Chapter 1

INTRODUCTION

The tropical rain forests have been the natural abode of most of the medicinal plants used all over the world. The dense canopy of such forests provide dense shade under which these plants could flourish. With the rapid explosion in human population and consequent pressure on cultivable land, denudation of forest has become widespread posing serious ecological imbalances. One of the prime victims of such deforestation is the medicinal plants.

On the other hand, there has been a new global interest in medicinal plants due to their pharmaceutical potentialities. There has been a shift in the consumption of medicines from synthetic to natural as the latter is regarded as harmless. A large percentage of medicines now available in the western market has herbal origin. Tropical countries can exploit this market demand if they can cultivate the medicinal plants on commercial scale and export them (Joseph et al., 1995).

Commercial cultivation of any plant species requires development of appropriate agrotechnology. It therefore becomes imperative to study the optimum conditions which favour growth and yield of marketable parts of medicinal plants. An understanding of the ecophysiology of these plant species is a primary requirement in this direction. Studies in this area are scanty as evidenced by scarcity of literature on these aspects.

In India, one of the potential areas for growing these plants is the west coast of peninsular India as intercrops in tropical plantation crops. The major plantation crop of
south India is coconut. The feasibility of cultivating medicinal plants as intercrop in coconut gardens have been investigated (Nair et al., 1991). Although some of the medicinal plants could be successfully cultivated in coconut gardens, the higher light penetration under the coconut canopy permits cultivation of easily marketable agricultural crops and as such they may get farmers’ preference.

Rubber (*Hevea brasiliensis*) is the second most widely cultivated plantation crop in the west coast, occupying more than five lakh hectares. The rubber plantations have a long gestation period of seven years before any returns could be obtained. Cultivation of agricultural crops as intercrops is possible in the first three years of growth of rubber (Mathew et al., 1978). But by the fourth year, the canopy of the trees closes and light penetration is restricted to the extent that agricultural crops cannot be cultivated. The cultivation of shade loving medicinal plants appears a viable proposal from the fourth year onwards. If found viable, it will serve as source of income especially for the small farmers who have to wait further to get returns from the rubber trees. It is in this context that the medicinal plants which are adapted to shade need be evaluated for cultivation as intercrop in rubber plantations.

Several rubber clones are under cultivation in different regions. The architecture of the canopy of individual clones vary. Consequently, the pattern and intensity of light penetration under each clone also varies (Satheesan et al., 1982, 1984). Identification of medicinal plants which are ideally suited for cultivation under different light regimes will help in clone wise recommendation of medicinal plants for intercropping.

Preliminary studies at the Rubber Research Institute of India (RRII) have identified a few commercially important medicinal plants suitable for cultivation under rubber canopy (Rubber Research Institute of India, 1990, Sathik et al., 1995). These
include *Plumbago rosea*, *Adhatoda beddomei*, *Adhatoda vasica*, *Alpinia galanga* and *Strobilanthes heyneanus*. These medicinal plants are important ingredients in many ayurvedic medicines. Species of *Adhatoda* are known for their bronchodilatory and antispasmodic properties. The rhizome of *Alpinia galanga* has diuretic, carminative and expectorant properties. *Plumbago rosea* is widely used for the cure of leprosy, anemia, diabetes, diarrhoea, dyspepsia and leucoderma. *Strobilanthes heyneanus* is used against neurological disorders, gandular swellings, skin diseases etc (Asolkar *et al.*, 1992; Chopra *et al.*, 1992; Kirtiker and Basu, 1984; Sivarajan and Indira, 1995).

The present study envisages investigation on the light requirements of the selected medicinal plants, aimed at elucidating the physiology of adaptation to shade at different phases of its phenology. Growth and yield of these plants under different light regimes, photosynthesis and other related physiological phenomena, differentiation and light and nutrient interaction are the major aspects covered under this study.