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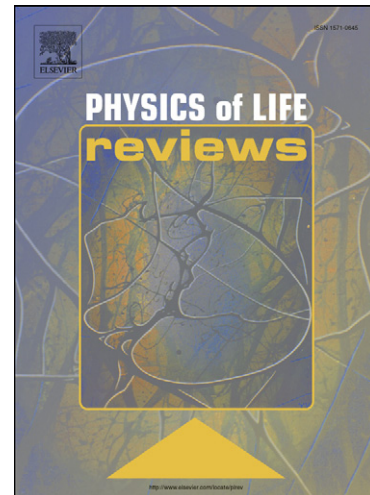
Pest Control: A Modelling Approach

Rebecca C. Tyson

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Pest Control: A Modelling Approach

Comment on “Multiscale approach to pest insect monitoring: Random walks, pattern formation, synchronization and networks”

by S. Petrovskii, N. Petrovskaya and D. Bearup

Rebecca C. Tyson^a

^a*Mathematics & Statistics, IKBSAS 5 BLDG SCI, University of British Columbia Okanagan, 3333 University Way, Kelowna, BC, V1V 1V7, Canada*

Successful food production results in the delivery to market of beautiful produce, free of damage from insects. All of that produce however, is an excellent and plentiful food source, and nature has evolved a multitude of insects that compete with humans for access. There exist a number of management strategies to combat pests, including old fashioned crop rotation and companion planting, as well as more sophisticated techniques including mating disruption using pheromones and the application of chemical sprays. Chemical sprays are extremely effective, and are in widespread use around the globe [20, 12, 1]. Indeed, pesticides are the dominant form of pest management in current use [20, 10].

Pesticide application is most effective if it is applied at the correct stage of development, and so growers need to know, for their particular microclimate, when is the ideal time to apply chemical controls. Early mathematical approaches to this problem led to the development of phenology models, also known as degree-day models [3]. Since insect development is inextricably linked to ambient temperature, the rate at which insects develop, from egg to larva and then eventually to adult, depends on the local weather. If the spring is relatively warm or cool, development will be accelerated or decelerated, respectively. Given the minimum and maximum temperature on a given day, a grower can look up the number of degree-day units accumulated on that day in a table (see, for example [2]). Once the total number of degree-day units for the targeted developmental stage is reached, the appropriate pesticide can be applied.

This approach works well, but does not involve testing for the presence of the insect, and so can lead to unnecessary application of pesticides. This is an issue of serious concern, as the widespread use of pesticides can create problems for the environment as well as

*Rebecca C. Tyson, corresponding author

Email address: rebecca.tyson@ubc.ca (Rebecca C. Tyson)

URL: people.ok.ubc.ca/rtyson (Rebecca C. Tyson)

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