CHAPTER I

INTRODUCTION

1.1 Background

Sri Lanka is an island lying in the Indian Ocean; having an area of 65,610 sq kilometers, locates at the southern tip of the Indian sub-continent between latitudes 5^0 54' and 9^0 52' north and longitudes 79^0 39' and 81^0 53' east. The agricultural sector has been playing an important role in the social, cultural and economic development of the country since ancient times. With the immense efforts of the kings ruled; agriculture has dominated the economy of Sri Lanka, and therefore it was called in past as "Granary of the east". King Parakramabahu who ruled during 1153-1186, was one of the greatest kings who served for the agricultural development of the island with a vision of "let not a single drop of water that falls on the ground go into the sea without serving the people".

Agriculture, industry and services are the three main sectors which contribute to the economy in Sri Lanka at present. The Agriculture sector is divided into two sub-sectors, as the export agriculture sector and the domestic agriculture sector. While the export agriculture sector comprises with tea, rubber, coconut and minor export crops; the domestic agriculture sectors comprises with paddy, horticultural crops, sugar cane and other field crops. The agriculture sector constituted 16.8 percent (%) of GDP in year 2007; and paddy sector alone contributed 30% to the agricultural GDP (DOASL, 2006).

Rainfall and availability of water are the important factors that determining agricultural land use in Sri Lanka. Rainfall distribution has traditionally been

generalized in to three climatic zones; "Wet Zone" in the southwestern region including central hill country, "Dry Zone" covering predominantly northern and eastern parts of the country and "Intermediate Zone" running between the other two zones. Wet zone receives relatively high mean annual rainfall over 2,500 millimeters (mm); while the intermediate zone receives 1,750 to 2,500 mm with a short and less prominent dry season. Dry zone receives less than 1,750 mm mean annual rainfall with a distinct dry season from May to September. The island was subdivided into seven agro climatic regions and again into 24 agro-ecological regions in 1979. Due to the bimodal availability of rain fall, there are two main cropping seasons namely “Maha” (northeast monsoon) - wet season from September to February and “Yala” (southwest monsoon) - wet season from March to August. “Maha” is considered as the major cropping season.

On average 560,000 hectares (ha) of paddy are cultivated during maha and 310,000 ha during yala, making the average annual extent sown with rice to about 870,000 ha under these diverse environmental conditions; and it is estimated as 34% of the total cultivated area of the island. About 879,000 farm families which comprises 20% of the total population and 32% of the total labor force is directly engaged in paddy cultivation island-wide (DOASL, 2008). In year 2008, agriculture sector recorded the highest sectoral growth of 7.5% with a good paddy harvest, increased by 24% by reaching the total production up to 3.87 million metric tons (mmt) (Central Bank of Sri Lanka, 2008).

Like the other countries in Asian region, rice is the main cereal crop grown, and the staple food of 19 million inhabitants in Sri Lanka. Therefore food security in Sri Lanka depends largely on intensive rice production in favorable environments of

irrigated rice-based cropping systems. Because of the predicted growth in population and decreased availability of water and land; a further increase in productivity is needed. This future yield increase will require improved crop care, integrated resource management approaches and more knowledge-intensive strategies for the efficient use of all inputs, including fertilizer nutrients (Fairhurst *et al*., 2007).

However in recent past, a declining interest could be noticed in paddy cultivation due to high cost of inputs, stagnating yield and declining prices of paddy. Therefore it was considered as a less profitable enterprise; and it made some farmers to move away from paddy cultivation to other crops.

1.2 Policies taken to improve paddy production in Sri Lanka

Adequate plant nutrient supply holds the key to improving food grain production and sustaining livelihood. Use of chemical fertilizers in food crops began in early 1960's coincides with the green revolution. Even though the nutrient management practices have been developed, in most of the cases farmers are not applying fertilizers at recommended rates. So the aim of providing more food and more income through increased productivity and maintaining soil fertility has been become one of the most important challenges today. Efficient fertilizer management integrated with other appropriate agronomic and pest management practices is needed to improve and sustain the productivity of paddy cultivation.

As a result, a number of institutional interventions occurred in recent past with regards to fertilizer management in paddy cultivation. In 1990, the Department of Agriculture (DOA) withdrew fertilizer recommendation in the form of fertilizer mixtures and re-introduced the recommendations involving straight fertilizer to allow

necessary site specific adjustments in keeping with actual requirements. Again a policy decision was taken by Ministry of Agriculture together with the DOA to promote integrated plant nutrient management (IPNM) technology among farmers in Sri Lanka in 1999. In year 2001, they recommended application of zinc sulphate for paddy, grown in dry and intermediate zones. Besides that; with the aim of enhancing income and living condition of paddy farmers, some government interventions occurred at different times of history with regards to subsidy on chemical fertilizers. In 1997, only Urea was subsidized. As a result, an increasing trend in the use of nitrogen (N) fertilizer was observed; and in addition, a gradual and substantial reduction in the use of phosphorus (P) and potassium (K) fertilizer was evident. Recently elected government in Sri Lanka decided to revise the subsidy scheme and implemented a fixed subsidy for all three fertilizers such as Urea, Triple super phosphate (TSP) and Murate of potash (MOP) under the theme of "Kethata aruna". Under this, a 50 kilogram (Kg) bag of any fertilizer is approximately around US$ 3.5. This new scheme was implemented with effect from 5th of December 2005; and it was given only for straight fertilizers. This new proposal was targeted to small scale paddy farmers in the island. Its main objective was to make chemical fertilizers available as cheaply as possible in order to encourage paddy farmers to follow fertilizer recommendations, and thereby to increase the productivity. The value of this incentive package amounted to 26 billion rupees in 2008 (Central Bank of Sri Lanka, 2008). However, this subsidy scheme has become a very strong political issue in Sri Lanka at present.

Beyond that, a number of policies have been formulated during the past with related to marketing aspects. The guaranteed price scheme which is being operated by

the government since 1948 has been a main supportive programme for paddy. The government paddy purchasing scheme also continued to operate in 2008. Accordingly, in 2008 yala season, Sri Lanka Agricultural Products Marketing Authority (SLAPMA) purchased paddy long seeds (Nadu) at 28.00 rupees per kilogram (Rs/Kg) and small seeds (Samba) at 30.00 Rs/Kg; and the government has spent 172 million rupees to purchase 5,747 mt of paddy in 2008 yala season (Central Bank of Sri Lanka, 2008).

On the other hand, Ministry of Agriculture development and Agrarian services with DOA initiated an island-wide accelerated program for local food production namely; "Deshiya Ahara Nishpadana Diri Genvime Jathika Meheyuma" (national campaign to motivate domestic food production) under the theme of "Api wawamu rata nagamu" (let us grow and uplift the nation). Granary area programme (GAP), recultivation of abandoned paddy lands and a certified seed paddy production programme were implemented with a target to increase the cultivation extent, intensify production and increase the yield per unit of land.

GAP is a rice sector development programme; implemented in year 2004 under major irrigation schemes of the inter-provincial areas of Ampara, Anuradhapura, Polonnaruwa, Hambantota, Hasalaka, Moneragala and provincial areas of Hambantota, Kurunegala, Puttalama, Batticaloa, Trincomalee and Mannar districts. Activities conducted under this programme were paddy production yaya programmes, saruketha yaya programmes, organic manure application promotion campaigns, training of farmers and officers on rice productivity improvement, rice product development promotion programmes and setting up cyber extension units. The saruketha yaya programme is implemented with the key element of IPNM

approach; and has clearly demonstrated the possibility of achieving higher productivity levels such as 200 bushels per acre (10 tons/ha); thereby increasing farmer incomes. It was implanted in high potential areas of the island with the aim of increasing the average yield of paddy in Sri Lanka up to 5.2 metric tons per hectare (mt/ha) and achieving 6.5 mt/ha of maximum potential yield in favorable rice growing environments. To increase the cropping intensity by 10% on the average from 176% to 186% mainly through better water management and thereby increasing farmers income by about 100% are the other main targets. Under this programme in year 2006, the average yield was 138 bushels per acre (2,829 Kg) in the inter-provincial area of Hambantota district (DOASL, 2006). This programme theorizes that low productivity results in low profitability, which leads to low investments and subsequently to low productivity, thus completing a vicious cycle. Therefore the programme aims at improving the productivity and sustaining it through better marketing, processing and storing facilities. The higher productivity is expected to improve farmers' profitability and their capability to invest in activities leading to high productivity. It is expected to be achieved through increasing paddy yields and cropping intensity. The agricultural interventions expected to increase the paddy yields are agricultural extension and irrigation water management. These are accompanied by interventions to promote storage facilities and use of machinery (DOASL, 2009).

1.3 Present status of paddy production in Sri Lanka

At present, paddy cultivation in Sri Lanka is dominated by newly improved high yielding varieties introduced by the DOA. In 2003, 98% of the total cultivated

area was under these improved varieties. As a result of these practices, the stagnated rice production and average yield of 3.5 tons/ha during the two decades of 1980 to 1990 are now in the increasing trend starting from 2000 decade. The national average yield has increased up to 4.3 tons/ha in year 2007 (DOASL, 2008).

The per capita consumption of rice fluctuated around 100 Kg per year during 2000 depending on the price of rice, bread and wheat flour. At present it has gone up to 108 Kg; and it is further expected to increase up to 116 Kg. The increasing price and import limitations of wheat flour and increasing prices of all food items have created this growth of rice consumption.

Under this background, the consideration of paddy cultivation as a less remunerative enterprise is not true any more because of increased price of rice and decreased input cost because of the fertilizer subsidy scheme on chemical fertilizers. It has been found that the average profit of one ha of cultivation is ranging from 40,000 to 62,000 rupees depending on the yield level (DOASL, 2008).

Though there is an increasing trend of paddy yields especially in irrigated agriculture; still the present levels remain below the potential yield value of the improved paddy varieties. The existing yield gap may be exploited through improved nutrient and crop management practices.

1.4 Constraints to improve paddy production in Sri Lanka

Regarding constraints; technological, institutional, socio economic and policy constraints and natural constraints are considered as major items found to be against the production improvements of rice sector in Sri Lanka. Land ownership has become one of major socio economic constraints; as low attention has been paid on long term

soil fertility improvement with tenancy, changing cultivators or leasing out of paddy lands. Shortages and increased cost of labor is one another reason. Even though mechanization would be a reasonable solution for this situation; low availability of adequate number of machineries and some land related limitations such as small plot size results through land fragmentation has been adversely affected to this. Therefore it has become a major reason for the abandon of paddy lands especially in wet zone. Farmers' slow adoption of new technologies, using low quality seed paddy, deteriorated infrastructural facilities are some of the other factors that worsened the situation (DOASL, 2008). Decrease of soil organic matter, acidification, soil fertility depletion, soil erosion, iron toxicity and salinity in paddy fields, floods, droughts and unexpected pests and diseases outbreaks have been identified as main natural constraints that adversely affect to the production improvement.

The dissolvement of the Paddy Marketing Board can be identified as a major problem which adversely affected to the profitability of paddy production. Since then; prices of paddy have largely been determining by private traders and rice millers operating in an open market situation.

1.5 Proposed programmes for further improvement of paddy production

Although the present production nearly satisfies the nation's requirement; it is projected that it should be increased up to 4.56 mmt in year 2020 in order to cater to the ever-increasing demand in future (DOASL, 2009). To reach the desired level of production, two major strategies have been identified. One is to increase the total land extent cultivated through cultivating the abandoned lands at present; and the second is to increase the productivity through implementation of yaya programmes, conducting

demonstrations and media programmes, promotion of mechanization and seasonal cultivation.

1.6 Rationale

Even though the agricultural extension service system of the DOA has contributed greatly to the successes gained at present through introducing innovations in improving rice production and protection technologies; the attention paid by them on the feed back from paddy farmers on integrated nutrient management adoption and profitability seems to be low.

On the other hand, as a developing country; with the escalation of fertilizer prices, this subsidy scheme has become a severe financial burden on the government and the economy of Sri Lanka (Rajapaksa and Karunagoda, 2008). At present paddy farmers are largely dependent on this subsidy scheme in maintaining nutrient management in paddy cultivation. According to Wijetunga *et al*., (2008); now it has become a key determinant for the use of chemical fertilizer in paddy production. Therefore they have pointed a risk of pushing paddy farmers to lower income groups as in the past with a sudden withdrawal of fertilizer subsidy scheme.

With this background, in year 2009 budget proposals; government decided to limit the subsidy by allowing three 50 Kg bags of fertilizers per acre under a guarantee issued by a farmer organization; only for paddy cultivators who apply organic fertilizers. Also began to promote the production of organic manure in order to introduce an integrated nutrient management (INM) system for sustainable agriculture development; with the aim of reducing the import of chemical fertilizers by 25% within next three years. Therefore with this severe uncertainty on chemical

fertilizer subsidy; gradual transformation of paddy farmers towards INM technologies will be a great relief.

Therefore this study will focus on the adoption of nutrient management practices in irrigated paddy production system of the low country dry zone, Sri Lanka.

1.7 Objectives

Given this background, the objectives of this study are therefore,

1. To characterize different nutrient management practices adopted by paddy farmers in low country dry zone.
2. To identify factors affecting to the adoption of INM practices.
3. To investigate the status of profitability in paddy production.

1.8 Usefulness of the study

The objective of this efforts is to generate a good source of information for relevant authorities to develop extension and agricultural services in target area to improve farmers' adoption of INM practices; not only targeting higher yields but also to improve fertility condition of paddy soils. Thus; this analysis will reveal the present status of the adoption, constraints and farmers' perceptions with regards to INM technology. Profitability analysis will emphasize the authorities to find economically feasible solutions for minimizing the cost of production and also for increasing returns in paddy cultivation. Hence, the outcome of this study may be useful for policy makers, planners, researchers and extension authorities to design a strategy for improving productivity and increasing profitability of paddy production in different agricultural systems in Sri Lanka through INM practices.