

# *Introduction*

# CHAPTER - I

## INTRODUCTION

Environment is highly dynamic, multidimensional and an interdisciplinary concept which encompasses various elements concerning human settlements, water, air and land, which consequently influence all forms of life in one way or the other. A healthy environment means less pollution, less sickness, less misery which could result in greater productivity that leads to development. Environmental deterioration, depletion of resources and health problems are due to improper disposal of domestic waste whether in open dumps, inactive landfill or active landfill that are inadequately engineered in addition to other factors. Hence, today preservation of environment is one of the major concerns in the world.

Solid waste composting is a composting technique operating in a wide scale. Most solid waste composting facilities are source separated operation, where, biodegradable waste, are separated from non-degradable waste. These biosolid composts are co-composted with yard waste with the possible addition of effective nitrogenous fertilizer like urea. Generally, solid waste is disposed in three ways (i.e.) incineration, sanitary landfill and composting.

According to Crecchio *et al.* (2004) solid waste composts have been used to maintain the long term productivity of agro ecosystems and to protect the soil environment from over cropping and changes in climatic conditions. They also have additional benefit of reducing waste disposal costs. Solid waste compost not only influences soil fertility but also affect the composition and activity of soil microorganisms.

The applications of Municipal Solid Waste (MSW) composts significantly increase the amount of soil microbial biomass and there were significant increases in dehydrogenase and urease activities.

Jeyapriya and Saseetharan (2007) reported that the amount of solid waste generated in Coimbatore city has been increased dramatically during the past several years. On an average, the city generates 800 metric tonnes per day of solid waste from households, industries and manufacturing processes. Coimbatore Municipal Corporation, which is responsible for the collection and disposal of solid waste, is now facing problems associated with solid waste management system.

The concept of effective microorganisms (EM) was developed by Higa (1991). EM is a liquid concentrate consisting of mixed cultures of beneficial and naturally occurring microorganisms that can be applied as inoculants to increase the microbial density of soils. EM contain selected species of microorganisms including predominant population of lactic acid bacteria, yeasts, smaller number of photosynthetic bacteria, actinomycetes and other types of microorganisms. All of these are synergistic and coexist in liquid culture.

According to Higa and Wididana (1991), EM is not a substitute for other management practices. It is, however, an added dimension for optimizing soil and crop management practices such as crop rotations, use of organic amendments, conservation tillage, crop residue recycling and biocontrol of pests. The basic principle behind EM technology is that when introduced into an environment for biodegradation, it rapidly devours the methanogens and pollutants which are formed as a result of the chemical breakdown process. As a result, compost piles mixed with EM produce no harmful or offensive odors, and decompose very rapidly

into pure, nutrient rich composts, which can be directly infused back into the process of organic farming with astonishing results. Piles treated with EM have the ability to break down organic waste into useable compost in less than four weeks. Due to the organism's ability to antioxidantize root systems and purify toxic soils, plants grown in EM – rich soil can focus their energy on healthy development.

## **TEST CROPS**

### **Lady's finger [*Abelmoschus esculentus* (L.) Moench.]**

It is an economically important crop cultivated throughout India. It is a multiple use crop and is grown for its immature fruit, which is eaten as a cooked vegetable (Tindall, 1983 and Akanbi, 2002). Leaves, buds and flowers are also edible. Dried seeds are nutritious food which contains up to 20 per cent protein. The fibre from okra canes is a possible paper pulp source while the dried canes are a fuel source. Okra is rich in many nutrients, vitamins, folic acid, carbohydrates etc. and it has medicinal properties too (Plate – I).

### **Cow pea [*Vigna unguiculata* (L.) Walp.]**

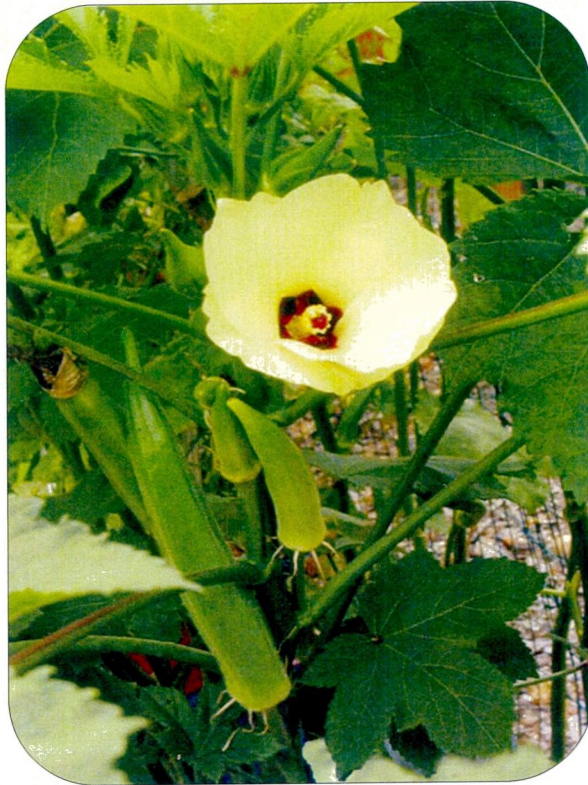
Cow pea is a tropical grain legume which plays an important nutritional role in developing countries of tropics and subtropics. Because of its high protein content (20 – 25 per cent), cow pea has been referred to as “poor man's meat”. Young leaves and pods of cow pea contain vitamins and minerals which have fuelled its usage for human consumption and animal feeding (Nielson *et al.*, 1997). It is a good supplement to staple foods. It has the ability to fix nitrogen in soil and it meets its own requirement. It is a rich source of lysine and tryptophan. It can fortify carbohydrate rich diet, so as to improve the nutritious value of food and fodder (Saxena and Yadav, 1973) (Plate – II).

Assessment of future solid waste management requires accurate knowledge of the quantity and quality of solid waste. The solid waste consists of paper, garden trimmings and yard waste, organic fractions (vegetable, fruit and food waste), jute, wood pieces, cloth, rubber and others. Easily degradable fractions can be segregated from non-biodegradable fractions and converted into nutrient enriched organic manure by eco-friendly cost effective, EM technology.

The overall goal of solid waste management is to collect, treat and dispose the waste generated by population in a socially satisfactory manner using the most economical means available. The success of this study not only gives permanent solution for land filling problems but also reduce the application of chemical fertilizers for crops.

## PLATE I

Test Plant Lady's finger  
(*Abelmoschus esculentus* (L.) Moench)



## PLATE II

Test Plant Cow Pea  
(*Vigna unguiculata* (L.) Walp)



With this background, the present study entitled, **“EFFICACY OF EFFECTIVE MICROORGANISMS (EM) ON BIODEGRADATION OF SOLID WASTE (SW) INTO ORGANIC MANURE AND ITS INFLUENCE ON TEST PLANTS”** was carried out with the following objectives.

1. To evolve an appropriate technology for the decomposition of solid waste(SW) into a nutrient enriched organic manure using Effective Microorganisms (EM).
2. To ascertain the compost maturity of EM-SW compost by analyzing biochemical parameters.
3. To assess the efficacy of EM-SW compost on test plants like Lady's finger and Cow pea by analyzing biometric, yield and biochemical parameters.
4. To assess the impact of EM-SW compost by analyzing the biochemical parameters of soil profile (enzymology) of test plants.
5. To analyze the influence of EM-SW compost by determining NPK levels during pre and post harvest days of the soil.