PROJECT PROFILE

Title of the Project	**:**	**Response of mycorrhizae and microbial symbionts to elevated CO_2 in Commercially important tree species**
Principle Investigator	:	Dr. A. Karthikeyan
Co Investigators	:	Dr. C. Buvanseswaran
Duration of Project (Start & End)	:	4 years April 2011 to March 2015
Objectives		1. To study the sporulation and colonization of mycorrhizae in the selected commercially important tree species under elevated CO_2 2. To study the response of Nitrogen fixing bacteria in Casuarinas and *Acacia auriculiformis* under elevated CO_2 3. To study the photosynthetic activity of indigenous tree species inoculated with mycorrhizae and microbial symbionts under elevated CO_2 conditions 4. To study the nutrient uptake of commercially important tree species inoculated with mycorrhizas and microbial symbionts under elevated CO_2 conditions.
Funding agency	:	NFRP
Summary/Achievements	:	This project has been taken up to assess the economically important tree crops such as *Acaica auriculiformis, Ailanthus excelsa, Casuarina equisetifolia, C. junghuhniana, Dalbergia sissoo, Eucalyptus camaldulensis, E. tereticornis, Gmelina arborea, Melia dubia* and *Neolamarkia cadamba* for the growth performance in elevated CO_2 condtions along with microbial symbionts. Assessment of the Carbon sequestration potential of these crops is very essential as they are largely planting for commercial purpose all over the country. The tree crops were propagated and inoculated with microbial symbionts and thereafter the seedlings/ roote stem cuttings were maintained in

		ambient, 600ppm and 900 ppm of elevated CO_2 conditions. The results showed that under 600ppm of elevated CO_2 conditions the seedlings of all selected tree crops showed better performance in growth, biomass, photosynthetic activity and nutrient enhancement than ambient CO_2 conditions. The improved photo syntheitic rates were recorded in 600ppm of elevated conditions due inoculation microbial symbionts viz., 6.81 um^{-2} s^{-1} in *A. auriculiformis*, 4.26 um^{-2} s^{-1} in *Ai. excelsa* 13.7 um^{-2} s^{-1} in *C. equisetifolia*, 14.3 um^{-2} s^{-1} in *C. junghuhniana* , 6.4 um^{-2} s^{-1} in *D. sisoo*, 4.2 um^{-2} s^{-1} in *E. camaldulenis*, 4.8 um^{-2} s^{-1} in *E. terteticornis*, 6.2 um^{-2} s^{-1} in *G. arborea*, 7.4 um^{-2} s^{-1} in M. *dubia* and 6.8 um^{-2} s^{-1} in *N. cadamba*. The growth and bio mass improvement were recorded two folds more in microbial symbionts inoculated control seedlings than control under elevated CO_2 conditons. The nutrient uptake is also higher in 600ppm of elvated CO_2 conditions than ambient CO2 condtions inoculated with microbial symbionts in all seedlings. Interestingly *C. equisetifolia* and *C. junghuhnina* performs in all growth parameters under 600ppm as well as 900ppm of elevated CO_2 conditions. It showed that these tree crops are more adaptable to extreme elevated CO_2 conditions along with microbial symbionts. The AM fungal colonization and sporulation in the tree crops found higher in 600ppm of elevated CO_2 conditions showed that the fungi utilizing the excessive Carbon for their infectivity. From this study it was understood that Casuarinas having more Carbon sequestration potential than other tree crops. This study emphasized the importance of microbial symbionts inoculation in commercial plantations to mitigate global warming as well as improved bio mass productivity.