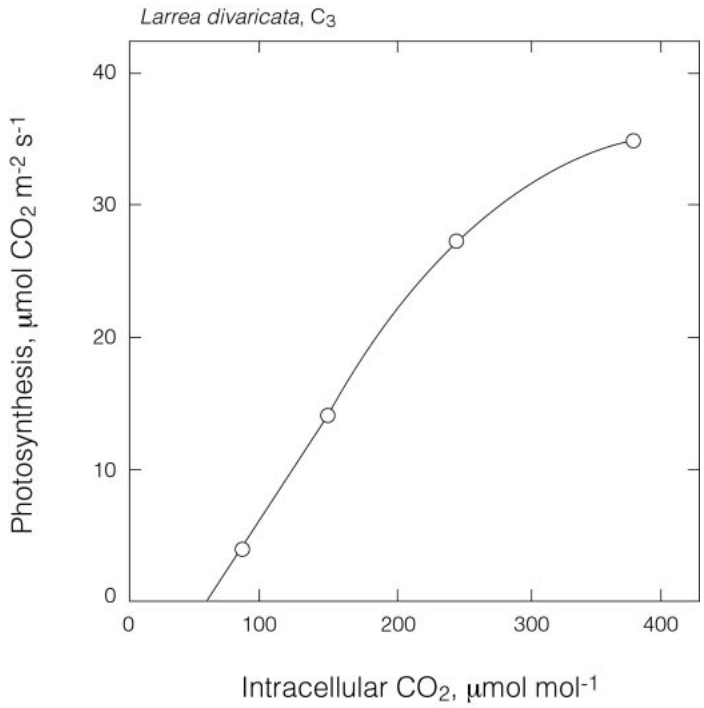
During the past month we have examined photosynthetic characteristics of *Kallsalot bell*a, an attractive shrub with deep purple flowers from Mediterranean climate regions of southern California. We took our instrumentation to the field and measured the photosynthetic performance of different leaves within the canopy. *K. bella*, what a beautiful plant to work with - the photosynthetic responses were easy to measure and highly repeatable.

At first, we measured the light-saturated photosynthetic rate for leaves at different positions in the canopy. We controlled ambient [CO_2] at 370 ppm, leaf temperature at 25 °C, and relative humidity at 60%. From those observations, we obtained the following data. Each observations represents a separate leaf within the canopy.

leaf location	Maximum photosynthetic rate (μmol CO_2 m^{-2} s^{-1})	Leaf conductance to CO_2 (mol m^{-2} s^{-1})	Photon flux (% of full sun)	Intercellular [CO_2] (ppm)
1	25	??	100	250
2	19	??	80	250
3	10	??	52	250
4	5	??	23	250

Well, once we had measured the maximum photosynthetic rates on *K. bella* leaves, we measured the photosynthetic dependence on intercellular [CO_2]. The data were collected under experimental conditions in which we kept the incident photon flux density (PFD) at full sunlight (2,000 μmol m^{-2} s^{-1}), leaf temperature at 25 °C, and relative humidity at 60%. We then measured the photosynthetic dependence on intercellular [CO_2] (called the A - c_i response curve). These measurements for all leaves showed a pattern similar to that illustrated below for Larrea divaricata.



Observations for *K. bella*:

leaf location	Initial slope of the A - c_i curve	Leaf nitrogen content (%)
1	0.125	4.0
2	0.093	3.0
3	0.050	1.6
4	0.025	0.8

Note that the initial slope of the A - c_i curve is measured over the linear portion between 0-200 ppm.

On a recent series of field trips through the deserts of North America with students, we collected the following remarkable data. Basically, these data suggest that there is a relationship between precipitation patterns and the life form of plants in the habitat. None of these habitats were grazed by cattle or sheep.

Coefficient of variation in annual precipitation	Faction of the entire flora that are perennials	Faction of the entire flora that are annuals
2.5	0.45	0.55
1.0	0.90	0.10
1.9	0.70	0.30
1.6	0.75	0.25
0.5	0.94	0.06
3.5	0.17	0.83

When we visited desert locations that were highly grazed we saw a very different relationship between the life form distribution and variability in precipitation.

Yesterday in class, we had a very excited discussion on what parameters to measure in an exotic weed that is invading Utah's arid land ecosystems. This plant has dimorphic seeds and seems to be spreading throughout the southern portions of the state at an alarming rate. We know that this plant is a member of the Asteraceae and that it is an annual. In summary, we came up with the following as parameters to measure in each plant. Obviously students had different reasons to measure the different parameters, but I wonder just how many of these measurements are relevant to understanding the "bet-hedging" strategy used by this plant.

Parameters to measure on each plant:

- plant height and total leaf area
- the number of ray versus disk flowers
- flower color and petal length
- biomass of seed type 1 versus seed type 2 on each plant
- biomass of the carpels associated with each flower head
- biochemical composition of seed type 1 versus seed type 2 on each plant
- dispersal distance of seed type 1 versus seed type 2 on each plant
- germination rates of seed type 1 versus seed type 2 on each plant
- growth rates of seed type 1 versus seed type 2 following germination
- photosynthetic rates on plants developing from seed type 1 versus seed type 2
- determinate versus indeterminate flowering