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HARMLESS MATURATION DELAY IN PREY-PREDATOR TYPE INTERACTIONS

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Discrete and continuous time delays are often introduced into mathematical models of interacting populations to take into account stage-structuring of one or more species. In prey-predator models, maturation time delay is introduced to the growth equation of predators to implicitly model the stage-structure of predators. Most of the prey-predator models with maturation delay are known to exhibit regular and irregular, even chaotic, oscillations due to destabilization of coexistence steady-state when maturation time period is significantly large. However, such kind of instability can results in due to the introduction of maturation delay into predator's growth equation with lack of ecological justification. Recently we have worked on a class of delayed prey-predator models, discrete time delay represents the maturation time for specialist predator implicitly, with ratio-dependent functional response [1] and Michaelis-Menten type functional response [2]. We have established (i) the stabilizing role of maturation delay, (ii) extinction of predator for significantly long maturation period and (iii) suppression of Hopf-bifurcation for large time delay, when the model is constructed with appropriate biological rationale. Main objective of this talk is to discuss analytical results for the stable coexistence of both the species for a class of delayed prey-predator models with maturation delay for specialist predator. Analytical results will be illustrated with the help of numerical simulation results and appropriate bifurcation diagrams with time delay as bifurcation parameter.

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References

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