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A mathematical model for indirectly transmitted diseases between two host populations

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ABSTRACT

This talk fits into the general setting of invasion and persistence of parasites through spatially distributed host populations. We consider a mathematical model for the indirect transmission via a contaminated environment of a microparasite between two spatially distributed host populations having non coincident spatial domains. The parasite is benign in a first population and lethal in the second one.
Various heterogeneities are included in our model: spatially variable carrying capacities as well as temporal oscillations in carrying capacities. Global existence results are given for the resulting reaction–diffusion system coupled with an ordinary differential equation. Then, invasion and persistence of the parasite are studied. The impact of the parasite on the second host population is also assessed.
A simplified model for the transmission of a hantavirus from bank vole to human populations is then analysed.
This is a multidisciplinary work with D. Pontier (University Lyon1), W.-E. Fitzgibbon (University of Houston), F. Marpeau & C. Wolf (Bordeaux), F. Sauvage (Lyon).

Key Words: indirectly transmitted disease, reaction diffusion systems, global existence, invasion and persistence.

AMS Classification: 35K57, 35R05, 35B40, 92D30.

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