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Biomass production and carbon sequestration through agroforestry

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Abstract

Productivity of any vegetation system mainly depends on biomass production and carbon storage potential in their different components, which are affected by nature and age of plant, and other climatic, edaphic, topographic and biotic factors. In different vegetation systems, the bole/ stem biomass contributed 28 to 86% of total aboveground biomass. The percentage contributions of bole, branch and leaf were 65-76, 14-19, 3-12 for fast growing tree species. In case of other tree based systems stem contributed about 76 to 80%, branch 11 to 29% and leaves 3 to 14% of aboveground biomass. A tree allocates on an average 81.89% to above ground biomass (stem, branch, leaves and litter) and 18.11% to below ground biomass (roots). The available estimates of carbon stored in tree based systems ranged from 0.29 to 15.21 Mg C $ha^{-1}year^{-1}$ in above ground and 30-300 Mg C ha^{-1} upto 1 m depth in the soil. Soil carbon storage potential in agroforestry systems differed from system to system and highest storage potential was observed in homegardens where it stored 119.3 t SOC per hectare.

(Singh, 1994). However, the biomass and productivity estimates of tree species vary from place to place due to variation in climate, soil, temperature and rainfall (Lodhiyal *et al.*, 2002). Assessment of biomass is helpful in determining the productivity, carbon stock, carbon sequestration and nutrient cycling performance of tree species. Although biomass has long been of principal importance and interest in forestry, a research study of forest productivity and biomass was given impetus by the work of Ovington (1956) who developed a relationship between phenology of tree and dry matter production which depends on the site conditions. Biomass is also an essential aspect of studies of carbon cycle (Ketterings *et al.*, 2001). Earlier foresters were interested in standing crop rather than biomass but with the development of more complete utilization of trees, biomass is becoming their major focus.

Biomass production

Aboveground biomass production : Individual tree biomass values are used to estimate the total biomass