(Course Title) Special Lecture on Comparative Agricultural Studies 11	**(Group)** M1 students or above **(Number of credits)** 1 **(Course offered period)** 2024/ Spring Semester (April – Aug.) **(Class style)** Lecture **(Language)** English **(Day/period)** June 6, 13, 20, 27; July 4, 11, 16, 18, 2nd period **(Room)** W102 (16 July only, W506)
(Affiliated department) Graduate School of Agriculture **(Job title)** Associate Professor **(Name)** Katayama	

(Outline and Purpose of the Course)

The Behavioral Ecology of Biological Control

Behavioral Ecology is a comparatively young, multi-and cross-disciplinary field of science that intertwines concepts, ideas and approaches from animal behavior, ecology and evolution. The overall objective of Behavioral Ecology is studying the adaptive significance of behavior and how it contributes to survival and reproductive success. This course highlights the behavioral ecology of herbivores and natural enemies that have relevance in agriculture as either pest or beneficial. It places emphasis on how behavioral ecology contributes to the knowledge base needed for the successful control of arthropod pests and using arthropods as natural enemies, that is, biological control. Biological Control is the targeted control and regulation of populations of pests and weeds by the use of living natural enemies and has ever-increasing success, especially in horticulture. Biological control is a science-based approach that rises and falls, and which success depends on, thorough knowledge of the behavior, ecology and evolution of the players in multi-trophic food webs including plants, herbivores and their natural enemies. The course explains the theoretical background and presents arthropod case studies, mainly from insects, spiders and mites, to illustrate the major ideas, thoughts and concepts of behavioral ecology and showcases behavioral ecology-based approaches in pest management. Major topics discussed include, but are not limited to, foraging behavior, predator-prey interactions, sexual selection, recognition systems, cognitive ecology and learning, social organization, behavioral plasticity, signaling and communication, orientation and dispersal, multitrophic interactions and induced plant defense, basics of population ecology, risk considerations in biological control, and biological control under global change, and the relevance of animal personalities in biological control.

(Course Goals)

Course objectives are (i) to grasp the relevance of behavioral ecology for biological control, and (ii) to understand how particular behavior patterns contribute to an animal's chances of survival and its reproductive success and to the tremendous success of arthropods as herbivores (pests) and the herbivores' natural enemies (beneficials).

(Course schedule and Contents)

1. Behavioral ecology scope and relevance for biological control (June 6, Thurs)
2. Foraging behavior and sexual selection (June 13, Thurs)
3. Predator prey interactions and anti-predator behavior (June 20, Thurs)
4. Recognition systems and kin selection (June 27, Thurs)
5. Learning by herbivores and their natural enemies (July 4, Thurs)
6. Multitrophic interactions and induced plant defense (July 11, Thurs)
7. Animal personalities in biological control (July 16, Tues)
8. Student presentations (July 18, Thurs)

The schedule may change slightly depending on the progress.

(Method, Point of view, and Attainment levels of Evaluation)

Class attendance and participation in discussion (50%), talk (jointly given by 2-3 students) on a course-related scientific topic in the last class – unit 8 (50%)

Refer to current year's 'Guide to Degree Programs' for attainment levels of evaluation.

(Regarding studies out of class (preparation and review))

Scientific paper reading assignments

(Others (office hour, etc.))

The lecture is given in English by a visiting professor, Peter Schausberger (Department of Behavioral and Cognitive Biology, University of Vienna, Austria)

Personal discussions possible after each lecture unit

(Requirements for taking courses)

Basic knowledge of entomology, animal behavior, horticulture, and plant protection

English proficiency suitable for understanding lectures and contributing to discussion and reading.

(Textbooks used to compile the lecture)

Alcock, J. (2013). Animal Behavior, an Evolutionary Approach. 10th ed., Sinauer Associates.

Begon, M., Harper, J.L. & Townsend, C.R. (1996). Ecology, 3rd ed., Blackwell Science.

Davies, N.B., Krebs, J.R. & West, S.A. (2012). An Introduction to Behavioral Ecology, 4th ed., Wiley-Blackwell.

Goodenough, J., McGuire, B., Wallace, R.A. (2001). Perspectives on Animal Behavior. 2nd ed., John Wiley & Sons, Inc.

Krebs, J.R. & Davies, N.B. (1997). Behavioral Ecology, 4th ed., Blackwell Science.

Price, P.W., Denno, R.F., Eubanks, M.D., Finke, D.L., Kaplan, I. (2011). Insect Ecology. Behavior, Populations and Communities. Cambridge University Press

Westneat, D.R. & Fox, C.W. (2010). Evolutionary Behavioral Ecology. Oxford University Press.

(Student handouts)

Students will get access to pdf handouts of the power point slides used in the lecture and pdfs

of the scientific paper reading assignments
(Related URL)