Determining hybrids between invasive and native Carpobrotus N.E.Br. species in South Australia: field, morphological and molecular insights

Michelle Waycott1,2, Hellmut Toelken2, Ed Biffin2, Korjent Van Dijk1, Chris Brodie2, Jessica Burdon1,2, Ainsley Calladine2, Kat Ticli2, Chelsea Tothill2, Helen Vonow2 and Jürgen Kellermann1,2
1 The University of Adelaide, School of Biological Sciences, Adelaide, South Australia 5001, Australia
2 State Herbarium of South Australia, Department of Environment, Water and Natural Resources, GPO Box 1047, Adelaide, South Australia 5001, Australia (michelle.waycott@adelaide.edu.au)

Our project has expanded the detailed understanding of Carpobrotus taxonomy, formulated by Hellmut Toelken for all of the Australian taxa, by utilising a molecular genetic approach to identify hybrids among populations and species in representative material from South Australia. We detected an extremely high-level of hybridisation among native and introduced Carpobrotus from the Adelaide area using a ddRAD Next Generation Sequencing approach. Back-crossing between hybrids and parental types was also detected. A revised taxonomy is being developed to support the ongoing identification of hybrids in the Adelaide region, however hybridisation is likely to be occurring on a larger spatial scale.

Keywords Carpobrotus, molecular detection, Next Generation Sequencing, hybridisation, introgression, South Australia, taxonomy.

Summary Carpobrotus edulis (L.) L.Bolus ssp. edulis has been listed in the Metropolitan Adelaide and Northern Coastal Action Plan as a priority environmental weed in the region. This has led to coastal on-ground works targeting C. edulis for weed control since 2009. In many of the same areas there are native species of Carpobrotus, and putative hybrids have been observed. Taxonomic work, in South Australia, Australia and around the world, has uncovered that there are real difficulties in differentiating native species from hybrids with introduced species.

Plants being used in restoration work, purported to be identified as the native species, C. rossii (Haw.) Schwantes, may potentially be hybrid material between the introduced and native species (C. edulis × C. rossii). Ultimately there is a significant concern that hybrids have become incorporated into restoration plantings. If so, this will be an issue for seed collectors and growers of plant materials used for restoration programs.