

Demographic consequences of heterogeneity in conspecific density dependence among mast-fruited tropical trees

ABSTRACT

The role of conspecific density dependence (CDD) in the maintenance of species richness is a central focus of tropical forest ecology. However, tests of CDD often ignore the integrated effects of CDD over multiple life stages and their long-term impacts on population demography. We combined a 10-year time series of seed production, seedling recruitment and sapling and tree demography of three dominant Southeast Asian tree species that adopt a mast-fruited phenology. We used these data to construct individual-based models that examine the effects of CDD on population growth rates (λ) across life-history stages. Recruitment was driven by positive CDD for all species, supporting the predator satiation hypothesis, while negative CDD affected seedling and sapling growth of two species, significantly reducing λ . This negative CDD on juvenile growth overshadowed the positive CDD of recruitment, suggesting the cumulative effects of CDD during seedling and sapling development has greater importance than the positive CDD during infrequent masting events. Overall, CDD varied among positive, neutral and negative effects across life-history stages for all species, suggesting that assessments of CDD on transitions between just two stages (e.g. seeds seedlings or juveniles mature trees) probably misrepresent the importance of CDD on population growth and stability.