Preface

Plant tissue culture is one of the important reasons behind the success of biotechnology. The technique helps to give rise to genetically identical copies of parent plant without damaging the mother plant. *In vitro* propagation provides a solution for mass propagation of rare, threatened and endangered plants.

North East India has been well known of its rich biological diversity and Barak Valley of Assam is well known for its plant biodiversity, especially medicinal plant diversity. Karimganj, Hailakandi and Cachar are the three districts of Barak Valley of Assam. North East region of India is one of the Biodiversity hotspots among twenty-five biodiversity hotspots of the world.

The over exploitation of plant resources, with increasing habitat destruction and /or fragmentation, pollution and introduction of exotic species are the important reasons for many plant species extinction. Today it is widely accepted that the rate of plant extinction has reached one species per day due to human activities, a rate some 1000-10000 times faster than would naturally occur otherwise (Hilton-Taylor,2000) Species which are either extinct in the wild (EW) or critically endangered (CR) are high priority to rescue and conservation using *in vitro* measures (Sarasan *et al*.,2006). There are 250000 higher plant species on earth and of them 80000 plants have medicinal property. About 5000 species are used in traditional system of medicine. *The Red Data Book of India* has 427 entries of endangered species of which 28 are treated as extinct, 124 threatened, 81vulnerable, 100 rare and 34 insufficiently known species (Thomas, 1997).

Cyathea gigantea Wall Ex. Hook is a tree fern. During the recent years, *C. gigantea* Wall Ex. Hook is depleting at an alarming rate and presently the species is nowhere abundant or frequent as reported by Baishya and Rao (1982) and this species is treated as one of the endangered plants of India (Beniwal,1994). *Dioscorea alata* L. is an important tuber crop and is a staple food for millions of peoples in tropical and subtropical countries (Edison *et*

al., 2006) and it is an endangered species (Choudhury *et al*., 2002). *Arundina graminifolia* (D. Don)Hochr. is commonly known as bamboo orchid. Bamboo orchid is a terrestrial perennial orchid and it is an endangered orchid (Jain and Sastry,1980). *Kaempferia parviflora* Wall. ex. Baker is a herbaceous plant belonging to Zingiberaceae family (Sirirugsa,1992) with a large number of medicinal importance. Its black to purple rhizomes used as flavouring agent in local food and as a folklore medicinal plant for the treatment of a wide spectrum of illness.

India has one of the richest ethnobotanical traditions in the world with more than 700 species of plants used in different indigenous systems of medicine and industries. Over 95% of plants used by the herbal and pharmaceutical industries are collected from wild sources. Given the alarming rate of loss of biodiversity due to other well-known factors with the indiscriminate collection of wild medicinal plants, there is a real danger of extinction of many of our medicinal plant species. In the phase of serious threat to biodiversity, it is extremely important to take urgent steps to conserve medicinal plants genetic resources.

According to the World Resource Institute, India place among 28 countries that are facing severe effects of increasing ecological imbalance. The IUCN Report reveals that in India 7.7% of the plants are under threat. In conservational aspect plant tissue culture is an effective tool to conserve the plant genes and guarantee the survival of the endemic, endangered and over exploited genotypes.

In the present work four species (*Cyathea gigantea, Dioscorea alata, Arundina graminifolia, Kaempferia parviflora*) are selected for *in vitro* propagation. Successful culture from different explants had been obtained on MS medium supplemented with different growth regulators (IAA, NAA, BAP, KN) on the basis of trial and error method. The successful establishment of *in vitro* propagation protocol for the selected species will pave the way for conservation and save the species from expected extinction.

The total experiments of the present study have been illustrated in 19 tables, 15 figures, 11 photoplates. First figure of the present report shows the map of

study site. Figure 2,4,6,7 shows the photographs of plant under study in natural habitat. Growth of sporophyte of *Cyathea gigantea* in terms of dry weight and fresh weight and effect of various concentrations of growth regulators on sporophyte length is illustrated by the figure 8, 9. Figure 10, 11 shows the effect of various concentration of hormone on shoot length and root length of *Dioscorea alata* respectively. Effect of growth regulators on shoot length and root length of *Arundina graminifolia* is illustrated in figure 12, 13 respectively. Figure 14 and 15 shows the effect of growth regulators on shoot length and root length of *Kaempferia parviflora.*

Photoplate 1 shows the inoculated culture bottles and developing plants under study. Plate 2 shows the developing stages of *Cyathea gigantea* in MS basal medium. Plate 3, 4 shows the growth stages of *Cyathea gigantea* on MS medium with growth regulators. Plate 5 shows the structure of sporangium of *Cyathea gigantea.* Plate 6,7 shows the different growth stage of *Dioscorea alata.* Plate 8 reveals the different growth stages of *Arundina graminifolia*. Plate 9,10 shows the growth stages of *Kaempferia parviflora* on different treatment. Photoplate 11 shows field transfered plants.

Out of the 19 tables, table 3.1 shows steriliation technique. Tables 3.2, 3.3, 3.4 and 3.5 show the preparation of stock solution of MS macrosalts (10x), MS microsalts (100x), MS vitamins (100x) and plant growth regulators respectively. Table 3.6 shows the minimum time necessary for autoclaving. Table 4.1, show germination percentage of spore. Table 4.2 and 4.3 represent the data of growth of gametophyte and growth of sporophyte. Table 4.4 shows sporophyte length. Table 4.5 shows effect of IAA on axillary bud proliferation in *Dioscorea alata.* Table 4.6 and 4.7 represent the data of shoot and root formation of the same plant.Table 4.8, 4.9, 4.10 represent the data collected during *in vitro* culture of *Arundina graminifolia.*Table 4.11 and 4.12 show the shoot growth of *Kaempferia parviflora* on different hormone and table 4.13 show root growth of the same plant.