1163-37-1619 **Sunmi Lee**, Department of Applied mathematics, Kyunghee University,, Yongin, 446-701, South Korea, and **Minseok Kim** and **Yun Kang*** (yun.kang@asu.edu), Mesa, AZ 85212. *Optimal control of a discrete-time plant-pest model with bistability and fluctuating environments.* Preliminary report.

Discrete-time plant-pest models with two different constant control strategies (i.e., removal versus reduction strategies) have been investigated to understand how to regulate pest population. The corresponding optimal control problem has been explored on three scenarios of bistability of plant-pest dynamics where these dynamics are determined by the growth rate of the plant and the damage rate inflicted by pest. Through analysis and simulations, we identify and evaluate the optimal controls and their impacts of fluctuating environments on the plant-pest dynamics. There are critical factors to characterize the optimal controls and the corresponding plant-pest dynamics such as the control upper bound (the effectiveness level of the implementation of control measures) and the initial conditions of the plant and pest. The results show that the pest is hard to be eliminated when the control upper bound is not large enough or the initial conditions are chosen from the inner points of the basin of attractions. However, as the control upper bound is increased or the initial conditions are chosen from near the boundary of the basin of attractions, then the pest can be manageable regardless of fluctuating environments. (Received September 15, 2020)