Meeting: 1003, Atlanta, Georgia, SS 18A, AMS-SIAM Special Session on Recent Advances in Mathematical Ecology, I

1003-92-1183 **Andrew J Whittle*** (whittle@math.utk.edu), Department of Mathematics, University of Tennessee, Knoxville, TN 37996, **Suzanne Lenhart**, Department of Mathematics, University of Tennessee, Knoxville, TN 37996, and **K. A.J. White**, Department of Mathematical Sciences, University of Bath, Claverton Down, BA2 7AY Bath, England. *Optimal Control of an Integrodifference Model for Gypsy Moths.*

Gypsy moths have long been a forest pest in Northeastern United States. Its population levels cycle between four phases; innocuous, release, outbreak and decline. It is during the outbreak phase where gypsy moths often cause extensive defoliation. Although what causes the release phase to occur is not completely understood, the decline phase is attributed to a naturally occurring baculovirus, LdNPV. A more recent discovery is the effect that plant food quality, in particular tannin levels, have on the vital rates of the moths. It was found that tannin reduced the susceptibility of the moth to the virus and also reduced its birth rate.

The extensive defoliation caused by gypsy moths produce a substantial cost to the local economy, hence there is a need to control gypsy moth populations. One method of control is to spray a biocontrol agent, Gypchek, yet this can be costly. The aim of this study is to determine an optimal spraying strategy to minimize an objective function consisting of a sum of both the cost of damage caused by gypsy moths and the cost of controlling them. However, the objective function is subject to the constraints of a system of integrodifference equations that describe the tritrophic interactions of the gypsy moths, virus and tannin. (Received October 04, 2004)