INTRODUCTION

Agriculture has provided livelihood to over half of the world's population today and it has been the basic source of subsistence of man over thousands of years. India's agricultural practices date back to more than 4000 years. Farmers in the Vedic period possessed fare knowledge of soil fertility, seed selection, plant protection, season of sowing and sustainability of plants in different lands and this has helped in maintaining the soil fertility over a long period of time.

During the late 1960 in India, green revolution technologies were adopted using synthetic fertilizers and pesticides with nutrient-responsive, high-yielding varieties of crops. This has boosted the production output per hectare and helped the country to become food surplus but has caused problems affecting natural resources, human health as well as agriculture. As a result, the natural resources are depleting and the threat to the environment in the form of pollution and toxicity is increasing (Stewart, 1991 and Rao, 1999). Hence, scientists, farmers and policy planners are having a re-look at the traditional agricultural practices, which rely more on biological inputs, rather than heavy usage of chemical fertilizers, pesticides, etc. (Pretty, 2000).

There is also a major-shift in consumer preference towards food quality as there is an increasing consciousness about the health hazards caused by agrochemicals. Globally consumers are increasingly looking forward to organic food that is considered safe and disease-free (Kortbech-olesen, 2000).
At this juncture there is an urgent need to develop sustainable farming techniques. Sustainable farming combines traditional techniques that involves conservation with modern technology such as improved seed, modern equipment for low tillage practices, integrated pest management and weed control, thereby reducing environmental degradation. Sustainable farms try to use wind or solar energy instead of purchased energy and use organic animal manure and nitrogen fixing legumes as green manure to maintain soil fertility. Organic farming is the most widely recognized eco-friendly farming system. It helps to improve the physical, chemical and biological properties of the soil and maintains the ecological balance, as well as productivity of life supporting systems for the future generations (Welsh, 1999).

According to Pathak (1992), the success of organic farming strategies would depend on long term whole farm systems involving all aspects of crop production that will maintain soil productivity and reduce dependence on chemical inputs.

Organic farming is therefore often termed as knowledge-based rather than input-based agriculture (Ramesh et al., 2005). Although the concept of organic agriculture has received much collaboration at different levels, the description offered by Lamphlin (1990) has been found to be the most comprehensive on covering all essential features. According to him organic agriculture is a production system which avoids and excludes the use of synthetically compounded fertilizers, pesticides, growth regulators and livestock feed additives. Organic farming systems rely on crop rotations, crop residues, animal manure, legumes, green manure, off-farm wastes and biopesticides to control pests and weeds and to maintain soil and plant
productivity. The Codex Alimentarius Commission defines organic agriculture as a holistic food production management system, which promotes and enhances agro ecosystem health, including bio-diversity, biological cycles and soil biological activity (FAO, 1999).

Organic farming aims mainly to work within a close system using local resources to maintain long-term fertility of the soil and avoid all forms of pollution caused by agricultural techniques. In addition it also aims at reducing the use of fossil energy in agricultural practices and provide food stuff of high nutritional quality in sufficient quantity.

**CONCEPT OF ORGANIC FARMING:**

The concept of organic farming has been getting very popular of late with many advocating to return to traditional methods of agriculture. The organic food business is growing and is fast becoming a very lucrative one. According to the organic overview report, sales of organic produce have risen to a record of $2.8 billion a year.

Organic farming includes two major aspects of alternative agriculture such as:

a) The substitution of manures and other organic matter for inorganic fertilizers

b) The use of biological pest control instead of chemical pest control.

In organic systems or mixed farming there is a synergistic interaction between plants, animals, soils and the biosphere. It prevents degradation, improves soil life and structure and improves infiltration and retention of rain water. Domestic animals in organic agriculture systems are linked with the soil,
resulting in feed and manure production for the farm, leading to increased food production for human consumption.

Living soils are a source and storage mechanism for nutrients for crops. Deep-rooting plants bring mineral deposits from deeper soil layers into the nutrient cycle. Nodulation, nitrogen-fixing and de-nitrifying bacteria, P-solubilizing bacteria and root symbiosis with mycorrhiza are all highly valued for their energy efficiency and crop growth compatibility. However, organic farming is by no means the only one sustainable agriculture. But it is generally considered to be under the sustainable agriculture “umbrella”. The commercial industrial technologies that are used in agriculture today to feed the world are not inherently sustainable. We are also losing the top soil, salinity of soil as a result of irrigation, and ultimate reliance on petrochemicals are obviously not renewable and that clearly is not sustainable also. I don’t think we really need to embark upon another risky technological fix to solve the mistakes of a previous one. Instead, we should be looking for solutions that are based on ecological and biological principles and have significantly fewer environmental losses. There is such an alternative that has been pioneered by organic farmers. In contrast to the industrial monoculture approach advocated by the biotech industry, organic agriculture is described by the United Nations Food and Agriculture Organisation (FAO), as a holistic production system which promotes and enhances agro-ecosystem health, including bio-diversity, biological cycles and soil biological activity.

Consumer demand for organic products is driving the organic movement ahead at a 20% annual rate of market growth primarily with the
help of an increasing consumer demand for organic products. The amount of certified organic agriculture land is increasing day by day.

The agribusiness critics and academia express that "If overnight all our food supply were suddenly organic, to feed today's population we'd have plowed down half of the world's land area not under ice to get organic food because organic farmers waste so much land. They have to because they lose so much of their crops to weeds and insects".

In fact, as a number of studies attest, organic farming methods can produce higher yield than conventional methods. Moreover, a worldwide conversion to organic has the potential to increase food production levels; not to mention reversing the degradation of agricultural soils and increase soil fertility and health (Jenkinson, 1994; Welsh, 1999 and Raupp et al., 2006). Keeping these aspects of organic farming in mind, a study was undertaken to produce an organic manure that would improve crop growth. The following objectives were planned to be tackled to effectively increase growth, yield and nutrients in the crops. Vegetables like Palak, Tomatoes, Cluster beans and the medicinal plant Coleus forskohlii were chosen as the bioassay crops to accomplish our study.

The objectives were:

1. Standardization of procedure for organic-rich manure formation.
3. To unearth the biochemical process involved in organic-rich manure formation by analyzing:
   (a) Chemical changes in soil during litter decomposition.
   (b) Pattern of changes in microbial number in the decomposition material
4. Protocols to enrich the effect of manure using additives like:

(a) Hormones to increase rooting in *Coleus sps*.

(b) Usage of light wavelength to increase the production of tuber and forskolin in the tuber of *Coleus sps*.

The thesis has two chapters. The first chapter covers the methods of production of manures, the science of decomposition during the formation of manures, covering the release of nutrients, the changes in the microbial numbers and the bioassay as experimentation.

The second chapter concentrates on the protocols for producing value added vegetables, influence of hormones and light wavelength on increased quality and quantity of proteins and alkaloids in the legume *Cyamopsis tetragonoloba* and in the medicinal plant *Coleus forskohlii*, respectively.

In this thesis we are only giving the details of our experimentation to produce protocols for this technology and this will be transferred to the organic farmers to practice along with other procedures of organic farming. Here we are not dealing with aspects of organic land certification, the production certification, marketing, etc. These procedures will follow once the farmer starts incorporating these ideas and procedures into his cultivation practices for sustainable agriculture.