

Population dynamics of small mammals in semi-arid regions: a comparative study of demographic variability in two rodent species

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Abstract

The seasonally determined demographic structure of two semi-arid rodents, both agricultural pest species (the leaf-eared mouse (*Phyllotis darwini*) in Chile and the multimammate mouse (*Mastomys natalensis*) in Tanzania), is analysed using capture-mark-recapture (CMR) statistical models and measures for elasticity (the relative change in the growth rate due to a relative unit change in the parameter of concern) derived from projection linear matrix models. We demonstrate that reproduction and survival during the breeding season contribute approximately equally to population growth in the leaf-eared mouse, whereas the multimammate mouse is characterized by a more clearly defined seasonal structure into breeding and non-breeding seasons and that reproduction contributes far more than survival during the breeding season. On this basis, we discuss evolutionary and applied (pest control) issues. Regarding the evolution of life histories (leading to a maximization of the overall net annual growth rate), we suggest that for the leaf-eared mouse, features favouring survival throughout the year will provide selective value, but that during the main breeding season, features favouring reproduction and survival are about equally favourable. For the multimammate mouse, features favouring survival are particularly important outside the breeding season, whereas during the breeding season features favouring reproduction are more important. Regarding pest control (aiming at reducing the overall net annual growth rate), we suggest that (ignoring economic considerations) affecting survival outside the main breeding season is particularly effective for the leaf-eared mouse, a feature that is even more the case for the multimammate mouse. In sum, we demonstrate through this comparative study that much is to be learnt from studying the dynamics of fluctuating small rodents—a focal issue within much of population ecology.