

Reproductive biology of important invasive plants in the Eastern Cape Province of South Africa

Thesis submitted in fulfilment of the requirements for the degree of MASTER OF SCIENCE at RHODES UNIVERSITY

By CARA-JAYNE THORNE

2015

ABSTRACT

Baker's rule predicts species capable of uniparental reproduction are more likely to establish after long distance dispersal (or introduction in the case of invasive plants), thus the ability to undergo autonomous self-pollination should promote colonization. An investigation into the reproductive biology of eleven invasive species in the Eastern Cape Province of South Africa between 2012 and 2014 showed strong support for Baker's law. Breeding system results showed evidence of self-compatibility in eight species, ten species were capable of autonomous self-pollination, and only three species showed evidence of varying levels of self-incompatibility. These results provide evidence that autonomous self-pollination occurs more frequently among invasive species, self-compatible species more frequently become invasive compared with self-incompatible species and that autogamous species should have a larger invasive range. Co-opting suitable local pollinators may be problematic for invasive plants, especially those with highly specialized pollination systems. The species investigated appear to be largely independent of pollinators, mostly setting seed in the absence of pollinators. Despite this, all eleven invasive plant species are regularly visited by a variety of generalist pollinators including *Apis mellifera*, *Xylocopa* bees and *Allodapini* species. Pollinators all carried substantial pollen loads, even managing to extract pollen from more specialized plants, such as the poricidal anthers of *Solanum* species, and frequently came into contact with both anthers and stigmas. Considering most of these species are capable of autonomous self-pollination, their reliance on pollinators may be low. Even the most self-incompatible species, *Passiflora caerulea*, appears to have successfully co-opted local pollinators (honeybees and carpenter bees), ensuring successful pollination and seed set. The ability for cross-pollination by local pollinators allows for some degree of genetic variation within invasive plant populations, especially for self-incompatible species. Inadequate pollen deposition by unreliable or inefficient pollinators, or reduced resource availability, can result in pollen limitation. Invasive plant species may be especially susceptible, with three of the plant species investigated showing possible pollen limitation at the level of seed set, while the remaining nine invasive plant species showed no evidence of pollen limitation in South Africa. The ability to utilize uniparental reproduction (as Baker's law predicted), and co-opt local pollinators has allowed invasive plants in the Eastern Cape to successfully establish and persist after

introduction. Hence, the inclusion of reproductive traits of plants should therefore be included in risk assessments for future plant invaders.