





บทความ Dynamical analysis of a delayed food chain model with additive Allee effect ถูกอ้างอิงใน วารสารที่อยู่ในฐานข้อมูลที่ กพอ
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... We also assume that the predator is dead as the impact of intraspecific competition for foods with the death rate symbolized by . Since the predator is exposed by the Allee effect, we apply the additive Allee effect term to the predator denoted by the hyperbolic term + where and are Allee effect constants [49][50][51] [52]. It is called the weak Allee effect if $<$ and the strong Allee effect if $>$

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A predator–prey model with additive Allee effect and intraspecific competition on predator involving Atangana–Baleanu–Caputo derivative

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ABSTRACT

A mathematical model of an interaction between two populations namely prey and predator is studied based on a Gause-type predator–prey model involving the additive Allee effect and intraspecific competition on the predator. A famous fractional operator called Atangana–Baleanu–Caputo fractional derivative (ABC) is employed to integrate the impact of the memory effect on the dynamical behavior of the model. The existence, uniqueness, non-negativity, and boundedness of the solution are given to confirm the biological feasibility and validity of the model. Three types of equilibrium points are identified on the origin, axial, and interior including their existence conditions. The Lyapunov direct method for the ABC model is used to investigate the asymptotic stability condition for each equilibrium point. The numerical simulations are provided to demonstrate the impact of several biological parameters on the dynamics of the solutions. The emergence of transcritical, saddle-node, and backward bifurcations driven by the Allee constant are provided which resulted in the appearance of bistability condition. A Hopf bifurcation as well as the evolution of the limit-cycle also occurs as the impact of the memory effect. Each analytical and numerical result is biologically interpreted to show the way that the density of both populations always balances in their ecosystem.