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A two-stage reaction-diffusion system

It is well known that in reaction-diffusion models for a single unstructured population in a bounded, static, heterogeneous environment, slower diffusion is advantageous. That is not necessarily the case for stage structured populations. In earlier work, Cantrell, Cosner and Martinez showed that in a stage structured model introduced by Brown and Lin, there can be situations where faster diffusion is advantageous. In this paper we extend and refine these results on persistence to more general combinations of diffusion rates and to cases where either adults or juveniles do not move. We also obtain results on the asymptotic behavior of solution as diffusion rates go to zero, and on competition between species that differ in their diffusion rates but are otherwise ecologically identical. We find that when the spatial distributions of favorable habitats for adults and juveniles are similar, slow diffusion is still generally advantageous, but if those distributions are different that may no longer be the case. This talk is based on joint work with Chris Cosner and Rachidi Salako.