

## Variation among carbon isotopes of plants growing in mixed evergreen-deciduous ecosystem.

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The variation of leaf bulk carbon isotope values  $C_3$  plants ( $\delta^{13}C_{bulk}$ ) at a global scale displays strongest dependence on mean annual precipitation (MAP) among all climate variables. However, the MAP-  $\delta^{13}C_{bulk}$  relation in regional scale studies displays varying correlation among the two variables. Such studies are conducted across a precipitation gradient, leading to differences in both environmental factors (soil moisture, topography etc.) as well as species assemblage. Additionally, the observed MAP-  $\delta^{13}C_{bulk}$  relation may be a one-time occurrence and not remain constant over time. To understand the MAP-  $\delta^{13}C_{bulk}$  relation temporally and minimize environmental variations, 18 naturally occurring plant species were sampled from a single location over a period of six years (2012-18). The study region (22°57' N, 88° 31' E) lies in the lower Gangetic floodplain experiencing sub-tropical monsoonal climate which supports mixed deciduous-evergreen vegetation. Among the two plant functional types (deciduous and evergreen), lower  $\delta^{13}C_{bulk}$  values were observed in evergreen species at an annual timescale with a difference of 0.9‰ to 1.5 ‰. The dataset compiled in this study shows no correlation among  $\delta^{13}C_{bulk}$  and rainfall amount in the months of June, July and August which is the period when maximum rainfall intensity occurs. However, a strong correlation is seen when  $\delta^{13}C_{bulk}$  values are correlated with MAP. Deciduous species exhibit a stronger correlation with MAP ( $r^2=0.55$ ) compared to evergreen ( $r^2=0.20$ ). The observations can be explained through the difference in leaf growth strategies between deciduous and evergreen species. The higher  $\delta^{13}C_{bulk}$  values in deciduous trees indicate a higher water use efficiency leading to lower carbon assimilation. Their dependency on MAP is a result of shorter leaf life-span compared to evergreen trees. In the context of changing climate with predictions of varying precipitation regime, a potential shift in plant community composition can alter the carbon assimilation at a global scale and tend to have an adverse effect on growth of deciduous species.