1. General Introduction

Bamboos are the most useful group of plants, belonging to the family Poaceae (Mc Clure, 1966). There are over 75 genera and 1250 species of bamboos growing in the world (Appasamy, 1993). In India alone, about 130 species belonging to 24 genera have been reported (Sharma, 1987). They are giant, woody, tree-like grasses having a long history as an exceptionally versatile and widely used natural resource. It is, the single-most item of forest produce used by rural communities of the tropics from the “cradle-to coffin”. Especially in Asia, where it is known as “the poor man’s timber” and “green- gold”, bamboo has been providing, the materials needed for existence.

Bamboo is a very important natural product and has traditional links with human beings. Kalidasa talks of the melody of wind whistling through a bamboo clump. God Krishna playing a bamboo flute is the most endearing figure of Indian mythology. Shoots and seeds of few bamboos are edible. The leaves are an excellent source of fodder for cattle in summer. Ayurvedic ‘Meteria Medica’ mentions several uses for its roots and leaves. It is a prime material for rural house
construction. Bamboo is also an eminently renewable resource. Whole communities in Asia earn their living by weaving rugged bamboo cane into baskets, mats, carpets and furniture. Its fibre constitutes a rich raw material for the paper and pulp industry, while its young shoots serve as a protein-rich food for man and livestock. Bamboo is also an important source of fuel, timber etc. Around 10 million tonnes of bamboo is produced annually in the world. In India, 44 percent of paper mills depend on forest materials in which bamboo constitutes 60 percent.

Bamboos are mainly propagated by seeds. But seed propagation is unreliable due to the long and unpredictable flowering habit i.e 30 to 100 years (Anonymous, 1948). Possibilities of raising bamboo plantations from seeds are not always practical because of long flowering cycles and quick seed deterioration (Uchimura, 1980). Even though huge quantities of seeds are produced during gregarious flowering, they cannot be utilised because of rapid loss of viability. A practical solution to maintain the seeds in viable condition is to develop suitable seed storage technology, so that seeds are made available to the planter whenever needed. In this direction very little has been done to evolve suitable method for storage of bamboo seeds (White, 1947; Gupta and Sood, 1978; Soman and Seethalakshmi, 1989). Hence, in the present work an attempt has been made to develop a suitable seed storage technique with a view to prolong the seed viability.

Bamboo regeneration in nature takes place through rhizomes and seeds. However, for raising nursery stocks, cuttings and clumps have also been tried out but with limited success. Several studies have been carried out on propagation of bamboo by conventional methods (Yeh and Chang, 1986a,b; 1987; Banik, 1987). These methods have their merits and demerits (Kamondo and Haq, 1990). In recent years, in vitro culture methods offer an attractive alternative to conventional methods.
for the mass propagation of bamboos. The two important methods that can be utilised for this purpose are, somatic embryogenesis and micropropagation. The improvements in the bamboo propagation research in general and tissue culture technique in particular during the last decade provide a new hope of evolving protocols for large scale propagation. Most of the research work on tissue culture of bamboos dealt with somatic embryogenesis. There are a few reports on regeneration from callus and multiplication through axillary - buds. The present study has been planned to induce axillary - bud sprouting and to establish a protocol for efficient regeneration from seed derived callus.

Bamboo, being a fast growing plant, requires more nutrients during the initial stages of seedling establishment. It is believed that nutrient requirements for growth were met from the seed itself. If the seed quality is not high, the seedling then starts to depend completely upon the root system (Cheung et al., 1987; Ravikumar et al., 1997). However, during early stages of seedling development, the root system will not effectively perform the function of drawing up water and nutrients. At this juncture the VAM fungal symbiosis was proved to play a vital role in such stress conditions by supplying the nutrients to the host plant. Another point worth mentioning is VAMF - association with higher plants is 'species-specific'. Therefore a goal oriented selection of organisms best suited for specific purpose is warranted.

Although slow growth rate after out-planting is common in most hard-wood trees, the problem may atleast be partially alleviated by introducing beneficial and efficient mycorrhizal fungi at the nursery stage. In general, there are two types of mycorrhizae viz., endo and ecto mycorrhizae. It is well established that mycorrhizal associations enhance the nutrient uptake in most forest trees. The mycorrhizae absorb minerals from soil and translocate them to the host plant and also produce
some vital enzymes, vitamins, hormones and other compounds which are nutritive to the host tree/plant.

Success of *in vitro* culture studies depend on the survival of *in vitro* raised plantlets in the field. They face problems at the transplantation and nursery stages and even those that have survived did not perform appreciably well in the field. Scanning of bamboo literature reveals that works on Bamboo-mycorrhizae association in general and their role at nursery stage in particular are very scanty. The present study envisages to survey and select efficient VAMF strain from the natural rhizosphere soils with a view to utilize them in tissue culture raised bamboo plantlets at the nursery stage to finding out their positive role in acclimatization and growth.

The present study is therefore aimed at the following objectives:

1. To evolve suitable seed storage condition for prolonging viability of *Dendrocalamus strictus* Nees
2. To find out biochemical changes taking place during storage in relation to loss of viability and seedling vigour in *D. strictus*
3. To examine the biochemical changes and viability of *D. strictus* and *Bambusa bambos* Willd. in relation to accelerated ageing
4. To develop a protocol for the micropropagation of *D. strictus* and *B. bambos*
5. To study the regeneration efficiency of seed derived callus from *D. strictus* and *B. bambos*
6. To conduct survey to identify VAMF association in the natural rhizosphere soils of bamboos in five districts of Tamil Nadu
7. To carry out experimental studies to assess the role of VAMF species (*Glomus aggregatum*, *Glomus fasciculatum* and *Glomus mosseae*) on the *in vitro* raised plantlets of *B. bambos* at the nursery stage and
8. To study the changes in biochemical constituents and biomass productivity on the application of VAMF.