A-1. Main Subjects

A. Research Activities (2010.4-2011.3)

The major research topic in this laboratory is the ecological, molecular and biochemical analysis of the interactions among plants, herbivors and predators, along with basic ecological and genetical studies of individual components comprising of these systems.

a) Inter- and intra-specific variations in the ecological performance of spider mites

Phytophagous mites of the family Tetranychidae occur in a variety of environments, while their adaptive traits such as diapause, dispersal and host plant range vary within species and between them. We have studied experimentally and theoretically, the genetic basis of this variation, and the ecological factors responsible for and the significance of the variation.

b) Management of spider mite population in orchards

We have compared the abundance of spider mite populations in pear and persimmon orchards that have different cultural and control programs, and determined the artificial factors responsible for outbreaks of the mites. Based on this survey, we proposed strategies for controlling the mite population, including the use of natural enemies, such as phytoseiid mites, and the development of new cultural management techniques.

c) Ethological interactive studies of spider mites and their predators
In general, herbivores and their predators are involved in complex food webs. Moreover, members within a trophic level also interact through inter-specific competition and/or intra-guild predation. We have investigated direct and indirect impacts of these interactions on the population dynamics of herbivores.

d) Evolutionary ecology of plant-herbivore interactions

Diverse interactions between plants and herbivores are maintained by the balance between defense of plants against herbivores and counter adaptation of herbivores. From this viewpoint, we have examined the reason why host ranges of phytophagous insects and mites are generally restricted to a small range of plant fauna available to them. We also investigated proximate factors responsible for the interactions such as secondary metabolites of host plants.

e) Meta-population structure and maintenance of genetic variation in spider mites

Neutral mutations are frequently lost or fixed by genetic drift within a finite population. Nevertheless, genetic variations in pesticide susceptibilities are maintained in a selection-free, wild population of spider mites. Such variations may be maintained by the meta-population structure of spider mites. We have analyzed the structure using molecular markers such as DNA polymorphism, and discussed the maintenance mechanism of the genetic variations.

f) Ecology and biodiversity of predacious phytoseiid mites and their use in pest management

Mite species of the family Phytoseiidae include natural enemies of spider mites and insect pests. Basic biology as well as distribution and abundance of native species have been investigated and better management strategies of pests have been explored nation-wide with a sustainable use of these natural enemies.

g) Ecological characteristics of a spinach infesting acarid mite Tyrophagus similis Volgin and investigation of its natural enemies

Spinach damages by Tyrophagus similis Volgin are rapidly increased along an expansion of greenhouse cultivation and increasing use of organic materials. The study includes scientific analysis of damaging mechanism by mites on spinach from the viewpoint of population dynamics of mites in the cultivated soil. Natural enemies of pest mites are also surveyed and potential biological agents are selected.

A-2. Publications and presentations

a) Publications
   Original Papers (including book-reviews)


b) Conference and seminar papers presented
- XIII International Congress of Acarology: 3 Presentations
- 19th Annual Meeting of the Acarological Society of Japan: 6 Presentations
- 26th Annual Meeting of the Society of Population Ecology: 3 Presentations
A-3. Off-campus activities 1

Membership in academic societies


Membership in Science Council of Japan, etc.

- Amano, Hiroshi, Ph. D.: The Agricultural Academy of Japan (member)

A-3. Off-campus activities 2

Research grants

1. Grants-in-aid for Scientific Research (KAKENHI)

- JSPS Research Grant: Basic Research (C): Yano, Shuichi: Effect of ants on predator-prey interactions among mites in agroecosystems

- JSPS Research Grant: Basic Research (C): Amano, Hiroshi: Establishment of pest management system with self-propagation system of natural enemies by farmers

- JSPS Research Grant: Basic Research (B): Osakabe, Masahiro: Physiological basis of UV adaptation in spider mites

2. Other Research Grants

- “Research and development projects for application in promoting new policy of agriculture, forestry and fisheries” by the Agriculture, Forestry and Fisheries Research Council of Japan.: Amano, Hiroshi: Establishment of a new sustainable management system of acarid pest mites by means of biological interactions of organisms in agricultural fields

A-4. International cooperation and overseas activities 1

Membership in academic societies

- Amano, Hiroshi, Ph.D.: Acarological Society of America
- Osakabe, Masahiro, Dr. Agric. Sci.: The Entomological Society of America, European Association of Acarologists

A-4. International cooperation and overseas activities 2

Visiting Research Scholars

- Visiting Research Scholar 1 (United Kingdom)

B. Educational Activities 2010.4-2011.3

B-1. On-campus teaching

a) Courses given

- Undergraduate level:
  - Ecology - Looking for Sustainable Society- (Amano), Ecology (Amano), Ecological Information (Amano), Ecological Management (Osakabe), Seminar in Agro-ecosystem Science (Amano, Osakabe), Outline of Bioresources Science IV (Amano, Osakabe), Introduction to Foreign Literature in Bioresources Science II (Amano), Laboratory Course in Bioresource Science I・II (Yano)

- Graduate level:
  - Special Lecture in Ecological Management (Osakabe), Seminar in Ecological Information (Amano, Osakabe, Yano), Research in Ecological Information (Amano, Osakabe and Yano)

B-2. Off-campus teaching etc.

Part-time lecturer

- Amano, Hiroshi: The Open University of Japan (Chiba study center) (Looking for the World of Insects)

- Osakabe, Masahiro: Ishikawa Prefectural University (Applied Entomology)

Open lectures, etc.

- Amano, Hiroshi: Career-support Program for Women Scientists at Chiba University (Skill-up seminar) (invited lecture)

- Yano, Shuichi: Chemical Ecology Lab. Special Seminar, Kyoto Institute of Technology, Oral presentation