

## Abstract

### **Developing greenroofs for southern California: a comparison of heat tolerance for *Dudleyas* and *Sedums***

Green roofs provide a wide range of ecological benefits in urban settings by increasing energy efficiency, preventing stormwater runoff, and reducing urban heat island effects through evapotranspiration. In developing greenroofs for southern California it was found that the native *Dudleyas* had greater survival during the summers than the industry-standard *Sedums*. This study further investigated the response of both *Dudleyas* and *Sedums* to heat-stress. Whole pieces of tissue collected from plants in greenroof mesocosms at LMU were subjected to dry heat from 20°C to 55.6°C for 1 hour. Tissue samples were subsequently cut into 3-cell-thick sections and placed in 1% neutral red solution in a 7.5 pH 0.2M phosphate buffer (w/v) for 10 minutes and then rinsed in buffer for 10 minutes. Stained cells were counted using a bright-field microscope. The ratio of stained cells to unstained cells showed the reaction of each species to increased temperatures and heat-stress. Neutral red is a vital stain and is not taken up by dead cells. At temperatures below 40°C both showed very high staining ratios. As the temperatures were increased above 40°C a decline in the number of stained cells was observed. At temperatures above 52°C both *Dudleyas* and *Sedums* showed a marked decline in cells stained as only a few cells survived. The *Sedums* showed a steeper decline of stained cells than the *Dudleyas*. The *Sedum* tissue had fewer cells stained at each temperature interval between 40°C and 52°C. This suggested that the *Dudleya* cells can withstand higher temperatures and heat stress.