

# Vital rates contribute differently to impacts of competition on population growth

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## Abstract

Competition is among the most important factors regulating plant population and community dynamics, but it is not well understood how different vital rates respond to competition and jointly mediate competitive population dynamics and species coexistence. We used integral projection models (IPMs) to model the population growth of 112 pairwise combinations of 14 competing herbaceous plant species across an elevation gradient ( $n = 324$  IPM models in total). We showed that the response of individual growth and seedling establishment contributed most strongly to competition-induced declines in population growth compared to survival, flowering probability and fecundity that frequently showed complementary responses that occurred in 92% of species pairs. Complementary responses significantly promoted population growth under competition by 22% on average and strengthened species coexistence. Our study emphasises the need to investigate demographic processes to better understand competitive population dynamics and species coexistence.

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