



Research Experiences for Undergraduates (REU) 2011 Abstract

CHITRAKAR, R., SHRESTHA, S., WISNIEWSKI, C., LIU, W., THIBERT-PLANTE, X., GWINN, K. and V. PROTOPODESCU. The Effect of Borneol on Spore Germination and Germ Tube Growth of the Entomopathogenic Fungus, *Beauveria bassiana*. National Institute for Mathematics and Biological Synthesis and Department of Entomology and Plant Pathology, University of Tennessee, Knoxville, TN., Eastern New Mexico University, Portales, NM, Wesleyan College, Macon, GA, Southeast Missouri State University, Cape Girardeau, MO, Oak Ridge National Laboratory, Oak Ridge, TN.

Borneol, an essential oil secreted by the monarda plant, has antifungal and antipathogenic properties, which make it a potential substitute for synthetic pesticides. The entomopathogenic fungus, *Beauveria bassiana*, has the ability to grow inside plants and induce resistance to many plant pathogens and insects. Stacking the beneficial effects of borneol and *B. bassiana* could be used as a potentially more efficient biological control mechanism. The goal of this study was to assess the effect of borneol on the germination and growth of the *B. bassiana* spores. To this end we used data from three separate trials. For each trial, we plotted (i) the percentage of germinated spores as a function of concentration and (ii) the germ tube lengths for different concentrations of borneol at four time periods, during a twenty-four hour time period. An analytical mathematical model based on gamma distribution of spore germination and growth was developed to examine the effects of the oil on the germ tube length and percent germination of *B. bassiana*. Upon more extensive study and validation, the model could be used to predict effects of borneol on *B. bassiana* at different concentrations and time periods, and harness borneol and *B. bassiana* for disease control.