The pest control in agricultural systems

Servilia OANCEA - USAMV Iasi
I. GROSU - UMF Iasi
A.V. OANCEA - "Al. I. Cuza" University Iasi

The pest control is of great interest in agriculture domain because the pests have been the major factor that reduces the agricultural production in the world. An agricultural ecosystem consists of a dynamic web of relationships among crop plants or trees, herbivores, predators, weeds, etc. Organisms in a cropping system interact in many ways — through competition. There are different approaches in regard the possibility of the modeling of these complex systems. Over the last decade, there has been considerable progress in generalizing the concept of synchronization to include the case of coupled chaotic oscillators especially for biological systems. Many examples of biological synchronization have been documented in the literature, but currently theoretical understanding of the phenomena lags behind experimental studies. From mathematical viewpoint, biological control has been modeled as a two-species interaction. Arneodo et al.(1980) have demonstrated that one can obtain chaotic behavior for the system with three species and Samardzija and Greller(1988) propose a two-predator, one prey generalization of the Lotka-Volterra problem into three dimensions. In order to formulate the pest control in this work the synchronization of two Lotka–Volterra systems with three species, one prey and two predators is presented. The transient time until synchronization depends on initial conditions of two systems and on the control number. Our results show that the synchronization is about three times faster for all three controllers than for one controller. The synchronization for all species is possible with one controller only if we interfere on predator population. The control method described in this work is very easy and might be useful in the case of the
other chaotic systems.