

ASYMPTOTIC STABILITY OF AGE-STRUCTURED
RESOURCE-CONSUMER MODEL OF POPULATION
DYNAMICS WITH SATURATED INTAKE RATE
AND TIME DELAY

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The nonlinear autonomous resource-consumer model in a heterogenous environment consisting of several food patches with active resource and generalist consumer is studied. Food resources do not disperse between patches, while consumers do disperse. The model of consumer population is age-structured and is described by a delayed transport equation [1]. The model of n food resources is unstructured and is described by nonlinear ODE with saturated intake rate. The delay models the handling time of generalist consumer, i.e. the time a consumer needs to handle and digest a unit of resource. Digestion period is included in the calorie intake rate which impacts on the consumer fertility and mortality. Saturated intake rate models the inhibition effect from the behavioural change of the food resources when they react on the consumer population growing or from the crowding effect of the consumer. The model is studied both analytically and numerically. Conditions for existence of trivial, semi-trivial and non-trivial equilibria and their local asymptotic stability are obtained. Numerical experiments confirm and illustrate these theoretical results.

REFERENCE

- [1] V.V. Akimenko, V. Krivan, Asymptotic stability of delayed predator age-structured population models with an Allee effect. *Math. Biosci.*, 306, 170-179 (2018).