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| Title | : | Screening tree species for intra-specific variation in carbon sequestration potential under elevated CO2 |
| Principal Investigator | : | Dr. C. Buvaneswaran, Scientifst - F |
| Co-Investigator | : | Dr. Rekha R. Warrier, Scientist-E – Biotechnology division<br><br>Dr. A.C. Surya Prabha, Scientist D – Soil scientist |
| Duration | : | 4 Years (2014 to 2018) |
| Objectives | : | • To study intra-specific variation in growth and morphology in response to the elevated CO2 level under ambient and simulated temperature regimes.<br>• To assess the levels of photosynthates and enzymes involved in carbohydrate metabolism and evaluate their potential to act as biochemical markers for carbon sequestration potential.<br>• To assess the physiological responses and nutrient use efficiency under varied carbon dioxide conditions. |
| Funding Agency | | ICFRE |
| Summary/Achievements | | Increasing concentration of carbon dioxide ($CO_2$) in the atmosphere besides causing climate changes, it may also effectively affect the biomass production and allocation in tropical tree species. Atmospheric carbon dioxide concentration has increased from 290 ppm in to 410.79 ppm in June 2018 (www.CO2.earth). To understand the response of various tropical tree species to such an elevated $CO_2$, experiments conducted in Automated Open Top Chambers (AOTC) facility at Institute of Forest Genetics and Tree Breeding (IFGTB), Coimbatore (India). The results revealed that response of different tree species to different concentration of $CO_2$ and under different temperature conditions is highly varying which emphasizes the need to assess all important tropical tree species individually and not to generalize the response of tree species to elevated $CO_2$. *Casuarina equisetifolia, Casuarina junghuhniana, Tectona grandis, and Eucalyptus sp.* are the species used for the study and the response was positive in some clones and negative in other clones. There is scope that these species may be considered for greater carbon sequestration under elevated $CO_2$ and temperature levels. Further, the study also concluded that equivalent to or even greater than inter-specific variation, there existed huge intra-specific variation in all the four species studied. The present study on intra-specific variation in response of *Casuarina equisetifolia, Casuarina junghuhniana, Tectona grandis, and Eucalyptus sp.* under elevated $CO_2$ confirmed that there existed significant variation among different treatments of $CO_2$ as well as among various phenotypes or clones in terms of growth characteristics. This intra-specific variation in biomass accumulation under elevated $CO_2$ levels could be exploited for future breeding programmes in |

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| | | developing climate ready genotypes having greater potential to sequester more carbon and produce greater biomass under forecasted elevated levels of atmospheric $CO_2$. As a fruitful outcome of this present study, ideal clones having greater dry matter accumulation and in turn higher carbon sequestration potential have been identified like clones CE 1, CE 8 and CE 12 in *Casuarina equisetifolia,* CJ 18 in *Casuarina junghuhniana,* TG 2 and TG 3 in *Tectona grandis* and ES 2 in *Eucalyptus sp.* These clones can be used for breeding for climate-ready genotypes. |