The Dynamics of Intraguild Predation under Stoichiometric Conditions

Intraguild Predation (IGP) is a common interaction in natural food webs, in which species that exploit the same prey also prey upon one another. This coupling of competition and predation plays an important role in shaping food web structure, influencing species coexistence, trophic cascades, and ecosystem stability. Ecological stoichiometry provides a natural framework for modeling these complex dynamics by incorporating the role of nutrient balance in species interactions. Despite its importance, the role of such stoichiometric constraints in shaping intraguild predation dynamics remains insufficiently explored. In this talk, I will discuss the dynamics of IGP across two trophic levels under stoichiometric conditions with a focus on how the optimal strength of IGP influences species interactions and community structure. We develop a model that accounts for key stoichiometric features such as producer plasticity, consumer homeostasis, and nutrient recycling. Our analysis shows that incorporating stoichiometric constraints can significantly alter predictions of previous IGP models that neglect nutrient dynamics, leading to different stability regimes and coexistence outcomes. These results highlight the importance of nutrient based mechanisms in understanding and predicting food web dynamics.