Modelling biological invasions: species traits, species interactions, and habitat heterogeneity

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RESUMEN

In this paper we explore the integration of different factors to understand, predict and control ecological invasions, through a general cellular automaton model especially developed. The model includes life history traits of several species in a modular structure interacting multiple cellular automata. We performed simulations using field values corresponding to the exotic Gleditsia triacanthos and native co-dominant trees in a montane area. Presence of G. triacanthos juvenile bank was a determinant condition for invasion success. Main parameters influencing invasion velocity were mean seed dispersal distance and minimum reproductive age. Seed production had a small influence on the invasion velocity. Velocities predicted by the model agreed well with estimations from field data. Values of population density predicted matched field values closely. The modular structure of the model, the explicit interaction between the invader and the native species, and the simplicity of parameters and transition rules are novel features of the model.

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