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Co-invasion waves of a reaction diffusion model for competing pioneer and climax species

We consider a reaction diffusion model for competing pioneer and climax species. A previous work has established the existence of traveling wave fronts connecting two competition-exclusion equilibria in certain range of the parameters, while in this paper, we explore the possibility of traveling wave fronts connecting the pioneer-invasion-only equilibrium and the co-invasion equilibrium. By combining the Schauder's fixed point theorem with a pair of the so-called desired functions, we show that the model does support such co-invasion waves in some other ranges of parameters. We also determine the minimal speed for such co-invasion waves in terms of the parameters, and discuss some biological implications and significance of the results.

This a joint work with Zhaohui Yuan.