INDIVIDUAL VARIABILITY AND METAPOPULATION DYNAMICS: AN INDIVIDUAL-BASED MODEL

(Zmienność osobnicza a dynamika metapopulacji: model osobniczy)

Keywords: METAPOPULATION, INDIVIDUAL-BASED MODEL, INTRASPECIFIC COMPETITION, RESOURCE PARTITIONING, POPULATION EXTINCTION

Abstract: Individual-based model is presented for describing the dynamics of metapopulations. The model of the local population describes the dynamics of the population with non-overlapping generations. The growth of the individuals is followed in every generation. The growth rate of the individuals is affected by the level of resources. The individuals compete for these resources, which are therefore not evenly distributed among the individuals. The persistence of a local population in which the individuals could not disperse was compared to the persistence of the metapopulation. Metapopulation models differed in the conditions under which individuals disperse. In some versions of the model the individuals that dispersed were the weaker individuals in the local population - they dispersed because they could not acquire any resources in the original local habitat, or because they could not acquire enough resources to reproduce. In another version, the individuals that dispersed were the stronger individuals. They migrated immediately before extinction of the local population. In the last version of the model, the dispersing individuals were selected at random. The model showed that the reason for which the individuals dispersed affected the persistence of the metapopulation. In contrast to classic models, one cannot assume that dispersion could be adequately described in terms of diffusion equation. The effect of the reproduction rate and the variability of the individuals in the population on the persistence of different version the metapopulation model was also analyzed.