

第34回 MEE seminar

Mathematical Ecology & Evolution

2012年6月28日(木) 16:30~17:30

明治大学生田キャンパス第二校舎A館: A304

June 28, 2012. 16:30~17:30 Meiji Univ. Ikuta campus A304

小田急小田原線 「生田駅」から徒歩10分
又は「向ヶ丘遊園」駅北口から「明治大学正門前」行きバスで15分終点下車
詳しくは、http://www.meiji.ac.jp/koho/campus_guide/ をご覧下さい

Finite-size scaling analysis applied to evaluate spatially heterogeneous planting of crop genotypes

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Abstract: From the perspective of epidemic, there are several analytical methods and many factors embedded, such as spatial structures, transmission distance, stochasticity and heterogeneity. Every plant disease has its unique infection cycle and agricultural form, and therefore we should consider these aspects of diseases in defining an appropriate criterion. Here, if we assume spatially explicit plant epidemics with a strongly local interaction, the lattice model can help define the integrated criterion in the disease spread. I analyzed the lattice model by the approximations, such as mean field approximation, pair approximation, and percolation theory, and the computer simulations, which give us not only the estimated values of the epidemic magnitude, but also a theoretical idea to capture the essential features of differently spatial conditions. In this presentation, I'd like to show focus on an application of finite-size scaling analysis to a critical behavior of percolating cluster in a plant epidemic. The dynamics of disease spread is described by a basic SIR model (susceptible, infected, recovered or removed, without the host reproduction) in this study. With using the Monte Carlo simulations in the lattice space and several approximations such as mean field approximation, pair approximation, and finite scaling theory, we show that the different approximations can lead to the different thresholds of the initial resistant density which prevent an outbreak as agricultural criteria. Functional behaviors of these threshold fractions, depending on basic reproductive rate (R_0) of infected crops, shaped zones between among their curves. This zoning suggests the different features of disease transmission in different crop diseases.

参加自由です。皆様のお越しをお待ちしております。

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