FERTILISER POLICY ON PADDY FARMING: AN EVALUATION OF 2005 SUBSIDY PROGRAMME

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FOREWORD

High yielding varieties, improved irrigation and greater use of fertilizers have been the main factors which contributed to the increased paddy production in the country over the last few decades. To promote fertilizer use, the supply of subsidized fertilizers to farmers has been the policy adopted by Sri Lanka which is common to many other developing countries. The policy has been in operation in the Island for more than four decades with varying degrees of subsidy rates. Presently, fertilizer subsidy is the heaviest government subsidy in the agriculture sector.

Currently, the three main fertilizers; Urea, Muriate of Potash (MOP) and Triple Super Phosphate (TSP) used in paddy cultivation account for nearly 75 percent of the total amount of fertilizer used in the country. Of the total fertilizer requirement, 94 percent of the supply is met by imports.

The new fertilizer subsidy scheme introduced and implemented by the government in December 2005 brought several changes to the fertilizer policy in Sri Lanka. This policy primarily focused on increasing food security and farm income of rural paddy farmer. It was attempted by this policy to eliminate the urea biased attitude and promote balanced application of the fertilizers by all paddy farmers to increase paddy production. Fertilizer prices of all three main fertilizers were subsidized at Rs.350 per 50 Kg to smallholder farmers. The policy is implemented by issuing subsidized fertilizers to farmers according to a recommendation given by the department of agriculture through state agencies, mainly through agrarian development centers.

HARTI undertook a comprehensive study to review the 2005 fertiliser subsidy policy in Sri Lanka in order to examine its effectiveness in achieving the desired national objectives. I congratulate the team of researchers for successfully undertaking this study. The report provides an in-depth overview of the subsidy program over the last four decades, the effect of the new subsidy program on the paddy sector and the problems and issues of the program. In the report suggestions have been made towards a more efficient fertiliser usage in the paddy sector. I hope the findings and the suggestions of the study would be useful to policy makers and to practitioners in the agrarian sector.

Lalith Kantha Jayasekara
Director

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February 2011.

EXECUTIVE SUMMARY

The importance of fertilizers to agricultural production has made promotion of fertilizer use an important aspect of national policy in many countries. Almost all developing countries have, at various times and to different degrees, subsidized fertilizers. Subsidies have been widely used to stimulate increased fertilizer use and thereby bring about increased crop yields. Fertilizer subsidies were considered particularly important in inducing farmers to adopt high yielding varieties with improved practices especially during the era of green revolution. Subsidies appear to have been successful in this regard. Between 1971 and 1980 fertilizer use increased more rapidly in countries with subsidies than in countries without subsidies particularly in South East Asia and South Asia.

Fertilizer subsidy programme in Sri Lanka was first introduced in 1962 to paddy sector. It was then extended to other crops as well. This subsidy scheme has been in operation for more than four decades with several changes. It was also the heaviest government subsidy in the agriculture sector due to escalating fertiliser prices in the world market with rising oil prices. The new fertilizer subsidy scheme implemented by the government from 2005/06 *maha* season attempted to achieve the national objectives of economic efficiency in fertiliser use in paddy cultivation, food security and welfare of rural farmer. This policy had following characteristics:

1. Indicative price of three main fertilisers; Urea, TSP & MOP were at Rs.350 per 50 Kg
2. The procurement, distribution and issuing of fertilisers were made through state agencies
3. Fertilisers were issued on the basis of recommendations given by the Department of Agriculture
4. Fertiliser subsidy was targeted only on small paddy farmers who owned less than 5 Ac.

A study was undertaken to review the fertiliser subsidy policy in Sri Lanka in general and to evaluate the new fertiliser subsidy programme implemented from 2005/06 *maha* season to examine in view of its effectiveness and relevance in achieving the desired national objectives.

With the new fertiliser subsidy, farmers were given the three main fertilisers at Rs.350 per50 kg which is the **lowest price** recorded for all three fertilisers after withdrawal of the subsidy in 1990. By having such a low price for all three fertilisers; Urea, TSP and MOP, it was intended that farmers would adopt the recommendation given by the department of agriculture. By issuing only the recommendation, it was intended that farmers who use more than the recommendation would stick to the recommendation. Sample data from the study, provide adequate evidences that farmers have adopted the recommendations that was given with the fertiliser issue and thereby fertiliser use has been brought to the recommended levels by the Agriculture Department. Fertiliser prices have been an incentive to adopt the

recommendation as it reduced the fertiliser input cost from about 15% to only 6%. After implementation of the new subsidy program, nearly 32% of the sample population in Polonnaruwa has reduced their urea use while it was 100% in Gampaha. At the same time, hardly any evidence was found in the sample to indicate that farmers had purchased fertiliser from the open market.

Fertiliser Use, Productivity and Efficiency

After the new program was introduced the national per acre fertiliser use has increased relatively while increasing the national yield. This is also evident from the district level yield /productivity improvements after the implementation of the new subsidy programme. New fertiliser policy had been conducive to efficient use of fertiliser for paddy production at national level. Increased value addition due to increased paddy production has caused increased economic returns to the country particularly in major irrigated areas. However the yield variation continues to exist within a region. The yield variation of the average 50 % of the sample farms in Polonnaruwa ranged from 1600 kg per acre to 2310 kg per acre in 2006/07 *maha* season whereas the fertiliser recommendation was the same throughout the Polonnaruwa district. Therefore it is needed to revise these recommendations towards farm level for more efficient fertiliser use.

A more balanced and integrated use of fertilisers, including secondary and micronutrients, in combination with organic manures, green manure, bio-fertilisers, etc. has a crucial role to play in solving problems of declining crop response ratio and improving crop productivity.

Fertiliser Demand, its Determinants and Level of Subsidy

The analysis done on fertiliser demand after many decades of increased fertiliser use shows that the main fertilisers used in paddy cultivation are currently inelastic to its own price. Thus, there are other determinants of fertiliser use in paddy production than fertiliser price.

The national level analysis shows that demand for fertiliser increases as the irrigated area increases with favourable weather. Per hectare fertiliser demand is high in irrigated areas. Therefore as the irrigated area increases total fertiliser demand also increases. When the paddy prices are relatively high, there is an incentive to farmers to use more fertiliser to increase yields. When the prevailing paddy price is conducive, farmers would bring more lands under cultivation and *vice versa*. This has also resulted in an increased demand for fertiliser. Fertiliser price becomes the next important factor determining fertiliser use, particularly in the response to fertiliser price effected in the per hectare fertiliser use. When the two fertiliser -Urea - price shocks in 1990 and 2003 are analysed, it shows that as soon as the fertiliser price increased by two folds, the total urea use dropped by nearly 30% and 25 % respectively at national level. However, area under cultivation at national level did not show any notable reduction. Farmers adjust the per hectare fertiliser use in response to change in fertiliser price although the magnitude of the response largely

varied. Particularly farmers in dry zone irrigated areas are less responsive to fertiliser prices and fertiliser availability becomes a more important parameter than price. Farmers and the field officers are of the opinion that the fertiliser prices may go up to 500 Rs – 1000 Rs. if the paddy prices are kept above Rs.20/kg. However increase in fertiliser price reduces the farmers' profit as it increases the cost of production.

State Undertaking of Fertiliser Distribution

Agrarian development centres (ADC's) are totally involved in delivering fertilisers to farmers and therefore the current implementation mechanism has burdened the activities at ADC's. Non availability of fertilizer to farmers has been claimed to be one of the main drawbacks of this program. This is due to number of reasons including limited availability of fertiliser at the main company stores, low storage capacity of stores in agrarian development centres in relation to amounts required at peak planting time. In extreme situations, due to non-availability of fertiliser at the required time, farmers tended to apply these fertilisers to other crops or to keep the rest for the next season and in some cases it has been reported that they have sold it to shop owners.

Nevertheless work done by the AR&PA and the DO is appreciable in most cases, except for reported malpractices at some agrarian development centres' level. However, through this implementation, additional benefits have been accrued. Farmer organisations have been strengthened, Some agrarian development centres have been able to collect the cultivation tax (*Akkara badu*) along with the fertiliser subsidy which is still is not mandatory. However, agricultural instructor's involvement in the new subsidy program has been underestimated that he or she has no role to play with the fertiliser recommendation as given.

Conclusion

According to the findings, the new fertiliser subsidy program has been effective and efficient in terms of achieving the national objectives of economic efficiency, food security and, increasing welfare of the rural farmer of Sri Lanka during the global food crisis. Bringing the fertiliser use up to the recommendation level by almost all farmers and changing the fertiliser usage to the straight application, has contributed to increase paddy production in the country. Nevertheless, continuing huge differences in the yield within regions prove that there is a large scope to increase the fertiliser use efficiency by correcting soil related factors. The broader goal of the fertiliser policy would be to ensure adequate soil fertility in order to support increased agricultural productivity, food security, and incomes.

The more conducive institutional mechanism that has been created by the new subsidy programme need to be strengthened and made used for the purpose of implementing a more integrated plant nutrition programme to increase the productivity potentials of paddy lands in the long run. Unnecessary fertiliser leakages between crop sectors and the creation of black market for subsidised fertilizers can be avoided if correct dosage at correct time can be supplied. It helps adjusting the

current subsidised price up to its market prices at farm level without affecting farm income. It should also be noted that within the limited paddy lands in the country, productivity improvement is the alternative remaining for increasing production in the country.

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CHAPTER ONE

Introduction

1.1 Background

The importance of fertilizers to agricultural production has made promotion of fertilizer use an important aspect of national policy in Sri Lanka as in many other countries. Providing fertilizers to farmers through direct or indirect subsidy is the common policy adopted by almost all the developing countries at various times and in different degrees. Subsidies have been widely used to stimulate increased fertilizer use and thereby bring about increased crop yields. Fertilizer subsidies were considered particularly important in inducing farmers to adopt high yielding varieties and improved technologies especially during the era of green revolution. Subsidies appear to have been effective in this regard and between 1971 and 1980 fertilizer use increased more rapidly in countries with subsidies than in countries without subsidies particularly in South East Asia and South Asia. However, subsidy has been viewed as a short term policy option that requires changes in the long-run.

In Sri Lanka, the fertilizer subsidy policy mainly focussed on achieving self-sufficiency in paddy production. At the beginning of the 60's with the introduction of high yielding rice varieties this policy was aimed at stimulating the use of chemical fertilizers in the paddy sector. However, later the policy had been primarily instrumental in reducing the cost of production of local farmers owing to the heavy dependence on chemical fertilizers. The government had been intervening to prevent very high prices in the domestic markets during fertilizer price escalations in the world market especially price increased in urea. The local market price of urea and the effective subsidy rate for urea was revised from time to time with the objective of minimising the burden on small farmers.

The most recent change in the fertilizer policy took place with the new fertilizer subsidy scheme implemented by the government from 2005/06 *Maha* season. This policy has following characteristics:

1. Fertilizer subsidy is targeted only on small paddy farmers who own less than 5 Acres
2. The three main fertilizers; Urea, TSP & MOP are subsidised at Rs.350 per 50 Kg bag
3. State undertaking of procurement, distribution and issuing of fertilizers to the farmers
4. Fertilizers are issued on the basis of recommendations by the Department of Agriculture

With this new policy it was attempted to eliminate the urea biased policy that had been implemented before, so that the use of balanced N:P:K ratio of fertilizers in paddy cultivation was encouraged for higher productivity. A huge subsidy rate is attached to the new policy due to the fact that the policy attempted to maintain the fertilizer prices of all three main fertilizers at Rs.350 per 50 Kg to increase food security and farm income of rural paddy farmer. In order to reduce the marketing cost of fertilizer distribution, subsidised fertilizers were issued to farmers through state

agencies, mainly agrarian service centres. With this measure, it was also attempted to strengthen the state mechanism of fertilizer distribution.

However, the huge subsidy rate attached to this policy exerts an enormous burden to the national budget in the wake of increasing prices of all these fertilizers at the world market. Thus, it is necessary to evaluate the new fertilizer subsidy scheme in relation to its national objectives of increasing economic efficiency, food security and the income of the rural poor. With this goal, a study was undertaken to evaluate the new fertilizer subsidy programme implemented from 2005/06 *Maha* season to assess its effectiveness and relevance.

1.2 Objective of the Study

Thus, the main objective of this study is to evaluate the current fertilizer subsidy programme in the paddy sector in order to make appropriate policy recommendations for designing an effective fertilizer subsidy policy and distribution mechanism.

1.3 Specific Objectives

1. To review the fertilizer subsidy policy on paddy sector in Sri Lanka.
2. To study the effectiveness of subsidy policy on the paddy production in the country.
3. To study the economic efficiency of fertilizer use in the paddy sector under the new subsidy programme in the context of annual costs incurred by the government.
4. To assess and compare the procurement, distribution, the availability, timeliness of supply and cost of distribution to farmers by state sector agencies and by private sector mechanisms and
5. To suggest appropriate policy options for designing an effective and economically feasible fertilizer subsidy scheme.

1.4 Methodology

1.4.1 Data Collection Methods

The study was based on both primary and secondary data. The primary information was collected through rapid appraisal and questionnaire surveys. The rapid appraisal was conducted during the field survey for identifying the problems, weaknesses and constraints of the fertilizer subsidy implementation programme. The questionnaire survey was carried out to collect required quantitative and qualitative data systematically. Farm survey data from the Department of Agriculture, paddy statistics from the Department of Census and Statistics and statistics from Fertilizer Secretariat and Agrarian Services Department were the main secondary data bases for this analysis.

Field data collection was carried out during the period from November 2007 to January 2008. The locations selected for sample survey are presented in the figure1.1. Information was collected for the cultivation season, from 2004/05 *Maha* to 2007 *Yala*. Cost of production data for 2007 *Yala* was also collected.

1.4.1.1 Rapid Appraisal

This involved a semi-structured interviews, informal interviews and discussions with the key informants attached to the Department of Agrarian Services, Fertilizer Secretariat, State Fertilizer Companies, Private companies and the Department of Agriculture. During the rapid appraisal, an attempt was made to identify the impact of fertilizer subsidy programme on targeted group/s and problems and constraints involved in the fertilizer subsidy programme.

1.4.1.2 Questionnaire Survey and Sample Selection

Questionnaire survey was conducted to gather information from paddy farmers in selected locations and the selection of sample and study locations was done through the following procedure using multi-stage stratified random sampling technique.

- In the first stage, seven districts were selected from seven major paddy cultivating areas representing the dry zone, intermediate zone, wet zone and Mahaweli areas
- In the next stage, 2-3 ASC divisions were selected from each district based on paddy extent and production as well as the proportion of the beneficiaries.
- From each ASC division, 3 GN divisions were selected considering the proximity to the ASC and the traveling time to purchase fertilizer (Table 1.1 & Figure 1.1).
- Finally, 7- 20 paddy farmers were selected randomly from each GN division which totally accounted to about 375 paddy farmers who received the fertilizer subsidy under the scheme.

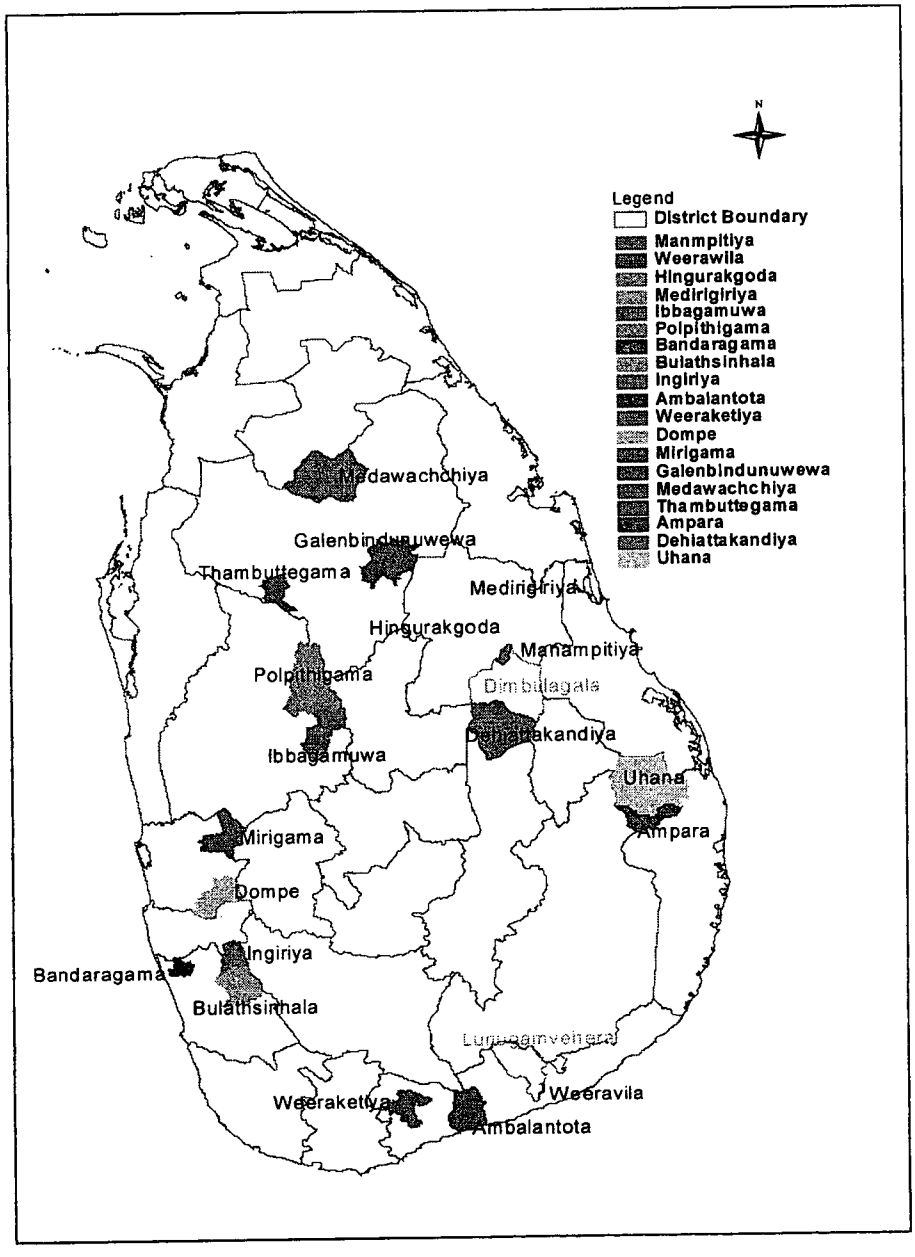
Table 1.1: Sample Frame of the Study

District	ASC	No. of Farmers
Polonnaruwa	Higurakkoda Manampitiya Medirigiriya	60 paddy farmers
Ampara	Uhana Ampara Dehiaththakandiya	65 paddy farmers
Anuradhapura (Mahaweli H)	Thambuththegama	40 paddy farmers
Hambantota	Ambalantota Weeraketiya Weerawila	65 paddy farmers
Kurunegala	Ibbagamuwa Polopithigama	45 paddy farmers
Kalutara	Bulathsinhala Bandaragama Ingiriya	60 paddy farmers
Gampaha	Dompe Mirigama	40 paddy farmers

1.5 Organization of the Report

Fertilizer policies are reviewed in the second chapter from early 1960's until the new subsidy policy is implemented in 2005/06 *maha* season. In the third chapter, a description of the new fertilizer subsidy program is presented to characterise the specific elements attached to the new program, intended objectives of the program and the implementation mechanism of the program. In chapters four and five the effects of the fertilizer subsidy programme implemented from 2005/06 *maha* season are evaluated in order to examine whether the desired national objectives have been achieved. Chapter six summarises the findings and draws some conclusions and recommendations.

Figure 1.1: Locations of the Field Survey



CHAPTER TWO

Fertilizer Subsidy Policy and its Effect on Paddy Production: A Review of Past Policies and Programs

In this chapter, fertilizer policies on the paddy sector from early 1960's until the new subsidy policy was implemented in 2005/06 *maha* season are reviewed in order to examine its effects on the production sector. Attention is paid to the main fertilizer policy viz. subsidy policy that was implemented in the country from 1962 in addition to other fertilizer promotion programs implemented to promote fertilizer use in the paddy cultivation to achieve self sufficiency in paddy production.

2.1 Fertilizer Policies in the Paddy Sector

Fertilizer policies in Sri Lanka have been mainly focussed on promoting chemical fertilizer use in order to increase paddy production with a view to achieving self-sufficiency in paddy. Fertilizer promotion was pursued through programs such as subsidies, establishing a guaranteed price for paddy, improved fertilizers availability, awareness programs such as extension education, and credit facilities for purchasing.

2.1.1 Fertilizer Subsidy Policy

With the introduction of fertilizer responsive rice varieties in 1957 by improved old varieties which was followed by new improved varieties in 1968, a major breakthrough took place in chemical fertilizer use in the paddy cultivation. It created an increased demand for inorganic fertilizers in the paddy sector to improve yields. However, these chemical fertilizers were new to many farmers and the subsidy was seen as one way of stimulating the process of increasing the rate of application.(Box 1) Therefore, to encourage farmers to use fertilizer and thereby to enhance paddy production, fertilizer subsidy was first introduced in 1962 by the government. This subsidy was given in the form of a direct subsidy by reducing the market price of main fertilizers; Urea, Muriate of Potash (MOP) and Triple Super Phosphate (TSP). It was expected that subsidies would increase fertilizer use and thereby increase productivity, and net farm incomes so that farmers would move closer to the profit-maximizing use level.

Almost 95 percent of the fertilizer requirements of Sri Lanka are imported. Urea, Sulphate of Ammonia, TSP and MOP are the major fertilizers used and imports of Urea, Sulphate of Ammonia, TSP and MOP were 366.2, 60.68, 81.9 and 159.9 thousand tonnes respectively in 2006. Rock-phosphate is the only fertilizer produced domestically. The change in fertilizer price in the world market has a direct influence over the cost of paddy production of local farmers owing to the heavy dependence on imports of chemical fertilizers.

Box 1: Arguments on Fertilizer Subsidy

SUBSIDIES: Fertiliser subsidies can differ in terms of (1) the point at which the subsidy is applied (farmer, trader, domes-tic fertilizer producer); (2) the form of the subsidy, or how it is provided (cash payment, voucher/coupon, reduced market price, transport subsidy); and (3) related to the above, whether the subsidy is direct (fertilizer price reduced), or indirect (through subsidised credit, for example).

Arguments in favour of fertilizer subsidies fall into three categories:

- *Financial.* Increased agricultural output or incomes (for farmers and traders) are valued using prevailing (i.e., financial) prices, without necessarily making an explicit case that the efficiency losses from the subsidy are offset by the output/income gains.

- *Economic.* Subsidies are expected to create real economic gains by (a) "kick-starting" process of innovation, e.g., through credit to overcome liquidity constraints, so that agricultural productivity rises in the medium to long term or (b) correcting for missing or imperfect input and output markets.

- *Non-economic.* Subsidies are expected to help restore soil fertility, improve food security, alleviate poverty, and provide social and environmental protection all objectives whose economic impacts are difficult to quantify.

Arguments against fertiliser subsidies most often stress the following problems:

- Misallocation of scarce resources: stimulation of fertiliser use where it is not economically profitable, and/or diversion of scarce public resources from other productivity-enhancing in-vestments that promise higher or longer-lasting payoffs.
- Ineffective targeting: the beneficiaries are supposed to be poor farmers but some fertiliser leaks out to others and elites may capture much of the benefit.
- Market disruptions: unpredictable changes in subsidy programs, which discourage private sector investment; price control and rationing, which encourage rent-seeking behavior; political interference; and unfair competition between state-run and private sector enterprises. Such effects can undermine the development of commercial fertiliser marketing networks to serve small farmers.

Alternatives to subsidies- A large number of policies and investments have been suggested as alternatives to subsidies in order to reduce the cost of fertiliser and to improve its effect on yields:

- Improving enabling conditions by promoting policies and institutions that contribute to efficient markets for in-puts, financial services, and outputs.
- Reducing the high costs of transportation, e.g., costs of handling and port clearance and poor road quality.
- Reducing taxation on agriculture.
- Investing in agricultural research, extension, and rural education.

Source: Eric W. Crawford, T. S. Jayne, and Valerie A. Kelly (2005)

Price of urea plays a vital role in government intervention policies and up to now urea has been a subsidised fertilizer in the country. Government is intervening in the market to prevent very high prices in the domestic markets during price escalations in the world market for urea, by providing a subsidy. But this has led to a very high expenditure in the government budgets. The local market urea price and the effective subsidy rate for urea are revised time to time with the objective of minimising the burden on small farmers.

A detail list of changes that took place in the fertilizer subsidy policy and its operation is given below.

2.1.1.1 Important Changes in the Fertilizer Subsidy Policy

1962 - A fertilizer subsidy programme was first introduced in 1962 to encourage the use of inorganic fertilizers in paddy cultivation. Private sector had a near oligopoly on importing and wholesale distribution of fertilizers. Three large firms dominated the trade

1964 - In 1964 government too entered in to the fertilizer trade by establishing the Ceylon fertilizer corporation (CFC). The CFC was established with the purpose of engaging in imports, mixing, storage and distribution of fertilizer mainly according to the growing needs of paddy and other food crop sectors.

1971 - In 1971 the private sector fertilizer imports were banned and a CFC monopoly was created, in accordance with the then government's policy of state intervention in international trade. Consequently the activities of the CFC expanded while the sales of private companies at wholesale level reduced to around 25% of the total consumption.

1975 - The first policy change important in the present context was brought about by extending the previously rice biased subsidy to all food crops. This policy of equal subsidization not only reduced cost of fertilizer for all crops but also prevented the leakage of fertilizer meant for one crop in to the production of another. This can be therefore considered as a move that led to increased efficiency of fertilizer use. The subsidy rate provided under these subsidy schemes was about 33 percent.

1977 -Following the trade liberalization policy adopted after 1977, seven new other private and state corporations were allowed to import fertilizer, in addition to the CFC. However, the CFC still dominated and handled 60% of fertilizer imports. (Samaratunga P.A & Ranaweera N.F.S 1992)

1978 - Fertilizer subsidy was administered by the treasury until 1978 and from 1978 onwards the responsibility was transferred to the national fertilizer secretariat. The subsidy rate calculated based on corporation's selling prices was changed in 1978 November and a uniform subsidy of 50 percent of the CIF price fertilizer was announced. At the same time, the custom duty of 12.5% and the business turnover tax 5%v on fertilizer were also abolished.

1979 - Further keenness of government to increase fertilizer use led to an increase of subsidy rate from 50% to 85% for urea and 75% for other fertilizers, in 1979 (Central

bank of Ceylon, 1980). In addition to this, an institutional setup was established and the National Fertilizer Secretariat (NSF) started functioning in 1979 primarily to co ordinate all activities relating to fertilizer imports and distribution and utilization. This is a result of recognizing at policy making level that promotion of efficient distribution and utilization of fertilizer is of substantial importance in the context of rising fertilizer prices. Taking care of this aspect in food production sector has been identified, as the main focus of NFS activities and its task has been defined as increasing the 'efficiency' of fertilizer use.

1979 -1983 -During late 1979 to mid 1983 varying and increased subsidy rates were applied to different types of fertilizer, which varied from 85 to 60 percent of CIF import cost for Urea to 75 to 40 percent for NPK Mixture.

1983 -1987 – A more or less stable price of all fertilizers was maintained from 1983 to 1987.

1988 - In 1988 subsidy rates for the fertilizer such as urea changed in the face of high international prices in order to maintain the subsidy expenditure within the budgetary allocation of Rs. 600 million in the increased CIF price (National Fertilizer Secretariat, 1989). The government budgetary provision for fertilizer subsidy and actual expenditure was fluctuating around the budgetary allocation due to above mentioned reasons. Another significant change made in 1988 was the withdrawal of subsidy for Sulphate of Ammonia and rock phosphate fertilizer and only urea, TSP, MOP and NPK compound fertilizer were eligible for the subsidy (National Fertilizer Secretariat, 1989)

1990 The fertilizer subsidy was completely withdrawn with effect from 1st January 1990.

1994 However, fertilizer subsidy programme was reintroduced in 1994 and several subsidy schemes were implemented. In all these schemes, four varieties of fertilizer viz: Urea, Sulphate of Ammonia, MOP and TSP came under the subsidy schemes.

1997 - 2005, Since 1997, the subsidy was confined only to Urea, the mostly used fertilizer in the small farming sector on Sri Lanka.

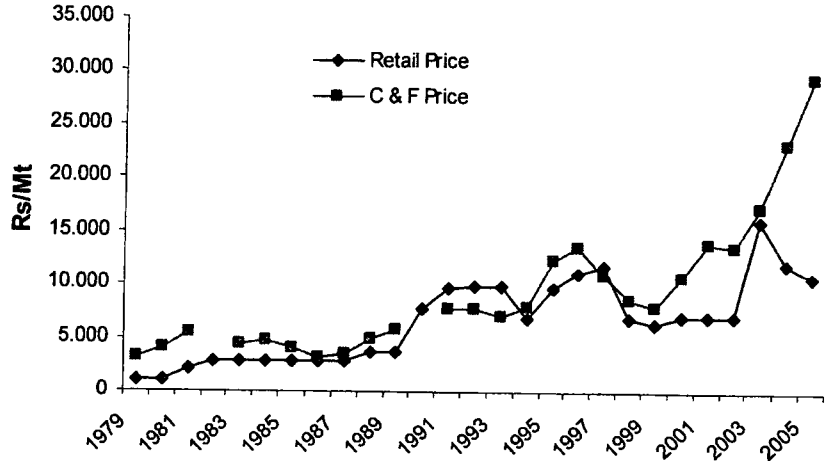
2.1.1.2 Subsidy Rate and Fertilizer Price

As mentioned earlier, fertilizer subsidy was given in the form of a direct subsidy by reducing the market price of main fertilizers; Urea, Muriate of Potash (MOP) and Triple Super Phosphate (TSP) which are imported from the world market. It was expected that by maintaining a relatively low price through subsidies fertilizer use would increase for enhancing paddy production in the country. In the early phases of the introduction of subsidy policy, subsidy rate was fixed and the retail price was revised accordingly. Until 1975, the subsidy level varied according to the crop. In order to avoid unauthorised leakages of fertilizers between agricultural sub sectors, subsidy rate was applied to respective fertilizer types after 1975. As described earlier, a relatively large subsidy was given to different fertilizers which varied from 50 to 85 percent particularly during the period 1979 - 1983. When the world market price of urea declined from 1983 to 1986, price of urea at retail markets continued to remain at 1983 price level. However, fertilizer price trend in the world market reversed and

started to increase and it caused a continuing burden to the government budget. Also adhering to the Structural Adjustment Program (SAP) of the 80's, the government was compelled to reduce the subsidy attached to fertilizers. Nearly three decades after the implementation of fertilizer subsidy in the country, it was completely withdrawn in January 1990. Urea price increased suddenly and continued to rise until the subsidy was reintroduced in 1994. Fertilizer subsidy was reintroduced in 1994 to maintain a relative low price at farm level particularly in urea targeting the small paddy farmer although it excreted an increasing burden on government budget (Figure 2.1).

After 1994, the subsidy was implemented by setting a price called indicative price that took into account the price at the retail market and the government budgetary allocation instead of subsidy rate. Therefore regardless of the world market price, government opted to consider more on the fertilizer price at farm level that sidestepped the farmer from the policy making process. However, price of urea was increased from Rs. 350 to Rs. 600 per 50 kg by 1996 owing to the increasing world market price. From 1996, the world market price of urea dropped whereas price of other fertilizers continued to increase (Table 2.1) Consequently, the subsidy was confined to urea from 1997 onwards and the retail price of urea was dropped to Rs. 350 per 50 kg.

Figure 2.1 Import Price (CIF Price) and Retail Market Price of Urea



Source: Fertilizer Secretariat

Table 2.1: Average CIF and Retail Price of Urea, TSP and MOP

	Average CIF (Rs/Mt)			Retail Price Rs /Mt		
Year	Urea	Tri Super Phosphate	Muriate of Potash	Urea	Tri Super Phosphate	Muriate of Potash
1979	-	-	-	980	1335	1065
1980	-	-	-	-	-	-
1981	-	-	-	2140	2065	2230
1982	4446	3682	3255	2785	2685	2900
1983		-	-	2850	2850	2750
1984	4700	4562	3314	2850	2850	2750
1985	4116	5046	3530	2850	2850	2750
1986	3194	4581	3325	2850	2850	2750
1987	3463	5308	3228	2850	2850	2750
1988	5006	6485	3706	3650	3650	3550
1989	5753	7347	4527	3650	3650	3550
1990	-	-	-	7800	9550	8200
1991	7660	6940	7360	9600	9550	9100
1992	7720	8292	7953	9850	10300	9500
1993	6978	8088	7310	9850	10300	9500
1994	7933	7900	7069	6850	7100	6700
1995	12269	10773	8275	9600	10800	10000
1996	13584	12612	8892	11000	12000	11250
1997	10851	12984	9254	11800	13600	12050
1998	8579	12023	10116	6800	19200	13500
1999	7981	13056	11417	6300	19200	15200
2000	10711	13042	12181	7000	19200	16500
2001	13820	15159	14857	7000	17200	18600
2002	13598	15528	15318	7000	21000	19940
2003	17170	17060	16231	16000	22500	21000
2004	23187	21332	21996	12000	26100	25210
2005	29456	24839	24505	10740	33250	32200

Source: National Fertilizer Secretariat

From 1998 up to 2003, under the subsidy scheme the farmer was given a 50 kg bag of Urea at Rs. 350 fixed price of Rs.350 amidst the increasing fertilizer prices at the world market. The subsidized market price of the 50kg bag of urea increased to Rs. 800 in 2003 following the government decision to minimise the budgetary burden. However, again the government reduced the price of urea to Rs. 600 and Rs. 550 per 50 kg in 2004 and 2005 respectively while the import price of urea was at Rs. 23,187 per mt and Rs. 29,456 per mt. for respective years. Accordingly, the subsidy given to urea was nearly Rs. 20,000 per Mt in 2005.

2.1.1.3 Fertilizer Trade, Marketing and Delivery

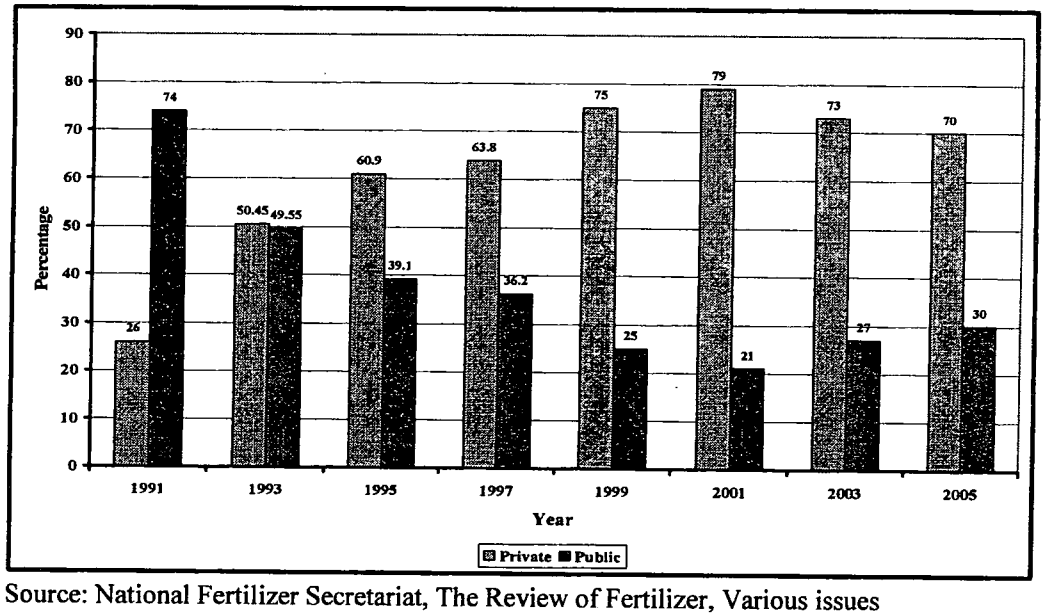
As Sri Lanka imports almost 95 percent of the fertilizer requirements of the country, fertilizer trade plays a determining role in the fertilizer prices. Since government entering in to fertilizer imports from 1964 by establishing CFC, both state sector companies and private companies were involved in fertilizer imports except during the period from 1971 to 1977. The Ceylon Fertilizer Cooperation (CFC) was

responsible for the largest share of fertilizer imports for many years. After 1979, coordination of all activities relating to fertilizer imports and distribution became a responsibility of the National fertilizer secretariat (NFS).

After 1992 the fertilizer trade and marketing was gradually grabbed by the private sector and that the market share of the public sector diminished. In 1991 the two public sector companies Ceylon Fertilizer Co. Ltd and Colombo Commercial Co. (Fert) Ltd held 74% of market share while the private sector held only 26% share. But by year 2001 public sector held only 21% of the market share while the rest was handled by private sector as shown in Figure 2.2. Of the six major fertilizer-importing private companies in Sri Lanka; CIC Fertilizer Co. Ltd and A Baur & Co. Ltd held a major share of the market. Ceylon Fertilizer Co. Ltd however as the leading fertilizer importer of the country, in year 2002, held a 23.2% market share and in year 2005, it increased up to 24.2%. CIC Fertilizer Co. Ltd came second, which held 23.3% in 2002 and 21.9% in year 2005 (Figure 2.3).

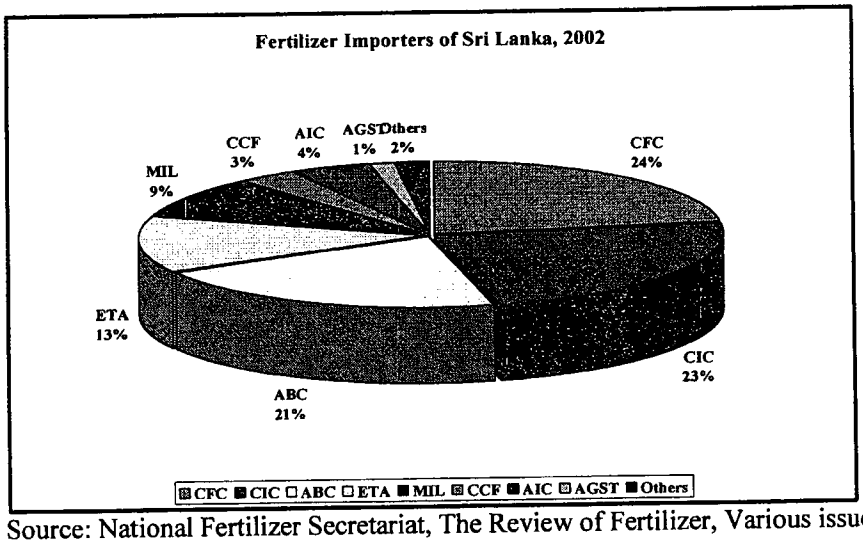
Under the new fertilizer subsidy policy, fertilizer imports for subsidy are only handled by public sector companies. Private sector dealers, co-operatives and agrarian service centres were the main fertilizer retailers at the farm level until the new state mechanism was in place.

Figure 2.2: Private and Public Sector Share of Fertilizer Imports (%)



Source: National Fertilizer Secretariat, The Review of Fertilizer, Various issues

Figure 2.3: Market Shares of Major Fertilizer Importers, 2002



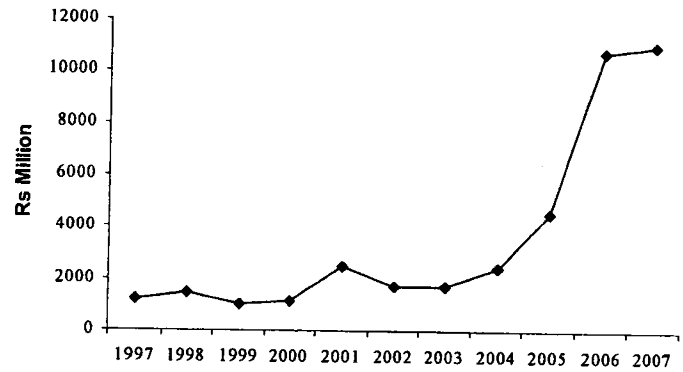
Source: National Fertilizer Secretariat, The Review of Fertilizer, Various issues

2.1.1.4 Subsidy and Government Expenditure

Being in operation in Sri Lanka for more than four decades from its introduction to paddy sector in 1962 and later to other crops in 1975 with several changes, fertilizer subsidy is the heaviest government subsidy in the agriculture sector. The frequently increased price of fertilizers and the increased fertilizer use forced the government to increase the budgetary allocation for the subsidy from Rs. 870 million in 1979 to Rs.1000 millon in 1981-1986. The actual expenditure exceeded the budget are allocation in 1981 and 1984. The annual budgetary allocation for the fertilizer subsidy was reduced from Rs. 1000 million in 1986 to Rs. 700 million in 1987, and to Rs. 600 million in 1988 during price decline at the world market (Abeyratne, 1991, Obrien D & Mallawaarachchi T, 1989). Paddy sector received a subsidy worth of Rs.545 Million in 1984 and it was reduced to Rs.418 million in 1987. The annual budgetary allocation for the fertilizer subsidy for all crops was Rs.610 million after re-introducing the subsidy in 1994 and it was increased to Rs.6285 million in 2005.

The subsidy was confined to Urea from 1997 and the urea subsidy to the paddy sector increased from Rs.1236 million in 1997 to Rs.4511 million in 2005. As paddy is the largest consumer of Urea, almost 70% of the fertilizer subsidy went to the paddy sector. With the implementation of the new subsidy programme, the entire subsidy was captured by the paddy sector and it increased by 2-3 folds due to the increased fertilizer prices in the world market and the granting of the subsidy for all three main fertilizers at 350 Rs /50 bag (Figure 2.4, Table. 2.2)

Figure 2.4: Government expenditure on Subsidy, 1997 – 2007



Source: Fertilizer Secretariat,

Table 2.2 : Urea Subsidy, Government expenditure and Subsidy on Paddy

	Urea Use in '000 Mt			Subsidy on	
	By All Crops	By Paddy	%	All crops Rs Million	Paddy Rs Million
1997	228.9	149.3	65%	1894	1236
1998	272.7	180.1	66%	2215	1463
1999	318.4	234.2	74%	1390	1023
2000	302.1	193.3	64%	1774	1135
2001	313.0	214.4	68%	3649	2500
2002	376.5	270.1	72%	2446	1755
2003	288.9	201.9	70%	2487	1738
2004	322.8	222.2	69%	3500	2409
2005	370.9	266.2	72%	6285	4511
2006*					10699
2007*					10998

*** Subsidy on all three fertilizers on paddy sector**

Source: National Fertilizer Secretariat, Department of Census and Statistics, HARTI

2.1.2 Other Fertilizer Promotion Programs Implemented in Sri Lanka

In addition to fertilizer subsidy, several other fertilizer promotion programs were in operation to enhance the awareness among farmers on recommended usage of inorganic fertilizers and organic manure in order to increase crop yields. *Yaya, Granary area* and *Saruketha* are among the extension programs explicitly promoting inorganic and organic fertilizers in paddy farming (Department of Agriculture). Provision of credit under Agricultural Trust Fund to needy farmers is also among the other government policies implemented (Wijayatilake 1994).

2.2 Effect of Subsidy Policy on Fertilizer Use

2.2.1 Fertilizer Use

Fertilizer use in the paddy sector has increased continuously over the time with drops in the years of drought and serious civil disturbances (Figure 2.5). Per hectare fertilizer use in the paddy cultivation has also increased by many folds. For example hectare urea use at national level increased from 4.36 Kg /ha in 1965 to 284 Kg /ha in year 2005 (Figure 2.6, Appendix Table 2.1).

Figure 2.5: Total Use of Urea, TSP and MOP

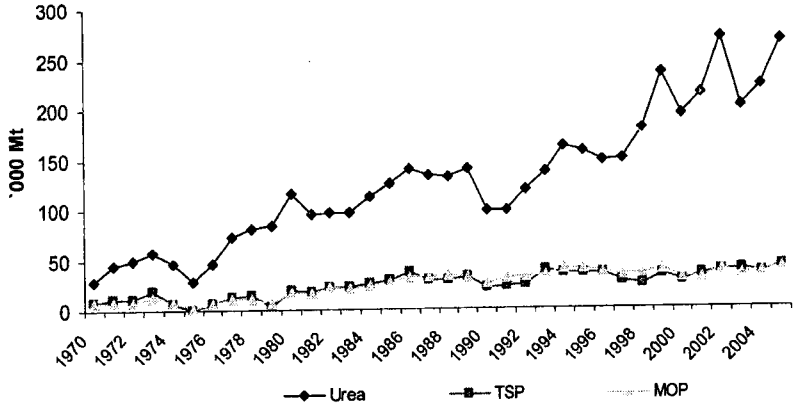
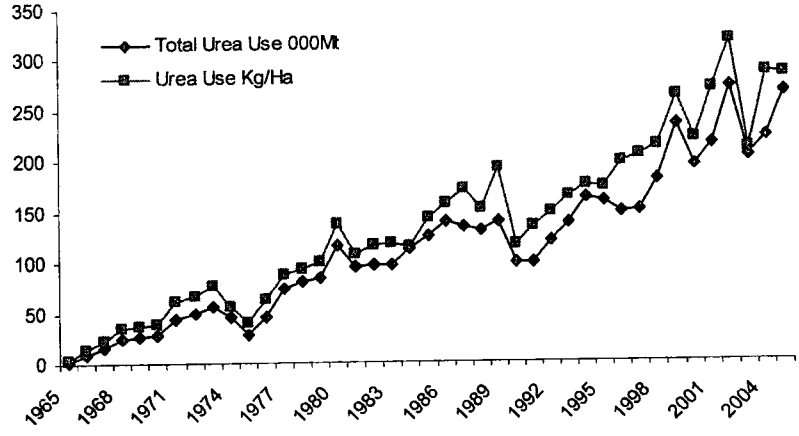


Figure 2.6: Total Use and Per Hectare Urea Use in Paddy Production



Source: National Fertilizer Secretariat

2.2.2 Fertilizer Demand and its Determinant

As described earlier, continuous increase in fertilizer use in the paddy sector is attributed to number of factors including subsidy policy, expansion of irrigated area,

adoption of new improved varieties, conducive paddy prices, and fertilizer promotion programmes.

Table 2.3: Use of Fertilizer, Area under Major Irrigation, Paddy Prices and Fertilizer Prices

Year	Use of Fertilizer '000 Mt			Area under Irrigation	Paddy Prices	Retail Price Rs/ Kg		
	Urea	Tri Super Phospate	Muriate of Potash	000 Ha	Rs/Kg	Urea	Tri Super Phospate	Muriate of Potash
1981	94.58	17.73	16.41	349	3.22	2.14	2.07	2.23
1982	97.30	22.20	21.80	347	3.42	2.79	2.69	2.90
1983	97.00	21.80	20.30	373	3.52	2.85	2.85	2.75
1984	112.56	25.14	24.46	426	3.51	2.85	2.85	2.75
1985	125.03	27.97	27.75	393	3.85	2.85	2.85	2.75
1986	139.70	36.50	32.40	411	3.90	2.85	2.85	2.75
1987	133.00	28.80	31.90	371	4.15	2.85	2.85	2.75
1988	131.00	28.60	33.80	400	4.25	3.65	3.65	3.55
1989	139.10	32.00	32.00	356	5.65	3.65	3.65	3.55
1990	**99.20**	**20.50**	**26.00**	**352**	**7.47**	**7.80**	**9.55**	**8.20**
1991	**98.20**	**22.80**	**29.80**	**335**	**7.24**	**9.60**	**9.55**	**9.10**
1992	118.90	24.20	32.30	350	8.06	9.85	10.30	9.50
1993	136.50	37.70	32.70	409	8.22	9.85	10.30	9.50
1994	161.50	35.20	40.10	470	7.81	6.85	7.10	6.70
1995	157.60	34.60	40.00	474	7.83	9.60	10.80	10.00
1996	**147.00**	**34.80**	**36.90**	**388**	**9.95**	**11.00**	**12.00**	**11.25**
1997	**149.30**	**26.80**	**32.70**	**370**	**10.80**	**11.80**	**13.60**	**12.05**
1998	180.10	23.70	34.60	461	10.25	6.80	19.20	13.50
1999	234.20	34.10	38.40	471	12.66	6.30	19.20	15.20
2000	193.30	27.10	29.80	481	11.08	7.00	19.20	16.50
2001	214.40	32.90	29.50	437	12.47	7.00	17.20	18.60
2002	270.10	37.20	37.50	462	13.76	7.00	21.00	19.94
2003	**201.90**	**38.10**	**33.20**	**516**	**12.60**	**16.00**	**22.50**	**21.00**
2004	222.17	34.77	36.59	439	15.66	12.00	26.10	25.21
2005	266.17	41.60	39.58	516	13.89	10.74	33.25	32.20

Source: National Fertilizer Secretariat, Department of Census and Statistics

The national level analysis (Table 2.3), shows that demand for fertilizer increases in accordance with the increased irrigated area and the use of new improved varieties. Fertilizer promotion through extension is also largely responsible for increased fertilizer use under irrigation.

Relatively high paddy prices are an incentive to farmers to use more fertilizers. When the prevailing paddy prices are conducive, farmers would bring more lands under

cultivation. (Food Information Bulletin, October- December 2006). Farmers tend to use more fertilizer to increase paddy yields when the paddy prices are higher (Rajapaksa R.D.D.P., and Karunagoda K.S., 2008). This results in an increased demand for fertilizer at national level. Particularly Urea and TSP application are sensitive to price of paddy at farm gate (Ekanayake, 2005). According to Ekanayake in 2005, if farm gate lagged price increased by one unit (Rs/ mt) the urea demand increased by 0.33 units (mt).

Price becomes the next important factor in determining fertilizer use. Particularly the response to fertilizer price is effected in the per hectare fertilizer use. Significant relationship has been observed between fertilizer price and its consumption (Ekanayake, 2005, Rajapaksa R.D.D.P., and Karunagoda K.S., 2008). According to Ekanayake, in 2005 increase in price of one unit (Rs/ mt) of urea reduced annual urea demand for paddy by 0.15 (mt).

In addition to the factors described above, fertilizer use and application at farm level is dependent on effective fertilizer distribution mechanism and availability of credit.

Although fertilizer price is one of the determinant factors of fertilizer use, analyses done on fertilizer demand after many decades of increased fertilizer use show that the main fertilizers used in paddy cultivation were inelastic to their own price (Rajapaksa R.D.D.P., and Karunagoda K.S., 2008, Ekanayake, 2005). Several studies from developing countries including Sri Lanka (Rajapaksa R.D.D.P., and Karunagoda K.S., 2008, Ekanayake, 2005, Sidhu and Baanante 1981) have also shown that paddy pricing policies are stronger than fertilizer subsidy policies in promoting fertilizer use for increased production.

Table 2.4: Fertilizer Demand and Paddy Supply Elasticities

	Hambanthota	**Kalutara**
Fertilizer demand wrt paddy price	2.84571	5.04924
Paddy supply wrt paddy price	0.95387	2.36847
Fertilizer demand wrt fertilizer price	-1.0269	-1.0915
Paddy supply wrt fertilizer price	-0.2272	-0.3832

Source: Rajapaksa R.D.D.P. and Karunagoda K.S., 2008

A study done by taking time series cost of production data from1990-2006 into account by the Department of Agriculture for two districts has shown that fertilizer demand as well as paddy production in the country depend more on paddy prices than fertilizer prices (Karunagoda K.S., 2008, Ekanayake, 2005).

This study also reveals that paddy supply and fertilizer demand in non-commercial farming area (Kalutara) is more responsive to the fertilizer price than the commercial farming area (Hambantota) and therefore the fertilizer price has less effect on commercial areas than non-commercial paddy growing areas. This leads to the

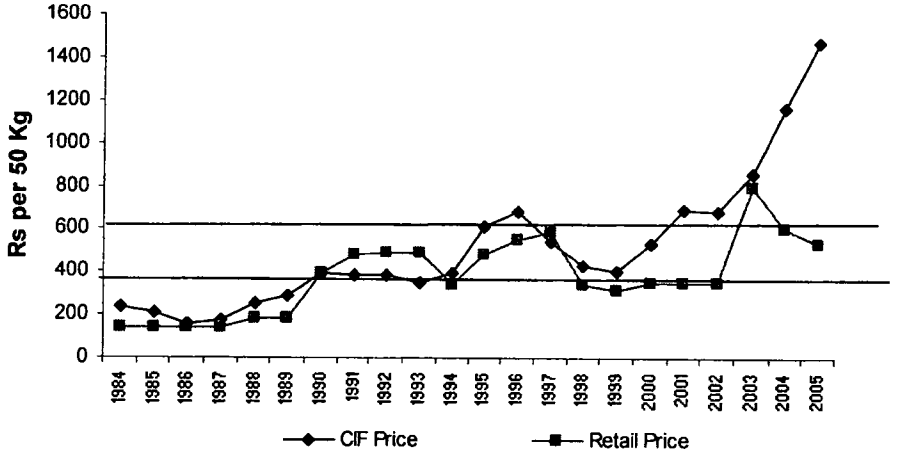
hypothesis that behaviour of the non-commercial wetzone farmer minimizes his cost produced for home consumption. On the other hand the dry-zone commercial farmer maximises his profits subject to given resources such as land extent. In his case fertilizer price becomes a relatively less determinant factor.

2.2.3 Subsidy and Fertilizer Use

2.2.3.1 Fertilizer Subsidy and Price of Fertilizers

Fertilizer subsidy has been in operation in the country for more than four decades. Subsidy policy was able to maintain the fertilizer prices affordable to farmers in the context of price increases in the world market, particularly of urea, the mostly consumed fertilizer. Throughout the period after 1990, price of urea has been around Rs. 350 – 600 per 50 kg except in the year 2003 when price increased to about Rs. 800 per 50 kg in nominal terms (Figure 2.7). Many studies presented above on the responsiveness to fertilizer prices had considered farm gate fertilizer prices which were ranging between Rs. 350 - 800 per 50 kg.

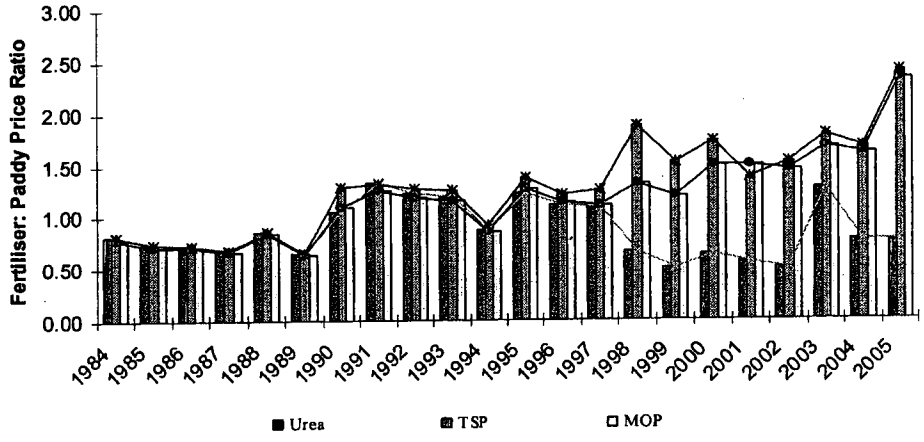
Figure 2.7: Price of 50 kg of Urea



Source: National Fertilizer Secretariat

In relation to the paddy prices, continuous increase of fertilizer prices of TSP and MOP is observed over the years. However, with respect to urea price to paddy price ratio, it had been less than 1 until withdrawal of the subsidy in 1990 which increased afterwards. However, after urea biased policy was implemented in 1997, a relatively low price ratio is observed for urea (Figure 2.8).

Figure 2.8: Ratio of Fertilizer Price to Paddy Price



Source: National Fertilizer Secretariat

2.2.3.2 Urea Biased Policy and its Effect on Fertilizer Use

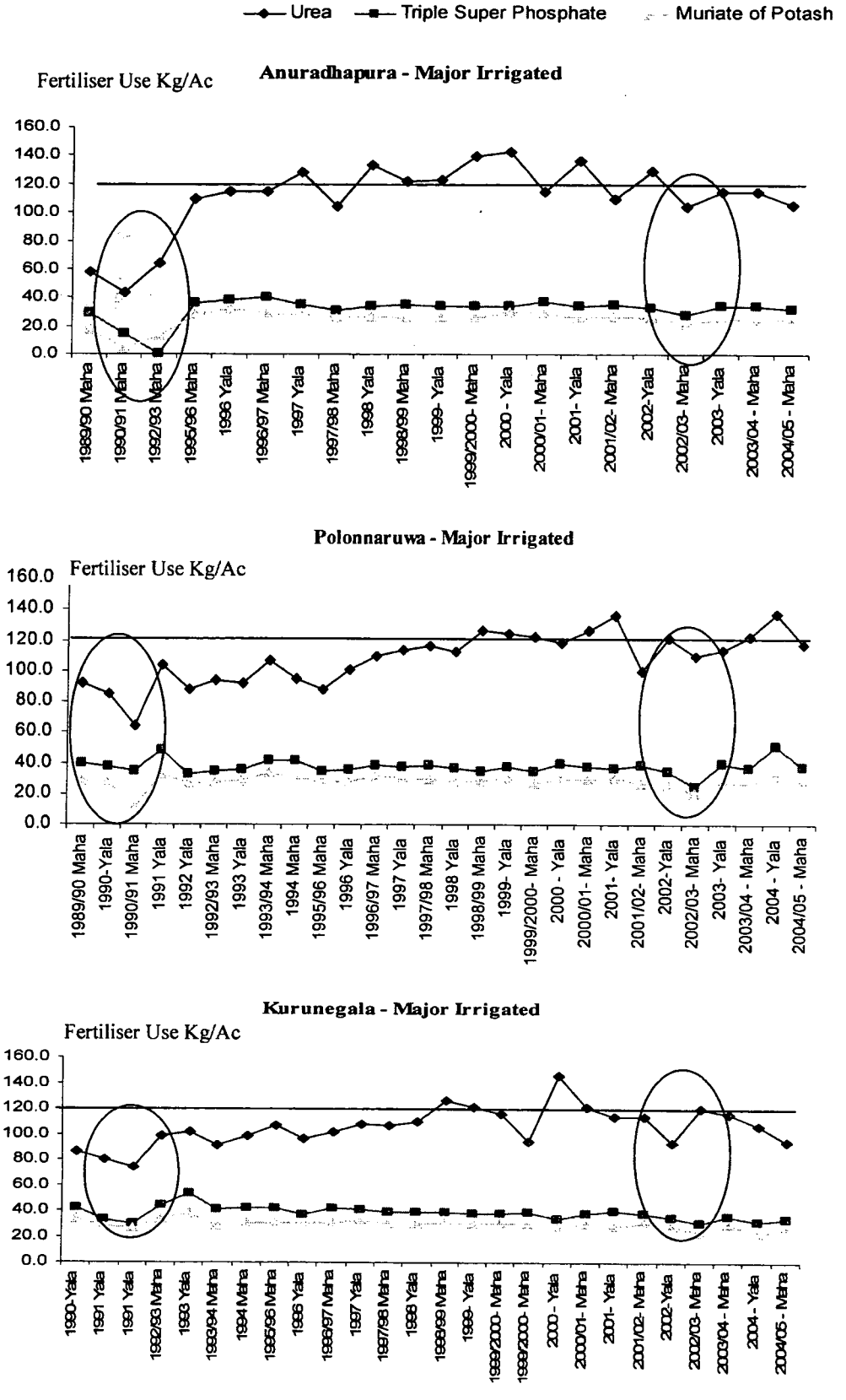
Urea is the mainly responsive fertilizer to the new technology. At current level of irrigation and NIV; increasing returns of paddy production to the increased urea application have been observed (Wickramasinghe, 2008). This has been the underlying factor that, urea has been subsidised through out the subsidy program implemented in the country from 1962 except between 1990 and 1994. It shows that average per hectare urea use over the years has increased to the level or above the level of recommendation given by the department (Figure 2.9). Particularly, after the subsidy was confined only to urea from 1997, per hectare urea use shows a considerable increase. According to the cost of cultivation survey results of the department of agriculture it shows that average urea use per hectare has exceeded the recommended amount, particularly during the period from 1997 to 2003 when subsidy was confined to urea (Figure 2.9).

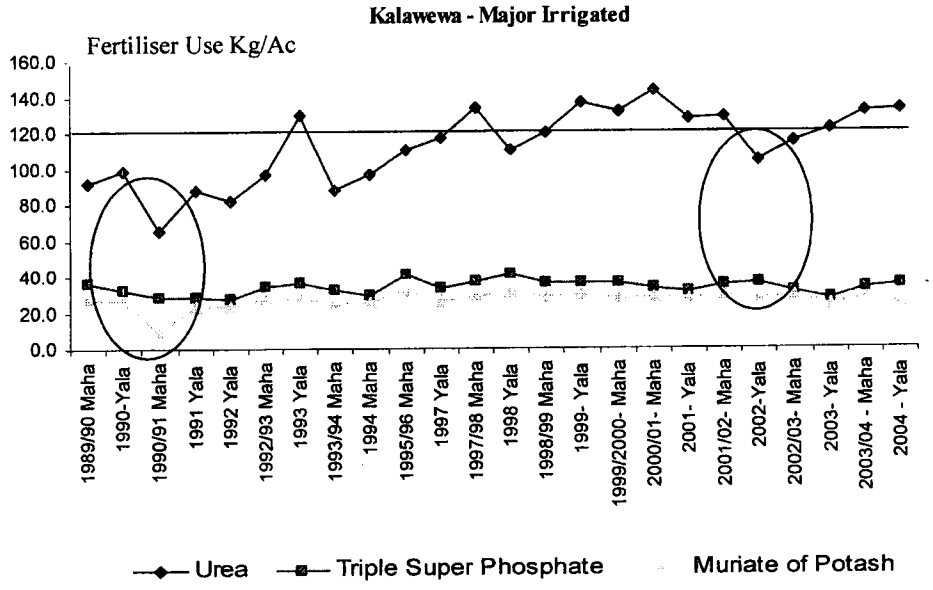
Thus, the urea biased policy had been conducive in bringing the fertilizer use up to the recommended level. However in some instances, it was by reducing the levels of TSP and MOP which led to imbalance of fertilizer use. Therefore urea biased policy has been viewed as a policy that led to over usage of urea and imbalanced N: P: K use in paddy cultivation (Ekanayake, 2005, Wijewardena 2005).

2.2.3.3 Two price shocks in 1990 and 2003 and their effects on fertilizer use

As described earlier, in the midst of increasing prices at the world market and due to the Structural Adjustment Program (SAP) of the 80's, government was compelled to reduce the subsidy attached to fertilizers and it was completely withdrawn in January 1990. Following the withdrawal of subsidy, fertilizer prices increased in the retail market two fold. Also in the year 2003, there was a sudden increase in urea prices as a result of the government decision to minimise the subsidy burden on the budget.

Figure 2.9: District level fertilizer use in the paddy sector, Kg/Ac





Note: Per acre fertilizer use by type of major nutrient was calculated based on fertilizer application by different fertilizer mixtures

Source: Department of Agriculture

An analysis of the two fertilizer -Urea - price shocks in 1990 and 2003 shows that as soon as the fertilizer prices increased by more than two folds in 1990, total fertilizer use had dropped by nearly 30%, 36% and 20% respectively for urea, TSP and MOP at national level. Sudden change in the urea price in 2003 caused about 25% drop in urea use in the country.

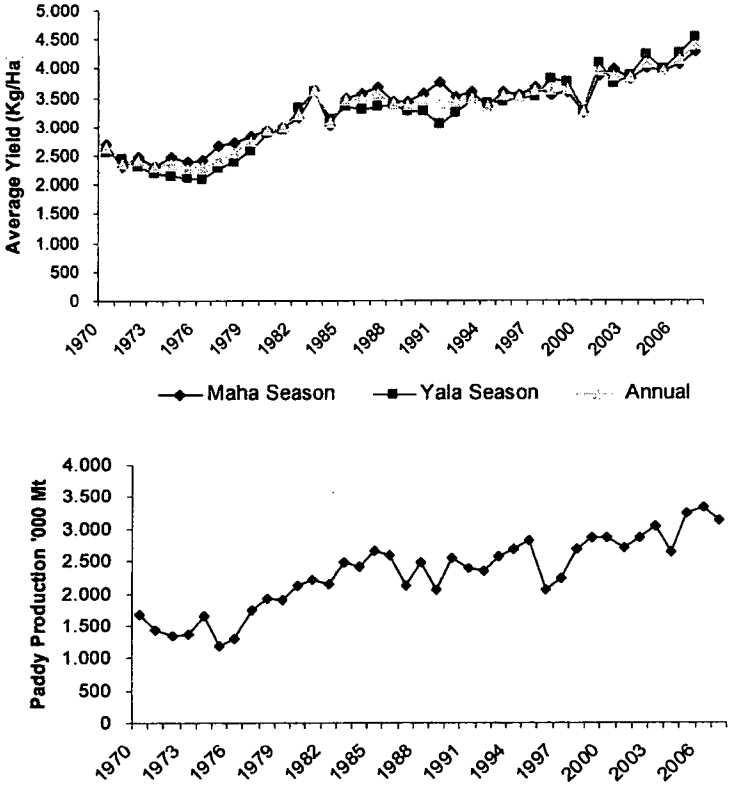
In the district level analysis, mixed responses are observed in relation to the per hectare fertilizer use after the two price shocks in 1990 and 2003. Farmer responses to the sudden increase in fertilizer prices is illustrated (Cost of production data by the Department of Agriculture) in the figures given below.

As described earlier, the subsidy policy was aimed at maintaining the fertilizer prices at a low level irrespective of the price increases in the world market. It is evident that subsidised price provided an incentive to farmers to use more fertilizer, particularly Urea. Farmers are responsive to sudden price changes but fertilizer price will not be a determinant if the prices increase gradually. Therefore when establishing subsidy levels, price of fertilizers at farm level should betaken in to account since farmers are responsive to sudden price changes. Subsidy policy can contribute to the cushioning of world market price fluctuations to the local farmer.

2.3 Subsidy Policy and its Effect on Paddy Production

Reaching the total land area of paddy cultivation to its ceilings during mid 1980's, increasing productivity is the main factor behind increasing paddy production in the country.

Figure 2.10: Average Yield of Paddy by season and Total Paddy Production

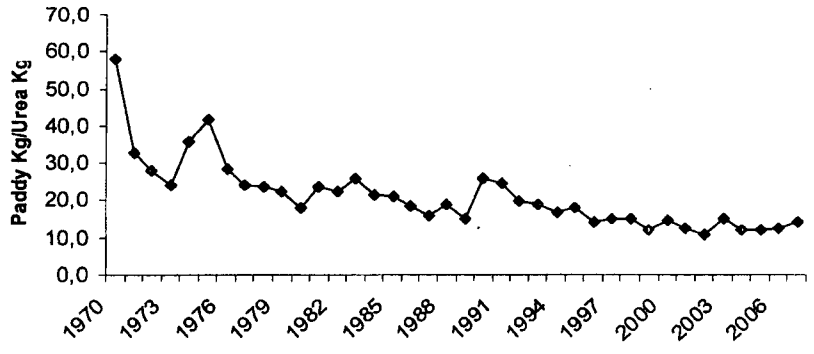


Source: Department of Census and Statistics

Improved irrigation, fertilizer responsive improved varieties and chemical /inorganic fertilizer use are the three factors behind increased paddy production. Particularly urea is the largely responsive fertilizer to the new technologies. Paddy yield increases were evident in past decades and these three factors have been complementary to each other. Without fertilizers sustained high-yield agriculture would not have been possible under irrigation. Subsidy policy therefore had been contributing to increased fertilizer use for increased paddy production in the country. Particularly subsidy policy had been promoting the urea use in the country for realisation of potential yields of new improved varieties (NIV) during 1990's and later.

However, net return of paddy output to 1 kg of urea at national level drastically came down over the period.

Figure 2.11: Paddy Production per Unit Use of Urea



Source: Department of Census and Statistics

The consumer also directly benefited due to relatively reduced price of rice owing to reduction of unit cost of production. This is a cumulative effect of incremental supply shift due to increased yield and relatively reduced price of rice due to fertilizer price. The direct benefit received by the consumer due to reduced fertilizer price through subsidy is 2- 6% of the rice price (Table 2.5).

Table 2.5: Total Fertilizer Subsidy on Paddy and Subsidy as a Percentage of Rice Prices

	Subsidy Paddy Rs Million	Paddy Production 000 Mt	Subsidy (Rs) per Kg		Price of Rice	Subsidy as % of Rice Price
			of Paddy	of Rice		
1997	1236	2241	0.55	0.83	24.81	3%
1998	1463	2692	0.54	0.81	25.42	3%
1999	1023	2857	0.36	0.54	29.93	2%
2000	1135	2860	0.40	0.60	26.58	2%
2001	2500	2695	0.93	1.40	29.18	5%
2002	1755	2860	0.61	0.92	32.94	3%
2003	1738	3046	0.57	0.86	30.34	3%
2004	2409	2627	0.92	1.38	37.32	4%
2005	4511	3245	1.39	2.09	36.17	6%

Source: National Fertilizer Secretariat, Department of Census and Statistics, HARTI

2.4 Concluding Remarks

With the introduction of inorganic fertilizer to paddy cultivation in the early 60's, fertilizer subsidy policy has been one of the important policies of the governmen Subsidy policy primarily targeted increased fertilizer use especially during the green revolution. Later the subsidy policy was aimed at maintaining the fertilizer prices at

the farm level as much as low irrespective of the price increases in the world market. Subsidised price provided an incentive to the farmer to use more fertilizer for increased production. The consumer also directly benefited due to reduction of unit cost of production which resulted in a relatively reduced price for rice and also by the incremental supply shift.

Subsidy policy can continue to contribute to increase the paddy production in the country by cushioning of world market price fluctuations of fertilizers to the local farmer.

CHAPTER THREE

New Fertilizer Subsidy Program Implemented from 2005/06 *Maha* Season

In this chapter, the new fertilizer subsidy program is described in order to understand its specific elements and intended objectives. The implementation mechanism of the program and the institutions are also dealt with. The government cost involved in the program is given at the end in order to emphasize the extent of the public expenditure on the programme.

3.1 New Fertilizer Subsidy Program: Its Objectives and Characteristics

Under the current development policy of ***Mahinda Chinthana,*** a new fertilizer subsidy scheme was introduced and implemented by the government from 2005/06 Maha season. The scheme attempted to achieve the national objectives of economic efficiency in fertilizer use in paddy cultivation, food security and welfare of rural farmer. This policy has following characteristics:

1. All types of fertilizers are rated at 350 Rs /50 Kg
2. Recommended dosage for every issue is based on the rate applied to the paddy crop
3. The procurement and distribution of subsidised fertilizers are through state agencies
4. Fertilizer subsidy was targeted only on small paddy farmers

With the new fertilizer subsidy, farmers were given the three main fertilizers at 350 Rs per 50 kg which is the lowest price recorded for urea after withdrawal of the study in 1990. By having such a low price for all three fertilizers; Urea, TSP and MOP, it was intended that farmers who had been using less than the recommended levels of the Department of Agriculture, would adopt the recommendation. On the other hand, by issuing only the recommended levels it was intended that farmers who use more than the recommended levels would stick to the recommendation. By implementing such a policy, it was attempted to eliminate the urea biased policy that was in operation and to reduce the price by increasing the subsidy so that the farmers could be encouraged to use the recommended fertilizer dosage. By applying the recommended dosages, it was expected that a balanced N:P:K ratio is supplied to the soil to increase the yield levels in order to increase production in the country. It was also expected to increase fertilizer use efficiency in paddy.

By undertaking the distribution mechanism through state agencies, particularly through the Agrarian Services Centres, it was indented to develop a state mechanism to reduce marketing cost of fertilizer distribution. The other important element of the policy was that it was targeted on the small paddy farmer and confined only to those who owned less than 5 Ac of land. Achieving both national as well as household food security is therefore one of the main objectives of the program.

3.2 Implementation Mechanism of the New Subsidy Program

3.2.1 Target Group

As stated earlier, in this programme, the main focus was on the paddy smallholders (owners less than 5 acres of paddy) who were presumed to be more vulnerable to increases in cost of production. Under the first stage of this programme subsidized fertilizer was provided only for the farmers who were cultivating paddy in 2005/06 Maha season. However this subsidy programme was extended to paddy farmers who were cultivating other field crops such as potato, big onion, and low country vegetables during Yala season in the paddy fields from 2006 Yala season.

Further a subsidy scheme for tea, rubber and coconut growers with lands less than 5 acres was planned to be introduced with the effect from 5th May 2006, to provide 50kg of bag of mixed fertilizer at a rate of Rs.1200. However, this scheme is yet to be implemented.

In principle, almost entire paddy farming population is eligible to receive subsidized fertilizer by now such as tenant farmers as well as the farmers who are cultivating other field crops (OFCs) in their paddy fields. When the farmer is not the owner of the paddy land, farmer who is actually doing the cultivation is the person who is eligible to get the subsidized fertilizer. Those farmers have to produce a letter from the owner of the paddy land or the owner himself has to get the fertilizer and handover to the respective farmer.

3.2.2 Import, Distribution and Delivery of Subsidised Fertilizer

As described earlier, until the present fertilizer subsidy scheme came into implementation in 2005/06 maha season, urea price had been subsidised for all crops and other fertilizers were available at current market prices. Moreover, the distribution of subsidized fertilizer was undertaken by both government and private sector agencies and the urea subsidy was directly paid to those agencies to maintain the indicative price at retail level and this was administered by the fertilizer secretariat.

With the introduction of the present fertilizer subsidy programme, importing, wholesale marketing and delivering of subsidised fertilizers to the agrarian development centres for distribution among farmers became the sole responsibility of two government fertilizer companies' viz. CCF and CFC. The private sector gradually withdrew from its earlier role as an importer, wholesale distributor and as a retailer of subsidised fertilizers and stopped handling of subsidised fertilizers completely in 2007 yala. While government companies are only responsible for handling subsided fertilizers, open market fertilizers are allowed to be handled solely by the private sector. With this new policy two market mechanisms were developed for chemical fertilizers; state led trade and market mechanism of subsidised fertilizers to paddy farmers who have less than 5 Ac and private sector led fertilizer market with open market prices for large scale paddy farmers and for other crop growing farmers.

Fertilizer Secretariat collects data on the total fertilizer requirement for each district from the respective deputy commissioner in the district office of department of

Agrarian Development. Using the collected statistics fertilizer secretariat invites tenders from the registered suppliers of the government fertilizer companies to import fertilizer and the secretariat conducts the technical evaluation of the tenders.

3.2.2.1 Institutions and Key Personnel Involved in the Fertilizer Subsidy Program

In the first stage of this programme, two ministries, then named as the Agriculture, Environment, Irrigation and Mahaweli development ministry and Agriculture Development and Farmer Upliftment ministry jointly implemented the subsidy programme and Agrarian Development department and the Sri Lanka Mahaweli Authority were assigned a significant workload. However, at the inception of the implementation of the new subsidy programme, fertilizer distribution to the farmers was assigned to the Department of Agrarian Development, Mahaweli authority, Cooperative societies and private companies. From 2006 Yala season, the distribution of the subsidized fertilizer was mainly handled by the Department of Agrarian Services.

The Agrarian Development Centres (ADC) attached to the department of Agrarian Development play a major role in distributing the subsidized fertilizer to the farmers.

With the assistance of the Agricultural Production and Research Assistant (ARPA), Divisional Officers (DOs) in the ADCs obtain the applications from eligible farmers for subsidized fertilizer. Using the collected field data they calculate the fertilizer requirement for the season. Divisional officers submit their fertilizer orders to one of the government fertilizer companies and make arrangements to transport the fertilizer load to the ADC.

To provide sufficient amount of fertilizer, agrarian development officers were instructed to keep sufficient stocks. When the supply of fertilizer by the government fertilizer companies was not sufficient they were instructed to purchase fertilizer from private companies at the initial stages of the state distribution mechanism.

Fertilizer is distributed to the farmers at the ADC center itself or at the village by the ARPA through farmer organisations. There are instances where farmer organizations get fertilizer from the fertilizer companies under the certificate of ADC. Cooperatives were also involved in distributing the fertilizer. In Kurunegala district cooperatives were involved in distributing subsidized fertilizer. Fertilizer is issued to the farmers by the cooperatives according to the certified applications issued by the ADC.

Agricultural Production and Research Assistant (ARPA) has to play a major role with the present subsidy programme especially in recommending the suitability of farmers, issuing applications and making farmers aware of the program. He was the primary grass-root level government officer who worked with farmers until *gramasevaka* and *samurdi* officer were also given the authority. Farmer organisation leaders also have a role to play in the subsidy program as organiser of 10 farmers group to get subsidised fertilizer on group basis.

When implementing the fertilizer subsidy programme, each ADC was given a revolving fund and each ADC receive the fund season by season. In some centers, this fund was increased with time. In some ADCs the balance of the fund needs had

to be refunded to the office of the commissioner of the Agrarian Services (eg. Polonnaruwa District).

Agrarian Development Centre receives a fertilizer bag of 50 kg at Rs. 314, which is then sold to the farmer at Rs. 350. After deducting the costs for transportation, wages and other reductions, ADC earns a about Rs. 10/bag through the subsidy programme. The Mahaweli Authority is also involved in distributing subsidized fertilizer to the farmers in the Mahaweli areas. In the areas where Mahaweli Authority is functioning, unit manager is playing the role of DO.

In certain districts, Department of Agriculture (DOA) is involved in the distribution of subsidized fertilizer under special programs. In Polonnaruwa district DOA is distributing subsidized fertilizer through the *Saruketha* societies and the *Dhanyagara* (granary) project. Agricultural officers attached to the DOA are responsible for distribution of subsidised fertilizer to *Saruketha yaya* programme, *Dhanyagara* programme, model farms, and seed paddy farms in addition to give seed paddy to farmers as well as for the distribution of seed paddy.

***Saruektha Yaya* Society**

To get the subsidized fertilizer under this society, farmers have to be young active farmers in that area and the paddy lands should be in the same *yaya* scheme. There are ten farmers in one *Saruketha yaya* society. Single farmer is eligible to obtain subsidized fertilizer only for maximum of 3 acres of paddy land.

Fertilizer Recommendation under *Saruketha yaya* society

Urea	120kg/Ac	
TSP	45kg/Ac	
MOP	45kg/Ac	
$ZnSO_4$	2kg	(These two micro nutrients were distributed to the farmers at every other season to the market price. These two are not included in the subsidy scheme)
$(NH_4)_2SO_4$	10kg	

Farmers have to obtain their fertilizer allocation from Ceylon Fertilizer outlet in the area. Agrarian development centers are not involved in providing fertilizer under *saruketha yaya* project.

Granary area (*Dhanyagara*) Programme

Under this programme about 25-30 farmers get fertilizer at the subsidized price. About 50-60 acres of paddy lands are included in one programme.

Fertilizer recommendation under this project is as follows.

Urea	120kg/Ac
TSP	45kg/Ac
MOP	45kg/Ac

3.2.2.2 Application Procedure for Subsidized Fertilizer

To get subsidized fertilizer from the agrarian development centers farmers have to complete a standard application form. Applications for the subsidy are issued to farmers according to the cultivation register. (Suitability of the farmer to receive the subsidy is decided after a careful observation of the paddy fields and cultivation practices) With the recommendation of the president or secretary of the respective farmer organization, these applications should be handed over to the Agricultural Research and Production Assistants in the area. Again the accuracy of the applications is certified by the ARPA and the recommended quantity of fertilizer will be issued to farmers.

In the absence of farmer organizations in their respective divisions, applications should be handed over to the divisional officers with the recommendation of the agricultural research and production assistants. Since there are no ARPA officers in service in the North and Eastern provinces of Sri Lanka application forms for subsidized fertilizer should be handed over to the Divisional officers of the agrarian development centers in the respective area. Farmers in the Mahaweli area should forward their applications for fertilizer to the region's unit manager.

3.2.2.3 Distribution Mechanism

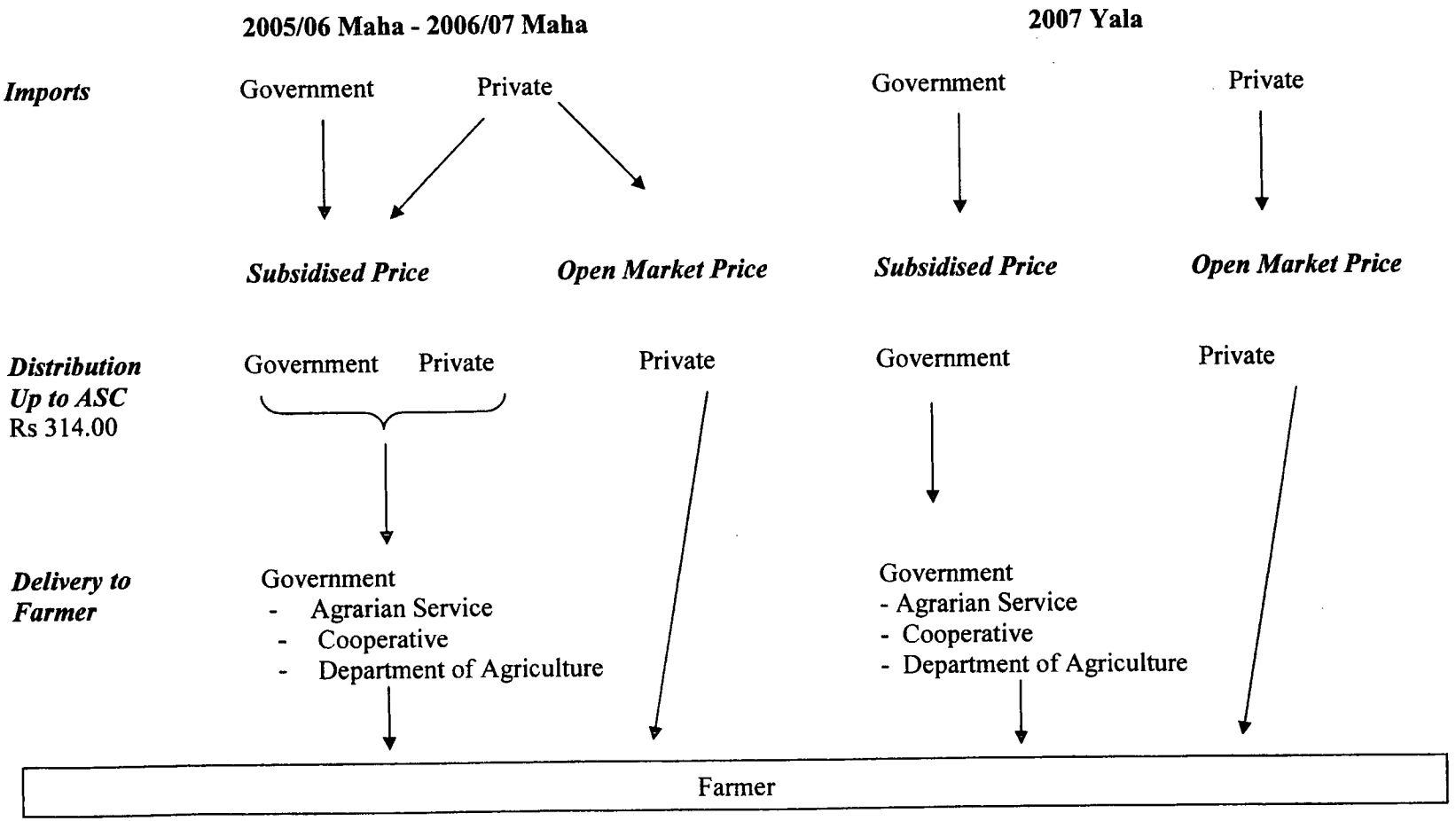
Distribution mechanism of fertilizers after the New Subsidy Program 2005/06 is presented in figure 3.1. Applications for subsidized fertilizers are issued by the following three agents.

1) Divisional Offices
2) Mahaweli Authority
3) Department of Agriculture

Farmers who get the fertilizer under the divisional office obtain their fertilizer allocation from the;

- ADCs
- Cooperatives
- Fertilizer company agents

Figure 3.1: Distribution Mechanism of Fertilizers after the New Subsidy Program 2005/06



The farmers who are registered under Mahaweli Authority get their fertilizer requirement from the Mahaweli stores. Under the *Saruketha yaya* and grannery programme that is implemented by DOA, farmers get fertilizers from the area agents of government fertilizer companies.

Amount of fertilizer and the percentage of fertilizer distributed by the two government fertilizer companies and the private sector are shown in table 3.1

Table 3.1: Subsidised Fertilizer Distribution by Government and Private Sector in Year 2007

	Government		Private *	Total	Government	
	Ceylon Fertilizer Cooperation	Colombo Commercial			Ceylon Fertilizer Cooperation	Colombo Commercial
Urea(MT)	135197	68226	14321	217744	62%	31%
TSP(MT)	45292	21655	2556	69503	65%	31%
MOP(MT)	40305	22089		62394	65%	35%

* Until 2007 Yala private sector was involved.
Source: National Fertilizer Secretariat

3.2.3 Fertilizer Recommendation and Quantity of fertilizer distributed among the farmers

Government has mentioned the maximum amount of fertilizer that should be given under the new subsidy programme in the circular dated 05.12.2005. The amount of fertilizer that should be distributed in each region is shown in table 3.2 and 3.3.

Table 3.2: Recommended Maximum Amount of Fertilizer per Acre in Kilograms for Farmers Who Use Direct Fertilizers

	Urea	T.S.P.	M.O.P.
Low country dry zone and Intermediate Zone	120	35	30
All other regions	60	35	45

Source: Department of Agriculture

Table 3.3: Recommended Maximum Amount of Fertilizer per Acre in Kilograms for Farmers Who Use Mixed Fertilizers

	"V" mixture	Urea	T.D.M.
Low country dry zone and Intermediate Zone	75	75	50
All other regions	75	25	50

Source: Department of Agriculture

However the field investigations revealed that fertilizer is being distributed according to the table 3.4 in the respective study areas.

Table 3.4: Field Level Implementation, Fertilizer Application Kg/Ac

District	Urea	TSP	MOP
Kurunegala	100-105	35	30
Gampaha	60	25-35	45 – 55
Anuradhapura	120	35	30
Polonnaruwa	120	35	30
Ampara	120	35	30
Hambantota	120	35	30
Kalutara	50-55	25	45

Source: Field Survey Data - 2007

The amount of fertilizer received by farmers during 2006/07 Maha season is presented in Appendix 3.1. Accordingly almost entire paddy farmers received the subsidy for paddy cultivation.

3.3 Cost of Subsidy and Subsidy Rate

The budgetary allocation for the fertilizer subsidy rose to Rs. 8.5 billion in 2006 and the actual expenditure was 10 billion. According to the new subsidy scheme, the subsidy rate of Urea, TSP and MOP per mt were Rs.29,000, Rs.24,500 and Rs.26,500 respectively. Due to the escalating world market fertilizer prices in the recent past and the implementation of the new fertilizer subsidy, government had to incur more than Rs.11,000 million for the fertilizer subsidy in the year 2007.

Table 3.5: Fertilizer Price and Subsidy Rate (Rs/Mt)

Year	Retail Price (Open market)	Subsidy Price	Subsidy	Subsidy Rate
2006				
Urea	36,000	7,000	29,000	81 %
TSP	31,500	7,000	24,500	78 %
MOP	33,500	7,000	26,500	79 %
2007				
Urea	50,000	7,000	43,000	86 %
TSP	45,130	7,000	38,130	84 %
MOP	43,500	7,000	36,500	84 %

Source: National Fertilizer Secretariat

The huge subsidy rate attached to this policy exerts an enormous burden on the national budget in the wake of increasing prices of all these fertilizers in the world market. In the year 2007, subsidy cost accounted to more than 3% of the agricultural GDP and nearly 30% of the government expenditure on agriculture and irrigation (table 3.6).

Table 3.6: Share of Subsidy Cost in the Government Expenditure 2007

Subsidy Cost	11,000 Rs. Mn.	
Agricultural GDP	363,343 Rs.Mn	3.3 %
Current Expenditure on Agriculture and Irrigation	22,849 Rs.Mn.	
Capital Expenditure on Agriculture and Irrigation	14,736 Rs.Mn.	
Total Expenditure on Agriculture and Irrigation	37,585 Rs.Mn.	29%

Source: Central Bank of Sri Lanka

3.4 Concluding Remarks

With the new fertilizer subsidy program almost entire paddy farming community is eligible to get the three main fertilizers Urea, TSP and MOP at 350 Rs per 50 kg according to the recommendation given by the department of agriculture. This includes tenant farmers and the farmers who are cultivating OFC in paddy fields too. This price is the lowest price recorded for Urea, TSP and MOP after 1990. By taking over the responsibility of implementing the state led mechanism, agrarian development department gradually became entirely responsible for fertilizer distribution to farmers. Subsidy cost amounted to 3% of the agricultural GDP in year 2007 due to escalating prices in the world market.

Appendix 3.1: Fertilizer issues under New Fertilizer Subsidy Programme (Kethata Aruna) 2006/2007 Maha (2006.10.01 - 2007.03.31)

District	No.of farmers received fertilizer	Extent of paddy land(acs)	Quantity of fertilizer issued (M.T.)					
			Urea	T.S.P.	M.O.P.	Paddy mixture	T.D.M.	Total
Colombo	8,485	6907.00	386.80	233.70	295.70			916.20
Gampaha	33,502	19,529.00	861.77	554.61	809.53	4.45	83.94	2,314.31
Kaluthara	37,011	34,900.00	1,088.30	767.80	989.80			2,845.90
Kandy	30,915	25,899.00	1,846.50	810.10	809.50	7.60	3.80	3,477.50
Matale	32,812	45,033.20	4,903.29	1,500.13	1,266.98			7,670.40
Nuwara Eliya	13,667	11,148.00	892.27	443.74	636.29			1,972.30
Galle	30,308	29,742.00	1,193.09	623.63	1,095.12		11.92	2,923.76
Matara	18,482	17,680.00	1,010.06	369.24	589.99		0.10	1,969.39
Hambantota	*	*	8,419.07	2,522.87	2,239.61	1.88	1.65	13,185.08
Kurunegala	129,244	139,069.	12,658.88	4,635.87	3,684.00			20,978.75
Puttlam	19,506	34,102.50	3,486.07	973.67	878.78		0.50	5,339.02
Anuradhapura	101,073	224,586.00	25,314.37	7,108.31	6,071.90	0.20	11.60	38,506.37
Polonnaruwa	62,969	127,252.00	14,451.05	4,120.99	3,461.31			22,033.34
Badulla	71,584	61,122.00	5,855.70	1,665.60	1,495.50	19.50	6.48	9,042.78
Monaragala	44,117	60,049.00	6,931.34	1,628.14	1,671.86	60.38	9.61	10,301.32
Ratnapura	27,745	55,021.00	2,062.56	933.45	1,039.16	10.05	4.03	4,049.25
Kegalle	24,994	18,008.00	853.51	522.27	622.25	1.00		1,999.02
Ampara	46,931	121,614.00	15,420.43	4,349.61	3,779.64			23,549.68
Trincomalee	17,085	37,968.85	3,593.43	1,028.25	22,081.94	17.00		26,720.62
Batticaloa	11,000	28,164.00	3,379.75	878.15	645.83			4,903.73
Vavuniya	*	*	1,771.00	500.25	505.00			2,776.25
Jaffna	14,135	6,885.48	600.00					600.00
Mannar	6,328	14,845.00	1,661.40	455.00	350.45			2,466.85
Mulathive *								
Kilinochchi*								
Total	781,893	1,119,525.03	118,640.64	36,625.38	55,020.13	122.05	133.63	210,541.82

* Data not available

Source: Department of Agrarian Development

CHAPTER FOUR

The Effects of New Fertilizer Subsidy Policy on the Paddy Production Sector

In this chapter, the effects of new fertilizer subsidy programme implemented from 2005/06 *maha* season is evaluated in view of its effectiveness and relevance in achieving the desired national objectives. The two specific characteristics of the new subsidy policy i.e. granting a huge subsidy to the three main fertilizers and issuing of fertilizers according to the recommendation made by the department of agriculture are primary concerns of the evaluation. Farmer's behaviour in relation to subsidy in fertilizer use and productivity relation to fertilizer will be considered in the analysis. The cost effectiveness of fertilizer subsidy as a public expenditure policy in relation to economic efficiency, food security and social equity will be reviewed at the end.

4.1 New Subsidy Program and Change in Fertilizer Price and Cost of Production

The price incentive received by the farmers due to changing fertilizer price at farm level under the new subsidy program has been given in the table 4.1.

Table 4.1: Change in Fertilizer Prices under New Subsidy Programme

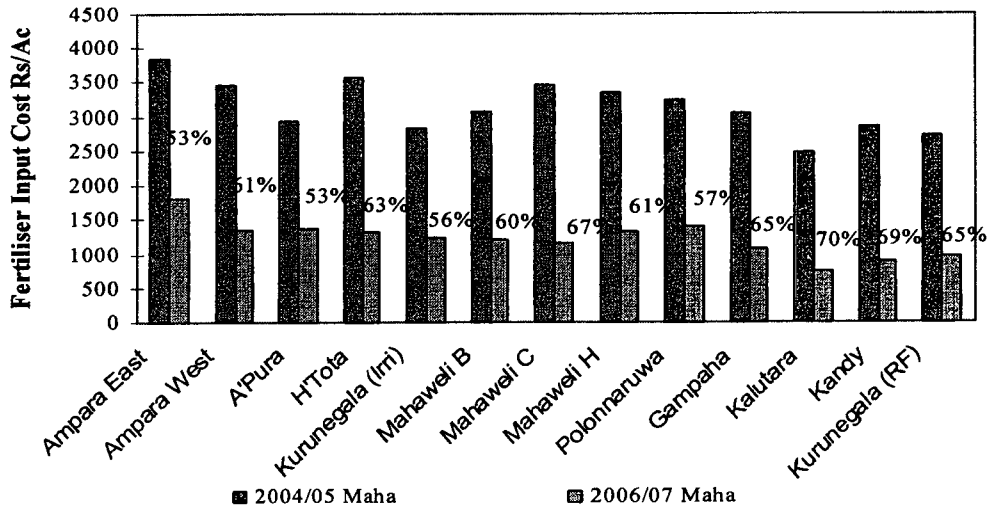
	Retail Price of Fertilizers Rs/Mt		
	Urea	**TSP**	**MOP**
2000	7000	19200	16500
2001	7000	17200	18600
2002	7000	21000	19940
2003	16000	22500	21000
2004	12000	26100	25210
2005	10740	33250	32200
2006	7000	7000	7000
2007	7000	7000	7000
Change in price with respect to 2005 prices (Rs/Mt)	3,740	26,250	25,200
Change in price of 50 kg of fertilizer with respect to 2005 prices (Rs /50 Kg)	187	1,313	1,260
Change in price of 50 kg of fertilizer with respect to 2005 prices as a percentage	35%	79%	78%

Source: National Fertilizer Secretariat

Accordingly, by subsidising the three main fertilizers at 350 Rs per 50 kg of bag, paddy farmers have received a huge price incentive for all three fertilizers particularly to TSP and MOP. Nearly 80% of price drop for TSP and MOP has been effective through the subsidy compared to 2005 and it is 35% for urea. It is the lowest price after 2000 and one of the lowest prices recorded after removal of the subsidy in 19[illegible] for all three fertilizers.

Due to this huge price incentive, fertilizer input cost has remarkably come down by 50% to 70% in all water regimes according to cost of cultivation of Department of Agriculture (Figure 4.1).

Figure 4.1: Comparison of Fertilizer Input Cost in 2004/05 and 2006/07 *Maha* Season



Source: Cost of Cultivation, Department of Agriculture

According to sample survey results of Polonnaruwa and Ampara districts, fertilizer cost was to about 6% of the total cost in 2007 *yala* season and it was about 14 to 15% of farmer budgets before the new subsidy. Due to the subsidised fertilizer price, there is about 50% reduction in the fertilizer input cost in the capital/cash budget of the paddy farmer. This eases the capital borrowings needed for fertilizer purchasing by the small farmer.

4.2 New Subsidy program and Change in Fertilizer Use

One of the important changes in the fertilizer use in paddy cultivation is the moving away from using fertilizer mixtures to straight application of fertilizers. This was attempted for a long time through extension and education. Straight application of fertilizers has been recommended by the Department of Agriculture due to the fact that it was considered as one of the strategies to increase fertilizer use efficiency in paddy cultivation (Wijethilake 1994).

According to the sample results, except in the study locations in Ampara and Gampaha districts, farmers have been using fertilizer mixtures for cultivations prior to the new subsidy program (Table 4.2). Lack of awareness, difficulties in mixing fertilizers and non- availability of straight fertilizers had been identified as factors hindering farmers using straight fertilizers (Aheeyar et al 2005). After the new subsidy program, entire farming population started to use straight fertilizers and it was expected that it would increase the fertilizer use efficiency to increase production.

Table 4.2: Fertilizer Use by Type of Fertilizer Prior to New Subsidy Program

District	Type of Fertilizer (Straight / Mixture - V mixture and TDM)
Ampara	As straight fertilizers
Polonnaruwa	100% as mixtures
Kurunegala	100 % as mixtures
Anuradhapura	100 % as mixtures
Hambantota	20 % as straight fertilizers
Kalutara	5 % as straight fertilizers
Gampaha	80 % as straight fertilizers

Source: Sample Survey

The other important change in fertilizer use is the change in amount of fertilizer use for cultivation by fertilizer type. The combined policy of subsidy with huge price incentive and the issuing of fertilizers according to a recommendation have driven farmers towards adopting the department recommendation.

In chapter 2, it was noted that average urea use per hectare has exceeded the recommendation, particularly during the period from 1997 to 2003 when subsidy was confined to urea. According to the sample results of the study, average fertilizer use during 2004/05 *maha* and 2005 *yala* has been below the recommended level of the Department of Agriculture when the prices were at Rs.537, Rs.1,662 and Rs.1,610 per 50 kg for urea, TSP and MOP respectively (Table 4.3). With regard to the fertilizer application by individual farmer, the study shows that some farmers have applied more than the department recommendation while more farmers have used less than the recommendation. In Polonnaruwa, about 36% of the farmers have applied urea above the recommended level. No farmer has used more than the recommended level in study locations in Ampara district. All the sample farmers in the study locations in Gampaha had applied more than the recommendation prior to the new subsidy.

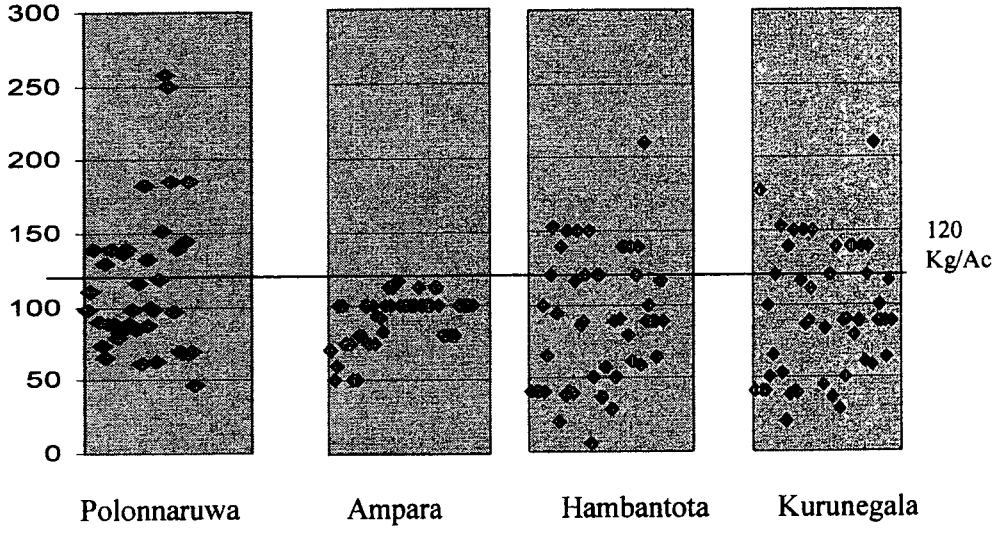
Table 4.3: Average per Ac Fertilizer Use and Fertilizer Use Based on Recommendation Prior to New Subsidy Program

		2005
Urea Price	Rs.	537.00
TSP Price	Rs.	1662.50
MOP Price	Rs.	1610.00

District	Season	Average Per Ac fertilizer Use			% of farmers use more than recommendation		
		Urea	MOP	TSP	Urea	MOP	TSP
Polonnaruwa	2004/05 Maha	113.5	23.6	32.0	36%	21%	41%
	2005 Yala	102.4	26.0	36.8	22%	36%	50%
Ampara	2004/05 Maha	91.5	8.3	23.9	0%	0%	0%
	2005 Yala	91.7	8.5	24.1	0%	0%	0%
Hambantota	2004/05 Maha	93.3	27.2	36.1	20%	14%	26%
	2005 Yala	87.4	25.7	32.8	21%	15%	17%
Kurunegala	2004/05 Maha	96.2	22.1	22.8	40%	20%	15%
	2005 Yala	92.7	23.9	25.2	32%	12%	16%
Gampaha	2004/05 Maha	79.9	60.6	41.7	100%	100%	98%
Kalutara	2004/05 Maha	55.3	32.5	38.7	41%	18%	21%
	2005 Yala	54.2	32.5	38.4	63%	11%	84%

Source: Sample Survey, 2007

Figure 4.2: Urea Use (Kg/Ac) by Farmers in Sample Locations of Major Irrigated Areas Prior to the New Subsidy, 2004/05 *Maha* Season



Source: Sample Survey, 2007

Due to the introduction of new subsidy program, fertilizer use has been brought to the recommended levels of the Agriculture Department and almost all the far ..rs have

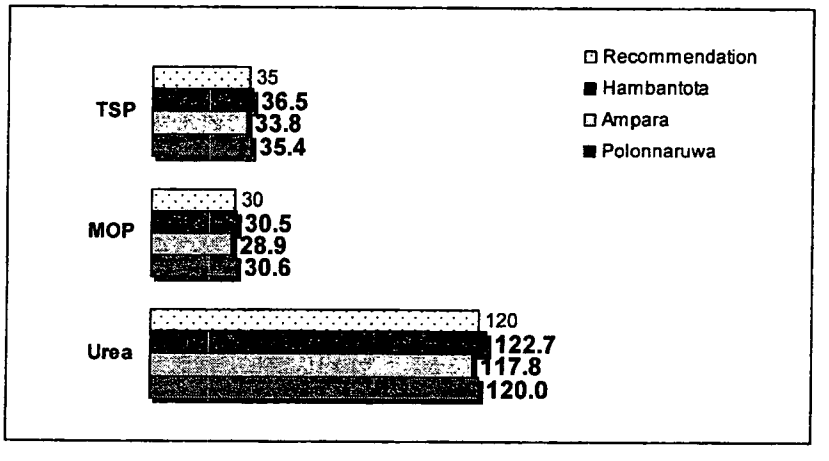
adopted the given recommendations. Sample data from the study provides adequate evidences that almost all farmers have adopted the recommendations that was given with the fertilizer issue and thereby fertilizer use has been brought to the recommended levels of the Agriculture Department (Table 4.4 & Figure 4.3).

Table 4.4: Fertilizer use by Type of Fertilizer and by Season in Sample Locations

		Ampara	Polonnaruwa	Hambantota	Kurune-gala	Kalutara	Gampaha
2005/06 Maha	Urea	117.8	120.0	122.7	102.1	49.8	60.0
	MOP	28.9	30.6	30.5	30.2	45.8	42.0
	TSP	33.8	35.4	36.5	35.5	24.4	27.0
2006 Yala	Urea	117.8	120.0	123.3	95.8	50.9	60.0
	MOP	28.9	30.6	31.6	31.7	47.4	52.2
	TSP	33.8	35.4	38.7	34.2	25.1	31.4
2006/07 Maha	Urea	117.8	120.0	123.0	97.1	49.7	61.6
	MOP	28.9	30.6	32.0	34.1	45.6	50.2
	TSP	33.8	35.4	38.7	38.6	24.4	32.5
2007 Yala	Urea	117.8	120.0	122.2	96.4	48.0	60.0
	MOP	28.9	30.6	33.5	31.4	45.2	53.4
	TSP	33.8	35.4	38.8	75.1	24.1	33.1

Source: Sample Survey, 2007

Figure 4.3: Comparison of Average Fertilizer Use by Sample Farmers and Recommendation in Major Irrigated Areas, 2005/06 Maha Season



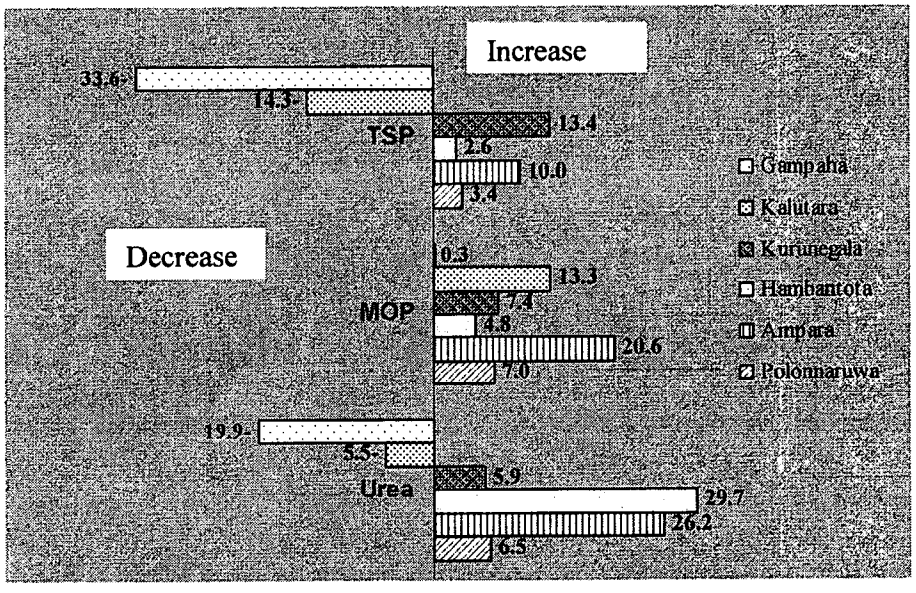
Source: Sample Survey, 2007

Farmers who had not applied the full amount of recommended levels of fertilizer before the subsidy have applied the recommended amount of fertilizer after this subsidy programme. Fertilizer prices has been an incentive to adopt the recommendation as it reduced the fertilizer input cost from 16% to only 6% of the cost of production. Generally farmers are satisfied with the amount of fertilizer they received. But about 13% of the farmers in Polonnaruwa district reported that the amount of fertilizer they received was not sufficient. Nevertheless, very limited

evidences are there in the sample that farmers have purchased fertilizer from the open market even if they had perceived that their fertilizer use was not adequate. Limited availability of open market fertilizers and the huge price difference between the subsidised fertilizer and the open market fertilizer have been the two factors holding back applying fertilizer at more than the recommended level.

Accordingly, with the implementation of the new subsidy program, particularly in the major irrigated areas in the dry zone, the recommended usage has given rise to an increase in their usual fertilizer use and in wet zone areas usual fertilizer use has been reduced.

Figure 4.4: Change in Average Fertilizer Use in 2006/07 Maha Compared to 2004/05 Maha Season (Kg/Ac)

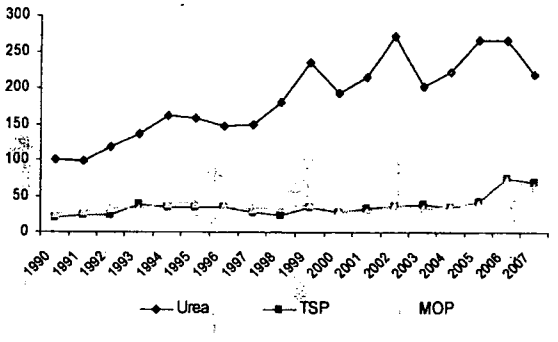


Source: Sample Survey, 2007

It is also observed in a study done in Anuradhapura district that the average per unit application of fertilizer has increased which was at a declining trend before the new subsidy (Jayalath & Wickramasinghe 2008). Another study done in Minipe scheme also shows that fertilizer use has increased by 32% from 2005 to 2007 (Wijethunga & Thiruchelvum, 2008)

Table 4.5: Total Fertilizer Use in Paddy Production, No.'MT

Year	Urea	TSP	MOP
2000	193.3	27.1	29.8
2001	214.4	32.9	29.5
2002	270.1	37.2	37.5
2003	201.9	38.1	33.2
2004	222.2	34.8	36.6
2005	266.2	41.6	39.6
2006	264.8	**74.3**	**73.2**
2007	217.7	**69.5**	**62.4**



Source: National Fertilizer Secretariat

Generally there is an increase in fertilizer use in the country after implementing the new policy compared to previous years. Average per area fertilizer use has increased in irrigated areas due to adoption of the recommended level by all farmers. At national level the increase is illustrated particularly of TSP and MOP and it is almost 90%. Achieving a relatively balanced N:P:K application is another change in fertilizer usage due to new adoption.

4.3 New Fertilizer Subsidy and Economic Efficiency of Fertilizer Use

In the next section, it is attempted to answer whether there has been an increase in productivity and hence an increase in economic efficiency of fertilizer use by bringing the fertilizer use to the level that is recommended by the department of agriculture after the new policy.

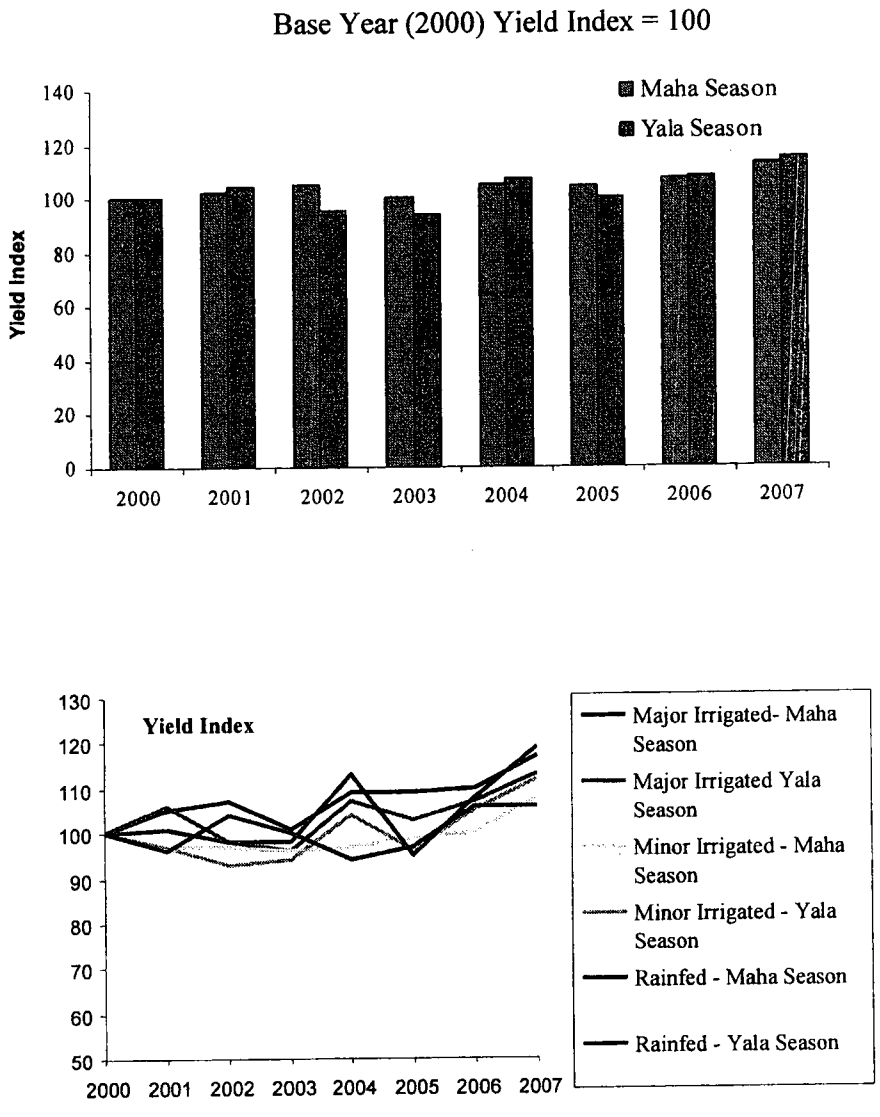
4.3.1 New Fertilizer Subsidy and Productivity

The three main yield increasing factors of paddy are Irrigation, improved varieties that were largely fertilizer responsive and chemical /inorganic fertilizer. The important change that took place in the paddy production sector after the new policy is the increase in chemical fertilizer use in the country, particularly in the major irrigated areas and balanced application of three main fertilizers as straight applications.

Owing to the change in fertilizer application yield increases are evident at national, district level and in the sample locations.

Significant yield increase in national average yield is observed by season as well as the average yield by water regimes and by season when yield index from year 2000 is considered (Figure 4.5, Appendix 4.1). The highest national yield was recorded in the country in 2007 and it is 4,386 Kg per Ha. The year 2007 records the highest ever average yield of 4,950 Kg per Ha in major irrigated areas (Department of Census and Statistics).

Figure 4.5: Average Yield Index in Different Water Regimes and Seasons



Source: Department of Census and Statistics

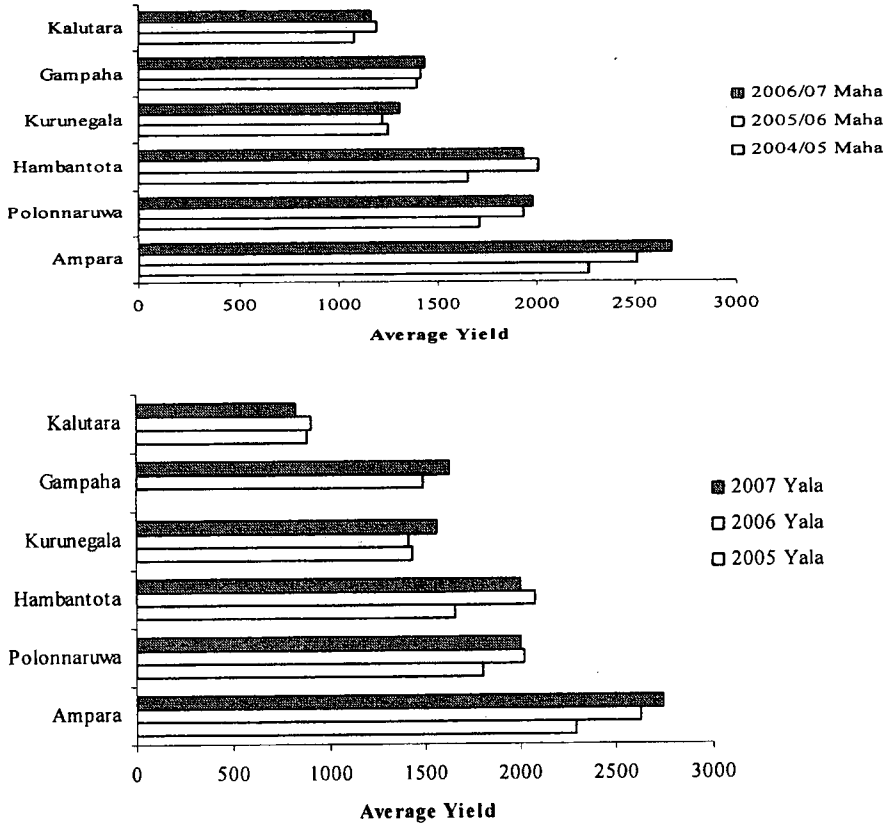
According to yield estimates of the sample, average yield has increased in 2005/06 *maha* and 2006/07 *maha* in all study locations compared to 2004/05 *maha* season. Similarly the average yield in 2006 *yala* and 2007 *yala* has increased compared to 2005 *yala* season (Figure 4.6). According to the yield comparison of the individual farmer in the sample for 2004/05 *maha* and 2005/06 *maha*, 2004/05 *maha* and 2006/07 *maha*, 2005 *yala* and 2006 *yala*, 2005 *yala* and 2007 *yala*, significant yield increases are observed in all the major producing areas (Table 4.6). Highest yield increases are observed in the sample population of Hambantota and Ampara.

Table 4.6: Paired Sample Mean Test Statistics of Yield Comparison

2004/05 maha and 2005/06 *maha*							
	Yield (Kg/Ac)		Mean difference (Kg/Ac)	SD	SE	t	Sig.
	2004/05 maha	2005/06 maha					
Kurunegala	1276	1217	-59.7	484	78	-0.76	0.452
Hambantota	1724	2038	313	575	87	3.574	0.001
Ampara	2278	2523	245	269	36.63	6.699	0.000
Kalutara	1088	1226	137	859	137	0.999	0.324
Polonnaruwa	1715	1965	250	360	58	4.271	0.000
2004/05 maha and 2006/07 *maha*							
	Yield (Kg/Ac)		Mean difference (Kg/Ac)	SD	SE	t	Sig.
	2004/05 maha	2006/07 maha					
Kurunegala	1276	1308	36.4	472	74	0.987	0.629
Hambantota	1644	1935	291	605	90	3.229	0.002
Ampara	2278	2692	414	200	27.32	15.15	0.000
Kalutara	1080	1240	160	891	142	1.12	0.267
Polonnaruwa	1726	2008	281	473	78	3.572	0.001
2005 yala and 2006 *yala*							
	Yield (Kg/Ac)		Mean difference (Kg/Ac)	SD	SE	t	Sig.
	2005 yala	2006 yala					
Kurunegala	1318	1463	-70	914	204	0.345	0.734
Hambantota	1702	2126	423	435	68	6.158	0.000
Ampara	2305	2643	338	195	27	12.46	0.000
Kalutara	810	1034	224	936	163	1.374	0.179
Polonnaruwa	1805	2021	215	401	56	3.796	0.000
2005 yala and 2007 *yala*							
	Yield (Kg/Ac)		Mean difference (Kg/Ac)	SD	SE	t	Sig.
	2005 yala	2007 yala					
Kurunegala	1318	1619	301	846	189	1.59	0.128
Hambantota	1648	2030	381	547	180	4.727	0.000
Ampara	2305	2766	461	196	27	16.96	0.000
Kalutara	804	808	4	370	66	0.061	0.952
Polonnaruwa	1809	2000	191	514	75	2.546	0.014

Source: Own Calculations

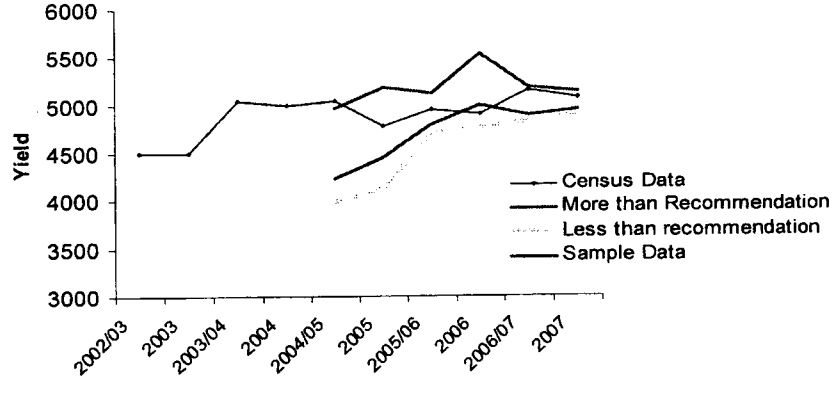
Figure 4.6: Average Yield in Sample Locations



Source: Sample Survey, 2007

The changes in yield due to change in fertilizer use by farmers who used more than the recommended level in the Polonnaruwa district before the new subsidy is illustrated in the figure 4.7.

Figure 4.7: Comparative Change in Average Yield of Farmers Who Used More than Recommendation and Less than Recommendation Prior to the New Subsidy in Polonnaruwa



Source: Field Survey, 2007

It compares the change in yield of farmers who used less than the recommendation prior to the subsidy. The study shows that significant change is not observed among farmers who used more than the recommendation prior to the new subsidy compared to the significant change that is observed with farmers who increased the fertilizer amount after using the recommended level.

Although it is clear that there is an increase in yield due to increase use of fertilizers, it could not be concluded that there is a possibility to increase the current level of recommendation in potential areas without further analysis. Already under special programs, such as *Saruketha,* farmers in high yield potential areas apply fertilizer above the recommendation given with the subsidy program.

4.3.2 Economic Efficiency of Fertilizer Use

Increased value addition due to increased paddy production has resulted in increased economic returns to the country particularly in major irrigated areas. According to the study, economic returns to increased fertilizer use have increased by four times in the major irrigated areas in 2007 compared to 2005, the best performed year before the new subsidy (Table 4.7).

Increased fertilizer use has given rise to a more economically efficient production in the country.

Table 4.7: Change in Fertilizer Cost and Change in Economic Returns Due to New Subsidy Policy in Major Irrigated Areas

	Polonnaruwa			Ampara		
	2004/05 Maha	2005/06 Maha	2006/07 Maha	2004/05 Maha	2005/06 Maha	2006/07 Maha
Fertilizer Use (Kg/Ac)						
Urea	113.5	120.0	120.0	91.5	117.8	117.8
TSP	31.99	35.4	35.4	23.9	33.8	33.8
MOP	23.63	30.6	30.6	8.3	28.9	28.9
Fertilizer Price (Retail) (Rs/Kg)						
Urea	10.74	7.0	7.0	10.74	7.0	7.0
TSP	33.25	7.0	7.0	33.25	7.0	7.0
MOP	32.2	7.0	7.0	32.2	7.0	7.0
Fertilizer Price (CIF) (Rs/Kg)						
Urea	36.82	36	36	36.82	36	36
TSP	33.25	31.5	45.13	33.25	31.5	45.13
MOP	32.2	33.5	43.5	32.2	33.5	43.5
Fertilizer Cost (1)						
Financial	3044	1302	1302	2045	1264	1264
Economic	6004	6460	8929	4433	6274	8675
Increased fertilizer cost						
Financial		-1742	-1742		-782	-782
Economic		457	2925		1841	4240
Yield						
Paddy	1715.63	2020.96	2000.42	2278.21	2523.59	2692.27
Rice	1115	1314	1300	1481	1640	1750
Increased Yield						
Paddy		305	285		245	414
Rice		198	185		159	269
Price of Rice						
Local -Wholesale (Samba II)		33.08	41.34		33.08	41.34
World- CIF Price		45.12	61.20		45.12	61.20
Change in Value of Production (2)						
Financial		6565.05	7652.54		5276.22	11126.17
Economic		8954.50	11339.62		7196.58	16472.35
Increased Economic Returns to increased Fertilizer Use (2) – (1) In Rupee Terms per Ac		**8497.93**	**9404.54**		**5355.47**	**12232.35**
- Ratio (2) –(1) / (1)		**19.61**	**3.87**		**3.91**	**3.88**

Source: Own Calculation

4.4 New Fertilizer Subsidy and Food Security

Water is the most decisive factor of production and paddy area under major irrigation is the prime determinant of paddy production in the country. The paddy productions in years 2006 and 2007 were maintained at 100% and 96% of self sufficiency level respectively although 2006 and 2007 recorded a reduced cultivated land area particularly under irrigation compared to 2005. This is owing to the increased paddy yields. Contribution of the yield component to total paddy production in the country is illustrated by the table 4.8 that depicts cultivated extent, average yield, production and self sufficiency. Considerable increase of national yields in 2006 and 2007 contributes to the paddy production to maintain food security in the country during the global food crisis.

Table 4.8: Total Extent, Yield, Local Production and Self Sufficiency Ratio

Year	Total Extent Cultivated (Ha)	Average Yield (Kg/Ha)	Local Paddy Production ('000MT)	Local Rice Production Equivalent ('000MT)	Rice Imports ('000MT)	Self Sufficiency ratio
2000	878,000	3,257	2,860	1,766	14.85	100%
2001	798,000	3,954	2,696	1,661	51.95	94%
2002	852,000	3,866	2,859	1,762	95.1	94%
2003	965,000	3,842	3,071	1,892	34.52	98%
2004	778,545	4,086	2,628	1,612	221.61	88%
2005	937,175	3,963	3,246	2,006	51.72	98%
2006	908,424	4,137	3,342	2,072	11.54	100%
2007	816,713	4,386	3,131	1,939	88	96%

Source: Department of Census and Statistics

Not only domestic production but price of rice is also important in terms of food security. Due to the subsidy transferred to paddy sector, the consumer has directly benefited due to reduction of unit cost of production by having a relatively reduced price for rice and also by the incremental supply shift. The direct benefit received by the consumer due to reduced fertilizer price through subsidy has increased to 16% and 12% of the price of rice respectively in 2006 and 2007 (Table 4.9).

Table 4.9: Subsidy on Paddy and Subsidy as a Percentage of Rice Price

	Subsidy Paddy Rs Million	Paddy Production 000 Mt	Subsidy (Rs/ Kg)		Price of Rice Rs/Kg	Subsidy as % of Rice Price
			of Paddy	of Rice		
1997	1236	2241	0.55	0.83	24.81	3%
1998	1463	2692	0.54	0.81	25.42	3%
1999	1023	2857	0.36	0.54	29.93	2%
2000	1135	2860	0.40	0.60	26.58	2%
2001	2500	2695	0.93	1.40	29.18	5%
2002	1755	2860	0.61	0.92	32.94	3%
2003	1738	3046	0.57	0.86	30.34	3%
2004	2409	2627	0.92	1.38	37.32	4%
2005	4511	3245	1.39	2.09	36.17	6%
2006	11867	3338	3.56	5.33	34.33	16%
2007	11000	3130	3.51	5.27	43.03	12%

Source: Own Calculation, National Fertilizer Secretariat, Department of Census and Statistics, HARTI

4.5 New Subsidy and Rural Farmer

The other important element of the policy was that it was targeted on the small farmer who produces to feed the population and is presumed as a vulnerable group in the rural sector. Thereby, fertilizer subsidy was confined only to paddy farmers those who own less than 5 Ac of land. Table 4.10 depicts the farmers who received the subsidy by their holding size.

Table 4.10: Size of Paddy Farmer by Holding Size of Paddy Cultivation

	less than 1 Ac	less than 2 Ac	less than 3 Ac	less than 5 Ac	More than 5 Ac
Polonnaruwa	4%	22%	73%	90%	10%
Hambantota	16%	49%	73%	96%	4%
Ampara	0%	30%	69%	91%	9%
Anuradhapura	10%	43%	70%	95%	5%
Kurunegala	23%	62%	82%	92%	8%
Gampaha	75%	85%	95%	100%	-
Kalutara	58%	83%	92%	100%	-

Source: Field Survey, 2007

The study shows that 90 to 100% of the paddy farmers holding less than 5 Ac have received the subsidy while about 5–10% of the farmers cultivating more than 5 Ac have received the subsidy. The reason for getting subsidy for larger holdings above 5 Ac was that they had obtained land on rent or leased the land for cultivation or cultivating their relatives' land. As long as the land owner is eligible to get the subsidy, cultivator benefits from it.

Of the total subsidy worth Rs. 11 billion attached to this price incentive in 2007, more than 50 percent has been directly transferred to farmers holding less than 3 acre of paddy land according to sample estimates.

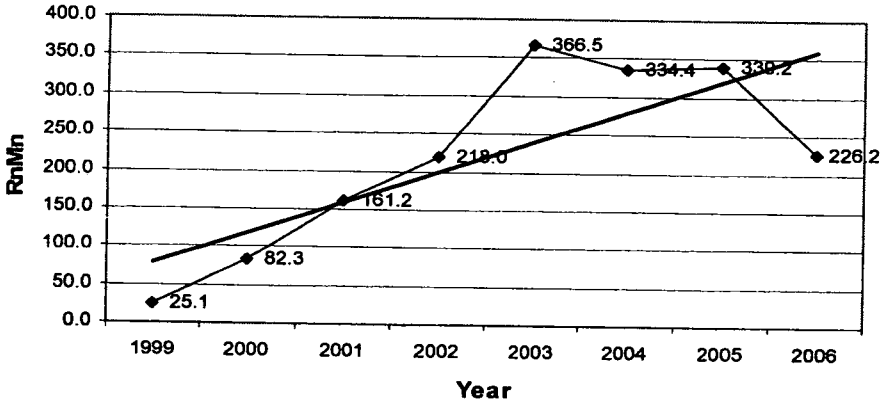
One of the other important achievements by the rural farmer due to the subsidy program is that significant decrease of dependency on credit and breaking the credit trap and easing the indebtedness. As the three main fertilizers were subsidised at 350 Rs per 50 kg, fertilizer input cost came down from about 15% to only 6% of the average cost of production of paddy. Due to the subsidised fertilizer price, the fertilizer input cost has come down from 20% to 9% in the capital/cash budget and it is about 50% reduction in the fertilizer input cost in the capital/cash budget of the paddy farmer.

Generally farmers used to get agricultural credit for cultivation and particularly inputs such as fertilizers are purchased on loan basis either on cash or on paying back from the harvest. It is reported from earlier studies that in Kurunegala 72 percent, 32 percent and 37 percent farmers have got credit for cultivation in major irrigated, minor irrigated and rain-fed areas respectively (Aheeyar 2005). Primarily these credit facilities were obtained from the private sector in purchasing fertilizer while the agricultural credit scheme under the *Govijana* bank also provided financial assistance to the farming communities.

It is revealed from the study that farmers who had been depending on credit for fertilizer input has reduced obtaining credit for fertilizer purchase after the subsidy program and have become independent of dues of paying back from their harvest. This has led to improved bargaining power of the small farmer (Fours group interviews, 2008).

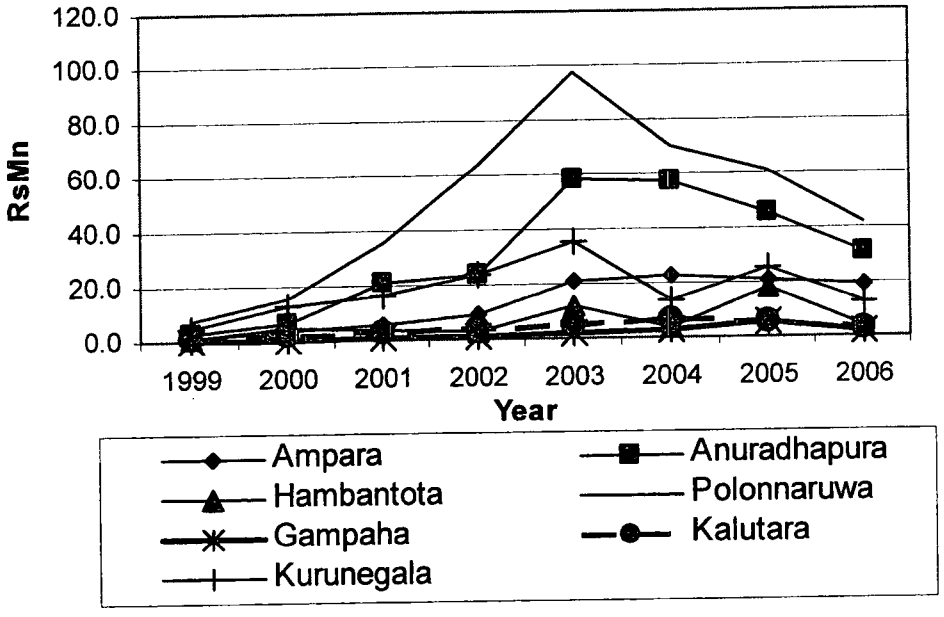
In 1999, value of loans issued for farmers was Rs.25.1 million through the *Govijana* bank and it increased up to Rs. 366.5 million by the year 2003. The increasing trend observed in obtaining agricultural loans from the year 1999 is due to the higher fertilizer prices existed during the period of 1999 to 2003. With the fertilizer subsidy it had decreased up to Rs.226.2 million (Figure 4.8 & 4.9).

Figure 4.8: Issuing of Agricultural Loans in Sri Lanka



Source: Department of Agrarian service, 2007

Figure 4.9: Issuing of Agricultural Loans in Selected Districts

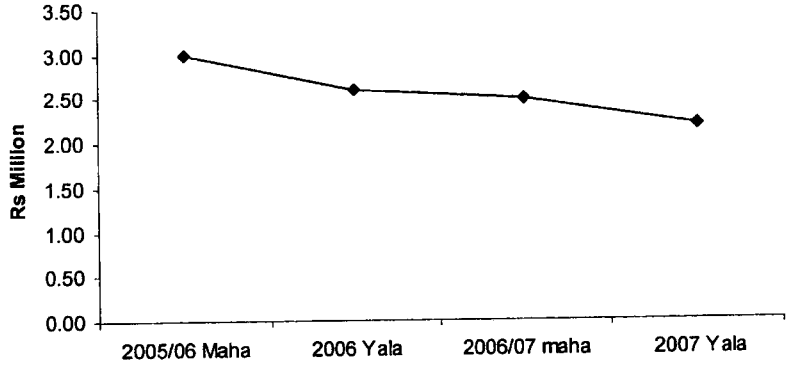


Source: Department of Agrarian service, 2007

Of the sample locations in Ampara district, 75% fertilizer purchases were based on credits prior to the new subsidy program. But after implementing the new subsidy program they had gradually reduced borrowing. It was revealed from the study that farmers in *Uhana* agrarian development centre area used to get loans from the *Govijana* bank to purchase fertilizers and a gradual decline in loans taken from the bank is recorded after the new subsidy program was implemented (Figure 4.10).

In the 2005/2006 *Maha* 374 number of farmers had obtained loans from *Govijana* bank. This had reduced up to 312 in 2007 Yala. When considering the value of loans, it was Rs. 2,992,450 in the 2005/06 *Maha* and Rs.2,183,110 in 2007 *Yala.*

Figure 4.10: Loans taken by Farmers in the Uhana ASC



Source: Department of Agrarian Service, 2007.

4.6 Concluding Remarks

With the introduction of the new subsidy program, fertilizer use in the country has increased and farmers have moved to a straight application of a more balanced N:P:K fertilizers that is recommended by the department of agriculture. Resultant increase in the productivity and value of production shows that country has gained from this policy in the short run. Increased fertilizer use has driven to a more economically efficient production in the country. Increased productivity in turn increased the national food security of the country and has benefited the rural farmer.

Appendix 4.1: Yield Index by District by Water Regime and Season, 2000 - 2007

Base Year (2000) Yield Index = 100								
	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
All water regimes (Average)								
Maha	**100**	**102**	**105**	**100**	**105**	**104**	**107**	**113**
Yala	**100**	**104**	**95**	**94**	**107**	**100**	**108**	**115**
Major Irrigated - Maha season								
Sri Lanka	**100**	**105**	**107**	**101**	**109**	**109**	**110**	**117**
Ampara	100	106	118	121	121	113	120	127
Anuradhapura	100	112	104	100	107	110	106	112
Hambantota	100	113	112	108	112	108	118	122
Mahaweli H	100	100	101	99	95	112	103	108
Polonnaruwa	100	109	103	99	111	111	109	113
Udawalawe	100	96	104	103	100	106	113	112
Minor Irrigated - Maha Season								
Sri Lanka	**100**	**97**	**97**	**96**	**97**	**99**	**100**	**108**
Anuradhapura	100	92	89	97	85	98	100	105
Kurunegala	100	92	88	90	84	85	93	110
Rainfed - Maha season								
Sri Lanka	**100**	**96**	**104**	**100**	**94**	**97**	**106**	**106**
Kalutara	100	103	102	86	85	102	100	112
Gampaha	100	98	108	99	101	108	112	100
Kandy	100	114	112	100	85	100	92	113
Batticaloa	100	105	106	98	95	81	118	98

Continued....

Continued.,

Appendix 4.1: Yield Index by District by Water Regime and Season, 2000 - 2007

	2000	2001	2002	2003	2004	2005	2006	2007
Major Irrigated Yala Season								
Sri Lanka	**100**	**106**	**98**	**96**	**107**	**103**	**107**	**113**
Ampara	100	105	97	96	102	102	105	107
Anuradhapura	100	107	102	93	104	101	110	116
Hambantota	100	115	105	93	121	104	112	120
Mahaweli H	100	125	121	115	113	127	124	135
Polonnaruwa	100	108	99	99	110	105	108	111
Udawalawe	100	106	102	101	112	107	113	117
Minor Irrigated - Yala Season								
Sri Lanka	**100**	**97**	**93**	**94**	**104**	**96**	**105**	**112**
Anuradhapura	100	97	89	89	81	96	100	103
Kurunegala	100	85	103	98	111	88	113	97
Rainfed - Yala Season								
Sri Lanka	**100**	**101**	**98**	**98**	**113**	**95**	**108**	**119**
Kalutara	100	103	96	87	87	88	101	113
Gampaha	100	93	104	85	97	89	92	138
Kandy	100	126	101	105	110	104	125	132
Batticaloa	100	116	96	123	141		119	121

Source: Department of Census and Statistics

CHAPTER FIVE

Problems and Issues Related to Current Subsidy Program

This chapter reviews the problems and issues related to current subsidy program in order to propose recommendations to remodel the current approach of the subsidy program. Issues related to current fertilizer recommendations with regard to yield factor are considered first. The possibilities of revising current subsidy level are discussed next. The efficiency of state-led procurement and distribution mechanism of fertilizers is evaluated in terms of availability, timeliness of supply and in terms of the cost of distribution mechanism. Institutional problems and issues related to current distribution mechanism are reviewed with the objective of suggesting a better implementation mechanism.

5.1 Yield Variation, Soil Fertility Factor and Fertilizer Use Efficiency

5.1.1 Yield Variation and Fertilizer Use Efficiency

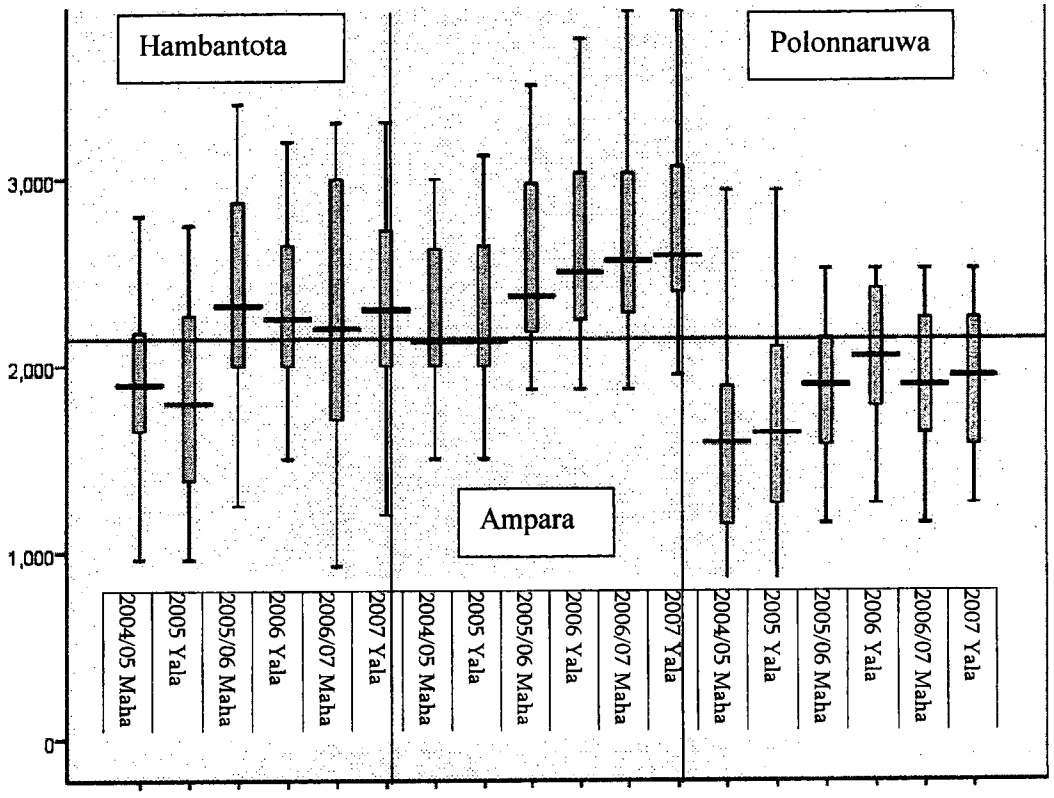
Although a more balanced fertiliser (N:P:K ratio) application was promoted by distributing the recommended level of fertiliser to farmer and subsequent yield increases are observed, yield variation continues to remain to same extent within a region even after adopting the fertilizer recommendation (Table 5.1 & Figure 5.1).

Considering the Coefficient of Variation (CV) of yield parameter, it is observed that CVs continue to remain in same degrees in the district samples even after the recommendation is applied.

The percentage of CV of yield in all seasons considered in table 5.1, ranges from 24% to 34% in major irrigated areas where fertilizer recommendation of 120: 30: 35 for urea, TSP and MOP is practised after the new subsidy. The percentage CV yield of the sample of Kurunegala district is 40% to 50% and it is more than 70% in the district sample of Kalutara

As the boxplot presentation given in figure 5.1, the 50% of the representing average sample farms in studied districts based on yield (after truncating maximum yielding 25% and minimum yielding 25% sample farms), shows that yield variation of this 50% sample farms ranges from 1600 kg per Ac to 2310 kg per Ac in Polonnaruwa district and this yield variation ranges from 1270 kg per Ac to 2750 kg per Ac in Hambantota and, 2375 kg per Ac to 3000 kg per Ac in Ampara in 2006/07 *maha* season. The yield difference within one region where same fertilizer application is practised is relatively huge making it unjustifiable to continue the same recommendation. Yield difference within the dry zone irrigated areas representing 50% of the average sample farms in the 3 districts is about 1000 Kg/Ac.

Figure 5.1: Sample Yield Variation of Major Irrigated Areas by Season



Source: Field Survey 2007/08

Table 5.1: Sample yield parameters by season (Kg/Ac)

		2004/05 Maha	2005 Yala	2005/06 Maha	2006 Yala	2006/07 Maha	2007 Yala
	Mean	1734.6	1805.7	1940.2	2021.0	1981.0	2000.4
Polonnaruwa	S Deviation	554.7	446.5	472.5	499.3	529.3	552.9
	CV %	32%	25%	24%	25%	27%	28%
	Mean	1892.9	1920.7	2290.0	2275.6	2238.1	2270.4
Hambantota	S Deviation	549.7	622.1	645.2	566.5	760.1	692.1
	CV %	29%	32%	28%	25%	34%	30%
	Mean	2278.2	2305.1	2523.6	2645.0	2692.3	2765.1
Ampara	S Deviation	519.4	510.3	680.0	617.1	624.3	601.0
	CV %	23%	22%	27%	23%	23%	22%
	Mean	1251.0	1426.6	1217.1	1465.3	1308.7	1560.7
Kurunegala	S Deviation	629.4	689.9	600.9	562.5	587.8	662.5
	CV %	50%	48%	49%	38%	45%	42%
	Mean	1078.7	882.6	1186.5	902.7	1159.6	824.5
Kalutara	S Deviation	721.8	638.8	1019.7	1050.9	1001.1	732.0
	CV %	67%	72%	86%	116%	86%	89%

Source: Field Survey 2007/08

This variability of yield can be attributed to a number of factors including soil related factors. Limitations of secondary and micronutrients, poor organic matter content in the soil and salinity are some of the important soil factors that lower the fertilizer use efficiency among other factors particularly water and seed that causes yield variation. While maintaining a huge yield variation, continuous recommendation of flat rate through out one region leads to large fertilizer waste. While adopting the flat recommendation continuously, if farmers perceive that the amount of fertilizer they receive is more than the requirement they may not apply the whole issued amount and vice versa. This may also cause unnecessary fertilizer leakages to other crop sectors and creation of black market for subsidised fertilizers if there is a mismatch between fertilizer demand perceived by farmers and supply.

Identification of the most limiting soil factors to increase fertilizer use efficiency by the paddy crop or recommendation of location-specific fertilizer application is advisable for more economic use of fertilizers for increasing yields.

Therefore a more balanced and integrated use of fertilizers, including secondary and micronutrients, in combination with organic manures, green manure, bio-fertilizers, etc. has a crucial role in improving crop productivity and solving problems like soil degradation, declining crop response ratio, etc.

Establishing site specific recommendations after soil testing is a better option to provide a balanced N:P:K ratio and other supplementary micro nutrients and organic manure (Wijewardena 2005, Wickramasinghe, and Wijewardena, 2003, Dissanayake, 2000),. Therefore, the fertilizer delivery to farmers involves a huge extension element.

5.1.2 Technical and Institutional Consideration for Better Soil Management

In the current fertilizer distribution mechanism, minimum integration of the technical know-how of the localities is considered. Assigning a recommendation from top disregards the site specific soil related problems and promotes unnecessary fertilizer use. In order to avoid unnecessary the fertilizer delivery to farmers, a distribution mechanism and technical knowledge of the localities could be amalgamated to the fertilizer distribution program. In already identified saline areas, micro nutrient deficiencies could be considered in the initial adjustments. Yield zoning, identification of potential areas and special yield zones could also be part and parcel of the redesigning of the fertilizer distribution program.

In view of the commitment from the farming community towards a more integrated program, almost all the farmers wanted their soil to be tested and almost all of them were willing to pay the cost (Table 5.2). Therefore, existing program of the department of agriculture on soil testing could be strengthened.

Table 5.2: Views on Soil Testing and Willingness to Pay for Soil Testing

District	Willingness to carry out soil testing in their fields	Willingness to pay for soil testing
Gampaha	Over 95%	>95%
Polonnaruwa	About 96%	96%
Anuradhapura	100%	100%
Kurunegala	71%	71%
Kaluthara	100%	85%
Hambantota	100%	100%
Ampara	100%	73%

Source: Field Survey 2007/08

Currently the Agricultural Instructor (AI), the key technical person working at agrarian development centre is not involved in the fertilizer distribution program. Involvement of AI in the distribution process is essential as the key technical person at farm level.

5.1.3 Field Problems Related to Organic Matter Use

Organic matter application is not a mandatory issue right now but the importance of making it compulsory in the distribution program was observed during the field visits. However there are several impediments to make organic matter use mandatory.

Paddy straw is the widely used organic matter in paddy fields as it is the easily available organic fertilizer to farmers. According to the field study, farmers had used straw in different ways.

i. Spreading straw in paddy fields
ii. Heaping straw and spreading after decomposing
iii. Addition of a small quantity of urea to accelerate the decomposing and then spreading.
iv. Using of combine harvester for harvesting which allows the spreading of straw in the field.

In addition to these, some farmers had applied green leaves, cow-dung and ash obtained by burning straw. According to the data, usage of straw had caused some problems to the farmers;

i. Increase of susceptibility of paddy to the fungal diseases.
ii. Yellowing of leaves.
iii. Stagnation of the field and bogginess.
iv. Due to the disturbances that occur during machinery operations in preparing land, the owners are hesitate to operate the machines in such fields and they ask for a higher price.
v. Difficulties in levelling the fields.
vi. Increase of rats in straw which, increase the risk of leptospyrosis.

These problems have led to farmers dislike towards the usage of straw. The data showed that the farmers need to have technical instructions about the usage of straw in fields.

- Farmers do not prefer to keep straw as a heap due to the risk of leptospyrosis. Some farmers have used to burn straw as soon as harvesting.

- It is not possible to use urea to accelerate the decomposition of straw as its price is very high. Therefore alternatives for urea should be investigated.
- Difficulty in using rotaries after spreading straw and therefore, farmers have to spend higher costs for machines.
- Increase of pests and diseases also a reason for the reduced usage of straw.

Thiruchellum *et al* (2008) have observed that there has been a reduction of organic matter use after the new subsidy. However considering the extension element involved in the organic matter promotion, there is a possibility of promoting use of organic matter along with the subsidy program.

5.2 Current Subsidy Level and Determination of Subsidy Levels

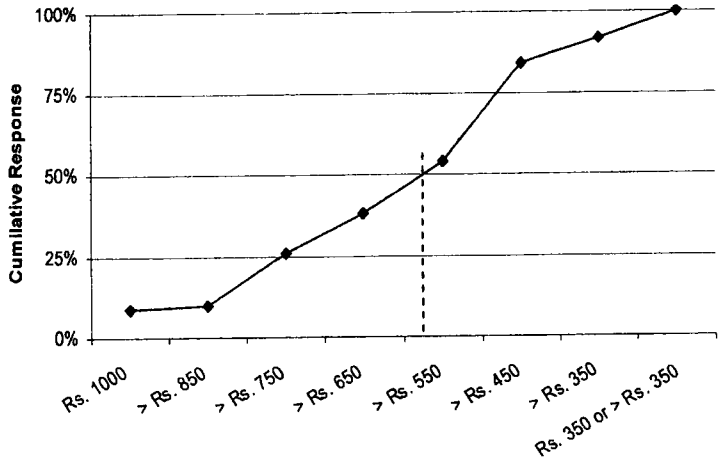
In the previous chapters, it was evident that fertilizer subsidy provided an incentive to farmers to use more fertilizer, particularly Urea. In addition, output price support and extension policies also had been the causal factors behind the change in fertilizer use. As explained in chapter 2, farmers are responsive to sudden price changes rather gradual increase of prices has been sustained. The new subsidy program however provided a huge price incentive that almost all farmers adopted the recommendations.

Table 5.3: Farmer's Willingness to Increase Fertilizer Prices

District	Price of fertilizer
Gampaha	90% wish to get at Rs.350/-
Polonnaruwa	Consent for a price increase-42% Price should remain unchanged-17%
Anuradhapura	59% gave their consent for a price increase.
Kurunegala	36% gave their consent for a price increase
Kalutara	16% gave their consent for a price increase. 56% wanted at Rs 350/-
Hambantota	40% of the farmers gave their consent to increase ferti.prices
Ampara	45% of the farmers gave their consent to increase ferti.prices

Source: Field Survey 2007/08

Figure 5.2: Farmer's Response to Price Speculation of Urea



Source: Field Survey 2007/08

In view of sample farmer responsiveness to fertilizer price increase from Rs 350 per 50 kg, an average sample farmer would like urea prices around 550 Rs per 50 kg (Figure 5.2) under the existing paddy prices (government purchasing price is 16.50 – 17.00 Rs/kg of paddy). In particular, farmers in commercial areas especially in major irrigated areas gave their consent for a price increase while farmers in the subsistence areas resist a price increase (Table 5.3). As it was observed in the chapter 2, that fertilizer price has less effect on the fertilizer use by farmers in the commercial areas than in non-commercial paddy growing areas.

Subsidy for fertilizer are very expensive for the modest agricultural budgets such as of Sri Lanka as for many other developing countries. Therefore, determination of subsidy level is a crucial issue. Subsidy policy can continue to contribute to cushion world market price fluctuations of fertilizers. Reducing or withdrawing subsidies should be done on the basis of normative approach of increasing production by utilising minimum fertilizers.

When the fertilizer use at individual farm level prior to the new subsidy is considered, there had been a large deviation in use by individual farmers compared to the fertilizer recommendation given by the department of agriculture. It was revealed from the farmer interviews, that there were a number of reasons including price factor, water availability, extension, and farmer perception for this deviation.

On the one hand, the subsidy may be low to one group of farmers, and it may not accomplish its intended purpose of encouraging farmers to take up or maintain fertilizer use. On the other hand the subsidy may be high to another group of farmers and it may lead to wasteful resource allocation.
Therefore, the best approach would be an implementation of more integrated plant nutrition programmes conducive to other non-price factors such as irrigation and seed utilization. Accordingly, there is a large scope to increase the current subsidised price to ease the national budget without effecting lower production through improper fertilizer use. To achieve this an integrated plant nutrition programme should be implemented.

5.3 Issues and Problems Related to State-led Fertilizer Distribution Mechanism

5.3.1 New Subsidy Program and State-led Fertilizer Distribution Mechanism

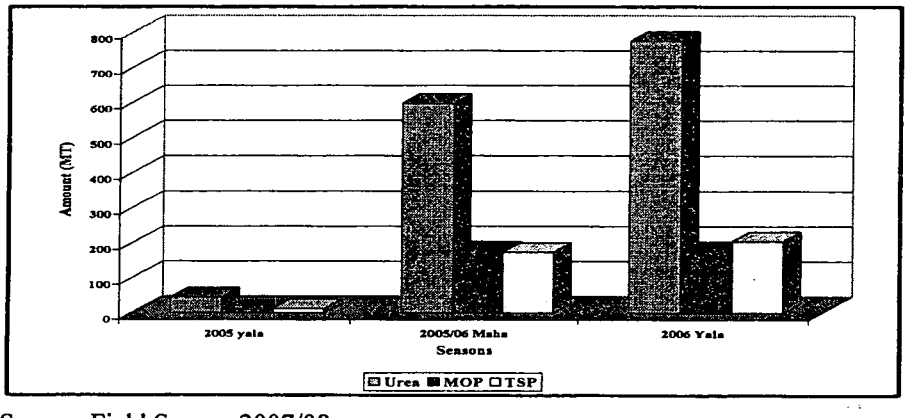
The operation and effective implementation of subsidy program with the change in the distribution mechanism after the new subsidy program, appears to be a much more complex activity.

Table 5.4: Place of Fertilizer Purchasing by Paddy Farmers Before and After the New Program

District	Place of Purchasing	
	Before	After
Gampaha	About 90% from the private sellers.	100% from the agrarian service centers.
Pollonaruwa	>90% from private sellers.	100% from ASCs.
Anuradhapura	100% from private sellers.	100% from ASCs.
Kurunegala	64% from private sellers.35% from ASCs.	100% from ASCs.
Kalutara	57% from private sellers, 46% from ASCs and 21% from co-operatives.	100%from ASCs.
Hambantota	99 % from private sellers	100%from ASCs.
Ampara	100% from private sellers.	79% from ASCs. Others from government stores and co-operatives.

Source: Field Survey 2007/08

Figure 5.3: Fertilizer Issues from *Ambalantota* ADC Before and After New Subsidy Program



Source: Field Survey 2007/08

5.3.2 Efficiency of the State Distribution Program

When the state fertilizer distribution mechanism is compared with the private sector distribution, the procurement and distribution of fertilizers, availability and timeliness of supply, the cost of distribution mechanism, and the quality of fertilizer are some important parameters that are considered below.

Timeliness in receiving subsidized fertilizer

At the beginning of the subsidy programme there have been some delays in getting fertilizer. Timeliness of getting fertilizer has improved gradually. However complaints of not getting fertilizer in time are still being received from certain remote areas. Farmer's response regarding the timeliness of receiving fertilizer in each district where the study was undertaken is shown in Table 5.5. It reveals that majority of farmers had received the fertilizer in time.

Main reason for delay in distributing fertilizer as identified by the study was insufficiency of fertilizer at the government fertilizer companies at the right time and shortages of storage facilities at the provincial level. The shortage of labourers at the agrarian service centres also contributes to slow distribution of fertilizer among a large number of farmers. (Table 5.6).

Non availability of fertilizer in time can lead to unnecessary leakages and also affects yield. In extreme situations, due to non-availability of fertilizer at the required time, farmers tend to apply subsidized fertilizers to other crops or to keep the unutilized balance for the next season. In some cases it has been reported that they have sold the fertilizer it to the third parties or private vendors.

Table 5.5: Percentage of Responses with Regard to Receiving Fertilizers in Time

		Yes	No	Not responded
Ampara	2006/2007 Maha Season	92%	0%	8%
	2007 Yala Season	46%	48%	6%
Gampaha	2006/2007 Maha Season	100%	0%	0%
	2007 Yala Season	100%	0%	0%
Anuradhapura	2006/2007 Maha Season	93%	2%	5%
	2007 Yala Season	81%	2%	17%
Kurunagala	2006/2007 Maha Season	81%	14%	4%
	2007 Yala Season	68%	24%	8%
Kalutara	2006/2007 Maha Season	91%	9%	0%
	2007 Yala Season	88%	13%	0%
Polonnaruwa	2006/2007 Maha Season	69%	31%	0%
	2007 Yala Season	71%	29%	0%
Hambantota	2006/2007 Maha Season	88%	12%	0%
	2007 Yala Season	98%	2%	0%

Source: Field Survey 2007/08

Table 5.6: Responses Ranks by Reason of Delay in Receiving Fertilizer in Time

Reason	Response Rank
Insufficient Capacity of Regional Stores	1
Delays in receiving fertilizers by regional stores from Colombo main stores at the required time (Beginning of the season)	2
Insufficient storage capacity at ADC	3
Farmers failing to pay for fertilizers on time	4
Long distance to ADC centre and high transport cost	5

Source: Field Survey 2007/08

However, when private sector distribution was in place, farmers were more satisfied by obtaining fertilizers from the nearest shop or boutique. Therefore no delays were reported and farmers did not want to waste time on purchasing fertilizers. Less transport cost from selling point to farm gate is another advantage of the private sector distribution of fertilizers.

When quality of fertilizers delivered through the agrarian service centres is considered, farmers state that they are of superior quality compared to what has been purchased from the private sector shops. Farmer perception about the advantages and disadvantages are given in table 5.7.

Table 5.7: Farmer Perception About the New Subsidy Program

	Previous fertilizer subsidy programme	Present fertilizer subsidy programme
Main Advantages	1. No delays. No time waste. 2. Any amount of fertilizer can be purchased. No need to purchase the full recommendation. 3. Transport cost is less because fertilizer was available at the nearest private shop. 4. Fertilizer could be purchased on credit. 5. No application process. 6. Purchase could be done when the need arise.	1. Cost of production is low because they get the fertilizer at a very low price. 2. The farmers apply the correct fertilizer recommendation. 3. Quality of the fertilizer is high. 4. Getting exposed to new technology because most of the farmers have contacts with the agrarian service centres.
Main Disadvantages	1. Price is high. 2. Quality of fertilizer is inferior. 3. Couldn't apply the recommended amount of fertilizer because the price is high.	1. Waste of time 2. Cost of transport is high

Source: Field Survey 2007/08

Cost of Distribution

After the inception of the new subsidy scheme, private sector has withdrawn from distribution of subsidized fertilizers to farmers due to the fact that their high distribution cost. In terms of cost of distribution, private sector incur additional costs due to their marketing strategies. According to Kumarasinghe (2006), private sector price mark-up (margin) is 30% of the fertilizer cost at district stores. In addition to that, private sector companies use sales discounts as a marketing tool to attract customers. The same study estimates sales discount as 10% of the mark-up price. Subsequently these margins and discounts are added to the declared retail price, when companies request subsidy payment from the government. Price margin and the sales discounts accounts to about 43% of the fertiliser cost at district stores. When the current price of Rs 314.00 /50 kg at district stores is concerned, retail fertiliser price would be Rs. 450.00/50 kg if private sector undertake fertiliser distribution.

Table 5.8: Distribution cost of Urea by Private Sector, 2005

Cost Components	Unit cost	Urea Rs./MT	% to Selling Price	%
Import price (CIF cost)	US $ 216	**21,708**	**59.17**	59.17
Insurance	0.18%	38		
Duty	2.50%	543		
Duty Surcharge on duty	10%	54		
Social Rehabilitation Levy	0.25%	54		
Port & Airport Development tax	1.50%	326	**4.96**	64.13
Bank Charges	0.15%	33		
Stevedoring Charges	US $ 5.7	573		
Labour (Wharf Loading)	Rs.80.5/MT	81		
Landing Charges	US $ 0.6	60		
Other Clearing Expenses	Rs.57.5/MT	58		
Landing Cost		**23,527**	**0.68**	64.81
Transportation (To Hunupitiya)	Rs.11.25/MT/km	169		
Overheads (Unloading)	Rs.80.5/MT	80		
Cost at warehouse		**23,776**	**5.12**	69.93
Transportation (To Matara)	Rs.11.25/MT/km	1,800		
Overheads (Unloading)	Rs.80.5/MT	80		
Cost at District Stores (Matara)		**25,656**	**30.07**	100
Price Mark-up	30%	7,697		
Added sales discounts	10%	3,335		
Retail Farm Gate Price		**36,688**	**100**	100

Source: Kumarasinghe, P.Y.A.S., 2006

Problems and Issues in the Distribution

The establishment of subsidy does not automatically mean that it will benefit the group for whom it was intended. Since the subsidy can represent a sizeable source of income, many people would like to profit from it. Therefore fertilizer reaching the intended recipient is an important factor that determine the effectiveness of the program. According to the sample results, there are farmers who hold more than 5 Ac of paddy lands and are considered not eligible to get the subsidy. But they also had received the subsidy. This percentage is about 10% in the sample studied in Polonnaruwa district.

Table 5.9: Size of Paddy Farmer by Holding Size of Paddy Cultivation under Subsidy Program

	Less than 5 Ac	More than 5 Ac
Polonnaruwa	90%	10%
Hambantota	96%	4%
Ampara	91%	9%
Anuradhapura	95%	5%
Kurunegala	92%	8%
Gampaha	100%	-
Kalutara	100%	-

Source: Field Survey 2007/08

Storage is another factor which affects the delivery of fertilizers to the farmers at required time. According to the responses received from the divisional officers, adequacy of space in the regional stores and the distance where stores are situated are considered as problems in delivering fertilizers in time in required quantities (Table 5.10) as also highlighted by the farmer responses too (5.7).

Table 5.10: Divisional Officer's Response in Relation to Storage Capacity at Regional Stores

	Study Location	Storage Problems at Regional Stores	Remarks
Ampara	Ampara Uhana Dehiattakandiya	Stores problem Stores problem Adequate stores	
Polonnaruwa	Manampitiya -4 centres	Storage problem More stores are needed	Availability is important than price
Hambantota	Ambalantota -3 Weerawila Sooriyawewa Lunugamvehara		Transport cost

Source: Field Survey 2007/08

Farmers were interviewed regarding the malpractices and political influences in the fertilizer distribution programme. However incidences of such activities were very low. Although the current implementation mechanism has over burdened the ADC's during the fertiliser distribution period, no claims have been reported of the inefficiency of the service of the AR&PA and the DO.

Although a good institutional structure has been developed, these weaknesses in the supply pipeline of subsidy program will reduce the effectiveness of the program.

Farmer Suggestions to improve the present fertilizer subsidy program

1. Improve the storage facilities at the provincial level.
2. Improve transport facilities so that fertilizer can be easily transported from the agrarian service centres.

3. Introduce a stamp system.
4. Expand of the service of farmer banks.
5. Store and issue the required amount of fertilizer at the provincial level before the cultivation season begin.
6. Increase the number of staff members at the agrarian service centres.

As a solution to the problem of not having enough cash at hand at the time of applying for fertilizer, farmers suggested an introduction of a method of paying one instalment at the beginning of the season and paying the rest after harvesting.

5.3.3 Other Important Issues of New Subsidy Program

Strengthening of state institutional mechanism

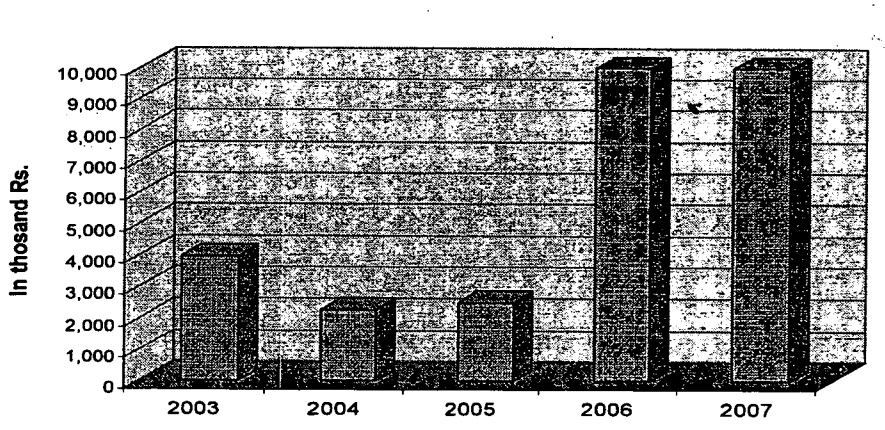
A better improvement in the interactions between members of Farmer Organization (FO), and farmers and officers of the agrarian development centres was observed after the implementation of the subsidy programme. The need of getting the recommendation of the president or secretary of the FO to receive fertilizer, necessitates cordial relationship between members of the FO. Joining of new members, increasing funds and increased participation of members of FO for activities such as cleaning bunds, sowing in appropriate time and using correct irrigation schedules are seen as positive development in relation to farmer organisations. It has also been able to minimize conflicts between farmers regarding rules and regulations of the organization as well as in distributing irrigation water (Field Information).

With the frequent visits of the farmers to agrarian development centres after the state undertaking of fertilizer distribution, the interaction b/w farmers and officers of the agrarian development centres has increased remarkably. With the invalidation of the service of agricultural extension officers, farmers distracted from the AIs. Because of this, the area to be covered by the AI's became larger and many problems arose with the extension services. Farmers were earlier used to get technical instructions about usage of agro-chemicals from salesmen in private shops. Although there is no direct involvement of AI with the fertilizer subsidy programme, their frequent visits after the new subsidy program have contributed to a good interaction b/w farmers and AIs.

Payment of acres tax

It is also revealed that new fertilizer subsidy had influenced on the payment of acres tax. The figure 5.4 shows the variation of the earnings of outstanding acres tax in the national level. Comparative earnings in 2006 and 2007 were higher than this was in 2003. Moreover, it shows an increase of earning by 152.4% in the 2007.

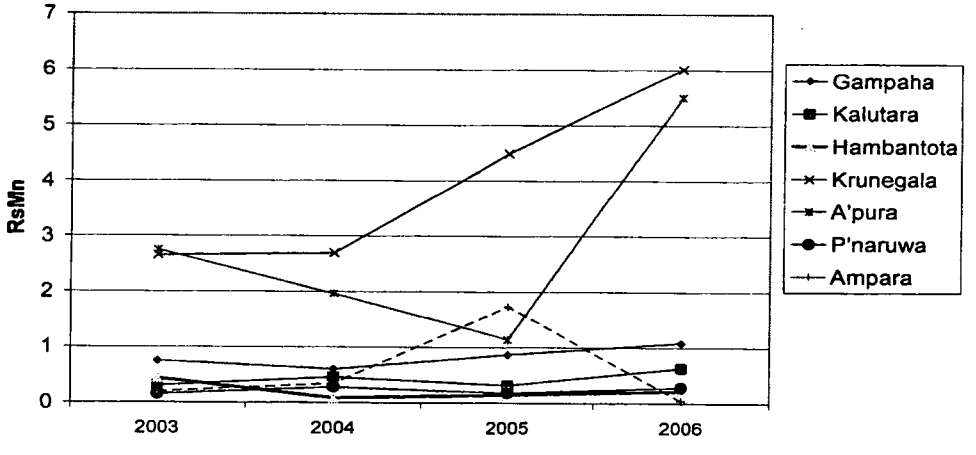
Figure 5.4: Paddy Acre Tax Collection, 2003 to 2007



Source: Department of Agrarian service, 2007

The data observed in the districts, Gampaha, Kalutara, Hambantota, Kurunegala, Anuradhapura, Polonnaruwa and Ampara during the period from 2003 to 2006 also showed improvement in paying the acres tax.

Figure 5.5: Paddy Acre Tax Collection in Major Paddy Cultivated Area



Source: Department of Agrarian Service, 2007

After implementing the new subsidy program, agrarian development centre has become a very useful institution to farmers and has become a place where farmers visit frequently. Strengthening of farmer organizations, better participation of farmers at the seasonal meetings, improvement in interrelations b/w farmers and officers at the ADC, farmer's commitment to pay the acre tax to the centre are some of the positive results of the new policy. In terms of such achievements as strengthening the link between farmer and the farm level extension institution, subsidy programme is a good investment.

However, absence of direct involvement of AI in the fertilizer subsidy programme is a deficiency of the institutional mechanism of the program and it needs to be corrected.

5.4 Concluding Remarks

Existence of huge yield differences within regions where same fertilizer recommendation is applied, can lead to waste of fertiliser. Therefore it is unjustifiable to recommend a flat rate to larger areas where heterogeneity of soil fertility exits. Recommendation of site specific N:P:K ratio with other supplementary micro nutrients and organic manure is a better option to increase fertiliser use efficiency.

ADC's has shown to be competent enough performing their services as the distributor of subsidised fertiliser to the farmer. Timely availability of fertilizers to the farmers which has been claimed as one of the main drawbacks of this program may lead to unnecessarily fertiliser wastage. Through the implementation of the subsidy scheme additional benefits have been accrued in addition to the strengthening of the existing institutional mechanism.

Fertilizer delivery to farmers is not merely a distribution program and it involves a huge extension element. What is required is the distribution of the required amount of fertilizer at the correct time. Therefore it is required to:

- reduce the gap between flat recommendation and field level (site specific) fertiliser requirement
- reduce the gap between fertilizer requirement and timely supply.

The more conducive environment that has created by the new subsidy programme have to be made use for the purpose of implementing a programme on integrated plant nutrition system to increase the productivity potentials of paddy lands while minimizing the environmental damage it can cause by inappropriate use of inorganic fertilisers.

CHAPTER SIX

Conclusion and Recommendations

Fertilizer policy in Sri Lanka has been mainly focused on promoting chemical fertilizer use for increasing paddy production. Fertilizer is one of the four growth factors of paddy production; land, irrigation, New Improved Varieties (NIV) and fertilizer. Fertilizer promotion was pursued through programs that directly stimulate fertilizer use such as subsidies, guaranteed price for paddy, improved availability of fertilizers, awareness programs through extension education, and credit facilities for fertilizer purchasing. By having four decades long fertilizer subsidy program in the country from its introduction in 1962 and by implementing several fertilizer promotion programmes including *Granary area* program, *Saruketha* and other extension programmes, it was attempted to increase the fertilizer use up to the level that is demanded by the new paddy technology. Over the years, the average farmer responded to these price incentives adopted through the subsidies and to promotions programs and they increased the fertilizer use resulting increase in an productivity. However, there were farmers who used more fertilizer than the recommended level and there were also farmers who used less than the recommended level.

Urea is the largely responsive fertilizer to the new technologies and at current level of irrigation and NIV, increasing returns of paddy to the increased urea application have been observed. This has been the underlying factor that contributed to urea subsidy through out the subsidy program except between 1990-1994. Fertilizer prices, particularly urea, have been kept at low levels and affordable to the farmers that they used the recommended level of fertilizer to get an optimum yield. Per hectare urea use at national level increased from 4.36 Kg /ha in 1965 to 284 Kg /ha in year 2005. However, this exerted a huge burden on the government budget with the increasing fertilizer demand and the increasing fertilizer prices at the world market.

6.1 Summary of the Findings

With the implementation of the new fertilizer subsidy scheme from 2005/06 Maha season, several changes were brought to the fertilizer policy of Sri Lanka. Fertilizer subsidy only targeted the paddy farmers, particularly small paddy farmers who owned less than 5 Ac with a huge price incentive for all three main fertilizers; Urea, TSP & MOP. All the three main fertilizers were issued at 350 Rs /50 Kg and it is one of the **lowest prices** recorded for all three fertilizers after the withdrawal of the subsidy in 1990. Fertilizers were issued only on the basis of recommendations given by the Department of Agriculture. The other important change in the policy was the procurement; distribution and issuing of fertilizers were made through state agencies. The new policy coincided with the sudden increases in the fertilizer prices in the world market and burdened the national budget amounting to a subsidy cost worth of 3% of the agricultural GDP in year 2007 and nearly 30% of the government expenditure on agriculture and irrigation. However, not only Sri Lanka but also other developing countries incurred heavy expenditure from their national budgets with the sudden escalation of fertilizer prices in the world market. Particularly India incurred about 3% of the GDP on fertilizer subsidies.

6.1.1 Change in Fertilizer Distribution Mechanism and its Efficiency

Due to the huge subsidy element attached to this new subsidy program and as the subsidised fertilizers were only available through the ADC, farmers were totally dependent on state sector distribution mechanism. On the hand, by taking over the responsibility of state led implementation mechanism, agrarian development department gradually became entirely responsible for the fertilizer distribution to farmers. In principle, almost entire paddy farming population is receiving subsidized fertilizers now.

Agrarian Development Centres (ADC's) are totally involved in delivering fertilizers to farmers and therefore the current implementation mechanism has burdened the activities at ADC's. Nevertheless the over-loaded work done by the AR&PA and the DO is appreciable in most cases, except for reported malpractices in some ADC's. While accruing additional benefits by state undertaking of fertilizer distribution, few bottlenecks in the distribution mechanism could be observed.

Timeliness of fertilizer availability to the farmers is one of the important determinants of the efficiency of this program. The findings of the study reveal that majority of farmers have received fertilizers in time. But at the beginning of the program there have been delays in receiving fertilizers by the ADC's in required time. The main reason for delay in distributing fertilizer as identified from the study was not having sufficient fertilizer at the government fertilizer companies at the right time and not having sufficient storage facilities at the provincial level. Also due to lack of labourers at the agrarian service centers, distribution of fertilizer among large number of farmers takes a considerable time. In extreme situations, due to unavailability of fertilizer at the required time, farmers tend to apply excessive fertilizers to other crops or to keep to fertilizers for the next season and in some cases it has been reported that they have sold it to the market.

However, through the implementation of the programme, additional benefits have been accrued. Farmer organisations have been strengthened. Some ADC have been able to collect the cultivation tax (*Akkara badu*) along with the fertilizer subsidy which is still not mandatory.

6.1.2 New Subsidy Program and Its Effect on Paddy Production Sector

The new subsidy program has been so efficient in promoting the fertilizer use to the required level that with its introduction of majority of farmers adhered to the given recommended levels of use of the Agriculture Department. There is no evidence to support that farmers have applied more than the recommended level by purchasing fertilizer from the open market. Fertilizer prices have been an incentive to adopt the recommended level of use as fertilizer prices dropped by 35%, 79% and 78% respectively for urea, TSP and MOP after the new policy. Also farmers who had been applying fertilizer mixtures have adopted straight fertilizers with the new policy. After the program, there has been a significant increase in overall fertilizer use at national level particularly in the dry zone major irrigated areas compared to the previous years.

By bringing the fertilizer use up to the recommended level and by changing the fertilizer usage to the straight application, average yield has increased in all water regimes by 4% and 11% in 2006 and 2007 respectively compared to the previous five

years and contributed to the growth of paddy production. Increased value addition due to increased paddy production caused increased economic returns to the country. According to the study, economic returns have increased four fold due to increased fertilizer use in the major irrigated areas in 2007 compared to 2005, the best performed year before the new subsidy.

As the three main fertilizers were subsidised at 350 Rs per 50 kg, fertilizer input cost came down from about 15% to only 6% reducing of the average cost of production of paddy. Of the total subsidy worth Rs. 11 billion attached to this price incentive in 2007, more than 50 percent was directly transferred to farmers holding less than 3 acres of paddy land. Of the subsidy recipient farmers, 70% to 95% are small farmers holding less than 3 acres. Yet, there is a considerable percentage of large paddy farmers who are cultivating more than 5 Acs of paddy land either by renting or leasing land for cultivation, but receiving the subsidy. According to the study this percentage is highest in Polonnaruwa and 10% of sample paddy farmers there are cultivating more than 5 Acres but are receiving the subsidy.

It is also revealed from the study that farmers who had been depending on credit for fertilizer input have reduced obtaining credit for fertilizer purchasing after the subsidy program was implemented. They have become independent without borrowing to pay back from their harvest. This leads to improved bargaining power of the small farmer.

6.1.3 Yield Variation and Fertilizer Use Efficiency

Increased fertilizer use after the new subsidy scheme made the small farm paddy sector economically efficient. However it does not mean that the country had been always using fertilizer efficiently for paddy production. A more balanced N:P:K ratio was achieved by applying the recommended levels and subsequent yield increases are observed. However, yield variation continues to remain at same extent within a region even after adopting the recommended levels of fertilizer use. Considering 50% of the representing average sample farms in studied districts based on yield (after truncating maximum yielding 25% and minimum yielding 25% sample farms), it shows that yield variation of this 50% of the sample farms ranges from 1600 kg per ac to 2310 kg per ac in Polonnaruwa, 1270 kg per ac to 2750 kg per ac in Hambantota and, 2375 kg per ac to 3000 kg per ac in Ampara2006/07 *maha* season. While maintaining a huge yield variation, continuous recommendation of flat rate throughout one region leads to large scale fertilizer squander. This may also lead to unnecessary fertilizer leakages between crop sectors and creation of black market for subsidised fertilizers if there is a mismatch between fertilizer demand perceived by farmers and supply. Limitations of secondary and micronutrients, poor organic matter content in soil and salinity are some of the important soil factors that lower efficiency of the fertilizer use among other factors that causes yield variation. To identify the most limiting soil factors to increase fertilizer use efficiency by the paddy crop or to recommend location-specific fertilizer application is advisable to use fertilizers more economically for increasing yields.

Therefore a more balanced and integrated use of fertilizers, including secondary and micronutrients, in combination with organic manures, green manure, bio-fertilizers, etc. has a crucial role in terms of improving paddy productivity and for solving problems like soil degradation, declining crop response ratio, etc.

6.1.4 Revising of Subsidy Level

Of the main determinants of fertilizer demand, fertilizer price also plays a role. The analysis done on fertilizer demand after many decades of increased fertilizer use shows that the main fertilizers used in paddy cultivation by average farmer are currently inelastic to fertilizer price and therefore fertilizer price is not the sole determinant of fertilizer use in paddy production. The responsiveness to fertilizer prices is still less among farmers in the dry zone commercial areas than in wet zone areas. However, farmers respond to sudden price increases and it is evident from the two main price shocks received in 1990 and 2003.

There is a scope to revise the current subsidised price without affecting the production through decline in fertilizer use, particularly if a more integrated plant nutrition programme is implemented. Also a reduction in subsidy effected through an increase in fertilizer prices may not translate into lower production through declines in fertilizer use, particularly if the paddy prices and the non-price factors are made conducive to fertilizer use. Public investment in irrigation is an effective instrument to promote the use of fertilizers.

6.2 Conclusions

Following conclusions could be drawn from the study that was undertaken to evaluate the new fertilizer subsidy programme implemented from 2005/06 *maha* season in view of its effectiveness and relevance in achieving the desired national objectives.

The findings of the study show that the new fertilizer subsidy program has been playing an effective and efficient role in terms of achieving the national objectives of economic efficiency, food security and, increasing welfare of the rural farmer of Sri Lanka during the global food crisis.

The new policy involved a huge extension element that was attempted for a long time by implementing several extension programs in the paddy sector. With this new policy, Sri Lankan paddy production was shifted towards one frontier by bringing the fertilizer application to the level that is demanded by the current technology proven by the field experiments of Department of Agriculture. After the new policy, there has been an increase in the fertilizer use by the farmers particularly in major irrigated areas. This resulted in caused to increased paddy yield in the country. However, there is further scope to increase the fertilizer use efficiency by correcting soil related factors and to increase the economic efficiency. The heterogeneity of our soils in relation to organic matter content, secondary and micro nutrients and other soil problems such as salinity are evident from the still existing huge differences in yield within regions where same fertilizer recommendation is practised.

Few bottlenecks in the state fertilizer distribution mechanism could be observed. The efficiency of the agrarian development department in delivering fertilizers to the farmers has been comparable to private sector distribution with less marketing cost. It is worthwhile to provide adequate infrastructure to streamline the distribution network for a better state-led distribution mechanism of fertilizers, as new fertilizer distribution mechanism opened up several avenues to develop agrarian development centre as the main contact place of village farmer.

By adjusting the fertilizer recommendation level towards farm level and by streamlining the distribution mechanism and by adjusting the gap between the fertilizer requirement and issued amount unnecessary leakages of fertilizer could be avoided to a greater extent.

The new subsidy policy had been costly and a burden on the national budget. Nevertheless, there is scope to revise the current subsidised price to ease the burden on the national budgets without translating it into lower production through decline in fertilizer use. In order to achieve that objective a more integrated plant nutrition programme should be implemented. Furthermore, other non-price measures such as improving proper irrigation and using better seeds in combination with a guaranteed paddy price should be implemented.

The new fertilizer subsidy program has given a momentum to move towards a more integrated plant nutrition programme in the future to increase the productivity potentials of paddy lands for food security. When compared with some of the other developing countries, Sri Lanka has moved ahead towards the new momentum and is in an advantageous position to implement such a programme. However, this policy also can be redesigned to accelerate the acquired momentum for long term benefits. It is also noted that there are new developments in the world which should also be taken into consideration when redesigning the program.

However, it should be admitted that this study has its own limitations. This national issue was studied by collecting information from a small representative sample. Discrepancy of data from various sources makes it very difficult to arrive at certain conclusions. Nevertheless following policy options and recommendations can be put forward for designing an effective and economically feasible fertilizer subsidy scheme.

6.3 Recommendations

1. Future fertilizer policy should be more focussed towards efficient use of fertilizers to increase economic efficiency of the paddy sector and to avoid squandering of fertilizer use. Flat recommendations on use levels of fertilizer in larger regions should not be made without considering the soil related factors.

2. The more conducive institutional mechanism that has been strengthened by the new subsidy programme have to be made use for the purpose of implementing a more integrated plant nutrition programme to increase the fertilizer use efficiency by correcting the limiting factors of the soil and by improving the soil structure in order to increase the productivity potentials of paddy lands in the medium term.
   - Identification of yield zones
   - Soil fertility testing program
   - Organic matter promotion
   - Fertilizer Trials at sub region level

3. State led distribution mechanism should be continued as a national program and the bottlenecks in the distribution mechanism should be cleared. Regional stores should be developed by utilising existing infrastructure.

4. Extension element of the subsidy policy should be strengthened and if possible other extension programs should be amalgamated to develop into a technology package.

5. Close coordination between Department of Agriculture and the Agrarian Development Department is essential to develop the Agrarian Development Centres as the main contact point of farmers. Agricultural Instructors can take a proactive role as the key technical persons in the Agrarian Development Centres.

6. Subsidy rate should be revised to ease the burden on national budget. However the price increases should not be abrupt. Fertilizer price could be adjusted in relation to the guaranteed price of paddy to which farmers are more responding.

7. In order to benefit from the fertilizer technology, two other technologies – irrigation and seed should be improved.

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Annex 1

Background Fertiliser production

Fertilisers can generally be divided into 3 main nutrients nitrogen, phosphorus, and potassium. These three elements make up about 90 percent of total fertilizer consumption.

Nitrogen

About 97% of the worlds nitrogen fertilizers are derived from synthetically produced ammonia. Ammonia is produced using the haber process with the nitrogen component derived from the air and the hydrogen component usually derived from natural gas although other sources include crude oil, coal or water.

Ammonia is produced in about 80 countries, however the world production is dominated by a small number of countries. Developing countries account for more than 55% of production with over a third of the world's production from China and India. 88% of world ammonia production is processed or used in the countries where it is produced. The remaining 12% of world ammonia production enters international trade directly for all end-users.

Approximately 85% of world ammonia production is used for nitrogen fertilizer production. The remainder is used in various industrial products including fibers, animal feed, explosives. Ammonia can be applied directly to crops as a nitrogen fertilizer or it can be used as a building block to make other nitrogen fertilizer products, including urea, ammonium nitrate, ammonium sulfate and water-based liquid nitrogen fertilizers.

Since 1973 Urea has become a more popular form of nitrogen fertilizer and its market has increased from 20% to 50%. Urea is commercially produced from two raw materials, ammonia and carbon dioxide. Urea is by far the dominant nitrogen fertilizer used in developing countries and is continuously increasing its share in these markets. Urea is produced in about 60 countries.

Phospherous

Phospherous is almost entirely derived from phosphate rock which is found in a limited number of countries. The main producers of phosphate rock and phosphate fertilizers are the USA, China, and Morrocco, which account for 58% of world production. The production of phosphate rock peaked in 1988 at a level of 166 million tonnes product, since then it has been falling and is now approximately 125 million tonnes.

More than 75% of the world's commercially exploited phosphate rock is surface mined. Overall, mineral fertilizers account for approximately 80% of phosphate use, with the balance divided between detergents (12%), animal feeds (5%) and specialty applications (3%). Approximately 85% of world phosphate fertilizers are manufactured by reacting phosphate rock either directly with sulphuric acid or indirectly with phosphoric acid produced using sulphuric acid.

Potassium

Potassium, or potash, is mined from naturally occurring ore deposits that were formed when seas and oceans evaporated. Unwanted minerals are removed from the ore in the manufacturing process and the product is then granulated for application.

Most of the world's potash deposits are found in Canada, Russia, Belarus, Germany and the United States. Canada and the Russia alone account for 55-60% of production and about 66% of world exports. European production dropped significantly when reunification of Germany took place and more recently the deposits in France were expected to be exhausted in 2004.

Source: International fertiliser Industry Association http://www.fertilizer.org/ifa/default.

Annex Table I: Annual Consumption of Fertilizer in Paddy in 000 mt.

Year	Sulphate of Amoniya	Urea	Rock-phosphate	Rockphos-pate(Import.)	Local Rock-phosphate	Tri super phosphate	Muriate of Potash	Year	n.p.k.	Kiezerite	Dolamite	Other Type	Total
1961	18.51	0.26	6.72				3.55	1961					29.04
1962	24.75	0.67	8.02				4.63	1962					38.07
1963	31.02	0.87	9.95				5.22	1963					47.06
1964	39.78	3.13	11.39				5.80	1964					60.10
1965	26.27	2.57	8.68				4.54	1965					42.06
1966	18.95	8.76	10.36				6.03	1966					44.10
1967	24.16	15.69	18.02				11.87	1967				3.45	73.19
1968	26.06	25.49	11.16			4.66	7.89	1968	9.99				85.25
1969	22.97	26.09	7.62			6.80	9.24	1969	10.79				83.51
1970	22.34	28.74	6.29			8.66	8.15	1970	12.89				87.07
1971	14.04	44.36	3.48			11.84	7.67	1971	14.05				95.44
1972	3.06	48.65	2.16			10.43	7.44	1972	16.63				88.37
1973	16.65	56.68	2.21			19.61	12.73	1973	17.65				125.53
1974	6.88	46.48	3.56			6.48	8.10	1974	24.95				96.45
1975	0.23	28.63	0.12			0.47	2.09	1975	17.20				48.74
1976	2.25	45.46	0.21			7.06	6.38	1976	10.65			0.43	72.44
1977	4.20	73.00	1.92			12.92	10.56	1977	19.35				122.02
1978	4.76	81.44	2.15			14.42	11.78	1978	21.53				136.13
1979	0.54	84.50				2.94	7.09	1979	34.87			0.42	130.41
1980	3.81	116.21				18.34	17.10	1980	34.43			0.10	188.83
1981	3.01	94.58				17.73	16.41	1981	23.80			0.50	155.59
1982		97.30				22.20	21.80	1982	25.60			0.30	167.14
1983		97.00				21.80	20.30	1983	23.10				162.22
1984	0.11	112.56	0.73			25.14	24.46	1984	23.87				186.90
1985		125.03				27.97	27.75	1985	21.70				202.50
1986		139.70				36.50	32.40	1986	24.00				232.62
1987	0.30	133.00				28.80	31.90	1987	22.80			0.30	217.12

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Year	Sulphate of Amoniya	Urea	Rock-phosphate	Rockphos-pate(Import.)	Local Rock-phosphate	Tri super phosphate	Muriate of Potash	Year	n.p.k.	Kiezerite	Dolamite	Other Type	Total
1988	6.20	131.00				28.60	33.80	1988	25.00				226.20
1989	0.60	139.10				32.00	32.00	1989	34.20				238.11
1990	1.80	99.20		0.20	1.30	20.50	26.00	1990	12.40	0.01	0.01	1.31	161.23
1991	12.80	98.20			1.50	22.80	29.80	1991	14.20	0.01			179.31
1992	16.90	118.90			1.70	24.20	32.30	1992	13.20			0.60	207.79
1993	21.20	136.50		0.06	3.20	37.70	32.70	1993	15.40			1.20	247.97
1994	21.30	161.50		0.01	3.60	35.20	40.10	1994	7.10	0.02	0.07	0.17	269.74
1995	16.10	157.60		0.02	2.60	34.60	40.00	1995	5.20	0.06	0.07		256.76
1996	16.30	147.00		0.02	2.20	34.80	36.90	1996		0.05	0.07	0.02	237.47
1997	13.70	149.30		0.01	1.70	26.80	32.70	1997		0.05	0.17	0.08	224.51
1998	10.90	180.10		0.20	1.60	23.70	34.60	1998	0.10	0.20	0.40	0.20	251.88
1999	10.90	234.20		0.20	2.00	34.10	38.40	1999	0.60	0.08	0.40	0.20	321.03
2000	8.50	193.30		0.10	1.50	27.10	29.80	2000	0.50	0.01	0.20	1.40	262.36
2001	2.50	214.40		0.01	2.00	32.90	29.50	2001	1.40	0.01	0.30	1.50	284.49
2002	2.60	270.10		0.01	2.30	37.20	37.50	2002	1.50	0.01	0.50	5.20	356.17
2003	3.80	201.90		0.01	2.10	38.10	33.20	2003	2.10	0.05	0.80	1.30	283.30
	Unit: mt.												
2004	1808.00	222176.00		44.00	2169.00	34775.00	36593.00	2004	1005.00	33.00	824.00	1082.00	300509.00
2005	1174.00	266169.00		65.00	1822.00	41602.00	39578.00	2005	379.00	39.00	1016.00	1332.00	353176.00

Source: National Fertilizer Secretariat

Annex Table 2: Imports of Fertilizer by Type in Metric tons

Year	Total	Amonium Salphate	Urea	Rock Phosphate	Tri Super Phosphate	Muriate of Potash	n.p.k.	Kiezerit	Other Fertilizer
1980	395356								
1981	294893	86345	51438	13202	33594	74209	31995	1950	2160
1982	174789	41047	5000	14609	22011	57374	33000	1450	298
1983	215550	56478		17400	27300	72315	37360	3570	1270
1984	336100	97949	62000	29541	35435	79524	26040	3422	2189
1985	508502	118760	165038	34396	41600	122155	18500	4153	3900
1986	423189	52600	180931	26321	61158	68459	25309	3160	5251
1987	382199	73633	144739	18720	39956	73559	23660	6158	1774
1988	544174	93223	210533	20500	65975	116375	25947	6900	4721
1989	364919	85888	142691	10000	20400	67772	25650	5748	6770
1990	507731	93796	183917	28682	41347	135024	13000	6750	5215
1991	385019	94343	181352	5000	36817	33002	20700	9100	4705
1992	369533	92565	130860	13700	37374	75998	11999	3603	3434
1993	479367	121211	170841	8875	41114	98674	25764	6717	6171
1994	459389	84572	204578	8299	43384	101395	10132	4223	2806
1995	525651	147287	203626	12039	65249	81986	9465	4706	1293
1996	447039	50000	240874	1000	39807	99726	9000	4656	1976
1997	411844	87550	189464	11830	42595	73450		4751	2204
1998	477433	43412	286639	12850	29815	93742	1000	7399	2576
1999	501191	65401	293472	11900	43446	75032	4247	6436	1258
2000	550542	60423	326512	4800	44508	98686	9233	5129	1251
2001	444112	71214	258785	12250	14557	74737	6600	4111	1859
2002	568072	75136	337906	11778	40495	95156		5402	2199
2003	529890	42560	309799	460	53950	105948	5434	5943	5796
2004	497009	83852	285119	950	33993	84483		5121	3490
2005	541844	61402	318760	100	48759	100695		4695	7434
2006	683152	60681	366199	205	81930	159909	225	5791	8212

Source : National Fertilizer Secretariat

Annex Table 3: Per Ha Urea Use, Paddy Output per Kg. of Urea

	TOTAL Production	Total Urea Use	Paddy Kg/ Urea Kg	Total Extent	Per Ha Urea Use
1970	1672	28.74	58.2	759011	37.8651
1971	1440	44.36	32.5	725849	61.1146
1972	1348	48.65	27.7	726238	66.9891
1973	1357	56.68	23.9	725238	78.1537
1974	1657	46.48	35.6	824774	56.3548
1975	1192	28.63	41.6	695805	41.1466
1976	1298	45.46	28.6	723939	62.7953
1977	1752	73	24.0	828065	88.1573
1978	1929	81.44	23.7	877910	92.7658
1979	1901	84.5	22.5	838626	100.7601
1980	2120	116.21	18.2	844648	137.5839
1981	2216	94.58	23.4	876746	107.8762
1982	2155	97.3	22.1	844163	115.2621
1983	2481	97	25.6	824100	117.7042
1984	2419	112.56	21.5	990198	113.6742
1985	2655	125.03	21.2	880691	141.9681
1986	2587	139.7	18.5	897447	155.6638
1987	2125	133	16.0	781230	170.2444
1988	2477	131	18.9	867807	150.9552
1989	2064	139.1	14.8	726953	191.3466
1990	2538	99.2	25.6	856710	115.7918
1991	2389	98.2	24.3	738416	132.9874
1992	2340	118.9	19.7	803173	148.0378
1993	2569	136.5	18.8	834263	163.6175
1994	2683	161.5	16.6	929621	173.7267
1995	2810	157.6	17.8	915021	172.2365
1996	2061	147	14.0	748745	196.3285
1997	2241	149.3	15.0	729815	204.5724
1998	2692	180.1	14.9	848264	212.3160
1999	2857	234.2	12.2	892053	262.5405
2000	2860	193.3	14.8	878000	220.1595
2001	2695	214.4	12.6	798000	268.6717
2002	2860	270.1	10.6	852000	317.0188
2003	3046	201.9	15.1	965000	209.2228
2004	2627	222.176	11.8	778545	285.3734
2005	3245	266.169	12.2	937175	284.0121
2006	3338	264.775	12.6	908424	291.4663
2007	3130	217.744	14.4	816713	266.6102

Source: National Fertilizer Secretariat, Department of Census and Statistics

Annex Table 4: Value of Imports of Fertilizer by Type in Rupees Million

Year	Sulphate of Amonia	Urea	Rock Phosphate	Tri Super Phosphate	Muriate of Potash	Kiezeriate	N.P.K.	Other Fertilizer	Total Fertilizer
1982	112.47	22.23	22.90	81.05	186.73	4.89	129.55	2.64	562.46
1984	234.20	291.43	51.76	161.67	263.51	9.40	112.28	15.25	1139.51
1985	335.76	679.30	56.26	209.93	431.16	12.81	80.25	29.88	1835.37
1986	133.54	577.90	40.57	280.18	227.61	10.80	102.07	37.38	1410.05
1987	207.23	501.16	27.85	212.09	237.48	23.03	100.45	12.40	1321.71
1988	225.21	1053.99	39.48	427.84	431.28	31.18	126.99	37.92	2373.88
1989	261.39	820.86	24.63	149.87	306.83	31.70	144.37	64.67	1804.33
1991	357.30	1389.10	8.80	255.50	242.90	59.60	170.40	83.20	2566.90
1992	388.10	1010.20	38.60	309.90	604.40	26.60	99.10	43.60	2520.50
1993	620.81	1192.11	32.28	332.52	721.31	50.63	247.65	73.03	3270.34
1994	499.93	1622.86	23.12	342.74	716.76	31.97	94.39	33.15	3364.92
1995	1026.45	2498.23	44.42	702.93	678.45	39.75	97.26	15.73	5103.22
1996	403.91	3272.03	4.18	502.04	886.76	44.56	149.55	27.73	5290.76
1997	663.07	2055.81	52.40	553.06	679.72	47.80		37.28	4089.14
1998	318.34	2459.18	58.53	358.48	948.29	84.39	12.91	46.22	4286.34
1999	382.76	2342.27	56.14	567.21	856.62	78.25	72.39	21.87	4377.51
2000	457.26	3497.33	27.45	580.49	1202.08	65.17	150.09	22.37	6002.24
2001	663.07	3576.41	80.37	220.67	1110.36	62.87	109.98	37.86	5861.59
2002	756.11	4594.98	83.83	628.80	1457.59	79.00		45.29	7645.60
2003	459.33	5319.38	3.59	920.41	1719.64	86.09	120.97	121.59	8751.00
2004	1261.35	6611.17	10.98	725.13	1858.32	73.04		58.48	10598.47
2005	1097.10	9389.28	1.28	1211.12	2467.58	69.61		169.82	14405.79

Source: National Fertilizer Secretariat

Annex Table 5: Imports, Value of Inputs, Average C&F and Retail Price of Use of TSP and MOP

Year	Imports Mt--->		Muriate of Potash	Value of Imports -->		Muriate of Potash	Average C&F-->		Muriate of Potash	Retail Price Rs /Mt		Muriate of Potash
	Urea	Tri Super Phosphate		Urea	Tri Super Phosphate		Urea	Tri Super Phosphate		Urea	Tri Super Phosphate	
1979										980	1335	1065
1980												
1981	51438	33594	74209							2140	2065	2230
1982	5000	22011	57374	22.23	81.05	186.73	4446	3682	3255	2785	2685	2900
1983		27300	72315	NA	NA	NA	NA	NA	NA	2850	2850	2750
1984	62000	35435	79524	291.43	161.67	263.51	4700	4562	3314	2850	2850	2750
1985	165038	41600	122155	679.30	209.93	431.16	4116	5046	3530	2850	2850	2750
1986	180931	61158	68459	577.90	280.18	227.61	3194	4581	3325	2850	2850	2750
1987	144739	39956	73559	501.16	212.09	237.48	3463	5308	3228	2850	2850	2750
1988	210533	65975	116375	1053.99	427.84	431.28	5006	6485	3706	3650	3650	3550
1989	142691	20400	67772	820.86	149.87	306.83	5753	7347	4527	3650	3650	3550
1990	183917	41347	135024	NA	NA	NA	NA	NA	NA	7800	9550	8200
1991	181352	36817	33002	1389.10	255.50	242.90	7660	6940	7360	9600	9550	9100
1992	130860	37374	75998	1010.20	309.90	604.40	7720	8292	7953	9850	10300	9500
1993	170841	41114	98674	1192.11	332.52	721.31	6978	8088	7310	9850	10300	9500
1994	204578	43384	101395	1622.86	342.74	716.76	7933	7900	7069	6850	7100	6700
1995	203626	65249	81986	2498.23	702.93	678.45	12269	10773	8275	9600	10800	10000
1996	240874	39807	99726	3272.03	502.04	886.76	13584	12612	8892	11000	12000	11250
1997	189464	42595	73450	2055.81	553.06	679.72	10851	12984	9254	11800	13600	12050
1998	286639	29815	93742	2459.18	358.48	948.29	8579	12023	10116	6800	19200	13500
1999	293472	43446	75032	2342.27	567.21	856.62	7981	13056	11417	6300	19200	15200
2000	326512	44508	98686	3497.33	580.49	1202.08	10711	13042	12181	7000	19200	16500
2001	258785	14557	74737	3576.41	220.67	1110.36	13820	15159	14857	7000	17200	18600
2002	337906	40495	95156	4594.98	628.80	1457.59	13598	15528	15318	7000	21000	19940
2003	309799	53950	105948	5319.38	920.41	1719.64	17170	17060	16231	16000	22500	21000
2004	285119	33993	84483	6611.17	725.13	1858.32	23187	21332	21996	12000	26100	25210
2005	318760	48759	100695	9389.28	1211.12	2467.58	29456	24839	24505	10740	33250	32200
2006	366199	81930	159909									

Source: National Fertilizer Secretariat