Biological Control via Alternative Food to Predator

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ABSTRACT: Biological control is a means by which pest/invasive populations are kept in check by the use of natural enemies, parasites, pathogens or a combination thereof. The classic work of Srinivasu et. al. demonstrates how such a process can be facilitated, by providing additional food to an introduced predator to control a target pest. A critical assumption in Srinivasu's model is that the additional food is constant.

We show that the classical model of Srinivasu, does not permit Turing instability for any parameter range, if one considers the spatially explicit extension. However, if one assumes the additional food is not constant, but depends on the predator density per se, then Turing instability becomes a possibility. We investigate different functional responses for the food amount given to the predator and stability analysis of the resulting system is done for each case. Srinivasu's model claims that if the additional food provided to predator is terminated after eliminating prey from the system, prey never rise up again. But we investigate that, prey will gear up even after the elimination if the additional food is cut off from the system. Various biological implications of our mathematical results are drawn in conclusion.

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