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A threshold area of organic to conventional agriculture ratio causes recurrent pathogen outbreak

We consider the effect of increasing the area of agricultural land under organic practises. We assumed that organic agriculture does not have effective means of pathogen control. We model pathogen dispersal with a diffusive logistic equation in which the growth/death rate is spatially heterogeneous. We find that if the ratio of the organic plots to conventional plots is below a certain threshold, the pest population is kept small. Above this threshold, the pest population in the organic plot grows rapidly. In this case, the organic plot will act as a source of pest to the surrounding regions, and will always infect organic plots as they become more closely spaced.