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**Complex dynamic behaviors of a discrete-time predator-prey system.** (English)

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Summary: The dynamics of a discrete-time predator-prey system is investigated in the closed first quadrant  $R_+^2$ . It is shown that the system undergoes flip bifurcation and Hopf bifurcation in the interior of  $R_+^2$  by using the center manifold theorem and bifurcation theory. Numerical simulations are presented not only to illustrate our results with the theoretical analysis, but also to exhibit the complex dynamical behaviors, such as the period-5, 6, 9, 10, 14, 18, 20, 25 orbits, cascades of period-doubling bifurcations in period-2, 4, 8, quasi-periodic orbits and the chaotic sets. These results reveal far richer dynamics of the discrete model compared with the continuous model. The Lyapunov exponents are numerically computed to confirm further the complexity of the dynamical behaviors.

**MSC:**

92D40 Ecology  
39A11 Stability of difference equations (MSC2000)  
37N25 Dynamical systems in biology  
39A12 Discrete version of topics in analysis

Cited in **108** Documents

**Full Text:** [DOI](#)

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