SOME THRESHOLD THEOREMS FOR A PREY – PREDATOR MODEL WITH HARVESTING

K. LAKSHMI NARAYAN AND N. Ch. PATTABHI RAMACHARYULU

Abstract

In the classical Lotka - Volterra Prey - Predator model, there is no protection for Prey from the Predator and Predator sustains on the Prey alone. When the Prey population falls below a certain level, the predator would migrate to another region in search of food and return only when the Prey-population rises to the required level. Kapur, (c.f. mathematical Models in Biology and Medicine, Affiliated East -West, 1985), discussed some of the prey-predator models. Gause, (The struggle for existence, Williams and Wilkins, Baltimore, 1934), deduced three Threshold

Theorems one for each of the three not-fully washed equilibrium states for a simple

Competition model. In consonance with **the principle of competitive exclusion** Gause, we derived three theorems and ten lemmas for a more general prey - predator model incorporating

(i) the Predator is provided with a limited resource of food in addition to the prey,

(ii) a cover to the prey proportionate to its population to get protection from the

predator, and

(iii) harvesting of both the species, proportional to their population sizes.

The model is characterized by a couple of first order **non-linear ordinary differential equations**.