Contribution ID: **309** Type: **Oral Presentation**

# Effects of interplay between direct and indirect effects on diversity of ecological communities

*Monday, 9 July 2018 16:30 (30 minutes)*

Species interactions are important to determine structure and stability of ecological communities. In particular, a variety of indirect effects appear between species which do not interact directly. However, indirect effects do also appear between species that directly interact. For example, plant species sharing a common herbivore may engage in both interference competition directly with other plant species and apparent competition indirectly through common herbivores. Then, if a plant species augments herbivores, then grazing pressure on another plant species increases and decreases in biomass of the latter plant may weaken competitive pressure on the former plant species. In this way, there may appear many feedback loops in a complex ecological community where species affect each other through many different paths connecting them. Thus, we should understand interactive consequences of a direct and many indirect effects to understand structure and dynamics of ecological communities. However, studies on indirect effects tend to focus on changes in density of a target species and neglect changes in diversity of the whole community.

In this presentation, we consider a very simple dynamical system model that describes a community composed of predator, herbivore and many plant species. In this model, since predators reduce herbivores and weaken grazing pressure on plants, there appear a positive trophic cascade from the predator to plants. Then, increased plant biomass may enhance both direct interference and indirect apparent competition between plants. Therefore, it is interesting to investigate how the presence of predators affects diversity of the plant community. We analytically solve steady state solutions of the model and investigate effects of predation, grazing, and interference competition on the number of plant species and total plant biomass. Based on the results, we discuss the importance of interplay between direct and indirect effects for structure of ecological communities.

**Primary author:** Prof. NAMBA, Toshiyuki (Osaka Prefecture University)

**Co-author:** Prof. YAMAMURA, Norio (Kyoto University)

**Presenter:** Prof. NAMBA, Toshiyuki (Osaka Prefecture University)

**Session Classification:** Population dynamics models with broader ecological, evolutionary, and social feedbacks

**Track Classification:** Minisymposium: Population dynamics models with broader ecological, evolutionary, and social feedbacks