Does carbonic anhydrase affect the fractionation of stable carbon isotope

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The samples were obtained from leaves of plants. Foliar stable carbon isotope, carbonic anhydrase (CA) activity and bicarbonate concentration were measured.

CA catalyzes the reversible conversion of bicarbonate to CO_2. There are significant positive correlation between the CA activity and $\delta^{13}C$ value in the leaves from different plant species at the same site. The higher the activity of CA in the leaves of plant is, the greater the variability of $\delta^{13}C$. The variability of $\delta^{13}C$ in the leaves of *Broussonetia papyrifera* (*Bp*) and *Orychophragmus violaceus* (*Ov*) are great because of their high CA activity compared to *Brassica juncea* (*Bj*) (Tables 1). The high correlation between foliar CA activity and $\delta^{13}C$ value is involved in that which plants with high CA activity can effectively use bicarbonate in the leaves as the carbon source for photosynthesis. The variation of $\delta^{13}C$ is also related to which plant alternately use bicarbonate and atmospheric CO_2 as the carbon source for photosynthesis.

	O v	***Bj***	***Bp***
CA activity	1350	246	3450
Mean	-26.805	-27.683	-29.656
Std Dev	1.207	0.234	0.794
Min	-29.125	-28.132	-30.920
Max	-24.254	-27.343	-28.842
n	20	10	10
CV/%	4.503	0.845	2.677
Bicarbonate concentration	2.03	2.06	2.64

Table 1: The variation of ^{13}C value, the ^{13}C value (‰ vs PDB), bicarbonate concentration (μmol $g^{-1}FW$) and CA activity (WAU $g^{-1}FW$) in the leaves from some plants species.

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Subsurface heterogeneity of high and low arsenic aquifers delineated by high resolution geophysical survey in Datong Basin, Shanxi, China

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The Datong Basin located in northeastern Shanxi province is a Cenozoic fault basin. A number of the tectonic and climatic changes during Quaternary have resulted in a complex hydrogeological structure of the aquifers with low water storage. Groundwater arsenic concentration increases from the Piedmont to the central basin, reaching 4.435 mg/L. This arsenic gradient corresponds to a lithological change from coarse sediment to fine, organic rich sediment. Studies have found that the smaller the sediment particle size, the higher the sediment arsenic loading. a high resolution, large depth exploration features. Sediment particle size in generally influences the resistivity. We show that audio-frequency magnetotelluric sounding method (EH-4 electrical conductivity imaging system) can be used to obtain high resolution subsurface sediment texture and to assist identification of high and low arsenic zones.

Resistivity value of ≤ 30ohm-m indicates loam-based clay where the water is poor; resistivity value of between 30-50 ohm-m corresponds to silt with weak water potential; resistivity value ≥ 50ohm-m is fine to coarse sand with gravel with high water yield. These high water yield zones are < 200 m deep, and are located along the hillside or the steep slope of the terrains at the head of the alluvial fan with rapid flow. In contrast, the aquifer in the low lying areas to a depth of 300 m is consisted of fine grained sediment with low quality water and low yield.

Test bore holes drilled along the hillside and in the central plains confirm the grain size inferred by resistivity results, suggesting that this can be a valuable tool to help locate low arsenic aquifer in alluvial basins.