Masahiro Anazawa
Tohoku Institute of Technology
e-mail: anazawa@tohtech.ac.jp

Interspecific competition models derived from competition between individuals

Population dynamics, including the dynamics of interacting populations, result from behavior of individuals comprising populations and interactions between them. It is important to reveal relationship between population dynamics and local interactions between individuals, and an effective way to do so is deriving population models from first principles. In a previous study, I derived various discrete-time population models for a single species from first principles, and provided a unified view to understand how various population models interrelate with each other. Extending the study above, this study aims at deriving discrete-time interspecific competition models, which describe dynamics of competing two populations, by considering competition for resource between individuals and spatial distribution of individuals. Competition type of each species is assumed to be scramble, contest or an intermediate of these two types. Interspecific competition models are derived for various combinations of the competition types of the two species and several types of spatial distribution of individuals. Furthermore, a general interspecific competition model that includes various competition models as special cases is derived for each distribution of individuals. Finally, I discuss coexistence of two species, based on competition models derived for contest vs. scramble case, and show that the ease of coexistence depends greatly on the type of spatial distribution of individuals.