

Reduced Pressure Alone Does Not Affect the Overall Sensory and Antioxidant Values of Radish

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Use of reduced atmospheric pressures (e.g., <101 kPa) for space exploration can offer several advantages during long duration space missions, including reduced launch mass for containment vessels, reduced gas leakage, reduced resupply costs, and increased potential for using transparent materials in greenhouses for a bioregenerative life support system on Mars and on the Moon. Limited testing with crop plants at reduced atmospheres has been conducted, with results focused on whole plant growth and gas exchange, but there are no studies regarding the quality of resulting products. This question is of importance not only from the standpoint of food palatability, but of potential nutritional and health benefits to the crew. To study this we grew radish (*Raphanus sativus* L. cv Cherry Bomb Hybrid II) plants at three atmospheric pressures: 33 kPa, 66 kPa, and 96 kPa (nominal ambient), while maintaining oxygen and carbon dioxide partial pressures constant at 21 kPa and 0.12 kPa respectively. After 21 days, growth chambers were repressurized and ten plants were harvested within the same time frame of the photoperiod for all three pressure treatments. The experiment was repeated three times. Aerial shoots and storage roots were separated immediately upon removal from growth chambers, frozen with liquid nitrogen and stored at -80°C until analysis. Six of the ten plants were lyophilized, ground to pass a 40 mesh screen and used for determination of the total antioxidant capacity and glucosinolate composition, while the remaining four plants were used to assess myrosinase activity. In addition, eight to ten fresh storage roots were shipped overnight on ice to Johnson Space Center's Food Quality Laboratory and used for sensory analysis by a group of trained panelists. Results showed no effect of reduced pressure down to 33 kPa on either total antioxidant capacity measured by oxygen radical absorbance capacity (ORAC_{FL}) or sensory values (color, flavor, texture and overall appearance), although ORAC_{FL} val-

ues in storage roots were 40% higher than that in leaves regardless of treatments. The influence of reduced pressures on the myrosinase activity and glucosinolate content, which is unique to the order Capparales (including *Brassica* and *Raphanus*), will also be discussed.