Committee, while noting the lack of incentives in RPS for
fertilizer units to optimize capital cost of plants, recommended a detailed study of the RPS as well as the working of the FICC by a Committee of experts.

Based on the recommendations of the Joint Parliamentary Committee on Fertilizer Pricing, the prices, movement and distribution of all phosphatic and potassium fertilizers were decontrolled w.e.f 25th August’ 92. As a result of the decontrol of all phosphatic and potassium fertilizers, the retail prices of these fertilizers increased significantly. With a view to partially compensating the increased costs of decontrolled fertilizers, an adhoc concession (later termed as concession) of Rs.1,000 per ton each for DAP and MOP, Rs.435-999 per ton for NP/ NPK fertilizers was extended effective from Rabi 1992-1993. The rates of concession were revised from time to time, in the later years the recommendations of the committee led to a series of changes in fertiliser policy responses as stated below:

(i) The prices, movement and distribution of all phosphatic and potassic fertilisers were decontrolled w.e.f. 25th August’1992.

(ii) Retail prices of urea got reduced by 10 per cent w.e.f. 25th August’92.

(iii) Import of rock phosphate and sulphur was decanalised w.e.f 1st March’92.

(iv)Import of ammonia and phosphoric acid was decanalised w.e.f 1st April’92.

(v) Import of DAP was decanalised w. e.f 17th September’92.

(vi) Import of MOP was decanalised w.e. f 17th June,’93

Subsidy reduction lead to imbalance in use ratios the Government of India constituted a ‘High powered Fertilizer Pricing Policy Review Committee (HPC)’ under the chairmanship of Prof. C. H. Hanumantha Rao, former member,
Planning Commission, to review the existing system of subsidization of urea, and to suggest an alternative broad based scientific and transparent methodology, besides measures for ensuring a greater cohesiveness among policies applicable to different segments of the industry. The HPC, which submitted its report to the Government on 3rd April 1998, recommended that unit wise RPS for urea be discontinued and that a uniform Normative Referral Price (NRP) be fixed for the existing gas based urea units and also for DAP.

The Government appointed various other committees to suggest alternatives to the RPS. These include Fertilisers Pricing Policy Review Committee, headed by Dr. C. H. Hanumantha Rao in March 1990 and Expenditure Reforms Commission (ERC) in the year 2000. The ERC recommended replacement of unit specific RPS by group based concession scheme. The recommendations of the ERC were further modified based on which the New Pricing Scheme (NPS) was brought in effect from 1.4.2003 wherein Unit Specific Subsidy in the latter has been replaced by a Group Based Concession in the former. NPS is still continuing on urea.

Alarmed by the mounting fertilizer subsidies resulting in fiscal concerns, the government appointed a committee called the Expenditure Reforms Commission headed by Shri K.P.Geethakrishnan, former Finance Secretary, to look into the question of rationalizing fertilizer subsidies. The commission submitted its report on 20th September, 2000. It recommended the dismantling of the control system in phases manner, so as to facilitate a decontrolled fertilizer industry at the commencement of the fourth stage to be able to compete with
imports albeit with a fair degree of protection the and feedstock cost differential compensation to naphtha/LNG based units for ensuring self- sufficiency.

Subsidy in respect of the latter has been replaced

Implemented in stages; Stage-I from 1.4.2003 to 31.3.2004. Stage-II from 1/4/2002 to 31/3/2005. The objectives of Stage – I & II of NPS were as follows:

(i) To encourage efficiency parameters to international standards based on the usage of the most efficient feedstock, State of the Art Technology

(ii) To ensure viable rates of return to units

(iii) To decontrol partially the distribution and movement of Urea leading to a total decontrol

(iv) To create an additional Urea capacity based on a cheaper feed stock i.e. gas through a policy of de-bottlenecking / revamp / modernization and brown field expansions of existing Urea Units

(v) To convert non-gas based Urea Units into gas run units through incentives.

The Department of Fertilizers (DOF) constituted a Working Group under the chairmanship of Dr. Y.K. Alagh for reviewing the effectiveness of Stages-I and II of NPS and also for formulating a policy for urea units beyond Stage-II i.e. from 1.4.2006 onwards. The Working Group submitted its report on 26.12.2005.

Stage-III was to commence from 1.4.2006 following a review of Stages-I and II. The Working Group adopted a composite methodology of meetings and discussions. It constituted 6 Sub-Committees comprising subject matter specialists, scholars of eminence, representatives of the industry, and Government
officials, to go in depth into the selected issues assigned to them and make recommendations in respect thereof. The urea companies and Fertilizer Association of India (FAI) made presentations before the Working Group giving their views on the impact of Stages-I & II of NPS on the performance of urea units and their suggestions for the policy in respect of Stage-III.

The Working Group made its recommendations on various issues such as, future demand for and supply of urea, joint venture projects abroad, maximum retail price of urea, feedstock related issues, taxation related issues, distribution and movement of urea, and subsidy related issues and policy for fertilizer usage. While considering the possibility of the total decontrol of urea pricing found that this might affect the interest of farmers in a significantly negative manner. Hence, the Working Group ruled out the possibility decontrol of urea pricing in the near future. It also considered the positive implications for the economy of moving away from unit level administered pricing strategies while observing that reforms under the NPS had led to cost reduction and energy savings as against from the levels achieved earlier. Based on this, the Working Group felt that the logical progression would be to move over to a single producer price strategy with a provision for energy pass through and grant of capital subsidy to existing fertilizer units to convert to gas as a feedstock.

However, considering the risks involved at the present stage, the sensitiveness of the agrarian question and the heterogeneity of the fertilizer industry, the Working Group also recommended a Second Best Strategy (SBS) in which there would be one group for gas based units and one for Fuel oil/Low
sulphus heavy stock based units. The first group of units would include units which have been designed and are working on gas as a feed stock. It would also include two other groups viz. units already converted to gas in the recent phase but in the process of completing the initial period of repayment of loan and interest payments and those units with plans or possibilities of conversion to gas based units. The latter group comprises naphtha based units and Gujarat Narmada Valley Fertilizer Corporation (GNVFC), Bharuch which would convert from FO to gas with tied up gas supplies. SBS also provides for the granting of capital subsidy for the Naphtha/FO/LSHS and Mixed Feed units which have made significant investments in revamp and for units converting to gas

The Working Group further stated that if SBS was not acceptable to the Government for fiscal or any other reasons, then the NPS might be continued into the next pricing period with some updating and corrections of anomalies. This recommendation was based on the premise that any policy needed time and continuity to bear results. The NPS has some positives such as increased energy efficiency and emphasis on conversion to gas based feedstock are already in evidence, though these processes have not reached their logical conclusion as envisaged earlier. Seen in this light, it could be said that more time is needed if all the objectives of NPS were to be realized in a meaningful and lasting manner. It is in this context that the Working Group has suggested under this option that the policy based on feedstock and vintage may be continued through Stage-III of NPS. Beyond this stage it is expected that the stage would be set for a single producer price and decontrol of urea which is the ultimate objective of the long
term urea policy. Having said this, it has also been stated that the issue of NG/LNG would have to be appropriately addressed.

The recommendations under the first two options appear to stem from the strategy as envisaged in the report of the Expenditure Reforms Commission (ERC) on which the policies adopted for Stages-I & II of the NPS were substantially based. ERC had envisaged the New Policy in stages. The Third Phase of the policy was to commence w.e.f 1.4.2005 wherein all plants were expected to get convert to NG/LNG, and the units failing to do so would only be entitled to concession as if they had switched over to LNG. For the Fourth Phase beginning from 1.4.2006, it was envisaged that the industry would be decontrolled. Simultaneously, it was also envisaged increase the Maximum Retail Price (MRP) by 7 per cent per annum from 1.4.2001 onwards reaching to a level of Rs. 6,903/Metric Tonne (MT) by 1.4.2006.

Stage-IV-from 1/4/2006 onwards. Units have been divided into six groups based on vintage and feedstock for determining group based concessions. These groups include Pre-1992 gas based units, post-1992 gas based units, pre-1992 naphtha based units, post-1992 naphtha based units, fuel oil/low sulphur heavy stock (FO/LSHS) based units and mixed energy based units. The mixed energy based group shall include those gas based units that use an alternative feedstock/fuel to the extent of more than 25% admissible as on 1.4.2002.

The unscientific/excessive use of chemical fertilizers and the neglect of organic have manure caused many problems like stagnation in productivity, soil sickness, widespread deficiency of secondary and micro nutrients, spread salinity,
alkalinity etc. Realizing the skewed use of fertilizers also in the country, the Ministry of Agriculture constituted a ‘Task Force on Balanced use of Fertilizers’, under the chairmanship of Shri A.K. Singh,(2006) Additional Secretary, Department of Agriculture and Cooperation to take a re-look at the policy on the use of fertilizers. The committee recommended the restoration of NPK use ratio at the macro level by increasing the use of nutrients P and K instead of reducing the intake of nitrogen. However, at the micro level, the application of nutrient needs to be soils crops and climate specific. Among other major recommendations, the committee suggested the strengthening of soil testing laboratories, fertilizer quality control laboratories, efforts for promotion of green manures, vermin compost, enriched organic manures, micronutrients, expansion of area under fertilization, etc. The committee also felt the need for recognition of the sulphur as a critical input on par with NPK for price fixation and the extension of subsidy for other secondary and micro nutrients. Keeping in view the importance of balanced fertilization the government is propagating the use of customized fertilization and is moving towards nutrient based regime since 2010.
Table 1. Highlights of various fertilizer pricing committees’ policy

<table>
<thead>
<tr>
<th>Year</th>
<th>Committee</th>
<th>Headed by</th>
<th>Recommendations/ Suggestions</th>
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<tbody>
<tr>
<td>1944</td>
<td>Establishment of Central Fertilizer Pool</td>
<td>Government of India</td>
<td>All fertilizers (imported &amp; domestic) to be pooled and distributed through fair price shops.</td>
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<tr>
<td>1952</td>
<td>Fertilizer Control Order</td>
<td>Government of India</td>
<td>Brought fertilizers under essential commodities act (ECA)</td>
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<tr>
<td>1966</td>
<td>Committee on Fertilizers</td>
<td>B. Shivaraman, secretary, Department of Agriculture, GOI</td>
<td>To bring reforms in production, promotion, distribution and consumption of fertilizers. Manufacturers to be given freedom to market 50% of the produce.</td>
</tr>
<tr>
<td>1972</td>
<td>Half Yearly Zonal Conferences</td>
<td></td>
<td>To regulate the distribution of fertilizers to be arranged under Essential Commodities Act (ECA).</td>
</tr>
<tr>
<td>1973</td>
<td>Fertilizer Movement Control Order</td>
<td></td>
<td>Fertilizer distribution and its Inter-state transfer to come under government control</td>
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<tr>
<td>1977</td>
<td>Fertilizer prices Committee</td>
<td>S.S. Marathe, Chairman, Bureau of Industrial Costs and Prices</td>
<td>To ensure fair returns on investment in a sustained manner Introduction of Retention Price Scheme (RPS)</td>
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<tr>
<td>1979</td>
<td></td>
<td></td>
<td>RPS for complex fertilizers</td>
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<tr>
<td>1980</td>
<td></td>
<td></td>
<td>Decontrol of AS and CAN</td>
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<tr>
<td>1981</td>
<td></td>
<td></td>
<td>To promote use of fertilizers in remote areas and allowing the reimbursement of secondary freight</td>
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<tr>
<td>1986</td>
<td>High Power Committee of Secretaries</td>
<td>B.B. Singh, Secretary, Dept of Fertilizers</td>
<td>To enhance production.</td>
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<tr>
<td>1987</td>
<td>High Power Committee on Fertilizer Consumer</td>
<td>G.V.K Rao committee</td>
<td>Among other, a systematic development of dry lands, improvements in soil testing labs,</td>
</tr>
<tr>
<td>Year</td>
<td>Initiative</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>------</td>
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<td></td>
</tr>
<tr>
<td>1992</td>
<td>Bureau of Industrial Costs &amp; Prices (BICP) Report on Normative Retention Price of Fertilizers</td>
<td>To encourage prudent design in production, but were not accepted</td>
<td></td>
</tr>
<tr>
<td>1992</td>
<td>Joint Parliament Committee</td>
<td>Decontrol of Phosphatic and Potassic fertilizers and to marginal 10 percent reduce the prices of urea. by 10 percent</td>
<td></td>
</tr>
<tr>
<td>1998</td>
<td>High Powered Fertilizer Pricing Review Committee</td>
<td>Uniform normative Referral price</td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>Expenditure Reforms Commission</td>
<td>Control System in a phased manner -4 stages.</td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>Expert Committee on Reassessment of Production capacity</td>
<td>To reassess the production capacity of urea manufacturing units through a) method of reassessment to be used; b) effective cut off date; c) quantification of the total amount of unintended benefits.</td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>Cost Price Study of Complex Fertilizer</td>
<td>To decide on rates of concessions of decontrolled complex fertilizers covered the under Concession Scheme</td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>Committee on Cost Price Study of DAP and MP</td>
<td>To undertake cost evaluation in respect of DAP, both imported and indigenous</td>
<td></td>
</tr>
</tbody>
</table>
The current policy regime can best be understood by focusing on three distinct phases of its evolution:

- The period 1977–91, during which fertilizer subsidies were instituted as one of the tools for achieving food security;
- The period 1991–2003, during which efforts were made to reduce and rationalize fertilizer subsidies as part of an economic reform agenda; and
- The period since 2003, during which the government has been trying to make the fertilizer sector more efficient and to keep subsidies extended to farmers in place, in view of the need to increase the agricultural productivity.
As part of the Green Revolution strategy, the GoI decided to encourage domestic production of fertilizers and increased consumption by farmers. This led the government in introducing the Retention Price Scheme (RPS) in 1977. The RPS guaranteed fertilizer producers a 12 percent return on their investment. Further the government also kept the farmgate prices of fertilizers mostly unchanged for a decade to encourage consumption. In the next phase, fertilizer subsidies became a focus of reform efforts, while attempts to reduce them were part of the landmark 1991 package that initiated the process of economic liberalization in India, lead to decontrol of phosphatic and potassic in 1991, which faced a stiffer resistance. Between 1991 and 2003, several attempts were made to increase the farmgate price of urea as well as to reform the policy governing its production and distribution. Despite some setbacks, the farm gate price was increased on six occasions, from Rs 2,350 per metric ton in 1990/91 to Rs 4,830/ton in 2002. It remained unchanged between 2002 and 2009. In February 2010, the cabinet approved another increase in the price of urea by 10 percent from Rs 4,830/ton to Rs 5,310/ton (Telegraph 2010).

After long and tortuous deliberations, the RPS, which had provided a base for the policy framework with regard to the production and distribution of urea, was replaced by the NPS in 2003. However, four -stage reform process brought about only modest changes in the policy framework. In February 2010, the government announced a nutrient-based fertilizer policy with a view to address the nutrient imbalance present in Indian agriculture. The government hopes that the nutrient- based scheme will bring down the overall expenditure on subsidy. It
continues to push for a greater efficiency in fertilizer production. At the same
time, it is committed to retaining the subsidy element with respect to fertilizers, in
some form, for the foreseeable future. It is in the light of these changes in the
fertilizer prices, that the present study intends to explore the impact of changes in
fertilizer prices in terms of its consumption and the consequential effects on
agricultural production and farmers incomes, with a view to understanding
whether there exists a judicious consumption of this costly input or not and also to
analyzing its use pattern at the micro level with the following objectives in view.

1.4 Objectives of the Study

The overall objective of the study is to analyze changes in fertilizer consumption,
agricultural production and cropping pattern against the backdrop of changing
prices. The Specific Objectives are:

1. To study the impact of changes in fertilizer prices on consumption,
   production and cropping pattern both at macro and micro levels.
2. To examine whether the withdrawal of subsidy to fertilizers leads to a
   judicious consumption of fertilizer or not.
3. To explore whether the consumption of fertilizer has decreased or not
   over time and also to analyze its effects on the welfare.
4. To make policy oriented suggestions.

1.5 Importance of the study

In the light of uncertain fertilizer price environment the relation between various
variable are not precisely establish as most of the observed facts are related to
the non price factors influence on fertilizers consumption. This study would help
to come out with certain insights about role of price in relation to agricultural productivity and incomes. And try to ascertain the role of price in determining the fertilizers use. There are no enough studies supporting policy reforms as there are divergent views observed, hence this study would try to fill the gap and add to the existent literature.

1.6 Study Area

The study area is confined to Karnataka for a macro analysis and for a three villages in Bellary and Gadag Districts micro analysis The Secondary data has been made use for analyzing the impact of changes in fertilizer prices on consumption, agricultural production, and cropping pattern at the macro level. In order to analyze the impact of fluctuations in fertilizer prices at the micro level i.e., at the farm level, on production, consumption and cropping pattern, the researcher has used a comparative approach i.e., the Institute for Social and Economic Change (ISEC), Bangalore, had undertaken a similar study in 1990-91 in the same study area mentioned above. The present researcher approached the same respondents in the same villages and collected data for the year 2001-02 for Rabi and Khariff seasons to examine whether there exists any desirable changes, in the trends with respect to the variables mentioned above over time and space between the two studies.

1.7 Methodology— The present study has two dimensions of analyzing the objectives viz; macro and micro. To analyze the impact of fertilizer price changes on consumption, production and cropping pattern, the primary data was collected from three villages in Bellary and Gadag Districts. The methodology followed for
the study has been divided into three parts – selection of districts, villages and households respectively.

1.7.1 Criteria adopted for Selecting Districts

To analyze various aspects at the micro level, three villages in Bellary and Gadag districts were selected for a primary survey, while the following rationale was adopted for selecting districts. The objective was to select districts on the basis of levels and quality of irrigational facilities, fertilizer consumption and cropping pattern. In other words, districts with variations in fertilizer consumption per hectare were selected while giving an adequate importance to the irrigation facilities and crops grown. For this purpose, information on rainfall, extent and sources of irrigation, cropping pattern and fertilizer use for all the districts for the period 1980-81 to 1990-91 was collected. After averaging the figures of each of these variables, ranks were worked out based on the proportion of area under canals in relation to the total irrigated area (an indicator of quality of irrigation), proportion of net area irrigated to net area sown (an indicator of the level of irrigation) and fertilizer use per hectare (in kgs) for all the districts. Percentage of area (average for the eighties) under important crops in the districts was used for the selection of districts. The districts falling into the five top and bottom ranks in terms of fertilizer use were subjected to a further scrutiny as detailed below.

The districts, ranked top five based on per hectare fertilizer consumption, were Mandya, Kodagu, Bellary, Shimoga and Bangalore. The districts of Bangalore and Kodagu were omitted as the former is a predominantly an urban area, while the latter is substantially different from other districts in the state in
terms of agro-climatic conditions and cropping patterns. The rest of the districts were seriously considered as the potential candidates for the study. After conducting a pilot survey in Shimoga and Bellary districts, it became clear that Bellary would be better choice for the study than Shimoga and Mandya for the following reasons.

First, Sugarcane, being a significant crop in Mandya and Shimoga districts, posed a problem, as one of the study objectives was to collect information for both Kharif and Rabi seasons. Since sugarcane takes about 12 months to mature, it is difficult to categorize this crop under Kharif and Rabi seasons. Considering that the productivity of Sugarcane may vary depending on the original sugarcane plant life cycle, Mandya and Shimoga districts were excluded for the analysis purpose.

Secondly, the cropping pattern in Bellary district remains diversified. In this district, apart from Paddy, food crops such as Jowar and Bajra are grown; besides, cash crops such as Groundnut, Cotton, Maize, and Sunflower are cultivated. It was assumed that such a diversified cropping pattern would give rich insights into the problem on hand. The selection of Gadag can be justified on the ground that this district is perennially drought-prone with a relatively low per hectare consumption of fertilizers. Besides, the cropping pattern in this district is diversified. This would help to examine the fertilizer consumption pattern with respect to rain-fed crops such as jowar, gram, cotton and sunflower.
1.7.2 Criteria Adopted for Selecting Villages

The objective was to select villages with extreme variations in infrastructural facilities. Genikihal in Bellary district is completely an irrigated village with about 90 per cent of the total cultivated area under assured source of Lower Level Canal of Thungabhadra Project (TBP). Chaganur village in Bellary district also comes under TBP, but a large proportion of the land in this village does not receive adequate water, as it is located at the tail end of a channel. For the study purpose, this village was treated as semi-irrigated village. Huilgol in Gadag district is completely a dry village with most of the lands depending on uncertain and erratic rainfall. The area cultivated, therefore, varies according to the timing and quantum of rainfall. For instance, drought conditions pertaining in 2000-2001 and 2002 had disastrous effects on the cultivation of crops in the Rabi season.

Basic information about these villages including the cropping patterns has been obtained from offices of the State Agricultural Department located at the district headquarters. Main crops grown in Genikihal include Paddy, Jowar and Bajra, whereas in Chaganur, the main crops grown are Paddy, Jowar, Bajra, Groundnut, Maize, Cotton and Sunflower. All these crops are cultivated under rain-fed conditions. Thus, the cropping patterns in the study villages are diversified. This enables one to cover a large number of crops grown under both irrigated and rain-fed conditions. Thus, the selected villages represent not only dry and wet regions in the state but also important crops grown.
1.7.3 Criteria Adopted for Selecting Households

For conducting an intensive survey, households were selected through a stratified-random sampling. In the first round, a census survey was conducted for obtaining information on caste and landownership details of each household in all the villages. With the help of this information, households in these villages were stratified according to caste and landholding size. Out of the total households, some households were selected through random sampling. A structured questionnaire was canvassed to all the selected households. The questionnaire was designed specifically to collect information, besides general details of the households, on changes in the consumption of fertilizers, cropping patterns and production, and also perceptions regarding the impact of fertilizer price hike on welfare and the functioning of the agricultural extension system in the villages.

1.8 Database

The Primary data was collected from Genikihal and Chaganur villages in Bellary district representing irrigated tracts and Huilgol village in Gadag district representing dry tracts. A three stage sampling design was used to select the household they are -.1) Selection of districts 2) Selection of villages and 3) Selection of households. The study has utilized both qualitative and quantitative data for analyzing the objectives of the study based on both secondary and primary data. The main objective was to look into the fertilizer consumption pattern, both at the farm and regional levels, with a special stress on agricultural yield and perceptions regarding price fluctuations. The data relates to the year
2001-02 collected during December of the same year. The study was conducted across three regions, with substantially differing irrigation levels.

1.8.1 Secondary Data A significant portion of the information related to fertilizer consumption, production, yield levels, cropping pattern and the cost of production has been collected from various published and unpublished records. Fertilizer Statistics (FAI India), was the principal document used for macro analyses besides, Fertilizer News and Economic Survey, the Department of Agriculture, University of Agricultural Sciences, Bangalore and Dharwad, Directorate of Agriculture, Economics and Statistics, District Agricultural Office at Bellary and Gadag, Agricultural Extension Offices at Taluk level, Karnataka at Glance, District at Glance and reports published by respective Agricultural Departments (particularly for analyzing the characteristics of the study area). In addition, information has been collected from the website. Further, details pertaining to the cost of cultivation and fertilizers have been drawn from Agriculture Costs and Prices Reports published by the Department of Agriculture and the Government of India.

1.8.2 Primary Data The micro level study was carried out in three villages in Bellary and Gadag districts of Karnataka state, for both Rabi and Kharifff seasons for the year 2001-02, covering a sample size of 201 households, drawn from Ganilanahal, Chaganur and Huilgol villages; to be more specific, 59 households were drawn from the irrigated villages, 76 households from the semi-irrigated villages and the remaining 66 households from dry land villages. The required information was collected by canvassing a questionnaire to the heads of
households and also by personally recording the responses. Questions contained both general as well as specific queries with a focus on the pattern of fertilizer consumption across crops by different size class farmers, method of application, yield levels, perceptions towards fertilizer price hikes etc.

1.9 Statistical Techniques Used

The collected secondary and primary data have been analyzed using simple statistical techniques like Descriptive, Tabular Analysis besides averages, ratios etc; Mathematical and Statistical tools like simple ratios, percentage, compound growth, standard deviation, etc have also been appropriately used for the purpose of analyzing data in the light of the objectives of the study. The data have been analyzed using SPSS package. The data compiled have been presented in the form of tables, graphs, charts etc. For assessing the impact of price rise, a pre-price rise related to 1991-92 fertilizer consumption comparing post-price rise i.e. the Year 2001-02 and “t” test and ANOVA test have also been used for delivering the statistical significance.

1.10 Agricultural Seasons in the Study Area

Agricultural seasons in the study area subject to the release of water through canals and the rainfall pattern.

*Mungaru* - Kharifff (July to November) This is the first season of the agriculture year and sowing starts soon after the first spell of rains; during this season, usually high yielding variety of seeds are grown due to the availability of water through canals and rainfall and also the cost of production is high.
December to January_Crops are harvested, produce marketed or stored, and land preparation works are usually undertaken.

*Hingaaru* - Rabi (February to April) During this period the second quality seeds are grown with a relatively low input mix in terms of fertilizers, pesticides and labour.

1. 11 Outline of the thesis

The thesis has been organized into 7 chapters, which are as follows. The first chapter brings out the importance of agriculture, technology and highlights the various recommendations of fertilizer pricing committees, along with objectives, methodology data base etc. The second chapter presents an analytical review of various studies, which is presented under sub- headings to find out divergent views on various issues pertaining to the study and also to identify the research gap. The third chapter touches on theoretical background of research questions, while the fourth chapter provides an insight into socio-economic details of the study area which is presented in 2 sections, while the first section gives details of Karnataka state and the following sections provides information had data findings. A macro and micro analyses of the first objective is presented in the fifth chapter in two sections. While macro provides the national and state perspectives and micro section brings out the field study findings. The sixth chapter looks into the distortions in nutrient use pattern and their impact on the incomes of the farmer and followed by seventh chapter that sums up the thesis with summary, findings and policy prescriptions.
1. 12 Limitations of the Study

Capturing information pertaining to the impact of the removal of subsidy on consumption and production of fertilizers appeared very difficult as no baseline studies have been conducted in a detailed and structured manner in respect of the study area. However, the Institute for Social and Economic Change, Bangalore, had conducted a study immediately after the withdrawal of subsidy. This was taken as benchmark study. Accordingly, the findings have been compared and discussed. As the data on the cost of cultivation collected from sample respondents are found to be quite inaccurate in view of the observed tendency of the respondents, in order to estimate the cost of input and changes in welfare, the present researcher has had to depend on the cost of cultivation data collected by CACP units for respective crops and for respective years.