

Basal Sprout Centered Management of Vector-Borne Tree Diseases

Kelly Buch*, N.H. Fefferman

Department of Mathematics, University of Tennessee, Knoxville, TN 37996

kbuch@vols.utk.edu

Non-native, lethal forest pathogens can cause high mortality in tree populations, so the production of basal sprouts (small shoots produced by the root system of infected trees) is an important contributor to population maintenance post-epidemic. However in the case of fatal vector-borne tree diseases, the production of basal sprouts by infected host trees can also lead to a larger vector population, lengthening and worsening the impact of the disease. Ideally, management strategies should aim to maintain the host population and eradicate the vector-pathogen complex simultaneously. However management of a forest system is expensive and labor-intensive, so only methods with high feasibility and success should be used. Since management strategies involving basal sprouts may be more feasible than management on larger trees due to the difference in size, we consider basal-sprout centered management strategies within a mathematical model for a vector-borne tree disease. We specifically consider the application of fungicides on susceptible basal sprouts and removal of either infected or susceptible basal sprouts. We test these strategies for effectiveness in lowering the vector population and maintaining/increasing the host population at equilibrium. We present a recommendation for wildlife managers which depends on both the degree to which infected trees produce basal sprouts and the rate of infection of basal sprouts through connected to infected parent trees.