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Genomic Signatures and Phenotypic Consequences of Mating System Transitions in a Geographically Widespread Plant Species

The diversity within a plant species is not only associated to environmental conditions but also to many other traits that could impact the dispersal, adaptation, and evolutionary pattern of a species. One of the traits that may be significant and consequential in determining the diversity within a plant species is the plant mating system. Cross-fertilization is prevalent in angiosperms but shifts to self-fertilisation are common evolutionary transitions. Here, we examined the genomic and phenotypic consequences of intraspecific mating system variation in fourteen populations of selfing and outcrossing Arabidopsis lyrata ssp lyrata from across North America. Analysis of SNP frequencies from pooled whole-genome sequence data of the outcrossing and selfing populations indicate a convergent selection on adaptive genes significantly associated with floral scents across four independent transitions to selfing. Analysing the floral scents using GC-MS, a reduction in VOC emissions under selfing was revealed; the magnitude of the reduction was partly explained by geographical location and the predicted age of populations. Younger selfing populations which are newly establishing a range, exhibit enrichment in aromatic compounds known to be pollinator attractants. Over time, as self-fertilizing continues, there may be selection against increased VOC emission, as observed for the other non-aromatic compounds; parallel reduction in green leaf volatiles with selfing evolution in the two distinct geographical clades. Hence, we suggest a two-step process in the evolution of selfers. We conclude that transition to self-fertilisation leads to parallel vestigialisation of floral scents among populations of a geographically widespread species. Our results accentuate the significance of range-wide studies to understand the consequences of mating system shifts among populations of a species.

Keywords: Arabidopsis lyrata, divergent genomic footprint, environmental gradient, mating systems, floral scents.

Biography

Elizabeth Oladapo currently working at University of Sheffield at Unite Kingdom. Her research are genome, plant science etc.

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