

A DISCRETE COMPETITION-EPIDEMIC MODEL

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In this talk we present a discrete eco-epidemic model [3]. The community interactions, competition, are represented by a discrete Leslie-Gower model. The disease dynamics follows a discrete SIS epidemic model with frequency-dependent transmission. We focus on the case of disease only affecting one of the species. We assume that parasites provoke density- and trait-mediated indirect interactions in the community that occur on a shorter time scale. This is included in the model considering that in each time unit there exist a number k of episodes of epidemic changes followed by a single episode of demographic change, all of them occurring separately. The construction of this kind of systems, together with a reduction method that simplifies their analysis, is reviewed in [1, 2].

The proposed model takes the form of a three-dimensional system of difference equations with two time scales. The application of the reduction method yields a two-dimensional competition model that includes the effects of the disease in its parameters. We carry out a complete mathematical analysis of the asymptotic behaviour of its solutions deriving interesting information about the influence of a disease in competition dynamics. This includes an assessment of the impact of the disease on the equilibrium population of both species as well as some counterintuitive behaviours in which although we would expect the outbreak of the disease to negatively affect the infected species, the contrary happens.

References

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