Chair Agricultural Ecology

2.1.6 Laboratory: Plant Production Systems

Member:	Professor	Inamura, Tatsuya, D. Agric. Sci.
	Doctor's program	2
	Master's Program	5
	Undergraduate	4
	Other	1

A. Research Activities (2010.4-2011.3)

A-1. Main Subjects

a) Evaluation of the land productivity for the clarification of the optimal land utilization and cropping systems.

Sources of the variation of yield and quality of wheat and soybean in paddy-upland rotational fields (rice-wheat-soybean) were examined during the crops seasons from 2007 through 2010 to evaluate the possibility of the Precision Crop Management that implements the site-specific input of agricultural materials in proportion to the variation of these sources in the field for maximum yield and quality. The proper management of variable rate seeding in proportion to the soil moisture percentage on dried soil basis at seeding in the field may be able to control the number of panicles of wheat in the field to bring the adequate average yield and quality. This variable rate management may control 42.7% of the controllable proportion to total variation of wheat yield in the field.

b) Evaluation and mitigation of the influence of intensive agriculture on environmental pollution in western part of inland China.

There is a great concern on nutrients cycle and dynamics in intensive cropping agricultural ecosystems because of their possible negative environmental consequences. Field researches were conducted on the surrounding areas of Dianchi lake, Kunming, particularly, on the intensive farming belt of the areas, to investigate the spatiotemporal changes of land use patterns, the budget of nutrients inputs and outputs, and the impact of high input of fertilizer on the nutrients cycle in intensive cropping ecosystems. The collected data was expected to give the environmental nitrogen-assimilation capacity that is an effective guideline for nitrogen input in agricultural lands and helps in the prevention of nitrate pollution in groundwater and forage crops derived from agricultural land.

c) Difference of rice growth with two kinds of soil.

Rice cultivar "kasalath" was cultivated in 1/5,000 a wagoner pot with gray lowland soil and red soil without any nitrogen fertilizers and soil solutions for rice growth period were sampled from both soils to analyze both NH4+-N and NO3--N contents in soil solutions. Rice was cultivated with two water condition, i.e. lowland and upland (pF=2.0) condition. Rice headed normally in gray lowland soil, while rice did not head in 120 days after sowing in red soil. In soil solution from gray lowland soil, NO3--N content with upland condition and in NH4+-N content with lowland condition was high, respectively. While, in soil solution from red soil, both NH4+-N and NO3--N contents were extremely low with each water condition. From these results, it may be necessary to apply nitrogen sources for rice cultivation in red soil with both lowland and upland water condition.

d) Studies on the effect of application of biogas slurry to a paddy field with attention to nutrient accumulation in subsoil.

More attention has been paid to a biogas plant as a tool for producing energy from animal dung and food waste, while a by-product biogas slurry is becoming a problem. In our laboratory, biogas slurry has been applied to a paddy field as a liquid manure for a period of eight years in order to utilize it effectively in agriculture. In this study, accumulation of nutrients in soil especially subsoil was evaluated. It was revealed that there was little accumulation of nutrients in soil and that soil chemical properties were influenced mainly by soil components such as organic matter and clay rather than the amount of biogas slurry applied. Accordingly it was suggested that excessive application of biogas slurry to paddy fields would not only decrease the apparent use efficiency of the nutrients by rice plants but also accelerate their leaching from the soil.

A-2.Publications and presentations

a) Publications

Original Papers(including book-reviews)

- Tatsuya Inamura, Akane Yoshikawa, Sachiko Ikenaga and Michihisa Iida: Path Analysis of Tiller Density of Winter Wheat Demonstrates the Importance of Practices that Manipulate Clod Size based on Soil Moisture at Seeding in Rice–Wheat Cropping System. Plant Prod. Sci. 13:85-96, 2010

- Sachiko Ikenaga, Yoshie Endo and Tatsuya Inamura: Spatial variability of soil properties in contiguous small-scale paddy fields under paddy-upland crop rotation. Jpn. J. Soil Sci. Nutr., 81: 207-214, 2010

- Moritsuka, N., Matsuoka, K., Matsumoto, S., Masunaga, T. and Yanai, J.: Significance of plant-induced solubilization of soil nitrogen: A case of komatsuna plants grown in fertilized soils. Plant Production Science, 13: 307-313. - Saito H., Y. Okumoto, Y. Yoshitake, H. Inoue, Q. Yuan, M. Teraishi, T. Tsukiyama, H. Nishida and T. Tanisaka:

Complete loss of photoperiodic response in the rice mutant line X61 is caused by deficiency of phytochrome chromophore biosynthesis gene. Theor. Appl. Genet. 122: 109-118.

b) Conference and seminar papers presented

- The 310th Ann Meet. of Crop Sci. Soc. of Japan: 4 presentations

A-3.Off-campus activities 1

Membership in academic societies

- Inamura, Tatsuya, D.Agric.Sci : The Crop Science Society of Japan (Editorial board member of Plant Production Science), The Society of Crop Science and Breeding in Kinki (Council member)

- Inoue, Hiromo, D. Agric. Sci. : The Society of Crop Science and Breeding in Kinki (chairman of editional committee)

- Moritsuka, Naoki, D. Agric. Sci : Japanese Society of Soil Science and Plant Nutrition, Crop Science Society of Japan, Japanese Society of Soil Physics, Japanese Society of Pedology, Japanese Society of Root Research

A-3.Off-campus activities 2

Research grants

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

- Grant-in-Aid for Scientific Research (B) : Inamura, Tatsuya, D. Agric. Sci : Analysis of the sources of variations of quality of wheat and soybean in the field, and variable rate management

- Grant-in-Aid for Scientific Research (A) : Inamura, Tatsuya, D. Agric. Sci : Evaluation and mitigation of the influence of intensive agriculture on environmental pollution in western part of inland China

2.Other Research Grants

- Sponsored Research Funds : Inamura, Tatsuya, D. Agric. Sci : The effect of irrigating the treated wastewater on rice growth

A-4.International cooperation and overseas activities 1

International joint research, overseas research surveys

- Improvement of the water pollution in the agricultural irrigation system in southwest China, Inamura Tatasuya, Kunming University of Science and Technology, Kunming, Yunnan Province of China

B.Educational Activities(2010.4-2011.3)

B-1.On-campus teaching

a) Courses given

- Undergraduate level:	Outline of Bioresource Science 1(Inamura), Crop Production Techniques and
	Farm Practice (Inamura, Inoue, Moritsuka), Plant Production Systems I
	(Inamura), Plant Production Systems II (Inamura), Laboratory Work in
	Bioresource Science I, II (Inamura, Inoue, Moritsuka), Seminar in
	Agricultural Ecology (Inamura, Inoue, Moritsuka), Introduction to Research
	(Inamura, Inoue, Moritsuka).

- Graduate level: Plant Production Systems (Advanced Course) (Inamura), Plant Production Systems-Seminar (Inamura), Special Laboratory Work in Plant Production Systems (Inamura).

B-2.Off-campus teaching etc.

Part-time lecturer

- Inamura Tatsuya: Kyoto University of Education (Agriculture and Environment)

- Naoki Moritsuka: Shimane University (Soil ecological engineering)

Open lectures, etc.

- Naoki Moritsuka: Open seminar (University farm, Kyoto University)

B-3.Overseas teaching 1

International students

- International students : Research Students 1 (China)

C.Other Remarks

- Inamura, Tatsuya, D. Agric.Sci: Committee for disaster prevention and environmental preservation in the southern Nara land improvement enterprise (Member), The Ministry of Agriculture, Forestry, and Fisheries commission project research (Member of outsider evaluation committee)