

# INTRODUCTION

Forests are one of the most important natural resources and deserve a prominent status in the national economy. In fact, forest is a wealth of nation. It's importance at the national level lies chiefly in the following aspects. Forests are a major factor of environmental conservation and control extremes of heat and cold, rendering the climate equable. Forest affords protection to animals and crops against strong, cold or hot and dry winds and rays of the sun and prevents desiccation and vegetative retrogression. Forests tend to increase local precipitation, at least to the extent of increasing the number of rainy days. Forests improve the soil towards it's fertility. It helps to prevent soil erosion, landslips, shifting sands and silting up and consequent overflowing of rivers, thus reducing the danger of floods. Forests supply timber, fuel, pulpwood, and other varied products, which in turn support major industrial activity in various sectors and provide large scale employment.

Trees and shrubs usually dominate the flora of a forest. Trees have different meanings for different people. For our ancestors they were a source of fuel and shelter and some times an object of worship. To the home owner they are a source of

pleasant shade in summer, but in the autumn, a nuisance which shed leaves on the lawn. Wood was once the chief source of fuel and, as other fuels become scarcer, trees may again become an important renewable source of fuel. To the arborist trees are ornamental object in the landscape, to the conservationists and sportsmen they protect water sheds and game and provide recreation, to the foresters they are a source of timber and pulp wood, and to horticulturalists they are a means of producing fruits. A large variety of economic plants are obtained from forests such as medicinal and aromatic plants, fibre yielding plants and edible and non-edible oil plants. A wide variety of other products that come from forests are rubber, cocoa, quinine, katth and catch, lac and shellach. Tannins, oils and dyes are obtained from wood, bark, leaves and fruits of the plants.

The type of a tree species, it's distribution and frequency of occurrence in the forests are determined by the environmental conditions. Due to a wide variation in the climatic conditions in India, we can get various types of forests. Tropical and Temperate forests are the major zones of forests in our country. The studies indicated that the flora of Indian forests is highly rich in a variety of plant species.

If we look at the geographical area it can be seen that

the forests are spread more or less in about 20 per cent of the total area. However, to maintain the environmental balance and ecology, it is advised to have more than 33 percent geographical area under the tree cover. Thus to increase the forests area, particularly in our country, the concept of social forestry has come up. Social forestry, agroforestry, silviculture and many such practices are to be introduced and practiced to increase the forest area in the country.

The arborists, foresters, and horticulturalists are interested primarily how to grow trees efficiently while plant physiologists are primarily interested in learning how trees grow. The two objectives are more closely related than generally supposed, because in order to grow trees efficiently one must understand the basic physiological processes which control growth and how they are affected by environmental factors and cultural processes. Thus basic physiological research can contribute to silvicultural and horticultural research and vice-versa. The greatest overall progress will occur when physiologists learn more about how trees grow while foresters and horticulturalists learn more about the physiology of trees, and the two groups co-operate to solve the problems of growing trees as efficiently as possible. The general role of plant physiology is to explain how plants grow, respond to environmental factors and cultural treatments in terms of

their physiological processes and conditions. Study of processes such as photosynthesis, translocation, assimilation, respiration and transpiration may seem far removed from the practice of forest tree or horticulture. However, growth is result of the interaction of physiological processes, and in order to understand why trees grow differently in various environments and with different cultural treatments, it is necessary to understand the nature of these physiological processes and how they are affected by environment. Nearly every one knows that the growth of trees, like that of all other organisms is controlled by their inherited genetic potentialities and their environment. But too little consideration is given to the means by which this control is exerted. Therefore, we need a better understanding how various causes produce their respective effects.

Some of the important physiological conditions affecting tree growth are amount and efficiency of chlorophylls, kinds and amounts of carbohydrates present and their inter conversion, kinds and amounts of nitrogen compounds and the ratio of carbohydrates to nitrogen and kinds and amounts of other constituents such as fats, and phenolics.

Inspite of various forestry programmes, it is observed that the area under forest in our country is deminishing day by day due to deforestation, improper management and poor

understanding of the nature and the pattern of growth of tree species. This certainly is a serious matter as far as the human welfare is considered. Thus it can be said that a day has come to think over the problem quite seriously. In this background one must put all his efforts in Indian forestry. It is necessary now to undertake various studies in forestry to understand the problems and difficulties in successful forestry. To study the behaviour of various forest trees, it is highly essential to understand the natural pattern of growth and development of a tree species.

With this view in mind the present investigation was undertaken. An attempt has been made to study some of the preliminary physiological aspects. In fact, from the point of view of size and complexity of organization, trees represent the highest development of the plant kingdom and to interpret their form and behaviour in physiological terms is the ultimate challenge for the plant physiologists. In the present investigation the chlorophyll, carbohydrate, proline and polyphenol contents of different parts such as young, mature and senescent leaves, stem, bark, fruits and seeds of Sesbania grandiflora Press., Moringa pterygosperma Gaertn., Emblica officinalis Gaertn., Tamarindus indica Linn., Azadirachta indica A.Juss., Acacia arabica Willd., Lucaena leucocephala Linn., Polyalthia longifolia Blume. have been determined. An attempt has also been made to analyse polyphenols qualitatively in different parts of some polyphenol rich tree species namely -

Embllica officinalis, Acacia arabica, Polyalthia longifolia and Lucaena leucocephala. For these studies recent and advanced methods have been followed. UV-spectrophotometry and two dimensional paper chromatography techniques have been extensively followed. For convenience and presentation, the thesis has been divided in different parts. "Review of Literature" Chapter-I is in fact the first part of this thesis. This part describes importance of forestry in India, economic importance of some well known tree species, principles, perspective and problems and scope of the present investigation in understanding the physiology of tree species. The second part of the thesis "Materials and Methods" (Chapter-II) describes the details of methodology adopted for various analytical experiments. The observation made and results obtained have been discussed critically Chapter-III, Results and Discussion in the light of most recent and upto date Literature in the form of abstracts, papers, reprints, journals, books and monographs. The aim of the investigation, current status of the problem, the methodology adopted and the observations made have been summarised briefly in "Summary and Conclusion". The literature used for review and discussion in the form of journals, books and monographs has been arranged systematically in the last part of the thesis "Bibliography".

The present investigation throws some light on the extent of growth rate in the tree species investigated and on identification of better sources of proteins, carotenoids, carbohydrates and commercially important source of tannins. The investigation also explains the physiology of leaf ageing in tree species.