

Effect of Refuge and Density Independent Migration on the Dynamics of Predator-prey System

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Abstract: In this paper, we investigate a three-patch predator-prey model which incorporates refuges for the predator and prey. We assume that individuals use density independent migration from common patch to refuge patch and vice versa, i.e. per capita migration rates are constant. We also assume that the two time scales are involved in the model, a fast one corresponds to migration, and a slow one corresponds to growth, mortality and predator-prey interaction. We take advantage of the two time scales to reduce the dimension of the model by using methods of aggregation of variables. The aim of this paper is to study the effect of fast density independent migration on the dynamics of predator-prey system. We show that fast density independent migration can allow prey to avoid predation risk, even in some cases, prey is able to drive predator out. Too much migration to the refuge, however, can be detrimental to existence of the prey.

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