Title

Genetic purging due to self-fertilization does not prevent accumulation of expansion load

Authors

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Abstract

Mating system and demography shape genetic diversity within a population. Self-fertilization tends to occur more frequently towards species' range edges since mate reassurance that comes with selfing is a favorable trait for colonization. The accumulation of genetic load during range expansions may be combated in selfers due to increased homozygosity resulting in purging. While the effect of range expansions on genetic load is well described, the combined consequences of complex demography and mating system shifts are less clear. We investigate this question by integrating forward-time simulations of range expansions with empirical data collected from more than 500 genomes across a post-glacial expansion of *Arabis alpina*, a mixed mating plant. Simulation show that irrespective of self-fertilization, the expansion results in elevated genetic load in marginal populations. Selfers also expand their range faster, indicating fewer generations subject to genetic drift and a reduced Allee effect. We detect a reduction of recessive lethals in edge populations with increased selfing. However, this purging is not sufficient to prevent expansion load. Empirical results show substantial load still accumulated in selfing range-edge populations compared to outcrossing, range-core populations. Our results demonstrate that self-fertilization can alter the signature of genetic load in expanded populations, potentially providing an additional benefit of purging along with mate reassurance. Complicated factors such as local adaptation at the range edge may force slower expansion and therefore limit the benefit of selfing and subsequent escape from accumulating genetic load.