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Prasanth George and **John Ringland*** (ringland@buffalo.edu), 244 Mathematics Bldg,
University at Buffalo, State University of New York, Buffalo, NY 14260. *Asymptotic formulas for
the equilibria in a model of suppression of pest resistance to insecticidal genetically modified crops.*

We analyze a deterministic model of an insect pest population on an agricultural crop consisting of fields of genetically modified plants that are toxic to the pest and government-mandated "refuges" of conventional toxin-free plants. The model includes migration of the pest to and from a hospitable habitat distinct from the crop. It is assumed that the pest population carries a genetic allele that confers resistance to the toxin present in the crop; refuges are used with the goal of preventing a control failure due to this allele becoming predominant in the population. When the refuges are absent, an agriculturally desirable low-population equilibrium exists in some parameter regions of the model. The addition of refuges is seen to eliminate this desirable state, and can thus actually be harmful. Asymptotic formulas for the equilibria are developed in the limit of weak communication with the external habitat. The formulas show how each of the many parameters influences these agriculturally significant features. (Received September 22, 2009)