CHAPTER ONE

Introduction

1.1 Overview

Present-day agriculture largely depends on the use of many agro chemicals such as chemical fertilizer, pesticides, and weedicides. According to the Central Bank of Sri Lanka the government expenditure of importing chemical fertilizer in the year 2011 was US $ 44,959 million (Central Bank of Sri Lanka, 2012). Part of these chemicals, mainly urea, seeps out of farmlands and pollutes natural water bodies creating short term and long term environmental and health issues for present and future generations. According to United States Environmental Protection Agency (2005), agricultural runoff is considered one of the major sources of non point source water pollution.

Chronic kidney disease of unknown etiology (CKDu) reported among large numbers mainly in farming areas of the country is a serious health issue that has caused death to many. It is believed CKDu has a link with unsystematic use of agro chemicals. Millions of public funds are spent on providing medicine and health services to the victims of the disease, causing it an extra burden to the economy of the country. Non-availability of an economically viable corrective method to address this type of water contamination aggravates the seriousness of the issue and further highlights the importance of moving towards more environment friendly crop production systems for the betterment of living beings.

Considering all these aspects the government of Sri Lanka in accordance with its new development policy *Mahinda Chinthana* aims at reducing import of chemical fertilizer up to 15 percent by 2015. To achieve this target the government has initiated many projects allocating a considerable amount of money to popularize organic farming to compensate the reduced amount of chemical fertilizer. Adding compost to soils is essential to improve soil structure and texture as it plays a key role in carbon storage and strongly influences nutrient retention and availability (Hamarashid *et.al*, 2010). According to a survey on MSW compost, organic C content from the total C in the composted MSW is 20% on average (He *et.al*, 1995). Soils of Sri Lanka are reported to have a deficiency in Carbon element (C) and compost is an excellent supplement to correct carbon deficiency. To encourage the use of compost in agriculture, training programmes have been conducted covering all parts of the country for farmers on compost production as well as on many values of using compost in farming.

Compost could be used in all types of crop cultivation including home gardening, paddy cultivation and in plantation crops such as coconut, tea and rubber cultivations. The export agricultural sector is another area of crop cultivation where there is a need for applying compost in addition to chemical fertilizer. According to the census of agriculture (Department of Census and Statistics, 2002), of the total

agricultural land area which is 1,859,494 ha, the extent under cultivation is about 1,559,487 ha (Table 1.1). Therefore, there is a considerable potential for marketing compost if ongoing organic farming promotional programmes are successful.

Table 1.1: Land Use Pattern in Agricultural Holdings 2002

Type	Area (Ha)	%
Total Agricultural Land Area	1,859,494	100
Permanent Crops	914,983	49
Asweddumized Paddy	497,052	27
Temporary Crops	147,452	8
Forest Land	130,360	7
Lands under Roads, Buildings, etc.	78,266	4
Lands not classified elsewhere	61,470	3
Lands not Suitable for Cultivation	29,910	2

Source: Department of Census and Statistics, 2002

However large scale production of compost using traditional methods is generally limited to government agricultural farms and training centers. Domestic level compost production also takes place and it usually fulfills part of the requirement of their homegardens. To meet the country's compost requirement there is a need for more large scale compost production facilities since limited availability and difficulties in producing compost at household level has been reported a major constraint of using compost in agriculture (Hitihamu *et.al*, 2009). Composting projects that are being in operation at local authority level have the potential to meet the requirement of compost if the prevailing quality issues be addressed properly.

Potential benefits of MSW composting go much beyond its use as a fertilizer as it is considered a more preferred route of solid waste disposal as compared to other traditional waste disposal techniques. The traditional method of waste disposal adopts collecting and disposing of wastes at open dumping sites and this has resulted in many short term and long term adverse effects to human health and environmental sustainability.

According to the national solid waste management policy of Sri Lanka, solid wastes is expected to be managed in accordance with the 3R principles (Reduce, Reuse, Recycle) with special emphasis to minimize waste generation. To implement the policy into action, the national solid waste management programme, *Pilisaru* has been planned. The Central Environment Authority of the Ministry of Environment through its *Pilisaru* project evaluates the proposals submitted by local authorities for compost production; provides financial and technical assistance for implementation

and utilizing the expert knowledge of members of the technical committee established under the National Committee on SWM (Fernando, undated).

By the end of 2011, there were about 100 composting plants operating in different local government areas. Most of these plants were small in operational capacity and about 80% of them had capacity of handling less than 10 tons of organic waste per day. An overview of composting plants operated by local governments is given in Table 1.1.

Table 1.2: Operational Composting Plants in Local Government Areas of Sri Lanka, 2011

Local Government Unit	Total No. of Plants	Plant Size		Technique Used		
		Small	Medium	Windrow	Semi aerobic trench	Others
Municipal Councils	16	12	4	15	-	1
Urban Councils	16	11	5	15	-	1
Pradesheeya Sabhas	68	58	10	63	2	3
Total	100	81	19	93	1	5

Note: Medium: less than 50tons per day and more than 10 tons per day
Small: less than 10 tons per day

Source: National Solid Waste Management Support Centre, 2011

Successful continuation of composting projects would derive multiple benefits such as providing compost for cultivation, a healthier and greener environment, saving of government funds due to extended life span of dumping sites, a reduction in the import of synthetic fertilizer and saving funds spent on health services.

However, there are reports indicating that many of these composting projects had experienced various problems such as social protests over odour and leachate, limited marketing avenues due to concerns over adverse effects to man and the environment, that affect their proper functioning and sometimes leading to abandoning of the project permanently or temporarily. In the Western Province only 1 per cent of the waste collected by the local authorities is composted (Jayaratne and Premakumara, unpublished). Besides, only limited investigation has been done regarding the sustainability of projects that produce compost from MSW at local authority level and the potential of the use of MSW compost in agriculture.

1.2 Objectives of the Study

The overall objective of the present study is to investigate the factors affecting the successful functioning of MSW composting projects.

Specific Objectives

1. To investigate the potentials and constraints of producing and utilizing compost produced from municipal solid wastes
2. To study the existing marketing arrangement and to make suggestions for market expansion for compost produced from MSW
3. To find out the costs and benefits of converting MSW into compost

1.3 Methodology Adopted

Methods of Data Collection

Data and information was collected by reviewing both published and unpublished literature and by conducting key informant discussions, using a semi structured questionnaire with managers, employees of the composting plant and the users of MSW compost.

Study Locations

Five composting plants operating in different capacities in different parts of the country were studied during the fourth quarter of 2012. This included the composting plants managed by Balangoda and Weligama Urban Councils, Kaduwela Municipal Council, Bandaragama Pradesheeya Sabha and the Kalutara composting plant.

Of the five composting plants selected, four are being managed by the respective local authority and the Kalutara composting plant is being managed by the Waste Management Authority, Western Province.

Type of Data and Information

Information collected from the study included views of the project management, residents of the area and staff employed in the composting plants regarding site selection, technology and process adopted and issues experienced in different stages of composting and marketing the final product. In addition, information was also collected regarding beneficial and harmful effects of the project as well as on suggestions and feedback of stakeholders regarding the MSW composting projects. Secondary data was collected to analyze the costs and benefits of converting MSW into compost.