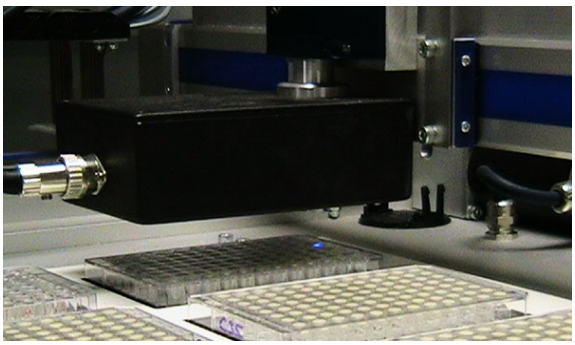

HONOURS PROJECT

Project Title: Oxidative damage and metabolic function during cryopreservation of endangered plant species

Supervisors: Ricardo L. Mancera & Eric Bunn

Project: We are investigating the factors that determine the ability of plant germplasm to survive cryopreservation at ultra-low temperatures. This project will study the factors that determine the ability of various plants to survive cryogenic storage, with a focus on species that produce recalcitrant seeds. Oxidative damage caused by reactive oxygen species and the integrity of mitochondrial function are major impediments to successful cryopreservation. Antioxidant content and enzyme activity has been shown to decrease through the cryopreservation process, leading to oxidative damage. At the same time, decreased mitochondrial function has been associated with poor damage repair and resumption of normal cell division and growth. This project will look at the efficacy of adding exogenous antioxidants during cryopreservation to reduce oxidative stress and improve survival results. The formation of MDA and 4-HNE as by-products of lipid peroxidation will be determined by high performance liquid chromatography – mass spectrometry (HPLC-MS), and antioxidants (glutathione and ascorbic acid) will be determined by HPLC-UV. Measurements of mitochondrial activity throughout the cryopreservation protocol will be conducted to identify particular stages that are damaging to the normal respiration process. Oxygen consumption in cryopreserved shoot tips will be measured during the recovery period using Q2 Oxygen Sensing Technology. Recalcitrant seeds from several Australian species will be tested to determine if metabolic activity, prior to cryopreservation and in recovering seed axes, is linked to plant regeneration rates.

Activities: Bioanalytical (HPLC-MS, HPLC-UV), metabolic (Q2 oxygen sensing) and statistical analyses.

Suited to: Students with a strong background in biochemistry and a desire to use bioanalytical and biophysical methods in conservation science.