Collaborative travel grant report- Veronica Briceno Rodriguez

My collaborative research was done at the Botany Institute at Innsbruck University in Austria. I did a short research in the Stress physiology and climate resistance laboratory, this group is specialised in how alpine plants cope and resist freezing and heating conditions. My study involved ice barriers in *Loiseleuria procumbens*, an alpine prostrate dwarf shrub.

Plants living in alpine environments regularly face the risk of ice formation, which can be lethal, especially for developing and reproductive tissues. Hence, alpine species have evolved ice barriers against ice spread into susceptible tissues. Ice barriers can be of thermal (cushion plants) or structural (woody plants, grasses) nature. In this lab visit I explored the structural ice barrier in the flower stalk of the *L. procumbes* and its changes during different reproductive stages related to the vulnerability against frost damage. I monitored the ice formation and propagation in twigs bearing reproductive shoots using infrared differential thermal analysis during various reproductive stages exposed to simulated night frosts. I find that ice barriers are active in the flower stalk during the bud stage, anthesis and early fruit stages, allowing the reproductive organs to supercool. While the vegetative shoots are completely frozen at -6°C or even -4°C, the reproductive tissues stay ice free at mean down to -12°C, which is sufficient to survive the naturally occurring air temperature minima in the Austrian Alps. However, fruits in an advanced reproductive stage froze more or less simultaneously with the vegetative shoots, indicating that the ice barriers had disappeared at this point. I suggest that buds, flowers and early fruits are very sensitive to ice damage, hence ice barriers are essential, however when the seeds are developed this barrier is not needed anymore as seeds can withstand lower temperatures. Ice barriers are thus an effective mechanism to protect developing offspring under episodic freezing events in this species.

Predictions under climate change scenarios propose that the snow cover in alpine areas will disappear early in the growing season, and this will exposed reproductive organs to freezing events. These unpredictable freezing events can interrupt the offspring develop, which can have serious consequences for species survival. Nevertheless, my study demonstrated that ice barriers in alpine plants are an effective mechanism to avoid the spread of ice into the reproductive organs. This is probably a widespread mechanism within alpine plants to avoid the damage that freezing events caused. Therefore, studies in Australian Alpine plants must be done to verify the existence of this mechanism.

This collaborative research allowed me to learn new techniques that can be applied in Australian Alpine plants, and also I had the great opportunity to share some of my findings on Australian alpine plants, with experts in this area, I also had the opportunity to be part of seminars and experiments that were running at the moment in this laboratory. Also, the results of my experiments will be part of a publication and also, I will present these results at the conference of the Ecological society of Australia in Melbourne this year. In addition, I established an important collaboration with this group, which is highly beneficial for my research. Hence, this research collaboration was successful in many ways and it was extremely important for my formation as a PhD student.