Multiple paternity, fertilization success, and male quality: Mating system variation in the eelgrass, *Zostera marina*

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Abstract

Genetic diversity can modulate a population's response to a changing environment and plays a critical role in its ecological function. While multiple processes act to maintain genetic diversity, sexual recruitment remains the primary driving force. At its southern edge-of-range, warming sea surface temperatures have resulted in shifts to a mixed-annual life-history strategy in the eelgrass (*Zostera marina*). Given that mating systems are intimately linked to standing levels of genetic variation, understanding the scope of sexual recruitment illuminates the processes that shape genetic diversity. To that end, developing seeds on flowering *Z. marina* shoots were genotyped from three meadows in Topsail, North Carolina. In all meadows, levels of multiple mating were high, with shoots pollinated by an average of 8 sires (range: 3 – 16). The number of fertilized seeds (i.e., reproductive success) varied significantly across sires (range: 1 – 25) and was positively correlated with both individual heterozygosity and self-fertilization. Outcrossing rates were high (approx. 70%) and varied across spathes. The reliance on sexual recruitment was also evident among sampled shoots, as no clones were detected and kinship among shoots was low. Given the role that genetic diversity plays in enhancing resistance to and resilience from ecological disturbance, disentangling the links between life-history, sexual reproduction and genetic structure will aid in informing the management and conservation of this key foundation species.

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