

Foliar Carbon Isotopic Compostion Showed No Altitudinal Trend in an Arid Region and Atmospheric Pressure Exerted a Negative Effect on Plant d13C

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Previous studies have suggested foliar δ 13C generally increases with altitude. However, some observations reported no changes or even decreased trends in foliar δ 13C. We noted that all the studies in which δ 13C increased with elevation were conducted in the human regions, whereas those investigations in which δ 13C did not vary or decreased were conducted in areas with water stress. Thus, we proposed that the pattern of increasing δ 13C with elevation is not a general one, and that δ 13C may remain unchanged or decrease in plants grown in arid environments. To test the hypothesis, we sampled plants along altitude gradients on the shady and sunny slopes of Mount Tianshan characterized by arid and semiarid climates. The measurements of foliar δ 13C showed no altitudinal trends for the plants grown on either of the slopes. Therefore, this study supported our hypothesis. In addition, the present study addressed the effect of atmospheric pressure on plant δ 13C by accounting for the effects of temperature and precipitation on δ 13C. This study found that the residual foliar δ 13C increased with increasing altitude, suggesting that atmospheric pressure played a negative role in foliar δ 13C.