# Chair Molecular and Cellular Sciences

# 2.3.5 Laboratory : Plant Nutrition

Member:	Professor	Matoh, Toru, D. Agric. Sci
	Associate Professor	Kobayashi, Masaru, D. Agric. Sci.
	Assistant Professor	Ochiai, Kumiko, D. Agric. Sci.
	Doctor's program	1
	Master's Program	9
	Undergraduate	3

# A. Research Activities (2010.4-2011.3)

# A-1. Main Subjects

a) Function of inorganic constituents in plant cell walls

Boron and calcium are the major inorganic elements in cell walls, and they are likely to contribute to cell wall integrity. We previously demonstrated that B cross-links two pectic chains at the rhamnogalacturonan II (RG-II) regions, and that Ca strengthens the bonding together. We recently found that deprivation of B from the media immediately induces stress responses in tobacco cells and Arabidopsis plants. The mechanism inducing such a quick responses are now under investigation. Tolerance mechanism of rice plants toward excessive B in soils is also our subject. Genetic difference between rice varieties tolerant to and sensitive to excessive B has been examined.

b) Nitrogen-use efficiency of rice plants

We have studied the mechanism underlying difference of the nitrogen use efficiency among rice varieties to breed an efficient variety which is suitable for sustainable agriculture.

c) Sustainable agriculture

We are trying to find out a suitable chemical fertilizer to develop sustainable, low-input and consumerconscious farming. We also try to establish a method to evaluate the quality of fermented manure.

#### **A-2.Publications and presentations**

a) Publications

**Books** 

- Plant Nutrition 2nd Edition, Buneido Publishing Co

- Plant nutrition and fertilizers, Asakura Shoten

Original Papers(including book-reviews)

- Sugimoto T, Watanabe K, Yoshida S, Aino M, Furiki M, Shiono M, Matoh T, Biggs R: Field Application of Calcium to Reduce Phytophthora Stem Rot of Soybean, and Calcium Distribution in Plants. Plant disease 94; 812-819, 2010

b) Conference and seminar papers presented

- 2010 Annual meeting of Japanese Society of Plant Nutrition and Soil Sciences: 5 Presentations

- The 52nd annual meeting of the Japanese Society of Plant Physiologists: 2 Presentations

- 2010 Annual meeting of Plant Cell Wall Research Network: 2 Presentations

- 164th Symposium on Sustainable Humanosphere: 1 Presentation

#### A-3.Off-campus activities 1

#### Membership in academic societies

- Matoh Toru : Japanese Society of Soil Science and Plant Nutrition (Council member, Editor-in-chief of Soil Science and Plant Nutrition), Japanese Society for Bioscience, Biotechnology, and Agrochemistry (Council member)

- Kobayashi, Masaru : Japan Society for Bioscience, Biotechnology and Agrochemistry (Organizing committee for 2011 Annual meeting)

#### A-3.Off-campus activities 2

#### Research grants

- 1. Grants-in-aid for Scientific Research(KAKENHI)
- Grant-in-Aid for Scientific Research B : Matoh Toru : Breeding a boron-excess tolerant rice

2.Other Research Grants

- Rice Genome Project : Matoh Toru : Breeding an efficient rice lines for fertilizers

- Startup Research Fund for Young Scientists : Ochiai Kumiko : Substitution effect of Na over K in plant cells

### **B.Educational Activities**(2010.4-2011.3)

# **B-1.On-campus teaching**

a) Courses given

- Undergraduate level :	Introduction to Applied Life Sciences I (Matoh), Biochemistry II (Matoh),
	Plant Nutrition (Matoh, Kobayashi), Plant Biochemistry I (Kobayashi,
	Matoh), Environmental Stress for Plants (Matoh), Seminar for 1st grade students (Kobayashi)

- Graduate level: Plant Nutrition Seminar (Matoh, Kobayashi, Ochiai), Experimental Course of Plant Nutrition (Matoh, Kobayashi, Ochiai)

### **B-2.Off-campus teaching etc.**

Part-time lecturer

- Matoh, Toru: Kyoto Prefectural University, Faculty of Agriculture, Plant Nutrition

**B-3.**Overseas teaching 1

International students

- International students : Master 3 (Peoples Republic of China) Doctral 1 (Thailand)

**B-3.Overseas teaching 2** 

Lectures and seminars

- Kobayashi, Masaru

Boron deficiency stress in plant cells: damages, responses, and signaling(Lecturer) : National Cheng-Kung University, Department of Life Sciences(Taiwan)