
GLOBAL DYNAMICS FOR A MODEL WITH STAGE STRUCTURE AND SPATIAL MOVEMENT

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ABSTRACT

Spatial diffusion and insecticide resistance, is a pest survival process. To better understand these traits, we discuss a structured model with two life stages, juveniles and reproducing adults. We present a systematic study using monotone systems theory. Using this model, we aim to understand the main characteristics leading to persistence or extinction of the insect pest population. We establish global stability results. Numerical simulations provide some interesting insights on the dynamics of the pest population. The dynamics is described in terms of a threshold value obtained by the spectral radius of the Poincaré operator of the linearized problem around the extinction equilibrium.

Keywords aggregated model · cooperative systems · Insects · slow fast dynamics

References

- [1] Khadidja Aicha, Kada; Bedreddine, Ainseba; Mohammed, Bouguima Sidi. Mathematical modeling of pest resistance to insecticides in a heterogeneous environment. *Math. Methods Appl. Sci.* 46 (2023), no. 12, 13320–13341.
- [2] Bouguima, Sidi Mohammed; Kada, Khadidja Aicha. Analysis and control of physiologically structured models with nonlocal diffusion. *Differ. Equ. Appl.* 15 (2023), no. 1, 29–60.
- [3] Ainseba, B.; Bouguima, S. M. An adaptative model for a multistage structured population under fluctuating environment. *Discrete Contin. Dyn. Syst. Ser. B* 25 (2020), no. 6, 2331–2349.

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