# CARBON STOCKS IN *DALBERGIA SISSOO* IRRIGATED FOREST PLANTATION, CHANGA MANGA (PUNJAB), PAKISTAN

**Muhammad Sajjad Haider, Amjad Ali Chaudhry*, Muhammad Farooq Azhar, Javaid Ahsan* and Mansoor Ali***
Department of Forestry, University College of Agriculture, University of Sargodha, Pakistan
*Punjab Forestry Research Institute (PFRI), Gatwala, Sheikhupura Road, Faisalabad, Pakistan
Corresponding author email: sajjad.haider@uos.edu.pk

**ABSTRACT**

The carbon data bank has been addressed in this article in the context of extenuating climatic changes. As a pilot study, carbon stock in Changa Manga plantation has been estimated using non-destructive sampling. The study revealed that total Carbon sequestered by Shisham (*Dalbergia sissoo*) irrigated plantation was 137.41tons $hac^{-1}$ and 38.87 tons $hac^{-1}$ above ground and below ground respectively. This indicates that *D.sissoo* at Changa Manga plantation has much potential of carbon sequestration.

**Key words:** Carbon stocks, *Dalbergia sissoo*, Changa Manga Forest

## INTRODUCTION

Global warming and climate change are the most dangerous threats to earth life in this millennium. This environmental issue is multi-dimensional with severe socioeconomic implications throughout the world. Among other factors, carbon emission (principal greenhouse gas) is supposed to be the major contributor of global warming. So, escalated emission of carbon is one of the major apprehensions and is well addressed in Kyoto protocol. Forests have been identified as possible sinks that may offset emissions produced by burning fossil fuels (Vagen *et al.*, 2005). In forests, carbon is accrued through increased live biomass and/or increased dead organic matter and soil carbon, whereas carbon is released to the atmosphere through respiration and burning. Around 30% of the world's land surface is under forest ecosystems, which store approximately 1200 giga tonnes of carbon which is considerably more than is present in the atmosphere (around 762 GtC). Trees are the significant components of forest ecosystem and the largest stores of carbon. However, the forests have undergone degradation and destruction by human societies for industrial and technological development in modern times that drive a major climate change. These developments have resulted in carbon emissions into the atmosphere. Forest carbon management will perhaps be the single important agenda for the first half of the 21$^{st}$century. Intergovernmental Panel on Climate Change (IPCC) reported an unusual warming trend during last century. Carbon dioxide ($CO_2$) levels in the atmosphere have risen from 280 ppm in pre-industrial to 400 ppm now, and are being raised by 1-2 ppm per year (Karnosky *et al.*, 2007). This increasing rate of $CO_2$in the atmosphere is unprecedented and not observed in the recent past during last 2 million years. It is evident that temperature and atmospheric $CO_2$ levels rise due to increase in power generation by over-using of fossil fuels in the second half of the 20thcentury.The fact about carbon storage in living biomass and soil for long periods is extensively documented since 1992;although several studies were carried out in this domain since 1980 and the fact was developed that tree carbon sequestration could definitely provide low cost emissions reduction.$CO_2$ emission to the atmosphere is supposed to increase from 7.4 Gigaton (Gt) Carbon per year in 1997 to about 26 GtC per year by 2100(Houghton *et al.*, 1997).This increase of atmospheric $CO_2$ could have diverse environmental consequences. This global scenario gets attentions in adopting strategies to reduce carbon dioxide emissions in the atmosphere or to combat this increase by storing excess carbon in forests (Houghton *et al.*, 1990).Trees are important carbon (carbon dioxide) sinksas 50% of their standing biomass is carbon itself (Ravindaranath *et al.*, 1997).

Significance of forests in carbon sequestration is obvious. But only a few attempts to study the potential of a single tree species in carbon sequestration from public forests have been made. Individual forest stands can be carbon sources or sinks but their capability depends on stand development stage (Gower *et al.*, 1996). The carbon uptake rate in growing trees can be less than the release of carbon from dead organic matter and decaying slash. Vigorously growing stands like young even-aged stands are assumed to have higher carbon uptake rates, while old tree stands absorb carbon at lower rates, but comparatively store more quantities of carbon per hectare (Lemay and Kurz, 2008).Therefore, an attempt has been made in appreciation of the importance of trees by assessing the carbon stocks by different aged *Dalbergia sissoo* tree stands of Changa Manga Forest.