PASS GRASS

Poas Are Sometimes Stressed: Getting Ratios around Sun and Shade

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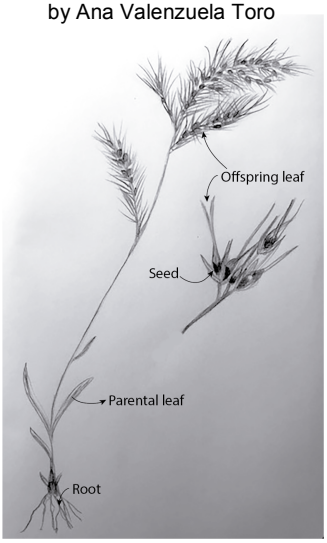


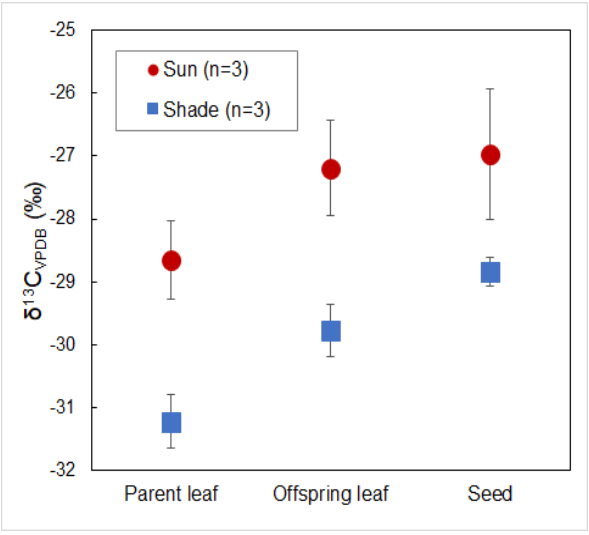
Background: Bulbous bluegrass (*Poa bulbosa*) is a perennial C_3 grass originally from Eurasia and North Africa. It can be found in disturbed areas, meadows, and fields. This plant produces two reproductive parts: flowers and bulbils, which are plantlets genetically identical to the parent.

Question: How does carbon uptake differ in *P. bulbosa* growing in sun versus shade and how does it vary in different organs?

Results: All $\delta^{13}C$ values from *P. bulbosa* fall in the C_3 range. Variations exist between different organs and between sun vs. shade.

Organ	Sun	Shade	Difference
Parent leaf	-28.65 ± 0.62 ‰	-31.22 ± 0.42 ‰	2.57 ‰ (P=0.08)
Offspring leaf	-27.19 ± 0.75 ‰	-29.78 ± 0.41 ‰	2.59 ‰ (P<0.01)
Seed	-26.97 ± 1.04 ‰	-28.84 ± 0.22 ‰	1.87 ‰ (P<0.01)

*All organs were significantly different in the shade, and close to being significantly different in the sun (0.06<p<0.08).



Interpretation:

Parental leaves: The shaded parental leaves have a lower $\delta^{13}C$ value than parental leaves in the sun because they experience less water stress and so discriminate more against ^{13}C.

Seeds: Seeds are enriched in ^{13}C relative to the parental leaves because they were made later in the growing season when water stress increased, and the plant discriminated less against ^{13}C. When offspring leaves grew from the seed, the isotopically lighter carbohydrates are preferentially used, leaving isotopically heavier elements (mostly cellulose) behind, resulting in more enriched seed C values.

Offspring leaves: The offspring leaf $\delta^{13}C$ values are intermediate. This is due to the lighter carbohydrates in the seed are being used to make these leaves, and the use of lighter photosynthetic $\delta^{13}C$ in the offspring leaves.

Conclusions: Variations among the *P. bulbosa* organs suggest carbon enrichment changes during the growing season as water stress changes. Further, exposure to irradiance has a strong effect on $\delta^{13}C$ in this plant.