

## Productivity studies in selected commercial tree species of tropics

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### ABSTRACT

Detailed investigations were conducted in Kerala Agricultural University, Vellanikkara to evaluate the growth performance, biomass production, physical properties of wood and leaf nutrients of commercial multipurpose tree species grown in the arboretum during the period from 1992 to 2007. A total of 12 species were included in the study with an objective of screening the promising species for their further multiplication for large scale distribution to farmers for farm/agro forestry and general afforestation programme. The results of the study revealed that among the species studied, species like *Terminalia tomentosa*, *Terminalia bellerica*, *Acacia auriculiformis* and *Acacia mangium* were found fast growing in terms of most of the vegetative growth parameters studied. The total biomass production was found to be maximum for *Terminalia tomentosa* followed by *Adenanthera pavonina* while the lowest total biomass was produced by *Swietenia macrophylla* in terms of both fresh and dry weight. Trunk accounted for maximum biomass production followed by branches. *Acacia mangium* and *Acacia auriculiformis* produced more heartwood compared to other species. *Terminalia bellerica*, *Artocarpus hirsutus* and *Acacia auriculiformis* were having high calorific values and hence could be used for fuel wood purpose also. Specific gravity was found to be maximum for *Swietenia macrophylla* and minimum for *Terminalia bellerica*. The N and P content were found to be maximum in *Adenanthera pavonina* while potassium in *Tectona grandis*. The present series of investigations clearly indicate that there is wide scope for selecting tree species based on their growth behaviour, wood properties and tissue nutrient content before recommending for commercial cultivation under social/agroforestry programme.

**Key words :** Growth, Biomass, Specific gravity, Calorific value, Heartwood, Sapwood

### INTRODUCTION

Raising plantations in degraded areas and other bare lands play an important role in promoting sustainable development in the tropics by reducing the pressure on natural ecosystems for fibre, timber, fuel wood, fodder and other needs. Planting of quick growing multipurpose tree species which can meet the various needs of the community, is of great importance in social/farm forestry system. Trees will also help in arresting the deterioration of the environment and improving the quality of life of people. To achieve the above objectives, a thorough knowledge of growth habit of various tree species is inevitable. Biomass produced by tree species is also important for carbon sequestration and these trees should be useful for small timber purpose also. So the wood properties and biomass production should be given importance in the choice of species. In addition to fodder values, leaf biomass of tree species are rich sources of nutrients which are essential for plant growth. Incorporation of leaf litters will improve the nutrient status of the soil without any deleterious effects on physical or chemical properties. Hence, selection of tree species with leaf biomass rich in nutrients is another need of the day. The present study was taken up to enable the researchers to screen the species for various purposes.

### MATERIALS AND METHODS

The present investigations were carried out at the instructional farm, College of Forestry, Kerala

Agricultural University, Vellanikkara, Thrissur, Kerala, during the period 1992 to 2007. The experimental materials consist of 12 trees each of 12 important tree species planted in the instructional farm at a spacing of 4 x 4 m. Uniform seedlings were planted during 1991-92 and are being maintained. The species included in the study were: *Acacia auriculiformis* (Acacia), *Acacia mangium* (Mangium), *Adenanthera pavonina* (Manchadi), *Ailanthus triphysa* (Matti), *Artocarpus hirsutus* (Anjali), *Bridelia retusa* (Kaini), *Grevillea robusta* (Silver oak), *Swietenia macrophylla* (Mahogany), *Tectona grandis*. (Teak), *Terminalia bellerica* (Thanni), *Terminalia tomentosa* (Karimaruthu) and *Xylia xylocarpa* (Irul).

Height, commercial bole height, girth and number of branches were recorded at yearly intervals. For biomass estimation, the trees were felled and then partitioned into stem wood, branch wood, twigs and foliage. Fresh weights of all the above ground components were recorded tree wise using appropriate spring scales. Moisture percentage of each portions of the felled trees was found out separately and dry weight was estimated. Physical properties like heartwood percentage, sapwood percentage, heartwood: sapwood ratio, bark percentage, calorific value and sp. gravity were determined. The samples of leaves of each of the tree species were dried, powdered and analysed for the major nutrient elements viz., N, P and K using standard procedures.