Annual Report of JDS Program
in
Graduate School of Bioresource and Bioenvironmental Sciences
Kyushu University

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1. Introduction

Japan's Grant Aid for Human Resources Development Scholarship (JDS) Program is to provide opportunities for academic research at Japanese higher educational institutions under the Grant Aid assistance by Government of Japan. The objective of this program is to support the respective Government in its efforts to facilitate its own plans for human resource development mainly for capacity building and institutional building, and thereby extend and enhance the bilateral relationship with Japan.

The JDS Program targets young government officers for public sector, researchers, business people and others with the potential to play leadership roles in their specialties after return to each country as well as to become leaders in their homeland in the 21st century.

The Program started in the Graduate School of Bioresource and Bioenvironmental Sciences, Kyushu University in 2002 and 25 students graduated from the graduate school. In the 2006 school year, the graduate school has a total enrollment of 13 JDS students. The students are belonging to the International Development Research Course. The JDS students are also studying in their laboratories for preparing of their Master thesis and attending the lectures performed in English.

Scientific tour for the JDS students was started on December 2003. The aims of these tours were to promote a greater understanding of policy, circumstances and technologies of Japanese agriculture. This annual report contains the scientific tour reports and research or campus life reports from JDS students.

2. List of JDS Students

Name	Nationality	Major Subject	Supervisor
Khin Thanda Win	Myanmar	Agricultural Ecology	Toshihiro MOCHIZUKI, Associate Professor
Vu Van In	Vietnam	Marine Biology	Michiya MATSUYAMA, Professor
Myint Thu	Myanmar	Farm Management	Masao TSUJI, Professor
Chea Marong	Cambodia	Farm Management	Masao TSUJI, Professor
Nguyen Thuy Minh	Vietnam	Agricultural Marketing	Satoshi KAI, Professor
Khun Kakada	Cambodia	Forest Management	Shigejiro YOSHIDA, Professor
Tran Thi Thu Hoai	Vietnam	Plant Genetics	Hikaru SATOH, Professor
Phi Cong Nguyen	Vietnam	Plant Breeding	Atsushi YOSHIMURA, Professor
Le Son Ha	Vietnam	Insect Pathology and Microbial Control	Susumu SHIMIZU, Professor
Huynh Viet Khai	Vietnam	Agricultural Economics	Hiroshi YOKOGAWA, Professor
Haymar Hein	Myanmar	Agricultural Marketing	Satoshi KAI, Professor
Em Huy	Cambodia	Agricultural Marketing	Satoshi KAI, Professor
Hour Ix	Cambodia	Drainage & Water Environment	Kazuaki HIRAMATSU, Professor

3. Overview of International Development Research Course

The Graduate School of Bioresource and Bioenvironmental Sciences regards the role of agricultural sciences to overcome issues related to global food and the environment and to contribute to worldwide progress in maintaining a stable supply of food and materials, conservation of the environment, and promotion of health and welfare. To fulfill this, the School includes leading researchers and specialists highly knowledgeable in the fields of life science, environmental science and socio-economics.

The International Development Research Course aims to build on the capacity of the above fields for international students from developed and developing countries whose aim is to contribute to worldwide sustainable development. The Master's program emphasizes the acquirement of synthetic and practical abilities.

4. Description of the Program

Students will be awarded the Master of Science (M.Sc) on completion of a satisfactory thesis. Students are also required to complete a four-semester course over a two-year period. The course consists of lectures, practicals, seminars and tutorials. Students must obtain 30 credits with a minimum pass grade of 60 %.

5. Qualification Requirements of Applicants for JDS student (Master's Course in 2007)

Note: As to further information, you should refer to guidelines for JDS applicants and the application form of the course.

(1) **Academic Requirements:** Applicants must hold a Bachelor's degree (or equivalent) awarded by a postgraduate school outside Japan or expect to receive a Bachelor's degree by September 30, 2007.
(2) **Health:** Certified as both physically and mentally healthy by a qualified and recognized physician.
(3) **Language:** Non-native English speakers must possess a sufficiently high official English qualification such as TOEFL, TOEIC, or the Cambridge Certificate.

6. JDS Scientific Tour

To disseminate knowledge and information on agricultural technologies and politics, JDS scientific tour was carried out as follows:

Date: July 20 (Thu), 2006 (AM9:00 - PM5:00)

・Agricultural Center, Iiduka District Extension Office (Honami town, Fukuoka)

・Integrated Rice and Duck farming (Mr. Takao FURUNO's Farm, Keisen town, Fukuoka)

7. Reports from JDS Students

Khin Thanda Win

Genotypic Variation in N-use efficiency (NUE) and Photosynthetic N-use efficiency in relation to leaf N partitioning to the Ribulose-1, 5-bisphosphate carboxylase/oxygenase

I am a Master student of the JDS program 2004-2006. This is the final semester of my two-year study here in Kyushu University. The study in Japan awards me enormous chances not only to study in my specialty with sufficient facilities but also to learn Japanese culture and Japanese Language. I also had other chances to participate in JICA seminar, workshop and study trips through which I could have the broad knowledge about Japan and its culture, and the great time to enjoy the beautiful scenery of Japan. Studying at Kyushu University is already a great reward for me with good study conditions, great facilities, and warm and friendly environment.

I would like to briefly introduce about my research activities. The present study deals with the evaluation on the genotypic variability in N-use efficiency of rice from agronomic and physiological points of view.

Rice is the most important cereal species on earth, providing the dominant staple food of Asian countries including Myanmar. It is well known that Nitrogen (N) is the essential nutrient for plant growth and a crucial component for increasing food production to feed the continuously increasing human population and nowadays global agriculture relies heavily on N fertilizer derived at the expense of petroleum. Rice production globally focuses on optimizing grain yield, reducing production costs and minimizing pollution risks to the environment. Only about one-half of all fertilizer N is taken up by crops, the remainder is subject to loss to the off-farm environment, where it contributes to the most pernicious global environmental challenges. While over-use of N in developed countries is well documented, in some developing countries, with the increasing cost of fossil fuel, fertilizer prices are increasing and sometimes reach far out of poor farmers' disposal as well as fertilizer shortage. It has contributed a major constraint to increase yield potential of rice in the region.

In Myanmar, N fertilizer use remains relatively low and often not efficiently used because of high price and fertilizer supply has been reduced by the government and poor acceptance and adoption of technically feasible N-management strategies. However, the growing population rate and relatively high per capita consumption rate indicate that N fertilizer use will certainly rise in the near and distant future. Moreover, about 35-45% of total variable cost of production in rice is due to N fertilizer. Therefore, having and using superior N-efficient genotypes would accomplish the high yield potential with low N inputs, reduce the production costs and minimize the release of N to the environment.
The specific objectives of the present study are as follows:

The main activities of the center are:

(1) To determine the extent of genotypic variability in grain yield in relation to N uptake and utilization
(2) To verify genotypes with potential to produce high yields at suboptimal N levels through efficient uptake and utilization of N
(3) To assess the genetic variability in photosynthetic N-use efficiency in relation to leaf nitrogen partitioning to the key photosynthetic enzyme, Ribulose-1, 5- bisphosphate carboxylase/oxygenase
(4) To identify N-efficient Myanmar traditional rice varieties for plant breeder to form an alternative gene pool for greater N-use efficiency.

Two main experiments were conducted in this study. The first one concerned the evaluation of superior N-efficient genotypes based on the grain yield response to N supply and the agronomic indices of NUE and the second one dealt with the genetic variability in photosynthetic N-use efficiency and leaf N partitioning to photosynthetic enzyme, Ribulose-1,5 bisphosphate carboxylase/oxygenase (Rubisco).

Evaluation of superior N-efficient genotypes with greater N-use efficiency:

In the present study, genotypic variability in grain yield and N-use efficiency of 12 Myanmar traditional rice varieties

(Indica rice), 3 high yielding varieties (HYVs) developed from IRRI (Indica rice) and 4 Japanese local and improved varieties (Japonica rice) were investigated with varying acquisition and usage of soil and fertilizer N under fully irrigated field conditions (Kyushu University Farm, Fukuoka and Experimental Farm, Okinawa Prefecture Agricultural Experiment Station, Ishigaki Island) and also pot experiment in the greenhouse.

N-use efficiency is a complex trait with multiple components and the various agronomic indices were commonly used to assess the efficiency of soil N and applied N (i.e. physiological efficiency (PE), agronomic efficiency (AE_N), recovery efficiency (RE_N) and partial factor productivity of applied N (PFP_N), mainly for purposes that emphasize crop response to N. Genotypes were distinguished as efficient, inefficient and inferior types based on grain yield response in relation to N supply. Before distinguishing as efficient and inefficient ones, genotypes were needed to identify as superior or inferior based on their performance under non-limiting N supply. Genotypes that did not respond to increasing rates of N due to either poor adaptation to high N supply environment or inherently low-yield potential were identified as inferior-type germplasm. Within the superior group, lines can be classified as efficient or inefficient based on their performance at sub-optimal levels of N.

It is evident that PE, AE_N, RE_N or PFP_N individually may not be able to distinguish efficient genotypes from inefficient ones. Among the N parameters for delineating N-efficient genotypes, nitrogen productivity index (NPI) appears to be the most consistent and promising parameter for both HYVs and traditional varieties.

Generally, traditional or local varieties are less responsive to high N supply environment. However, an N-efficient genotype with high grain yield and high physiological efficiency, especially under soil N or low N input, was detected from the tested Myanmar local varieties. Such type of genotype would be more appropriate for different N levels as it would have superior performance in both low and high yield potential environments. This superior N-efficient genotype would contribute to the breeding programme for improving N-use efficiency of Myanmar rice varieties as an alternative gene pool.

Genetic variability in Photosynthetic N-use efficiency and Leaf N partitioning to the key Photosynthetic enzyme, Rubisco:

Photosynthetic N-use efficiency has been defined as the photosynthetic capacity per unit leaf N per unit leaf area, and indicates the efficiency of plant producing matter with leaf N on the level of stoma. The light saturated rate of photosynthesis of a leaf was strongly correlates with its N content because the large amount of leaf organic N present in the chloroplasts, most of it in the photosynthetic machinery. However, differences in the various behaviors of plant related to acquired N, such as N distribution between plant organs, partitioning within and between leaves, and leaf turnover, may exist among the genotypes.

Genotypes used in this experiment were selected from the preceding experiments based on their contrasting N uptake, partitioning and use efficiency. Net photosynthetic rate (Pn) of a single leaf increased with increase of leaf N content as consequence of increasing N supply in all genotypes. On the other hand, photosynthetic N-use efficiency decreased with increase in N nutrition and leaf N content. Interestingly, genotypes with high physiological efficiency showed high photosynthetic N-use efficiency and N-efficient genotypes exhibited higher physiological efficiency and photosynthetic N-use efficiency.

For better understanding on the allocation of leaf N to the photosynthetic machinery, soluble proteins, Ribulose-1, 5-bisphosphate carboxylase/oxygenase (Rubisco, EC 4.11.39) and in-vivo carboxylation efficiency of Rubisco were determined for the tested varieties. Although the significant difference in total soluble proteins was not detected among the genotypes, the proportion of total soluble proteins allocated to Rubisco was considerably different. The ratio of net photosynthetic rate to Rubisco content (Pn/Rubisco) was computed as an indirect estimate of in-vivo carboxylation efficiency. The inverse relationship was interestingly observed between Rubisco content and its in-vivo carboxylation efficiency. In accordance with this inverse relationship, the genotypes with higher efficiency of Rubisco could economize on the allocation of soluble proteins to Rubisco without an appreciable reduction in Pn. The N saved may have a greater effect on N partitioning into other components limiting photosynthesis and hence, could increase N-use efficiency of photosynthesis. Since Rubisco plays a pivotal role in regulating the N economy, identification and developing of such genotypes have a distinct advantage in the breeding programmes for genotypes with

maximum productivity under low input conditions, and hence, improving NUE of rice.

In general, traditional varieties are less responsive to N fertilizer and have lower physiological efficiency and photosynthetic N-use efficiency than HYVs at the equivalent amounts of N taken up and total biomass produced. However, in accordance with our results, some traditional varieties showed high physiological efficiency and photosynthetic N-use efficiency like HYVs, especially under low N level, and then no significant difference in leaf N partitioning to the photosynthetic enzyme from HYVs. Such type of genotypes would have high productivity under low N input conditions and hence, reduce the production costs and leakage of N into the environment.

In conclusion, the genotype with high physiological efficiency, photosynthetic N-use efficiency and in-vivo Rubisco efficiency was providentially detected from the tested Myanmar local varieties. Such type of genotypes would be the most desirable for crop improvement from physiological and ecological view points with less destructive to the environment. This genotype would be used as breeding material for developing N-efficient genotypes with higher N-use efficiency from Myanmar rice varieties. Developing and utilizing superior N-efficient genotypes would be applicable to boost up yield potential in low N supply environment and improve the profitability of rice production as a consequence of reduction in production costs, and hence, prevent environmental degradation in Myanmar.

Vu Van In

Life and study in Japan

I can say I am very lucky to have a chance to study in Japan. It is very interesting for me both study and social life.

In the beginning day of the arrival in Japan, I saw may things in Japan that I have never seen before in my countries and ate a lot of Japanese food that I have never had. However, I felt a bit nervous when I went out where every thing is written in Japanese whereas my Japanese is very poor. I found it difficulties in finding a street or use the map to find the place I wanted to go to. In fact, I never went out a lone because I was afraid of losing the way. Soon after the Japanese class was over, I felt more confident because I can speak a little Japanese and people around me including Jice's staff, my professor and my tutors as well as lab. mates and other friends in Kyushu University where I am studying in, are willing to give me a hand whenever I need. I really appreciate their help during the time in Japan.

Japanese food cooking practice in Hokkaido

Fishing for experiment in Tsuyazaki, Kyushu

About Japanese food, it is very delicious and interesting to me. However, I did not like some kind of Japanese food at first because of the strange taste. But thing has completely changed right after one day my lab mates and I tried to finish the experiment in Tsuyazaki research station (a place far from the Kyushu main campus). After finishing the experiment, it was very late and I felt very hungry. There was a little choice in the restaurant nearby so I had to order the food that I did not like. Surprisingly it tasted very good that day and since then I like it very much and become fond of almost Japanese food. Now I feel very happy whenever my lab holds a party or when I eat out with my friends where I enjoy Japanese food together.

Study of course occupies most of my time. My research is on gonadal development and its relevant steroid hormones of a kind of marine fish. At first, I really worried about the research for graduation. However, thanks to my teachers and my tutors who enthusiastically instructed me about the method as well as gave me a lot of advice in the implementation of experiment. Now I am really interesting in my research and it is going fine. I think the research that I do is very interesting and useful to my job in the future. In the laboratory where I am studying in, each student pursues one research topic in the field of marine biology. It is very interesting and useful when we exchange experience and learn from each other. We have many chance to discuss each other especially in the retreat time (where student present their own research plan and achievement), and in journal club. Many of the research interested me and I find many things useful for my job that I tried to learn. Unfortunately, I could not learn as much as I want because I do not have enough time (*Zannen desu*). During the research, I have learned a lot from my teachers, tutors and other students who help me improve my knowledge and skills in doing a research. I feel happy when the experiment for graduation is almost finished and now I focus on writing the thesis and prepare presentation for graduation. Finally especially thanks to Jice staff, my professors and tutors who helped me a lot both in daily life and study. Now I can say I really enjoy life and study in Japan.

Myint Thu

Factors affecting farm returns on rice production in Myanmar.

I have learnt in Kyushu University since 2004. The title of my thesis is "Factors affecting farm returns on rice production in Myanmar". The primary data I used in my thesis was collected from Theryergone and Malit villages, Hlegu Township, Myanmar. I would like to express concern about the brief explanation on my thesis. Farm income is one of the incentive factors which accelerate the farmers not only to expand their production scale but also to increase the production efficiency per unit area. If they received much more returns from rice production, they would be able to invest more inputs in their farms. Therefore, this paper aims for a better understanding of influential factors contributing to the farm income. As long as I am studying in Kyushu University, I have got a lot of knowledge concerning with micro-economic and a basic principle for agricultural development in developing countries. I am pretty sure that this various knowledge and experiences would be useful and worthy to apply for the development of my own country.

(I)Purposes of study

The primary purpose of this paper is to examine the factors that affect the income variation in survey area and to assess the current status of rice cultivation. More specifically, this study examines the profitability of low income farm and high income farm based on the following implementation; by

a. Estimating the per acre cost of production,
b. Calculating the returns to land and management
c. Analyzing farmer's patterns of input and labor used

(II) Research hypothesis

The most productive farms are those that are predominantly used family labor although the very smallest farms do not unambiguously display higher productivity.

The availability of working capitals to the farmers is assumed to be a crucial factor influencing the determination of total net farm return on rice production.

(III) Methodology

About 41 rice cultivators from Theryergone village and 34 rice cultivators from Malit village were interviewed during 2005 wet season. Farm level data on socioeconomic characteristics, farm and farming profiles, as well as details of output, inputs usage, and costs of production were obtained through a survey questionnaire using a stratified random sampling technique.

Expression of Terminology

- Low income farms- are the farms in which their returns to land and management are lower than the average returns to land and management of the whole samples.
- High income farms- are the farms in which their returns to land and management are more than the average returns to land and management of the whole samples.

According to the average net farm income calculated from all respondent farms, 30 low income farms and 45 high income farms are obtained. After that, logistic regression is used to determine the major factors influencing the determination of net farm income. In order to meet the basic assumption, it is necessary to code 0 and 1 for low income farm and high income farm, so called farm status. Farm status is used as dependent variable and other socio-economic characteristics, such as farm experience in rice production, the education level of farmers and the possession of farm equipments etc., and individual production cost, such as pesticide cost, fertilizer cost and land preparation cost, are used as independent variables.

Logistic regression was used to determine the major influential variables that contributing to the probability having high income.

For a binary response variable Y and an explanatory variable X,

let $\pi(x) = P(Y=1|X=x) = 1-P(Y=0|X=x)$.
The Logistic Model is

$$\pi(x) = \frac{\exp(\alpha+\beta x)}{1+\exp(\alpha+\beta x)} \text{ ----------Equation (1)}$$

Where, $\pi(x)$= the probability of high income occurring
Exp= exponential value (2.718)
α = constant value
β = coefficient of x (Independent variable)
x = Independent variable

Equivalently, the log odds, called the logit, has the linear relationship

$$\text{Logit}[\pi(x)] = \log\left[\frac{\pi(x)}{1-\pi(x)}\right]$$

$$\text{Logit} = \alpha+\beta x \text{ ----------Equation (2)}$$

If $x = -\alpha/\beta$ is substituted in Equation (1),

$$\pi(x) = \frac{\exp^{(\alpha+\beta x)}}{1+\exp^{(\alpha+\beta x)}}$$

$$= \frac{\exp^{[\alpha+\beta*(-\alpha/\beta)]}}{1+\exp^{[\alpha+\beta*(-\alpha/\beta)]}}$$

$$\pi(x) = ½$$

This x value is sometime called median effective level. In other words, this amount of input is required to obtain the 50% chance of high income occurring.

Enterprise budgeting was used to assess the cost, return and profitability of Low income and high income farm.
Sensitivity analysis was utilized to determine the returns to land and management if ± 50% changes in both price and yield.

Simple Multiple Regression was applied to evaluate the influential variables contributing to the yield variation between low income farm and high income farm.

(IV) Results of data analysis

Logistic Regression Predicting high farm income from farm experience, pesticide cost and yields (Monsoon Rice)

Log likelihood= - 31.81

Predictor	Coefficient	Wald statistics	P	Odd ratio	95% Cl for odd ratio	
					Lower	Upper
Pesticide cost	-0.001	7.083	0.008	0.999	0.999	1
Yield*farm experience	0.003	15.442	0.000	1.003	1.001	1.004
conatant	-1.873	6.848	0.009	0.154		

Notes: Yield* farm experience = the interaction effect of yield and farm experience.
Dependent variable= farm status (high income farm = 1, low income farm = 0)
CI = confidence interval

Logistic Regression predicting high income farm from Seed cost and Yield (Summer Rice)

Log likelihood = - 20.67

Predictor	Coefficient	Wald statistics	P	Odd ratio	95% Cl for odd ratio	
					Lower	Upper
Yield	1.622	4.173	0.041	5.065	1.068	24.023
Seed cost	-0.002	9.895	0.002	0.998	0.997	0.999
conatant	4.863	7.259	0.007	129.358		

Note: Dependent variable= farm status (high income farm = 1, low income farm=0)

Results of simple multiple regression

Variables	coefficient	Std.	t-statistic	Sig.
Seed cost	-0.02	0.02	-0.99	0.33
Fertilizer cost	0.02	0.00	5.64	0.00
Pesticide cost	0.03	0.01	3.60	0.00
Hired oxen cost	0.01	0.01	1.22	0.23
The opportunity cost of family labor	-0.01	0.01	-1.36	0.18
Hired labor cost	0.01	0.01	1.22	0.23
Dummy variable (Farm Status)	346.31	38.22	9.06	0.00
Fixed cost	0.01	0.00	2.42	0.02
R^2=0.72, F= 24.95				

Notes: Dependent variable = Yield
Dummy variable (farm status) = high income farm =1, low income farm = 0

(V)Expected results and conclusion

According to the results of data analysis, the farm experiences in rice cultivation, the pesticide cost and yield were likely to be major factors influencing the determination of farm income in monsoon rice cultivation. Furthermore, there has been strong association between pesticide cost and the extent of farm experiences in the study area.

As the farm experience in rice production was increased, the farmers were able to prevent the infestation of insects and plant diseases prior to economic threshold level. In most cases, farms can increase net farm return by becoming more involved machinery intensive activities since the hired labor cost mainly affected the total production cost.

This result, in high income farm, machineries, such as power tractor, water pump, and threshing machine were found to be higher than that of low income farm. Unqualified measures of credit access and higher interest rate both failed to indicate the anticipated positive result. This may be an indicator of failure in the institutional and maintenance structures which surround these variables. In order for the farmers to overcome the financial problem in rice production, sufficient amount of loan should

be provided to the farmers with reasonable interest rate.

It can be clearly seen in statistical result that the greater the amount of seed rate used in summer rice production, the lower the net farm income. Some farmers have used higher seed rate in order to cover the missing hills due to unforeseen circumstances such as birds picking, poor leveling during land preparation and other environmental effects etc.,. According to the survey data, great deals of respondents have broadcasted the seed rate, ranging from 2bsk/ac to 5bsk/ac. This additional seed cost made the total cost rise to some extent. In accordance with the results of data analysis, 50% chance of high income can be obtained at the seed rate of 2.7baskets/ac in study area. In addition, enterprise budgeting indicated that the total revenue of high income farm is significantly different from that of low income farm. Since the total revenue is equal to the product of market price and yield, sensitivity analysis was used to assess the respond of each farm to ± 50% changes in price and yield.

According to the results from sensitivity analysis of monsoon rice cultivation, low income farm was likely to be more sensitive to change in both price and yield compared to high income farm. The returns to land and management of low income farm easily falls below zero only when 10% decrease in price and yield. But in high income farm, the returns to land and management falls below zero when 30% decrease in price and yield. But sensitivity analysis could not indicate which input contributed to explaining the yield difference between low income and high income farm. Therefore, simple multiple regression was used to confirm the results of budgeting analysis and to identify the reason why high income farm achieved more yield relative to low income farm. The results of simple multiple regression analysis depicted that the fertilizer cost, pesticide cost, fixed cost and farm status's dummy variable were found as an influential factor contributed to the yield variation. If the farmer spent 100 kyat per acre for the purchase of fertilizer, the yield would be increased by 2%. In the same way, if the farmer used 100 kyat per acre for the purchase of pesticide, the yield would be increased by 3%. The model also indicated that the farm status's dummy variable accounted for yield difference low income farm and high income farm is 346.31kg/ac. The fixed cost primarily included the depreciation cost of farm equipments such as power tractors, water pump and threshing machines, and so on. Therefore, it can be concluded that the possession of those equipments made the partial contribution to the yield.

(VI) Acknowledgement

I would like to thank my professor, Mr. Masao TSUJI, for the constructive comments and knowledge shared. I would like also to express my gratitude to my Associate Professor, Mr. Hotta KAZUHIKO, for his enormous efforts and excellent suggestions provided during the thesis writing process. I would like to extend a sincere thank to Mr. Shoji SHINKAI for his valuable suggestions during the data processing stage. His suggestions led to better results. Finally, I would like to extend my appreciation to the Japan International Cooperation Agency (JICA) for providing scholarship and other social facilities through the Japan International Cooperation Center (JICE) because my thesis paper would not have been possible without having their supports.

Chea Marong

A Study of Factors Affecting Rural Household Income A case study of Samrong Commune, Kompong Cham Province, Cambodia

My name is Chea Marong, Cambodian JDS fellow 2004. I am a Master student in Farm Management laboratory, department of agricultural and resource economics at Kyushu University. Generally speaking, I enjoy my academic life at Kyushu University in Fukuoka city, Japan. At the same time, I am also experiencing various cultural and social activities and a new way of life from time to time.

Up to now, my academic study comes to the last semester, and I am conducting *a study on factors affecting rural household income*, a case study of Somrong commune, Kompong Cham province, Cambodia. Even thought my investigation has not yet finished, I would like to share one part of my research findings with those who are interested in similar study fields.

1. Research Objective and Methodology:

One specific objectives of my study is *to analyze the main factors (farm size, labor and capital) affecting rice output and the relationship between farm size and household income*. Based on stated objective, this study aims at answering the following

questions: (i) What are the factors affecting rice farming household?; (ii) What should be the solutions to increase household income?.

In order to achieve the objective of my research above and in response to research questions, production function analysis (Cobb-Douglas Production Function), and simple regression analysis were used to identify the primary factors affecting rice output and relationship between farm size and household income by utilizing primary data collected from 51 households in Samrong commune, Kampong Cham Province, Cambodia.

For production, four-variable function can be written as the below:

$$\mathbf{lnY = {}_0 + {}_1 lnX_1 + {}_2 lnX_2 + {}_3 lnX_3 + {}_4 X_4 + u}$$

Where:

- Y = rice output , X_1 = farm size input , X_2 = labor input, X_3 = capital input, and X_5 = Dummy variable: 1 for low income household and 0, Otherwise (High income household)
- $_0$, $_1$, $_2$, $_3$, $_4$ are parameters and u is error term

2. Result and discussion:

From a purely statistical viewpoint in table 1, the F-test is significant (8.14E-26 level), indicating this model is useful, and the estimated regression line fits the data quite well. The *R Squared value of* 0.929129 indicates that about 93 percent of variation in the (log of) rice output is explained by the log of farm size, labor, and capital. This means about 7% of the variability in rice output is not explained and could be due to other factors such as education, experience and access to credit, etc.

Table 1: Regression Statistics

0.929129	R squared
0.19605	Standard error of estimate
51	Number of observations
150.7658	F statistic
8.14E-26	P value

As can be seen coefficient in table 2, the output elasticities of farm size, labor, capital and household are 0.385, 0.382, 0.143 and -0.07 respectively. In other words, in this study, holding other inputs constant, a 1 percent increase in farm size input led on the average to about 0.38 percent increase in the rice output. Similarly, holding other inputs constant, a 1 percent increase in the labor input led on the average to about a 0.38 percent increase in the rice output.

In doing the same way, holding other inputs constant, a 1 percent increase in the capital input led on the average to about a 0.14 percent increase in the rice output. The regression coefficient for household, -0.07, indicates that the expected rice output difference between low income and high income household with the same level of farm size, labor and capital is 0.07 kg, which rice output of low income household is lower than high income household. The coefficient for household is not significant, and it is not even close.

Table 2: Multiple Regression Results Using the Log of Farm Size, Labor and Capital

	Coeff	StdErr	T	P	Significant?
Constant	4.742766	0.782362	6.062113	2.34E-07	Yes (p<0.001)
Farm Size	0.385197	0.105394	3.654835	0.000658	Yes (p<0.001)
Labor	0.382239	0.08757	4.364973	7.14E-05	Yes (p<0.001)
Capital	0.143179	0.05877	2.436279	0.01877	Yes (p<0.05)
Household	-0.07011	0.07813	-0.8973	0.374233	No (p>0.05)

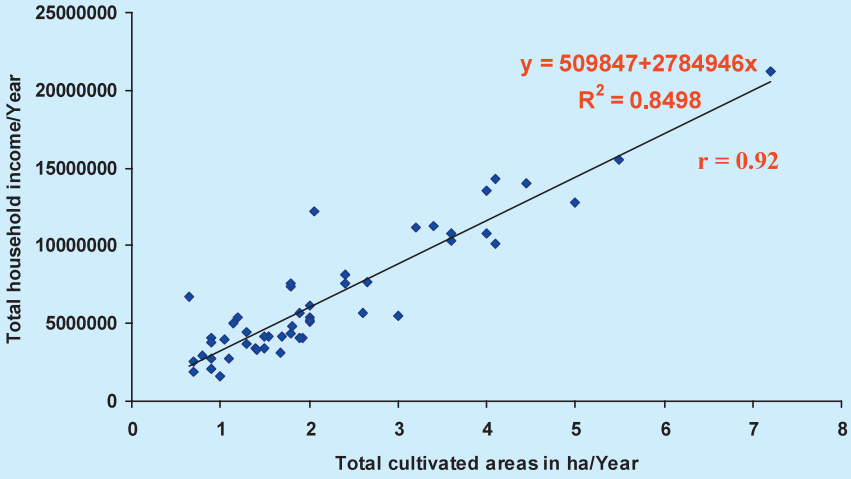
The prediction equation is:

Rice Output = 4.742 + 0.385 Farm Size +0.382 Labor + 0.143 Capital -0.070 Household

By adding the three output elasticities (Farm size + Labor + Capital), the result is (0.385 + 0.382 + 0.143) = 0.90, which

gives the value of the returns to scale parameter. As is evident, rice output in the study area was characterized by *decreasing return to scale*. In other words, it can be said that an increase all resources (farm size, labor, and capital) by 10 percent will add 9 percent to total rice output.

Figure 1: Relationship Between Farm Size and Household Income



Is increased the farm size a good choice to increase household income?. To answer this key question, it is worthwhile referring to figure 1. Note that the correlation coefficient, r, is 0.92. Because the value of r is close to 1.00, this can be concluded that there is a strong positive relationship between total cultivated farm size and annual household income. Therefore, increased farm size is good solution to increase household income. Next, we examine the coefficient of determination, $r^2 = 0.8498$. This value of r^2 implies that 84 percent of the variation in annual household income is explained by total cultivated land size.

3. Conclusion:

Rice output in the study area was characterized by *decreasing return to scale*. An increase all resources (farm size, labor, and capital) by 10 percent will add approximately 9 percent to total rice output. Farm size is the main factor affecting rice output, and labor input ranks as the second factor in producing rice output, while capital input contributes little to produce rice output. Also, there is no significant difference between two groups of farming household in producing rice output.

Increasing cultivated farm size would result in substantially increasing rice output. Then, it is likely to translate directly into higher household income. There is a linear or positive relationship between farm size and household income. Accordingly, increased farm size is a good solution to increase household income.

Nguyen Thuy Minh

Food stands of the North

If someone asks us what has the deepest impression in our mind about the traditional Japanese lifestyle in the small yet

beautiful town named Tokachi (the capital of Obihiro prefecture), my answer would be Kita no yatai which means Food Stands of the North.

Located right in the downtown of Obihiro city, some steps down from the main station, Kita no Yatai is a group of 20 small food stands that offer a wide variety of traditional ***ryori*** as well as some exotic cuisine.

Yatai (food stands) has a very long history in the human life and it has been available almost all over the world though the organization, scale and operation may differ from one place to another. In Japan, yatai could be found not only in Obihiro but also in other parts of this country like Fukuoka, Sendai, Kure, etc. But only in Tokachi, after listening to the story of Kita no yatai could one realize the typical life philosophy with which the active and heartful Japanese people in Obihiro have established and developed an attractive small cuisine alleys.

Picture 1: En yatai

Picture 2: Minori yatai

Most of these food stands would open from 5p.m. until 1a.m. next morning, some may stay until 3 or 4a.m. serving nearly 170,000 customers each year. Each stands would be close one day per week, 6 stands would close every one single day.

Kita no yatai was opened on July 29, 2001. The very first intention of the organizers of Kita no yatai did not concern with profits but instead, was to revitalize the streets with young power. At that time, Tokachi is a young town with fast pace of urbanization. Cars are increasing in the number and replace people along the streets. The shop owners moved to the outskirts, giving place to large concrete buildings, being convenient and gorgeous but cold and lack of room for personal contacts. With a hope to bring back a cozy touch to the local urban life, the founders of Kitanoyatai, thereafter called Northern Business Promotion Square Cooperative, transformed a former marketplace into a small street, around 100metres in length, filled up its both sides with 20 food stands each food stand. A single booth stand measures three tsubo (about $10m^2$) and would not extent its scale to secure a warm atmosphere by keeping the seller and the guests at a close distance, though the number of customers has increased rapidly over the past 5 years. Also, though there are many applicants, only 20 foodstands are allowed to operate at a time, because a larger number of shops would make it more difficult to remain the regular customer basis for each food stand.

The founders of Kitanoyatai have pointed out the two main goals of Kitanoyatai:

-To create a place for communication among local residents. The food offered at yatai is very delicious yet reasonably priced, the sitting is arranged in a way that every guest could find it a warm and friendly touch with the shop owners and with other guests. Cool in summer and warm in winter, it would be a very ideal place to have dinner for those who just leave their work. Other residents also would go to these food stands to see their neighborhood, to start a relation and to be involved in this life.

-To help improve local agricultural production. Many of the foodstands use the materials produced by local farmers and many shop owners are the farmers at the same time. The food is therefore very fresh, delicious and safe.

As the foodstands thrive on, a lot of other merits have been recognized. The small street has become an attraction to tourists though their main target is the local residents. The tourists, inspired by the great experience they have here, have disseminated the reputation of Kitanoyatai and local produce to other regions all over the country.

All the foodstand owners have good financial records with the most successful man earns a profit of 15million yen per year. However, the work of a shop owner is not at all easy even with that high profit. The most important thing that could keep an yatai owner in his business is his own passion with the work.

Our last words are for Mr. Hiroshi Kubo, the Senior Executive Director of the Northern Business Promotion Square Cooperative who we think to be among the most important persons to revitalize the custom of yatai to this beautiful city . He majored at economics and got his bachelor's degree in a university in Tokyo. He spent a long time abroad where he got a lot

of understanding and experience in foodstand business before he came back to his home town in Obihiro to start his career in improving the system of Kitano yatai. We have met him twice, first at the lecture inside the center, the other right at the yatai street where he keeps visiting every night to observe the operation of the yatai groups. He is a decisive, business-minded gentleman. He is very modest who hardly talks anything about himself but we could find inside him a heart filled with a love toward the local traditional lifestyle and a willingness to enhance communication among people. As he told us the second time we came to the yatai street, not the menu but it is the hospitality of the shop owner that keeps customers coming to his stand.

KHUN KAKADA

This year is the final year of my academic life in Kyushu University, Japan. During these 2 years, in the laboratory of forest planning under the supervision of Professor Dr. Yoshida and Associate Professor Dr. Mizoue, I got many knowledge and know-how about the forest management, forest planning and other skills. I also had the opportunity to visit many forest sites around Kyushu Island and to make presentation about my research 2 times in the official conferences. One presentation was made in Annual Forest Conference of Kyushu Island held in October, 2005 in Kumamoto prefecture and another one was in Annual Conference of Japanese Forest Society held in April 2006 in Tokyo. All activities I participated in will remind me about Japan in my life. The text below is about my research in brief for master s thesis.

TRIPLE POTENTIAL OF HEVEACULTURE IN CAMBODIA

Kakada Khun, Shigejiro Yoshida, Nobuya Mizoue and Takuhiko Murakami

Introduction

Rubber trees (Hevea brasiliensis), designated as “White Gold” have been playing important roles both socio - economically and environmentally as a source of Natural Rubber, Wood Production and Friendly Environmental Sustainability in Cambodia since 1920. This study was conducted to assess the three benefits from rubber plantations in Cambodia: latex (Kg ha^{-1} yr^{-1}), rubber wood volume (m^3 ha^{-1}) and CO_2 (MT ha^{-1}) up taking by rubber trees. It is also to set up volume equation to estimate the stand volume and mean annual increment (MAI) of rubber trees planted in Cambodia.

Material and Methods

Krek Rubber Plantation (red soil basaltic, PH= 4.57, T= 28℃ , rainfall= 1,700 mm) was selected for study area. Latex production from 2000 - 2005 recorded by Technique Office of Krek Rubber Plantation was based on to estimate the yearly average of rubber yield per hectare. 60 trees of clone PR107 at the age of 36, 44, 45 and 46 were felled and cut into segments of 1 meter. Diameters of both end sides of every segment were measured and recorded. Volume of individual tree was calculated by Smalian’s formula. Yamamoto Schumacher’s formula and Statistic Software R were used for regression analysis to formulate the volume equation. To examine rubber wood volume and volume increment per hectare, DBH and Total Height of 450 standing trees (15 sample plots) at different ages (6 - 10 and 36 - 48) were measured by Diameter tapes and Vertex III tools. Linear equation of above ground biomass $B = 42.69 - 12.8\ D + 1.242\ D^2$ (Brown 1997), where B denotes Biomass per tree in (kg), D denotes DBH in (cm), was used to calculate biomass per hectare and converted into the amount of CO_2 by $CO_2 = (B * r_c) *44/12$ (Dyson 1977, Jacob 2002), where r_c is the ratio of carbon to biomass.

Results and Discussion

This study revealed that the latex product was around 1,100 $kg.ha^{-1}$ $year^{-1}$ and the stand volume equation for rubber trees of over 30 years old planted in Cambodia was $V = 0.00018381\ D^{2.23961}\ H^{0.15334}$ ($R^2 = 0.9245$) where stem volume V is in (m^3), diameter at breast height D is in (cm), total height H is in (m). Rubber wood volume (> 30 years old) was 408.04 m^3 with the mean annual increment of 9.28 m^3 ha^{-1} yr^{-1} and the amount of CO_2 up taken by rubber trees was 577.89 MT ha^{-1} with the ability of up taking of 20.85 MT ha^{-1} yr^{-1}. It is observed that latex products in this study is lower than that of Malaysia, Thailand and Indonesia (around 1,400 Kg ha^{-1} yr^{-1}) due to their better management system and higher yielding clones selection and further more 54% of rubber trees in this plantation is too old to produce latex. However rubber wood volume per hectare (>30 years)

and the amount of CO_2 are higher compared to wood volume (25 years) of 207 m^3 ha^{-1} in Malaysia, 250 m^3 ha^{-1} in Thailand and 296.46 MT ha^{-1}, 340.26 MT ha^{-1} of CO_2 in Malaysia and Indonesia respectively.

Conclusion

It is anticipated that the triple potential of heveaculture in Cambodia are latex 1,100 $kg.ha^{-1}year^{-1}$ rubber wood volume (>30 years) 408. 04 m^3 ha^{-1} with the growth rate of 9.28 m^3 ha^{-1} yr^{-1} and CO_2 577.89 MT ha^{-1} with the up taking capacity of 20.85 MT ha^{-1} yr^{-1}. As this finding is the first study case on rubber trees in Cambodia so more researches need to be done and for my future study it will focus on "How is the appropriate management system for rubber plantation in Cambodia to maximize the above triple potential?"

References

- Brown S 1997, Estimating biomass and biomass change of tropical forests: a primer (FAO, Forestry 134).
- Krek Rubber Plantation (Bureau of Techniques and statistics): Rubber Product statistics 2000-2005.
- Chantuma A *et al* (Rubber Research Institute of Thailand): Cultivation Rubber wood Productivity in Thailand.
- Jacob J 2002 (Rubber Research Institute of India) Carbon Sequestration by Natural Rubber Plantations and Some Kyoto Thoughts.

(Contact: Kakada Khun, e-mail: khunkakada@yahoo.com)

REHEASAL PRESENTATION IN LAB.

ALL LAB's MEMBERS ON GRADUATION DAY

Tran Thi Thu Hoai

Diversity of starch properties in Northern Vietnam local rice cultivars

Introduction

Genetic resources on starch properties in rice are important not only to improve the quality but also to understand the starch structure and its biosynthesis. This study dealt with characterizing the endosperm starch properties of Vietnam local rice cultivars to provide the useful information to rice quality breeding program as well as the conservation of rice genetic resources.

Materials and Methods

185 local rice cultivars, which were collected from mountainous areas of Northern Vietnam and consisted of 97 waxy and 88 non-waxy rices, were used in this study. The apparent amylose content of endosperm starch was estimated by the colometric method of iodine-starch complex. The expression level of granule bound starch synthase (GBSS) was determined by SDS-PAGE and western blotting analyses. The alkali digestibility of endosperm starch was determined by 1.3% KOH. The amylopectin chain length distribution was analysed by HPAEC-PAD.

Results and discussion

In rice endosperm, GBSS is mainly responsible for the amylose biosynthesis. Based on the expression level of GBSS, 185 rice cultivars were classified into four groups of absent, low, intermediate and high. 97 waxy rice cultivars were subdivided into three groups of low, intermediate and high based on the iodine staining intensity, though they were missing in GBSS, suggesting that the variation in iodine staining intensity is caused by the amylopectin structure. 88 non-waxy cultivars were subdivided into three groups with low, intermediate and high GBSS level. The apparent amylose content in non- waxy rice of Vietnam varied from 9 to 32% (Fig.1)and they were grouped into low (9-12) , intermediate (13-18) , high (19-24) and very high (_25) . The correlation was observed between the GBSS level and the apparent amylose content. However, the continuous variation on the apparent amylose content was found in the cultivars with intermediate and high GBSS level.

A gelatinization property, which is one of the most important determinants of cooking quality of rice, was estimated by alkali digestibility test. The wide range in the alkali spreading scores was also observed in both of the waxy and non-waxy rice (Fig.2). 45% of the accession had the intermediate alkali digestibility (alkali score 4 to 6), while 30% showed high (1 to 3) and 25 % contained low alkali digestibility (7 to 8).

The amylopectyin fine structure was significantly varied in Vietnam local rice cultivars not only on the ratios of shorter chains with DP_18 to longer chain with DP_19 but also on the amount of longer A chains with DP_9. The good correlation was observed between the longer A chains and the alkali digestibility. Since the chain length distribution of amylopectin affects to the rheological properties of cooked rice, the further genetic analysis should be focus in the diversity of amylopectin structure and the relationship with physical behaviour of endosperm starch in Vietnam local rice cultivars.

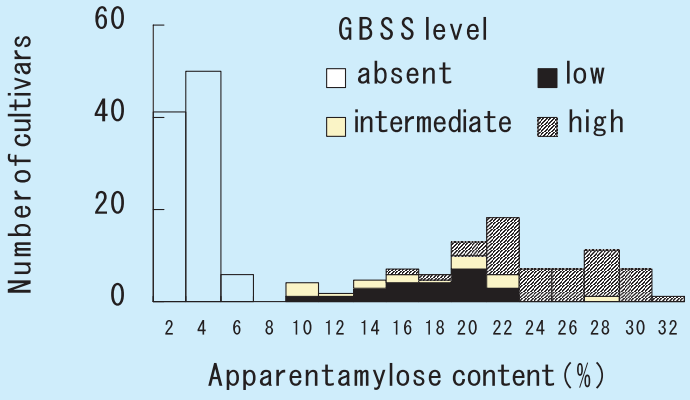


Fig.1. Frequency distribution of apparent amylose content and the relationship between apparent amylose content and GBSS level in northern Vietnam local rice cultivars.

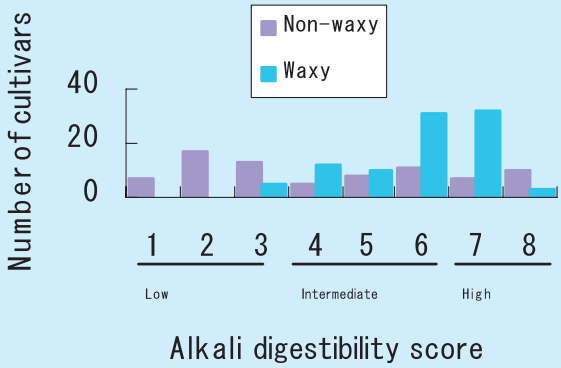


Fig. 2. Frequency distribution of alkali digestibility in northern Vietnam local rice cultivars.

Phi Cong Nguyen

Life and study in Kyushu University

Kyushu is the third largest island in Japan where one of the most beautiful cities of Japan located, Fukuoka city, the candidate city for Olympic game 2012, the most important event in the world.

Like other Vietnamese students, we, JDS fellow students, have chance to study at Kyushu University to follow the way Prof. Dr. Luong Dinh Cua and Prof. Vo Tong Xuan (former students of Kyushu university) chose.

Vietnamese students share the feeling that we have the best condition and environment for studying, research and also in daily life. Study program for special course of foreign students is designed suitable and practical. We can study in good condition lecture hall beside the peaceful environment. Many informative and interesting lectures given by Japanese professors help us to accumulate and gather necessary and useful knowledge, experience for future work. During lecture, we can study and discuss with professors and foreign students from other countries help us faster acquiring new knowledge and information. Supporting for study is very good and well facilitated library. JDS fellows and also other research students can find many text books, reference documents, journals, magazines from modern library via internet and borrow from librarian for study. Those are very useful for research and work in the laboratory where we can apply the obtained knowledge from study. Besides that, we can join many seminars for specific aims with leading professors in and out of Kyushu University. This will be very good chance to discuss and exchange interesting information and scientific results and successes.

Lectures those we acquired can be applied practically in research and work in the laboratory. Different to other student from social science, students from natural science can spend time on working and research in the laboratory with the best condition. As you known, it is very busy while study and work in the laboratory. Sometimes, I felt that tired of working all day in the laboratory. But from that, you can find out the way to manage your time when you have to deal with many works. Practice is the best way in improving your knowledge. Here, you can experience anything from lecture and sometimes when you have or get in difficulties you can find the answers by discussing with professors and friends. From Kyushu University's professors and other students in the laboratory we can learn many new skills and techniques. With instruction apprentices in detail, students can manage experiments, control new and modern techniques and facilities. This is really good condition for study and research with close atmosphere and open minded. You can receive assistance from professors, tutors, and other laboratory members that will help you overcome difficulties from work, daily life when studying abroad as the family's members. We can join journal club where we can exchange new knowledge, information and new scientific results help us more active in study and research. Sometimes you might feel tired but it is very interesting and useful when we can experience working in the laboratory and then in the field. Work makes people feel happy and I always enjoy this moment.

Before came to Japan, JDS fellow shared the wonder about life in near future in foreign country. With many lectures, monitoring meeting, and activities held by JICE, helped us to have overview about living, studying, culture for independent life in Japan. And then, when entered the Ms course at the Kyushu in October 2005, we found that Kyushu University is very good environment for studying, research and living. We are now enrolling in the long historical university about 100 years old with many good field of study. Beside study activities in the major course, students from JDS program and other students can take part in many activities of the university such as Japanese class, sport activities, study trips, field trips and vacations...etc. From Japanese class, we have the chance to study Japanese that is useful for daily life and to study more about Japanese culture and tradition. The fact that foreign students use English as the main way to study, communicate with each other but if you can just only talk with English you will feel that you miss the chance to talk openly with Japanese people while they are willing to talk and help you deal with difficulties. Sport activities also open for everybody who would like to join. You can freely practice in the gymnasium and join specific courses of sports. Community sport event held each year and is the good chance to exchange, communicate and make friend. I can list some activities such as softball, baseball, football...etc. Foreign student are given all the best condition to exchange tradition, culture and to learn about Japanese culture history and tradition. Study trips to historical places such as Hiroshima, Nagasaki... organized by Faculty, university are good ways to introduce history and culture values of Japan to foreign students.

Not only study condition but also living condition is very comfortable. We can live in the quiet and peaceful areas those

are favorable for study. Even sometimes you do not stay in the international dormitory, you will receive many helps, support from responsible organization. In case of JDS fellows, not any time you can stay in the international dormitory, JICE will help you to find good place to stay in and support you in stabilize your life. Besides that, many Japanese friends willing to help you to deal with difficulties you may get. This is very good feeling when you study at Kyushu University and live there. Same as mine, I wish you have very good time and strong memory about Kyushu University the place you will study and the place you can have many good friends. One thing I want to tell you is that please enjoy watching "sakura" - cherry blossom in the spring time you will good impression and know why "sakura" is the symbol of Japan.

Le Son Ha

Experience of a foreign student in Kyushu University

Since its establishing in 1911, Kyushu University has been amongst Japan's leading universities. At present, there are about 18.139 students in which more than 1.100 foreign students from 70 countries studying here.

Studying at the Kyushu University means being part of a rich traditional of very good in education and research as well as a nice student life.

Outside of class hours, I am working in laboratory under instruction of my professor. With excellence equipped laboratory, I am conducting the research on the field of insect pathogenic fungi and application of the fungi to control insect pest that would be useful to my career in future. I also can access necessary books and journals in the library of over 3.700.000 items with links to electronic journals.

Foreign students can participate in many groups of extracurricular activities and festivals. There are many traditional festivals in Kyushu region that you can wallow in Japanese culture. I have a very nice experience of Hanami festival (enjoy Cherry Blossom festival) in March at Nishi Koen (Western Park). I also have special memories of traditional festivals of Dontaku in Tenjin, Wasshoi in Kytakyushu city, and festival of rice transplanting in Ukiha.

That would be very special memories of student life in Kyushu University for me.

HUYNH VIET KHAI

How kind JDS program ～Impressions for JDS Program～

JDS program is very fair, good and extremely "kind". Probably, you will be surprised I use the word "kind" to describe this program. But, I think if you read all my following telling, you will understand more clearly:

I have worked as a young lecturer for Can Tho University at the south of Viet Nam. Studying more to get Master and Doctor Degree is my responsibility and duty. However, with the low salary of a teacher, taking the examination of scholarship program in Ha Noi is not easy for a lecturer in Can Tho. Because of the distance between Can Tho city and Ha Noi is rather far, the cost of examination can eat up the all salaries of almost 5 months without knowing if the exam result is successful. Yet it is extremely lucky for me because the candidates of JDS program are supported the all costs of transportations during taking examination. This is the first "kind" thing of JDS program that encourages me to apply this scholarship program.

The process of selecting candidates was very obvious and fair. It was different from other scholarship programs. The successful candidates must gradually succeed in four rounds of competition. Every round of choice was rather objective. There were not negative interventions of authorities who are not related to JDS program. The selected candidates mainly based on their actually talent abilities. Moreover, during taking the examination, with staff's enthusiasm of JICE office in Viet Nam, they helped us receive plenty of information and completed necessary procedures requested by JDS program on time.

The 2 months of studying Japanese language was challenging and useful for us. With the enthusiasm of Japanese teachers, they not only taught us Japanese language but also introduced us know more clearly Japanese country as well as Japanese people...In addition, they instructed us Japanese traditional culture as art of folding paper into shapes, making tea with Japanese style and Japanese songs...one of my favorite songs is Sakura, the name of famous flower in Japan. The content of Sakura song is to sing the praises of spring in Japan and the beauty of Sakura which is considered as the symbol of Japan. At that time, I would like to be able to go to Japan to see Sakura with my own eyes as soon as possible and can sit near the foot of Sakura to drink and enjoy delicious roast meats...

Required by JDS program, we also attended the Japanese language class for other 2 months in Kitakyushu located in Kyushu Island in Japan. It is extremely wonderful time for us. We were arranged to stay in the International Kyushu center which gave us chances to meet and take part in cultural exchanges with Japanese people and other foreigners, including Indonesian, American, Thai...Furthermore, it was the happiest for us to see Japanese country, the life of Japanese people with our own eyes and be able to speak to them directly. While we stayed there, our enthusiastic teachers and friendly JICE staff in Kyushu center introduced and took us to enjoy a lot of beautiful natural landscapes around Kitakyushu. In addition, we can understand more clearly the traditional culture of Japanese by joining the programs of Japanese home stay, Watsoi festival, Drum festival...

After finishing the Japanese language course in Kitakyushu, we moved to Kyushu University, the biggest University in Fukuoka city. I am very proud of being a student belonging to Agricultural Economics laboratory of Kyushu University in which there is the modern system of library contenting variety of major books and I can easily find any needed specific books and download any famous papers in Kyushu University. My supervisor is professor Yokogawa and I also receive a favor of professor Yobe and Sato. They are really friendly and very kind. They are ready to help me to solve not only the problems of my study, also the all things of my social life. Every year Sakura often blooms at the end of March. At that time, the Japanese and their family traditionally celebrate the party of enjoying Sakura flowers, namely Hanami. Although my professor was extremely busy and didn't arrange free time to have party with his family yet, he tried to save his time to enjoy Hanami with us. I appropriate more his sentiments towards us. We silently express our gratitude to him.

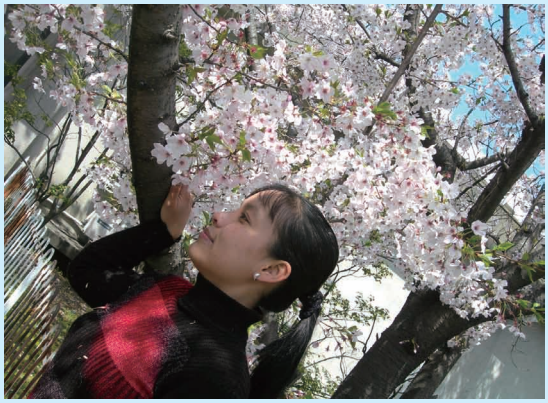
Until now, you probably agree with me JDS program is actually very "kind". I hope the JDS program will be more popular,

get more selected candidates in the future and there will be more other scholarship programs similar to JDS program which is extremely fair and "kind". We, Vietnamese, are grateful to Japanese Government for giving us changes to not only improve the academic knowledge, but also study the experiences of Japan which are used to construct our Viet Nam much better.

Haymar Hein

Report on Mushroom Production

Introduction



On 30th November, 2005, an excursion went to mushroom production of Ooki machi industry which is the biggest industry in Fukuoka city. This industry is private factory but the central government partially support some technology and financial status to these industry. There are more than 100 employees in this factory. Among them, there are 7 technical staff and most of the emplyoees are women and they are part-time worker. The part-time worker can get 800 yen per hour. The business time start from 8:30 am to 4:00 pm, with one hour break time starting from noon to 1:00pm. The staffs requirement is depend on the season and they need to work for 5 days in the spring and summer but in autumn and winter season 6 days a week with shifting duty system. As mushrooms are grown indoors under controlled environment conditions, they can be available all year round, although there are usually peaks and troughs in the market as some growers cease production during the hotter summer months.Mushroom cultivation requires high capital input and labour costs and a strict adherence to hygiene procedures. From November to December is the best season for mushroom production. Now the market for the product is only for domestic market (Fukuoka, Kurume) but this business seems to enlarge its produced quantities so far owing to the demand of the market.

Mushrooms are the edible fleshy fruiting bodies of certain fungi, which may be gathered wild or grown under cultivation. There are five mushroom species are cultivated in this factory. The following shows the name of the mushroom species and their growing period respectively.

No.	Types of Mushroom species	Growing period
1.	PLEUROTUS NEBRODENSIS (Bailingu)	80 days
2.	PLEUROTUS ERYNGII	50 days
3.	HYPIGUS MARMOMEUS (Buna shimeji)	90 days
4.	LENTINULA EROPES	60 days
5.	GLIFOLA FRONOSA	70 days

Even though there are five species in this factory, Bailingu is the most delicious and expensive respectively compared to Eryngii and Bunashimeji. In contrast, the amount of Bunashimeji daily produced is remarkable and much more than the rests. The period of production time is only 25 days a month. A day, the enterprise can produce totally 5 tons of aggregate amount to supply local market demand with the income of 2,350,000 yen in worth, among which the respective contribution of Bunashimeji is major and accounts for about 47000 kg; Eryngii is about 3000 kg, and Bailingu is 100 kg. The price of these mushroom commodities respectively increases three times if compare to the past. For instance the price of Bunashimeji was 20 yen in the past 5 months and then went up to 30yen and at the moment is 60yen per 100g. For Eryngii the price at the moment is 70 yen per 160g and the price for Bailingu at the moment is 100 yen per 100g. From this point of view it sets a good condition for the enterprise to make profit. We cannot estimate the net income of the enterprise because we do know the capital invested in the building and production itself and so forth.

Stages of mushroom production

To grow mushrooms on media is a complicated process, but success will come if procedures are followed carefully. There are 4 stages in the growing cycle:

(1) substrate preparation stage (media preparation)
(2) sterilization and inoculation stage
(3) incubation stage and
(4) Fruiting and picking stage.

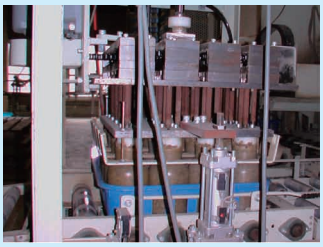
(1) Substrate preparation stage

In the substrate preparing stage mix the substrate (sawdust, wheat bran, corn cob and other supplementary material) and put them in a mixing machine, the moisture content is about 60 to 63%. Another necessary thing is plastic bottle which is used for carrying the substrate. Most of the raw materials are used from domestic products except corncob. These mixtures will eventually be carried to the filling point where a tray of 16 plastic cans are readily waiting. The filled cans are transferred to be capped and finally lifted to pile up orderly for sterilization. These process steps are done automatically by machine. The size of bottle is 800 milliliter. The price of bottle is 20 yen, but total income from one bottle is about 150 yen.

Tray of plastic cans

Raw materials

Mixing raw materials

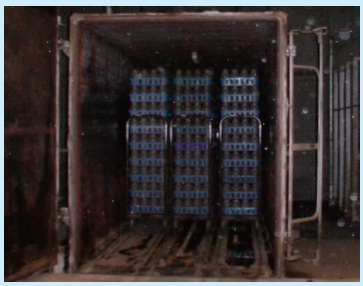


Capping

Filling the mixed into Plastic cans

(2) Sterilization and Inoculation stage

The bottles are autoclaved at 100.C for five to six hours. The autoclaving is done to sterilize the substrate and make the media contaminant free. This step is very important. These trays of cans are resent automatically into the first room where they are staying for one night at 10.C for cooling down and 5 gm of mycelia being put on the surface of the media automatically. This room is not allowed to enter.



Sterilization room

(3) Incubation stage

When the bottle is cool, move to the second room, the filled cans are kept under the moisture about 50 percent with the temperature 20℃ for one week. Then they are sent to the third room where they kept for another one week under the condition of temperature 20℃ and moisture 55 percent. In the fourth room they kept under the condition of temperature 20℃ and moisture 60 percent but the duration for keeping is 20 days. After 20 days the filled cans are transferred to the fifth room where they are kept under the temperature 18℃ and moister 65 percent for 35 days and then resent to the final stage of innovation room where they are kept for another 25 days under the temperature 20℃ and moisture 56 percent. These five rooms are systematically linked. Good ventilation to supply a constant flow of fresh air and prevent carbon dioxide build-up is essential. Ventilation units should be fully adjustable in terms of circulation volumes and include a filter which will prevent entry of pests and airborn spores. The filters should be cleaned regularly. Do not recycle unfiltered air between different growing rooms. Trays or shelving should be arranged to allow ease of air circulation.All the filled bottles are moved to the maturation room where they are kept for another 35 days under the condition of temperature 20℃ and moisture 41 percent to make the spore growing become mature. At that time most of the mycelia in the bottle are changed into white color.

Room 2

Room 3

Room 4

Room 5

Room 6

Maturation room

(5) Fruiting and picking stage

The filled cans are moved again to the growing room. Before moving into the growing rooms, all cans are opened the cap and cleaned up their mouth. In the growing room, the filled cans are kept for the last 20 days until the harvest. The temperature in this room is 14.5℃ and the moisture content is 95 percent. In this final stage, the highest level of moisture is required for high quality of mushroom to grow up.

Filled cans are removed cap

Mushroom are growing

Mushroom harvested

Eryngii

Buna Shimeji

Bailingu

After mushrooms being harvested and packed for the market, the plastic cans are returned to be cleaned up for the next production process. The compost left in the bottle can be sold as organic fertilizer and it is suitable for some crops like as tomato, strawberry, cucumber, watermelon and egg plants.

Packing room

Cans after mushroom harvested are carried to be cleaned

Em Huy

Life in Japan

Well, I arrived in Japan in July 1, 2005 under JDS program for master degree. I have stayed for over ten months so far. My first expression about Japan is Japanese society, which attracts me very much during this stay. The topic that I am going to describe is about my experiences living in this society, will be pinpointed as you will see in the following aspects:

Since I landed in this country I notice that Japanese people rarely go first in term of communication unless they are asked but do not assume that they are not friendly and helpful. First I thought they are hard to be accessed but once I tried to challenge by going straight to them with questions using my poor Japanese mixed with English, and got success finally. Don't be afraid of asking them for help if you need help! They are normally a bit shy, especially the young generation.

Most of Japanese people are helpful in common. Politeness, respect, quietness, morality, and discipline are the characteristics of its society. Smiling face to protect the real, secrete heart is normally seen everywhere in Japanese society. Words "Oishi (delicious) and Sugoi (wonderful/great)" are commonly heard endlessly in some occasions to express the enthusiasm to doers. I like the terminology. Why? Because it is an effective, positive motivation and encouragement, which is always preferred by most of people in this world the most particularly in management. Look at the right picture. Three of them are my Japanese friends. They are very nice, especially the one who is in green T-shirt, and another whose head emerges above the glass window between the curtains behind me. The other one is that lady, who used to work for NGO in Cambodia. Of course I could relax and have funs with them occasionally. This is the best way that I can release my stresses, which sometimes occur in my academic life.

The condition of living is quite convenient in terms of facilities, including electricity, water, gas, TV and internet connection, etc. It amazes me that during this period of stay I have never seen electricity being cut off. There are vending machines along the way, where you can buy drinks. Supper markets are very common markets where consist of diverse foods, drinks, and necessary things for kitchen. Convenient stores are open 24-hour service to customers. Not only in the town, is the existence of such facilities the same in rural areas.

Life here is fairly treated, and very safe I must say. The gap between poor and rich is almost eliminated. About 85 percent of Japanese population is in middle class. The access to social involvement and benefits is not far different between rural

and city people. The safety and security are almost 100 percent ensured throughout the country. Police is the best person for you to ask for help regardless in what purposes you want to seek for help. There is nothing annoyed, if even you walk or cycle or drive alone at late night in Japan; and along the streets you will find convenient stores, vending machines being in service. Taped water is drinkable safely. Well, you may disagree with the above statement but it is true in Japan. If you may have chance to visit or stay or study here, you will realize it.

Traffic system is good. I have never met traffic in jam even along some main streets, which are full of cars. Roads, highways and traffic signs/lights are well constructed to facilitate travelers. All drivers have high morality and respect to one another especially to walkers and bicyclers. The priority is provided to pedestrians and bicyclers. I observed that most of car drivers are stick to the traffic rules even in late night driving, and professional in their career. Vehicles are driven very carefully and skillfully on the streets. Traffic accidences are less to my understanding but I have never seen so far. However there are accidences occurred.

The above picture was taken at the farmer market named Michino Eki Ukiha in Fukuoka prefecture on my study tour 10-11 July, 2006. Look! The background of this picture is the villagers' residences and golden wheat fields. This is the wheat harvest season in Japan. As you see some plastic carriers in my right hand, they contain some tomato and lunch box I just bought from the nearby farmer market in the rural area. Well, I like this landscape very much.

In conclusion, things here are systematic and in orders. Although the society seems a bit quiet, I like and appreciate life in Japan very much, which is ensured and in a friendly environment and nature.

Hour Ix

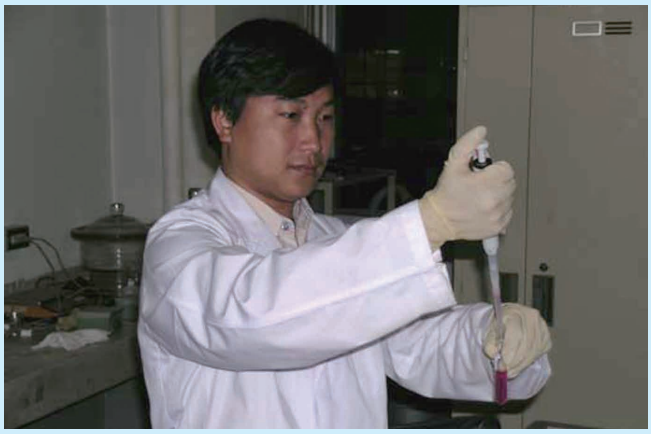
Cambodian-JDS Student 2005-2007

Laboratory of Drainage and Water Environment deals with water quality issues of agricultural ponds, lakes and estuaries etc., which are affected by surrounding land use activities. Laboratory provides a variety of facilities for students to conduct water experiments for their research studies. Sampling waters are taken directly from the research areas before their quality level being tested in the laboratory. Necessary water nutrients, which are essential for aquatic lives and regarded as the main indicators of pollution that should be tested as samples in the laboratory, are Soluble Reactive Phosphorus (SRP), Total Phosphorus (TP), Total Nitrogen (TN), and Chemical Oxygen Demand (COD). This water sampling activity will be continuously carried out once a week for the whole year round in order to detect the seasonal change of the eutrophication phenomena. An appropriate ecosystem model will be analytically developed and finally adopted for the water environment modeling after the phenomena are observationally clarified. The scenario analyses are then critically carried out for finding the optimal water conservation measure. Seminars of relevant courses such as Hydraulics, Hydrology, Water quality, Ecosystem, as well as Fortran Programming are provided to the students for their eligibility of the research before they actually come to practice.

This Laboratory is headed by **Professor Dr. Kazuaki Hiramatsu, Associate Professor Dr. Masayoshi Harada**, and **Assistant Professor Dr. Makito Mori** who provide direct supports in terms of technical and theoretical issues throughout the research process. In this year, there are three members who are conducting water quality studies on an agricultural pond with the research objectives of keeping water better for a wide range of uses such as recreation, fish habitat, aquatic life and irrigation. Those are **Mr. Takashi Saito**, the first year of Master course student, **Mr. Tatsuya Yamamoto**, the fourth year student of undergraduate course and I.

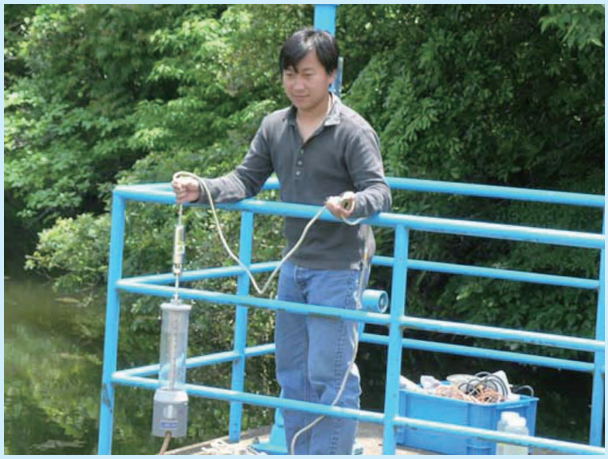
The research area is an agricultural pond called Toishigawara-ike, located in Sasaguri City of Fukuoka Prefecture. The total area of the pond is approximately 840m^2 with the water loading capacity of 2,192m^3 and the periphery of about 140m. This pond is polluted by adjacent agricultural fertilizers transferred in by rain, garbage wastes from surrounding settlement areas

carried in by inflow water, as well as other substances derived from nearby non-point sources. Field survey is carried out once a week started since March this year. **Associate Professor Dr. Masayoshi Harada**, who specializes in water quality, is the supervisor to the project. He directly leads the team to the field and provides technical supports when needed. In addition to water sampling, on-the-spot water quality instrument is used to measure temperatures of the pond's water, Dissolved Oxygen (DO), pH and levels of Electric Conductivity (EC) of the water at particular depths. Level of water clearness is also directly tested in the field by a simple equipment with naked eyes.



For inflow water, we need to measure its velocity, inflow cross-sectional area, and its flow depth in order to calculate flow discharge. Finally, both sources of water, inflow and pond water, are taken separately to the laboratory for further experiment by different bottles. Throughout experiment in laboratory, we will obtain the level of SRP, TP, TN, DO, and also the density of plankton existing in the pond water.

Kyushu University gives me a good opportunity to learn regional water environment problems. The more I get involved with water pollution issue, the more I feel interested in it. As water pollution is now becoming a severe problem especially in less developed countries, I really hope that more JDS students will be interested in our laboratory. I am now spending a very interesting and pleasant time in Kyushu University and Fukuoka City.



8. LIST of Subjects and Supervising Professors for on international Development Research Course (Academic Year 2006)

Applied Genetics and Pest Management

Bioresources and Management Michio OHBA, Professor
Genetics and Plant Breeding
Plant Breeding Atsushi YOSHIMURA, Professor
Silkworm Science Yutaka KAWAGUCHI, Professor
Plant Pathology and Pesticide Science
Plant Pathology Yoichi TAKANAMI, Professor
Pesticide Chemistry Eiichi KUWANO, Professor
Zoology and Entomology
Entomology Osamu TADAUCHI, Professor
Zoology Takayuki MŌRI, Professor
Biological Control
Insect Pathology and Microbial Control
Susumu SHIMIZU, Professor
Insect Natural Enemies Masami TAKAGI, Professor

Plant Resources

Applied Plant Science Shoji YAMASHITA, Professor
Agricultural Botany
Crop Science Mari IWAYA-INOUE, Professor
Horticultural Science Hiroshi OKUBO, Professor
Soil Science and Plant Production
Soil Chemistry Kazuhiko EGASHIRA, Professor
Soil Biology and Biochemistry Kenji SAKAI, Professor
Plant Nutrition Ken MATSUOKA, Professor
Plant Production Physiology Fumitake KUBOTA, Professor
Plant Metabolic Physiology Yoshichika KOBAYASHI, Professor
Agricultural Ecology Kei NAKAJI, Professor
Environment Control for Biology Jiro CHIKUSHI, Professor
Tropical Crops and Environment Kazuo OGATA, Professor

Bioscience and Biotechnology

Applied Biological Regulation Technology
Masahiro OKAMOTO, Professor
Applied Biological Chemistry
Biochemistry Makoto KIMURA, Professor
Chemistry and Technology of Animal Products
Yoshihide IKEUCHI, Professor
Nutrition Chemistry Katsumi IMAIZUMI, Professor
Food Chemistry Koji YAMADA, Professor
Food Biotechnology
Food Analysis Kiyoshi MATSUMOTO, Professor
Food Hygienic Chemistry Takahisa MIYAMOTO, Professor
Food Process Engineering Mitsuya SHIMODA, Professor
Microbial Science and Technology
Applied Microbiology Kensuke FURUKAWA, Professor
Microbial Technology Kenji SONOMOTO, Professor
Marine Biological Chemistry
Marine Biochemistry Miki NAKAO, Professor
Marine Resource Chemistry Makoto ITO, Professor
Marine Environmental Science Tsuneo HONJO, Professor

Animal and Marine Bioresource Sciences

Advanced Animal and Marine Bioresources
Mitsuhiro FURUSE, Professor
Animal Science
Functional Anatomy Hisao IWAMOTO, Professor
Reproductive Physiology Masa-aki HATTORI, Professor
Animal Feed Science Yasuhisa MASUDA, Professor
Marine Bioresources
Marine Biology Michiya MATSUYAMA, Professor
Fisheries Biology Akinobu NAKAZONO, Professor
Fish Production Technology Seiichi MATSUI, Professor

Agricultural and Resource Economics

Agricultural Resource Economics and Business Administration
Agricultural Economics Hiroshi YOKOGAWA, Professor
Agricultural Policy Shouichi ITO, Professor
Farm Management
Industrial Organization of Agribusiness
Quantitative Analysis of Agribusiness Organization
Agricultural Marketing Satoshi KAI, Professor

Bioproduction Environmental Sciences

Bioproduction and Environment Information Sciences
Ken MORI, Professor
Regional Environment Science
Irrigation and Water Utilization Yoshisuke NAKANO, Professor
Drainage and Water Environment
Kazunori HIRAMASTU, Professor
Environmental Soil Engineering Masami OHTUBO, Professor
Applied Meteorology Taichi MAKI, Professor
Bioproduction System Science
Bioproduction Engineering Eiji INOUE, Professor
Postharvest Science Toshitaka UCHINO, Professor

Forest and Forest Products Sciences

Systematic Forest and Forest Products Science
Ryuichiro KONDO, Professor
Forest Environment and Management Science
Forest Management Shigejiro YOSHIDA, Professor
Erosion Control Hiroshi OMURA, Professor
Forest Policy
Forest Bioscience
Silviculture Susumu SHIRAISHI, Professor
Wood Science Kazuyuki ODA, Professor
Forest Chemistry and Biochemistry Kenichi KURODA, Professor
Biomaterial Science
Wood Material Technology Yasuhide MURASE, Professor
Bioresources Chemistry Hiroyuki WARIISHI, Professor
Biomacromolecular Materials
Mitsuhiro MORITA, Professor
Forest Ecosphere Management
Forest Ecosystem Management Kyouichi OHTSUKI, Professor
Forest Resources Management

Genetic Resources Technology

Molecular Gene Technology Satoru KUHARA, Professor
Protein Chemistry and Engineering Yoshizumi ISHINO, Professor
Cellular Regulation Technology Sanetaka SHIRAHATA, Professor
Applied Genetic Resources
Silkworm Genetics
Plant Genetics Hikaru SATOH, Professor
Microbial Genetics Toshihisa OHSHIMA, Professor

*These laboratories also belongs to Graduate School of Systems Life Scilences.

(Remarks)
A professor in charge of the specific field, an associate professor, and assistant professor are usually assigned to each subject.
Other professors may be selected based on approval from the supervisory professor.

9. Curriculum of Special Course (Master's Course)

The Graduate School of Bioresource and Bioenvironmental Sciences runs two graduate education programs: the standard course and a special course. The special course, which focuses on International Development Research, is aimed at international students. The International Development Research Course follows a 2 semester system, starting in October with the autumn term and followed by the spring term, unlike the standard course which is taught in Japanese and commences in April.

(1) **Thesis work will be carried out in English.** Since the course is aimed at international students, all thesis work should be carried out in English.

(2) Students are expected to learn the Japanese Language during the course of their studies, and while not compulsory, this is aimed at bettering communication during daily life.

(3) Theses should be based on research conducted during the course, and on completion, should be submitted to the Division of Agriculture, the Graduate School of Bioresource and Bioenvironmental Sciences at Kyushu University. If the examiners' requirements are satisfied, an appropriate degree will be awarded.

Students will be awarded the Master of Science (M.Sc) on completion of a satisfactory thesis. Students are also required to complete a four-semester course over a two-year period.

The course consists of lectures, practicals, seminars, and tutorials. Students must obtain 30 credits with a minimum pass grade of 60 %. The Master's course curriculum is presented in Table 1.

Table 1. The Master's Course Curriculum

Code*	Subjects	Credit	Term**			
			Ⅰ (A)	Ⅱ (S)	Ⅲ (A)	Ⅳ (S)
C01	Master's Thesis Research Ⅰ	6	6			
C02	Master's Thesis Research Ⅱ	6			6	
C03	Seminar in Specified Field Ⅰ	2	2			
C04	Seminar in Specified Field Ⅱ	2		2		
C05	Seminar in Specified Field Ⅲ	2			2	
	(Subtotal)	(18)				
M01	Fundamentals of Agricultural Sciences	2	2			
M02	Biological Resources: Utilization and Conservation	2	2			
M03	Soil and Water Environment	2	2			
M04	International Rural Development	2	2			
M05	Advanced Technology in Agriculture	2			2	
M06	Food Science and Food Systems	2			2	
M07	Special Lecture on International Development Ⅰ	1			1	
M08	Special Lecture on International Development Ⅱ	1			1	
	(Subtotal)	(10)				
S01	Applied Genetics and Pest Management	2		2		
S02	Plant Resources	2		2		

S03	Bioscience and Biotechnology	2		2		
S04	Animal and Marine Bioresource Science	2		2		
S05	Agricultural and Resource Economics	2		2		
S06	Bioproduction and Environmental Science	2		2		
S07	Forest and Forest Production Science	2		2		
S08	Genetic Resource Technology	2		2		
	(Subtotal)	(2)				
	Total	30				

C: compulsory subjects = 5 subjects (18 credit units); M: module subjects = 5 subjects (10 credit units) selected from a total of 8; S: specialized subjects = compulsory and particular to each department (2 credit units).
** A = Autumn term; S = Spring term

An outline of the Master's course subjects is given in Table2. Compulsory subjects consist of the thesis (12 credits) and laboratory seminars (6 credits); module subjects of 5 subjects from a total of at least 8 (10 credits); and specialized subjects of one specific subject (2 credits) given by the department to which the student belongs.

Table 2. Preponderant features of the Master's course subjects

	Aim	Lecture methods	Choice	Professors	Required
Compulsory subjects	Research practice	Conventional form	5 subjects	Laboratory Prof.	5 (18 credits)
Module subjects	Improvement of basic academic abilities focusing on agricultural administration and rural development	Block module	8 subjects	Special team	5 (10 credits)
	Cross-cutting or interdisciplinary research				
Specialized	Improvement of expertise	Block module	8 subjects	Your	1 (2 credits)
subjects					Depts.

Table 3. An Outline of the Module Subjects

Code	Subject	Specification	Relevant Departments
M01	Fundamentals of Agricultural Sciences	Fundamentals of Agriculture and rural development (Biostatistics, etc.)	All
M02	Biological Resources: Utilization and Conservation	Fundamental sciences necessary for maintaining biodiversity and sustainable utilization of biological resources	Applied Genetics and Pest Management, Plant Resources, Animal and Marine Bioresource Science, Forest and Forest Products Science, etc.

M03	Soil and Water Environments in Agriculture	Irrigation, drainage, reclamation engineering, and the control of water resources	Plant Resources, Agricultural and Resource Economics, Bioproduction Environmental Science, Forest and Forest Products Science, etc.
M04	International Rural Development	Fundamentals and practical research on international rural development	Plant Resources, Agricultural and Resource Economics, Bioproduction Environmental Science, Forest and Forest Products Science, etc.
M05	Advanced Technology in Agriculture	Agricultural life sciences and biotechnology	Applied Genetics and Pest Management, Bioscience and Biotechnology, Animal and Marine Bioresource Science, Genetic Resources Technology, etc.
M06	Food Safety and Security	Science, technology and economics related to food safety and security	Bioscience and Biotechnology, Agricultural and Resource Economics, Bioproduction Environmental Science, etc.
M07	Special Lecture on International Development I	Special lecture (Technical communication, etc.)	Adjunct professors
M08	Special Lecture on International Development II	Special lecture (Wide-ranging issues related to international development strategies, etc.)	Adjunct professors

Lectures are given in a **block module format**. Each semester comprises three blocks, each of which includes 1 to 2 module subjects. A brief outline of the various module subjects is provided in Table 3.

The topic of the thesis research is specified after discussion with your supervisor. Students **must submit their master thesis in English** to the appropriate examination board in the department consisting the teaching staff. Students are required to give an **oral presentation of the thesis during the spring semester of the second year. A committee will evaluate overall performance based on a report by the department committee**. Satisfactory performance will lead to an award of the Master of Science from Kyushu University.

10. Acknowledgement

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Editted by **the Special Committee for JDS program**
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