Chapter 1 - General Introduction
1. GENERAL INTRODUCTION

The emergence of forest biomass as promising alternate sources of energy on a global scale necessitates bringing about forestry revolution based on lessons from India's Green Revolution. Escalating wood demand, shortcomings in implementation of the forest policy coupled with undue political and public interference at the local level, have over the yrs turned India into a wood deficit and wood importing country. Associated with this is the decline in forest cover, accompanied by environmental, social and economic decline. If unprevented this may lead towards an irreversible large scale desertification of our breadbasket regions.

The basic problem in forestry in India is the widening gap between supply and demand of wood on account of over population and low productivity of the planting stock. The annual requirement of firewood, timber and paper and pulp of the country is atleast 280 million m$^3$ but our mean annual increment from the forests is only 52 million m$^3$ (1.24%). Our productivity is 0.7 m$^3$ of wood per ha per yr, which is also the lowest in the world (Khoshoo, 1996). In addition, there are 200 to 400 million cattle which cause fodder crisis and compaction of the forest floor by trampling. This in turn also affects the forest cover.

The goals of forestry involve taking short and long range practical steps which would be hard, nonpopulist but pro-nature, pro-poor, pro-woman and pro-job generation decision. One type of forestry that emanates from such goals
is Restoration forestry. This brings about amelioration of degraded forest areas and wastelands so as to green and then enhance the productive capacity of such derelict lands and to improve general aesthetics. There are many instances where after 15-20 yrs natural forest composition takes place over in such areas (Khoshoo, 1987).

A well thoughtout programme of enhancement of productivity involves selection of suitable ideotypes, improving the quality of planting materials, species and site matching, site amelioration, applying and adopting plantation practices and models for commercial and farm forestry production (Khoshoo, 1996).

Plantation practices shift the dependence for fibre, fuel and fodder from natural forests which are only 23% as opposed to 33% envisaged under National Forest Policy Resolution. Plantation establishment is also a viable option to sequester and conserve carbon in terrestrial ecosystems (Dixon et al., 1993).

Sustainable management of plantations needs strengthening of scientific bases. Understanding natural mechanisms of productivity and mineral cycling, in addition to the principles of silviculture will help to develop an integrated strategy for resource management in a sustainable manner.

With the multiple aim of ameliorating the edaphic conditions, alleviating the fuel and fodder crisis met by the local people, enhancing the aesthetics of the campus and generating revenue, suitable tree species were planted in 1987 in the Campus of Bharathidasan University, Tiruchirapalli.
A few such plantations subjected to present study were *Acacia auriculiformis* A. Cunn. ex Benth, *Acacia holosericea* A. Cunn ex Don, *Casuarina equisetifolia* J.R.Forst & G.Forst., *Eucalyptus tereticornis* Sm. and *Leucaena leucocephala* (Lam.) De Wit (Mathew, 1983 and Brummitt and Powell, 1992).

A study of productivity and mineral cycling was undertaken to perceive the intricacy underlying productivity and mineral cycling phenomena, to assess the superior and suitable species and to devise management strategies for sustainable use of the above mentioned plantations with the following objectives:

1. Growth Characteristics - Morphometric studies
2. Estimation of total standing biomass
3. Estimation of Mean Annual Net Productivity (MANP)
4. Examination of biomass allocation to different plant components
5. Comparison of growth in terms of organic matter accumulation and productivity
6. Modelling of drymatter transfer in *A. auriculiformis, A. holosericea, C. equisetifolia, E. tereticornis* and *L. leucocephala* plantations
7. Estimation of Nitrogen (N), Phosphorous (P), Potassium (K), Calcium (Ca) and Magnesium (Mg) in a. standing crop b. Litterfall and c. decomposing litter of experimental species
8. Quantification of soil respiration in the study sites
9. Preparation of nutrient budgets for *A. auriculiformis, A. holosericea C. equisetifolia, E. tereticornis* and *L. leucocephala* plantations and
10. Comparison of performance of the 5 experimental species with regard to productivity and nutrient cycling.