Chair Agro-ecosystem Science

2.5.4 Laboratory : Tropical Agriculture

Member:	Professor	Nawata, Eiji, D. Agric. Sci.
	Associate Professor	Higuchi, Hirokazu, D. Agric. Sci.
	Doctor's program	2
	Master's Program	10
	Undergraduate	5
	Other	1
	Researcher	1

A. Research Activities (2010.4-2011.3)

A-1. Main Subjects

a) Bio-resources, farming and cropping systems and sustainability in Mainland Southeast Asia

In middle south Laos, integral analyses of relationship among used plant resources, ethnicity, topography and socio-economic environment of home gardens clarified that topography affected the scale of home gardens more conspicuously than ethnicity and that plant species composition in home gardens were affected mainly by ethnicity and socio-economic environment.

b) Evaluation of agricultural resources and sustainability in upland crop areas, developed on a large scale, in the tropics

In northeast Thailand, the dynamics of productivity of sugarcane were analyzed in the selected farmers' fields. We confirmed that appropriate fertilizer application systems were not established in the survey area. We started an field experiment to analyze the effect of split-application of fertilizers on growth and yield of sugarcane. In Northern Laos, we studied recent dynamics of shifting cultivation and indicated that fallow periods are affected by land use history and the difference in tribes.

c) Utilization of tropical plant resources and Distribution and dissemination of tropical crops

In order to clarify the distribution and dissemination of coriander in South and Southeast Asia, various morphological, ecological and biochemical traits were analyzed. Four variety groups were classified, namely variety group mainly distributed in India, that in Northern Thailand and Laos, that in Central Thailand and that in China. Ecological and biochemical traits of glutinous maize were also analyzed. Varieties distributed in the tropics showed strong short-day traits for flowering. Isozyme analyses did not show any particular tendencies. Field survey on the utilization and recognition and sample collection of wild mango species were conducted through north-east to north Thailand, as a part of "Study on the traditional plant utilizations remained in the tropics". According to the indigenous recognition, at least two types of wild mango Mangifera caloneura were found. Local people distinguish them on the viewpoints of leaf and fruit morphology, and taste, and gave them different names. the highly appreciated fruit "kalon" have been used in the area for a long time, whereas the expansion of commercial variety of cultivated M. indica caused the crisis of disappearing go utility of "kalon" as well as the indigenous knowledge.

d) Agro-ecological physiology of tropical fruit trees

The research to develop the new cultivation technique to solve the fruit flesh disorder of mangosteen, in which the flesh turns to be hard and translucent and to be unpalatable was continued. Among the factors of plant nutrient, soil water content, the development of rizosphere, and water stress that influence the flesh disorder, especially the water stress surrounding the fruit, was found to be substantially effective. Cultivation practice to promote the surface transpiration of the fruit contributes to reduce the incidence of the fruit disorder. The Ca content was higher at the portion of flesh disorder occurring. Pollen cube growth of cherimoya in the pistil was largely affected by low temperature and the growth rate was reduced, as compared with the rate on the artificial medium. Passion fruit flowers do not set fruit when they open on a rainy day, even in a greenhouse. The mechanism of this sterility was revealed by examining the relation between daily fruit set percentage and weather. Japanese-pepper cultivation under subtropical worm conditions, the flowering came earlier than temperate conditions, when the cultivation is combined with adequate pruning technique. The early flowering resulted in early harvesting, bringing about higher income for the growers.

A-2.Publications and presentations

a) Publications

Books

- Nawata, E.: "Shinka shitsuzukeru tairyori to tougarashi (Developing Thai cuisine and chili pepper), In "Tougarashi sanka (Viva Chili Pepper)", Yamamoto N. ed. pp. 139-149, Yasaka Shobo INC. Tokyo, 2010.

Original Papers(including book-reviews)

- Yanai, J., S. Nakata, S. Funakawa, E. Nawata, R. Katawatin and T. Kosaki: Effect of NPK application on the growth, yield and nutrient uptake by sugarcane on a sandy soil in northeast Thailand. Tropical Agriculture and Development. 54 : 113-118. 2010.

- Yamamoto S, T. Matsumoto and E. Nawata: Capsicum use in Cambodia: The continental region of Southeast Asia is not related to the dispersal route of C. frutescens in the Ryukyu Islands Economic Botany. 65 : 27-43. 2011.

- Maeda, T., Y. Yonemoto, H. Higuchi, S. Hagiwara, M. Taniguchi and K. Nakachi. Introduction of macadamia (Macadamia integrifolia Maiden & Betche) for extending the business period of tourism farms from autumn to winter. Hort. Res. (Japan) 9 : 177-181. 2010.

- Maeda, T., Y. Yonemoto, H. Higuchi, Md. A. Hossain, M. Fumuro and K. Shimizu. Effect of Temperature on Flowering Time of Japanese Pepper (Zanthoxylum piperitum (L.) DC. f. inerme Makino) Tree after Breaking of Dormancy. Trop. Agric. Dev. 54 : 67-70. 2010.

- Maeda, T., Y. Yonemoto, H. Higuchi and T. Kitabayashi. Effects of Cutting Back Pruning on Sprouting and Fruit Set in Japanese Pepper (Zanthoxylum piperitum (L.) DC. f. inerme Makino) Trees. Hort. Res. 9:485-488. 2010.

b) Conference and seminar papers presented

- 107th Meeting, Japan. Soc. Trop. Agric. (5)

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- The 1st EnvironmentAsia International Conference on "Environmental Supporting in Food and Energy Security: Crisis and Opportunity" (Invited presentation)

A-3.Off-campus activities 1

Membership in academic societies

- Nawata, Eiji : Japanese Society for Tropical Agriculture (Council member, Editorial-in-Chief).

- Higuchi, Hirokazu : Japanese Society for Tropical Agriculture (Editorial secretary).

A-3.Off-campus activities 2

Research grants

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

- Research (B) : Nawata, Eiji (collaborator Higuhi) : Changes in traditional utilization of plant resources under the progress of economic development and globalization

- Research (A) : Kosaki, Takashi (Faculty of Urban Environmental Science, Tokyo Metropolitan University, collaborator Nawata) : Proposal of optimized land use based on C dynamics model in humid tropics

- Research (A) : Inamura, Tatsuya (Laboratory of Plant Cultivation Systems, collaborator Nawata) :

A-4.International cooperation and overseas activities 1

International joint research, overseas research surveys

- Nawata, E.: Changes in traditional uses of plant resources under the economic development and globalization, Laos, National Agriculture and Forestry Research Institute

- Nawata, E.: Changes in traditional uses of plant resources under the economic development and globalization, Thailand, Khon Kaen University

- Nawata, E.: Changes in traditional uses of plant resources under the economic development and globalization, Vietnam, Northern Mountainous Agriculture and Forestry Science Institute

- Higuchi, H: Development of techniques for low tree height-cultivation and year-round production of tropical fruits such as durian, mangosteen, etc., in Southeast Asia, Thailand, Chantaburi Horticultural Research Station

- Higuchi, H: Development of techniques for low tree height-cultivation and year-round production of tropical fruits such as durian, mangosteen, etc., in Southeast Asia, Thailand, Southeast Fruit Research Institute

A-4.International cooperation and overseas activities 2

Visiting Research Scholars

- Visiting Professor 1 (Thailand)
- Visiting Professor Guset Research Associate ()

- Visiting Professor 1 (Thailand)

B.Educational Activities(2010.4-2011.3)

B-1.On-campus teaching

- a) Courses given
- Undergraduate level: Changing Southeast Asia Environment, Outline of Bioresource Science IV (Nawata), Industry and Society (Nawata), Introduction to Foreign Literature in Bioresource Science (Nawata), Introduction to Tropical Agriculture (Nawata), Environmental Stresses for plants (Higuchi, Nawata), Laboratory Course in Bioresource Science I•II (Higuchi, Nawata), Seminar in Tropical Agriculture (Nawata, Higuchi)
- Graduate level: Tropical Agriculture (Nawata), Seminar in Tropical Agronomy (Nawata, Higuchi), Special Laboratory Work in Tropical Agronomy (Nawata, Higuchi)

B-3.Overseas teaching 1

International students

- International students : Research Students 1 (China)

B-3.Overseas teaching 2

Lectures and seminars

- Nawata, E.

Estimation and Mapping of Land Productivity in Northeastern and Northern Thailand(Lecturer) : Faculty of Agriculture, Khon Kaen University(Thailand)