Population variability among three small mammal species in the semiarid Neotropics: the role of density-dependent and density-independent factors

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Abstract

We addressed the role of density-dependent (direct and delayed) and density-independent (precipitation) factors in shaping the dynamics of fluctuating populations of three small mammal species. Using a stepwise regression procedure, we tested the effects of nonlagged population density ($\log_{10} N_{t-1}$), lagged population density ($\log_{10} N_{t-2}$), and annual precipitation on the per capita rate of population change of *Phyllotis darwini, Akodon olivaceus*, and *Thylamys elegans* in two habitat types of a semiarid region of Chile. The most irruptive species (*P. darwini*) showed direct and delayed density-dependent effects in equatorial subpopulation, and only direct density-dependence in polar subpopulation. The per capita rates of population change of *A. olivaceus* showed direct density-dependent and precipitation effects in both habitats types, while *T. elegans*showed direct density-dependence and precipitation effects in the equatorial subpopulation but only a marginal effect of direct density-dependence in the polar subpopulation. The presence of delayed density-dependent strongly suggests the importance of biological interactions in shaping the dramatic irruptions exhibited by *P. darwini.*