Differential
Equations
& Applications
Volume 12, Number 1 (2020), 69–88
doi:10.7153/dea-2020-12-05

# ANALYSIS OF STAGE–STRUCTURED MODEL WITH MIXED TYPE OF FUNCTIONAL RESPONSE AND IMPULSIVE BIOLOGICAL CONTROL

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*Abstract.* The aim of this paper is to study a stage-structured pest management model with mixed type of functional response i.e., Holling type-I and Beddington-DeAngelis functional response with impulsive biological control. Stage structuring is proposed due to the fact that almost all the pests in their life pass through two stages namely, immature larva and mature adult. It is assumed that immature susceptible pests and exposed pests are attacked by a natural enemy and susceptible pests (immature and mature) are contacted by infected pests which make them exposed. Infected pests and natural enemies are infused impulsively after fixed intervals. All positive solutions are proved to be uniformly ultimately bounded. The stability analysis of pest extinction periodic solution, as well as the permanence of system, are obtained by making use of floquet's theory, small amplitude perturbation technique, and comparison theorem. The results obtained provide certain dependable theoretical findings for effective pest management. At last, theoretical findings are confirmed by means of numerical simulation.

*Mathematics subject classification* (2010): 92D25, 34C11.
*Keywords and phrases*: Beddington-DeAngelis functional response, pest management, impulsive effect, stability analysis, permanence.

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Paper DEA-12-05

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