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Top left : Upland rice planting activity using family labor (Feuang District, Vientiane Province)
Top right : Salted and fermented freshwater fish paste being sold at a market in Vientiane
Bottom left : Manual transplanting of lowland rice (Feuang District, Vientiane Province)
Bottom right : JIRCAS demonstration farm for lowland systems (rice-fish culture, bat guano application, and early transplanting)

(Photos by H. Ikeura and J. Marui)

In This Issue

JIRCAS
JAPAN INTERNATIONAL RESEARCH CENTER FOR AGRICULTURAL SCIENCES

Towards Maximizing the Outputs of Research and Development

In April 2001, as a result of the Japanese government's administrative reforms calling for the reorganization of government-affiliated research institutes, the Japan International Research Center for Agricultural Sciences (JIRCAS) became an Incorporated Administrative Agency (IAA) under the supervision of the Ministry of Agriculture, Forestry and Fisheries of Japan (MAFF). JIRCAS has been functioning as a semi-autonomous organization under the IAA system, and it has been 15 years since that transition.

In order to maximize the functions of administrative units in policy implementation as stated in the original purpose of the IAA system while demonstrating accountability to the nation, the Japanese government framed a policy plan in April 2014 to reform administrative organizations. To realise this policy plan, the Act on General Rules for Incorporated Administrative Agencies (Act No. 103 of 1999) was amended.

The amended Act divided the existing IAAs into three categories, namely, "Medium-term Target Management Agency," "National Research and Development Agency," and "Administrative Execution Agency." IAAs that were mainly in charge of research and development are reclassified as National Research and Development Agencies. Accordingly, on 1st April 2015, JIRCAS changed its organization name from an IAA to a National Research and Development Agency.

The purpose of the National Research and Development Agency is stipulated in the amended Act as "the maximization of the outputs of research and development to promote sound development of the national economy and the public interest through progress in the level of science and technology in Japan." In short, "maximization of the outputs of research and development" has become the principal objective of a National Research and Development Agency, in comparison to "efficient and effective implementation of administrative functions," which was the major target of an IAA.

This fiscal year (April 2015-March 2016) is the last year of JIRCAS's five-year, Third Medium-term Plan. The plan, based on the Basic Plan for Food, Agriculture and Rural Areas (decided by the Agriculture, Forestry and Fisheries Research Council on 31st March 2000), enabled JIRCAS to identify the following programs, namely, "Environment and Natural Resource Management," "Stable Food Production," and "Rural Livelihood," as important research areas. These programs have subsequently produced many useful research outputs.

Currently, JIRCAS is drawing up draft research programs for the next mid-long term plan which starts from 1st April 2016. The following items are stipulated as international activities under the new Basic Plan for Food, Agriculture and Rural Areas (decided by the Cabinet Council on 31st March 2015): 1. Acceleration of the building of food value chains, through cooperation between government sector and public sector, as a new system to support developing regions to contribute to global food security and economic growth of the developing regions; 2. Implementation of technical and financial cooperation and food aid concerning agricultural production and food safety against developing regions to cope with global issues such as hunger and poverty, climate change, and trans-border infectious diseases; and 3. Implementation of concrete measures for improved global nutrition worldwide particularly in Africa.

In addition, the following research and development themes are stipulated under the new Basic Plan for Agriculture, Forestry and Fisheries Research (decided by the Agriculture, Forestry and Fisheries Research Council on 31st March 2015): 1. Promotion of increased food production for developing regions under the impending concerns of global food demand and supply due to higher global population and economic growth as well as improved incomes in emergent countries, and 2. Accomplishment of active international contribution through international collaborative researches to cope with global issues such as climate change.

Based on the above-mentioned goals, JIRCAS will promote research and development in line with these new Basic Plans. It will be implemented in collaboration with related organizations to produce useful research outputs that can contribute toward the development of agriculture, forestry, and fisheries in developing regions and Japan.

Hiroshi Komiyama
Director
Research Planning and Coordination Division

Technology Development for the Utilization of Local Resources and Improvement of Agricultural Productivity in Laos

In 2011, JIRCAS launched the Rural Livelihood Improvement Program to carry out "technology development for income and livelihood improvement of the rural population in developing regions." Since then, we have been developing technologies for a recycling-based agricultural production system making full utilization of local resources, as well as technologies for increasing agricultural productivity and enhancing the value of agricultural products.

In Laos, we carried out collaborative research projects with the National Agricultural Forestry Research Institute (NAFRI) and the National University of Laos (NUOL). We proposed intensive and multiple agricultural management technologies based on farmers' economic condition and land use of the target village, and we have been demonstrating these technologies to the villagers.

These research projects are now on its fifth and final year of implementation, thus, on 4 June 2015, JIRCAS held a workshop in Vientiane, Laos, to summarize our research outputs and to clarify the significance of the project results and the remaining subjects in this field.

Mr. Savanh Harnphon, Deputy Director General of Planning and Cooperation Department of the Ministry of Agriculture and Forestry (MAF), presented his keynote speech titled "Overview of agriculture and future direction in Laos." According to the 'Agriculture Development Strategy to 2025 and Vision to 2030' manifesto that he introduced, the government recognized the agricultural sector as the foundation of national economic growth. It acknowledged the need to improve the transport system for better access to markets and to develop advanced technologies for food production and effective land use to achieve its goals. It also cited the transfer of technologies to small scale farmers as essential.

Participating researchers introduced their research outputs and the significance of our newly developed technologies as well as our technology transfer activities at the target village. (In this issue of the newsletter, we likewise introduced our research outputs on relevant topics.)

Mr. Vongvilay Vongkhamsao, Deputy Head of Planning and Cooperation Division, NAFRI, reported on the significance of our project and described the research subjects that remain to be done. In his report, he emphasized the importance of the following: the establishment of a small scale irrigation system to stabilize rice production, the verification of a low input cultivation system, and the development of a forest management system and a sustainable non-timber forest product (NTFP) harvesting program.

Dr. Vangthong Phengvichith, Deputy Director General, NAFRI, presented his topic titled "Strategy focusing on the agricultural research in Laos." He introduced NAFRI's strategies for improving productivity such as breeding and cultivation technologies, sustainable forest and agrobiodiversity management programs, climate change-resilient agriculture production systems, and policy research and communication activities.

Based on the information provided, the future direction of our research projects and the next step in our collaboration in Laos were taken up during the general discussion. We realized the importance of systematization and comprehensive utilization of newly developed technologies in relation to lowland paddy fields, upland farming systems, and forest management. We agreed not only to continue our collaboration on developing sustainable farm households at the target village but also to apply those technologies widely to other mountainous areas in Laos. We also agreed to accelerate the transfer of technologies to the farmers. Scientific validation of developed technologies and deepened research were also emphasized as major agenda in our future collaboration.

In conclusion, this workshop has provided us precious opportunities to exchange ideas and guide the direction of our future collaboration. It has also clarified the role of JIRCAS in supporting rural livelihood improvement in Laos.

Masayoshi Saito
Program Director
Rural Livelihood Improvement Program

Opening ceremony at the workshop. (L-R: Dr. Bounthong Bouahom, Director General of NAFRI, Laos; Mr. Ryotaro Suzuki, Minister of the Embassy of Japan; Dr. Phet Phomphiphak, Vice Minister of the Lao Ministry of Agriculture and Forestry; and Dr. Masa Iwanaga, President of JIRCAS.)

The JIRCAS Indochina Project: Technology Development and Dissemination Strategies

In the semi-mountainous areas of Lao PDR, villagers practice agriculture without the use of chemicals. Nevertheless, they achieve self-sufficiency by getting natural foods and products from their surroundings, benefiting greatly from the wide diversity of their environment and the wisdom of farmers.

The JIRCAS Indochina Project, which involves many researchers from different fields, was implemented in order to understand the relationship between the environment and the villagers' lives. Technologies that would improve the villagers' livelihoods are being developed based on the villagers' present living status and agricultural practices.

During the research process, we often realized some amazing nuggets of wisdom hidden behind their practices. For example, one research clarified the effectiveness of bat guano extracted from nearby caves in reducing aluminum toxicity in acidic soils, regardless of the fact that local farmers have been incorporating it with the soil at seed sowing without actually knowing the mechanism of effectiveness. Analyzing the farmer's wisdom scientifically and making a generalization will take much time and effort; therefore, a shortcut or a less time-consuming method that is acceptable to farmers facing similar problems must be developed.

Collection and analysis of data are not the final goals of this project; the final goal is the development of a technology that actually contributes to improved agricultural production and better lives. However, it is not so easy to establish a new technology that is acceptable to villagers within a short period and based on limited information. To cite an example, we investigated low rice yield in the village, and an irrigation researcher was able to identify transplanting delay as the major reason. He is now trying to improve rice yield by introducing a new rice cultivar with low sensitivity to delayed planting time and by using reservoir water for irrigation.

Although the introduction of new cultivars is being realized in cooperation with research organizations in Lao PDR, more advocacy efforts are required to get the reservoir owners' understanding and promote irrigation systems. The information gathered on the types (species) of non-timber forest products (NTFPs) and their monetary values would be useful in making the people, especially villagers, private company staffs, and government officials, understand the importance of forest conservation. Further research is also necessary to increase the production of NTFPs with high commercial value.

Regarding our dissemination activities, we do not necessarily wait for the technology to be completely developed before disseminating. Instead, we immediately provide the information at various levels to make the villagers and relevant people know the progress of our research.

The villagers are well aware of the Japanese researchers' presence around the village. We have set up a demonstration farm, conducted training sessions (e.g., tree grafting techniques), and held annual explanatory meetings (Photo 1). In addition, we try to get the understanding of regional officers and visitors through posters and photos showing the results of our research and other activities. The posters and photos are on display at the District Agriculture and Forestry Office (DAFO) near the village (Photo 2).

The Indochina Project is a collaborative research activity between JIRCAS, the National Agriculture and Forestry Research Institute (NAFRI), and the National University of Laos (NUOL), with the aim of building the capacity of Lao researchers. Lao researchers also present the results of research during annual meetings; needless to say, they perform an important role in disseminating the developed technologies. Furthermore, we hold separate annual meetings with members of the Japanese Embassy and the JICA Office in Lao PDR, hoping that our activities will promote technical cooperation and assistance programs in Laos.

Kazuyuki Matsuo
Crop, Livestock and Environment Division

Photo 1. Village meeting at the village head's house

Photo 2. Exhibition of the project activities at the District Agriculture and Forestry Office (DAFO)

Challenges in the Effective Use of Farm Ponds: Towards Improving Paddy Rice Cultivation in Semi-mountainous Areas in Laos

Characteristics and problems of paddy rice agriculture in Laos

In Laos, there is a distinct rainy season (May-October) and dry season (November-April). About 90% of annual precipitation (1300-3300 mm) fall during rainy season, which means that rainfall is hardly ever expected during dry season. Irrigation facilities have not been installed on most paddy rice fields, thus water supply to crops depends mainly on rainwater as water source. As a result, paddy rice yield during rainy season is affected by the amount and timing of rainfall, whereas crop cultivation during dry season is impossible due to water shortage.

Effective use of water resources towards increasing the productivity of paddy rice

JIRCAS has been conducting field surveys at a semi-mountainous village in Laos, where installing a large scale irrigation system was found to be difficult. The survey aims to improve paddy rice yield during rainy season and crop cultivation on paddy rice field during dry season through effective use of existing village water resources such as rivers and farm ponds.

Rivers (where available) are often relied upon to provide irrigation water whereas farm ponds, which collect discharge (runoff) from the mountain, are often used ineffectively, providing irrigation water only when it overflows. This research, therefore, examines farm ponds as dependable water supply sources to irrigate crop areas in the absence of rivers. In order to establish an irrigation system for paddy rice during dry season cropping and at the early stages of rainy season when water shortages frequently occur, we assessed the farm ponds based on the amount of stored water and available intake water, background of construction, current ownership, condition of usage, and management.

Using farm ponds for irrigation: Problems and countermeasures

To better understand the farm pond situation in Laos, we first explain the situation in Japan.

a) Irrigation system using farm ponds in the case of Japan

In Japan, farm ponds 1) have intake facilities, 2) are jointly possessed and shared by farmers, and are used equally for irrigation, and 3) are maintained and operated by a farmers' association called the "land improvement district." Irrigation facilities at the farm ponds and canals (up to branch canals) are jointly supervised under certain rules governing the fair use of water, a community approach resulting from experience and knowledge acquired after many years of struggles against water shortages and water conflicts.

b) Utilization of farm ponds in Laos

The following are our observations on the farm ponds that we have surveyed in Laos: 1) There are no intake facilities. Instead, water flows naturally through the intake, which was constructed by digging the dam body 30-100 cm (Photo 1); therefore, reserved water below the intake level cannot flow and be used for irrigation; 2) The farm ponds are private properties or family-owned and are not shared with the farmers. The farm ponds were constructed not for irrigation but for fish cultivation, and it was constructed without prior consultation and approval from co-villagers and other farmers. For this reason, only the farm pond owners can use it and the other farmers are unfairly left out; and 3) Supposedly, water is a common-property resource that should benefit all farmers. However, at present, there are no rules governing the fair use of water resources and there is no system or organization to jointly supervise the maintenance and operation of farm ponds and canals.

In order to use the farm ponds for irrigation, the following issues must be resolved: For the improvement of intake facilities, the intake gate must be installed at the position of the current intake to reduce wasteful discharge as much as possible and to control discharge for irrigation during water shortage periods. Then, as a new intake method, we considered the siphon system, which is easy for farmers to operate and is relatively inexpensive compared with other methods. Actual testing of the siphon system by the farmers confirmed that it can easily conduct stored water from the farm ponds (Photo 2).

To operate the irrigation system as planned, a set of rules or guidelines for using water resources and irrigation facilities is needed, and these rules must be agreed to by the farmers and the farm pond owners. The following steps will be taken to formulate these rules: First, we will show the villagers the basic information needed for making irrigation plans such as usable water resources for irrigation and available amount of intake water taking fish cultivation into consideration. Then, we will go into the details of irrigation management such as the operation and maintenance of farm ponds, canals, and siphon tubes. This new irrigation system should therefore enable dry season cropping and increase rice production. Accordingly, a plan that would allow all farmers to benefit fairly from this system is being considered.

Toshihiko Anzai
Rural Development Division

Photo 1. Current intake at a farm pond. (A net keeps the fish from escaping.)

Photo 2. Village farmers siphoning water from the farm pond

Upland Rice Production under Slash-and-Burn Agriculture in Laos: Description and Challenges

Role of upland rice

Laos is a major rice-consuming country on a per capita basis. Annual consumption of milled rice is approximately 170 kg per capita or three times that of Japan's. Rice, therefore, is the most important crop and a key contributor for achieving food security in Laos. Due to the topographical characteristics of the upland, rice is grown on slopes and usually cultivated using slash-and-burn (SaB) agricultural methods especially in the mountainous areas of northern and central Laos. For a long time, people have managed sustainable SaB cropping systems following long fallow periods. However, forest conservation policies and a shift to a market economy have drastically influenced upland rice production in Laos. Here, we describe the current situation and challenges of SaB upland rice cultivation by introducing the results obtained from our field survey at the JIRCAS project site in Nameuang Village. It must be noted, though, that the impacts of SaB practices differ among villages and regions.

Upland rice production in Nameuang Village

Nameuang Village, located 4 hours away by car from Vientiane Capital, is composed of 140 households, of which 88 conduct upland rice cultivation using the SaB method. The average rice production per household was 5.2 t in 2013 (1.5 t for domestic consumption and the remaining amount for selling), suggesting that upland rice production is a major cash income-generating activity. To produce a large amount of upland rice, farmers extended the field size in a remote, highly fertile, forest conservation area. From GPS surveys, the average upland rice cropping area was estimated to be 2.3 ha per household, far larger than that of Luang Prabang Province (usually less than 1 ha/hh), where illegal SaB agriculture has been strictly restricted. Large-area cultivation was achieved by applying herbicide and outsourcing specific tasks (adopted by 50% and 70% of upland rice producers, respectively). Despite the high costs, these labor-saving practices were adopted by many farmers simply because the benefits overwhelmed the costs.

We also estimated the labor productivity of two farmer groups: the labor-saving group, which cultivated a large field in a remote area; and the cost-saving group, which cultivated a small field in an area nearby. Estimates showed that the groups produced 32 kg and 12 kg of upland rice per man-day, respectively. This result indicated that, at the household level, farmers in Nameuang chose rationally, preferring the labor-saving option by working over a wider area. However, this farm household-level decision is not appropriate at the village level. Assuming that upland rice production followed a 1-year cropping and 4-year fallow length rotation system, cultivating a 2.3 ha field would require 11.5 ha in total at household level and 1100 ha at village level. Moreover, high dependency on upland rice production systems for cash income generation, together with its labor-saving strategies, would trigger deforestation and forest degradation.

Further challenges

A key factor for developing sustainable upland rice production systems is to utilize land resources more effectively by land use intensification. Further challenges include the following: First, land use reform through cultivation of upland rice for domestic consumption and adoption of other non-rotational activities such as fruit production, etc. for cash income; second, utilization of fallow periods for livestock grazing to generate cash income; and third, improvement of yield level by introducing crop genotypes and agronomic techniques appropriate for diverse environments. In addition, rice has been noted to have a large genotypic diversity in Laos. Genotypic resources that have so far remained unutilized could be very useful not only for Laos but also for developed countries such as Japan.

Hidetoshi Asai
Crop, Livestock and Environment Division

Photos: Extending field areas in slash-and-burn upland cropping systems (left) and applying herbicide in an upland field (right)

Raising Cattle in Lao PDR: Current Status and Future Trends

A notable increase in cattle numbers (169200 cows in 2012, according to the Teikoku-Shoin homepage) has been noted in Lao PDR, bringing economic benefits to the country because of the recently surging prices driven by increased domestic beef consumption and exports to neighboring countries such as China and Vietnam.

The maximum weight of Lao cattle is 350 kg for an adult bull, which is typically smaller than those from Japan, North America, and Europe. Many of the cattle graze freely and eat wild weed, post-harvest rice field weed, or forest grass. Therefore, artificial breeding techniques, including planned breeding and artificial insemination, cannot be done. Moreover, chronic feed deficiency occurs throughout the year, taking the bulls 5 to 7 years to reach the desired market weight and resulting to low cattle productivity. To improve this situation, chronic feed deficiency must be overcome. Overcoming feed deficiency is also expected to contribute toward solving breeding and reproduction problems.

The JIRCAS project, titled "Development of rural areas in Indochina," includes experiments and investigations on the following: the breeding of new grass varieties for cattle feed, the role of lactic bacteria for silage making, and the use of fodder and food processing by-products in rural areas for feeding cattle.

A feeding trial of beer lees (from Beer Lao, the most famous beer brand in Lao PDR) was conducted in a cattle barn. The experiment was able to clarify that beer lees feeding improves body weight gain in cattle. This result should hasten the progress of cattle and beef production in Lao PDR. Cattle manure, meanwhile, can be used as fertilizer to improve the growth of plants and crops, including dry land rice. Furthermore, the use of various by-products is expected to contribute to the reduction of environmental pollution.

Sada Ando
Crop, Livestock and Environment Division

Photo 1. Open-range cattle grazing on wild weeds in Lao PDR. The herd consists of 5 to 15 head of cattle.

Photo 2. Cattle feeding on Guinea grass. Beer lees are also fed to the cows.

Fruit Tree Research and Activities in Lao PDR

Importance of fruit production in Lao PDR

Tropical fruits from Southeast Asian countries comprise about 18% of worldwide production (2012, FAOSTAT). Although we can find many kinds of fruits when we visit the markets in Southeast Asia, most of those sold in Lao PDR are actually imported from neighboring countries such as Thailand.

Fruit production in Lao PDR is very low; therefore, increasing fruit production is considered one of the most important objectives for the country. In the mountainous rural areas, many people farm on sloping lands. Generally, sloping lands are not suitable for paddy field or field crops, but fruit trees can be planted on such lands. Thus, we are examining fruit tree cultivation as an option not only for increasing domestic fruit production but also for growing cash crops for farmers living in mountainous rural areas.

JIRCAS activities in rural areas

JIRCAS introduced fruit tree cultivation in rural areas as a collaborative research activity with the Horticultural Research Center (HRC) of the National Agriculture and Forestry Research Institute (NAFRI). At Nameuang Village, Lao PDR, we planted six kinds of fruit trees (mango, lime, rambutan, litchi, sapodilla, and Indian jujube) that are favorable for growth and production.

We monitored the fruit orchards to identify the difficulties encountered when people started fruit tree cultivation and to understand the trees' growth patterns. We have noted that the growth of rambutan and litchi trees tends to be delayed compared with other trees because Nameuang Village does not have enough water during dry season. However, other fruit trees, such as mangoes, are relatively strong and have been growing well. This is the 4th year since we planted the fruit trees, and some of them have started fruiting. As a result, people in the village are becoming more interested in fruit tree cultivation.

As part of our efforts for people to understand more about fruit tree cultivation, we arranged lectures at the village in collaboration with HRC. One of the lecture topics was pruning, which is an important technique for fruit tree management. Pruning fruit trees and keeping them compact reduce work time for farmers. Pruning also supports nutritional balance leading to stable fruit production. At the HRC experimental field, we showed that moderate pruning of a mature tree lowered tree height without reducing its yield. However, the pruning treatment took 3-4 years for the mature trees, thus it is important to control the tree height at the early stages. We observed that people in Nameuang Village had no prior experience cutting tree branches. They hesitated when asked to do so during the lecture demo, but they can now confidently prune the trees by themselves.

We also arranged another lecture, this time about nursery preparation, at HRC for the staffs and trainees. Preparing and providing good growing conditions for nursery stock and trees are important because the quality of the nursery affects initial growth for several years (after transplanting). Our lecture focused on practice so that the staffs and trainees could learn skills and apply this knowledge well. Recently, HRC staff members arranged a lecture in Nameuang Village on grafting techniques by themselves.

These recent developments have been encouraging, and we hope that this collaborative research with HRC produces effective options for improving agriculture in mountainous rural areas like Nameuang Village. However, fruit production at the village has just started. Based on these observations and feedback, more research activities are required to further develop fruit production in Lao PDR.

Naoko Kozai
Tropical Agriculture Research Front

Photo 1. Fruits sold at the local market. They are imported from neighboring countries except for local plums (p) and mangoes (m).

Photo 2. A Horticultural Research Center staff teaches grafting techniques to Nameuang Village farmers.

Component and Microbial Analyses for Quality Improvement of Fermented Freshwater Fish Products

Freshwater fish from rivers, reservoirs, ponds, and paddy fields is an important food resource in Laos, a developing country located in an inland part of Indochina. It is therefore noteworthy that fish-fermentation techniques have been developed in the area, which enabled perishable food, particularly the village's seasonally available freshwater fish, to be furnished with value-added features such as long shelf life and palatability. Accordingly, the fermented fish products, with its characteristic regional taste, are being sold as local specialties, providing an income source and improving rural livelihoods. We have been collaborating with local researchers and producers to investigate the functions of microorganisms and the key factors to enhancing the value of traditional fermented foods.

The salt-fermented freshwater fish named "*pa-daek*" is the representative fermented freshwater fish product of Laos (Photo). A similar product called "*pla-ra*" is popular in Thailand. For the preparation, raw fish is mixed with salt and rice bran or roasted rice powder and then fermented at tropical temperatures for at least six months. It is widely used as a shelf-stable, protein-rich cooking ingredient and almighty seasoning rich in *umami* substances, which impart the delicious taste.

Although commercial products are now available in the market, *pa-daek* production has remained a cottage industry particularly in rural areas. Producers and consumers often say that the taste of the products varies from place to place. To clarify the taste components and the nature of fermentation, regional characteristics such as pH and salt concentration were examined in 10 *pla-ra/pa-daek* products collected from central, northern, and northeastern Thailand, and from Vientiane in Laos (Figure). Products with lower salt concentrations were more acidic and contained higher amounts of lactic acid.

A comprehensive analysis of the bacterial genes in DNA extracted from each sample showed that salt-tolerant *Tetragenococcus* species were common in products with salt concentrations higher than 10% while *Lactobacillus* species were common in those with less than 10%. In short, salt concentration is the key factor that determines the representative lactic acid bacteria and lactic acid production in *pa-daek* fermentation. Simple measurement of pH and salt concentration can therefore be used in monitoring *pa-daek* production to ensure product quality and meet different consumer preferences in various regions.

It is generally believed that longer fermentation makes the products taste better. This notion was clarified when the amount of glutamic acid (the source of delicious taste) in the products was found to increase in a fermentation-time dependent manner over a 4 to 6-month period by the digestion of fish protein, although the concentration varied (0.2%-0.8%) between the products. The results of the study were graphically illustrated so that the producers become more conscious of the importance of long-term fermentation. It would also be helpful if consumers are informed that *pa-daek* is rich in the source of delicious taste made naturally by fermentation, according to a producer. Recently, there has been considerable public interest in scientific facts of traditional fermented foods, thus collaborative research should respond accordingly to this trend so that high-value traditional fermented foods can be produced and promoted further through value addition.

Junichiro Marui
Biological Resources and Post-harvest Division

Photo: Homemade *pa-daek* in Laos

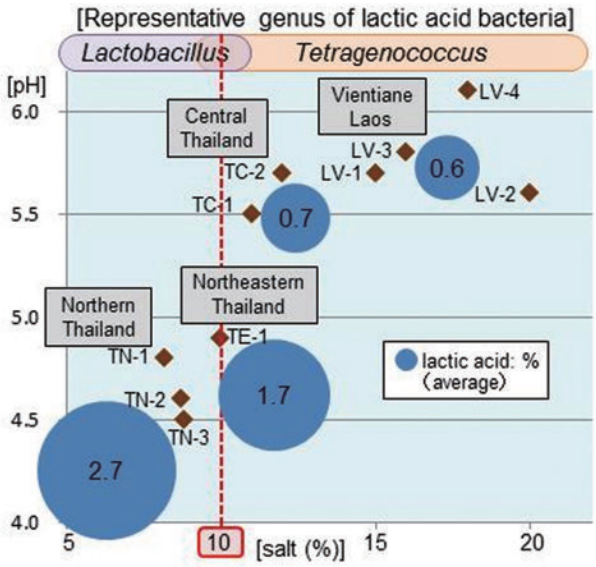

Figure: Correlation and regionality of the taste components and representative genus of lactic acid bacteria

Utilization of Wild Animals and Plants and its Importance in Lao PDR

Issues affecting the use of wild animals and plants

Rural people in developing areas worldwide depend heavily on wild animals and plants for subsistence and/or income. It has also been said that some 80 percent of the population in the developing world use wild animals and plants for health and nutritional needs. For this reason, JIRCAS conducts research on the significance of wild animals and plants to the lives and livelihoods of rural people in Lao PDR.

At the JIRCAS project site in Lao PDR, rural people engage not only in rice farming (their main activity) but also in catching wild animals and collecting wild plants for food. However, there are growing concerns about the decrease in wild animals and plants because of rapid human population growth, shortened fallow periods due to excessive shifting cultivation practices, increased market demand for wild food resources, and land use changes due to the expansion of cash crop cultivation and infrastructure development. Consequently, sustainable utilization of wild animals and plants has become a crucial issue.

Importance of edible wild animals and plants in a mountainous village of rural Lao PDR

Unlike most Japanese, who buy most of their cooking ingredients from supermarkets, the people at the research village procure their ingredients from various natural sources. Fish and shellfish (catfish, crab, snail, shrimp), insects (locust, cricket), mammals (rat, squirrel, weasel), reptiles (snake, lizard), amphibians (frog), birds, and other wild animals, as well as leaf and stem vegetables (fern, dwarf four leaf clover, morning glory), buds (bamboo shoot, rattan), mushrooms, flower vegetables (banana flower), algae and other wild plants, are caught and collected from paddy fields, streams, ponds, hilly lands (mainly slash-and-burn agriculture fields), and forests.

A survey was conducted to determine the villagers' dependency on wild animals and plants for their subsistence. Eight households were selected for the survey, and they were asked to record the ingredients they used and how these ingredients were sourced or procured (captured, collected, bought, gifted, cultivated or raised/bred) and to take photos of ingredients and each meal prepared over two 1-month periods, one during wet season and another during dry season.

Results showed that 906 ingredients in wet season were confirmed to be used for meals, of which 191 and 217 were derived from wild animals and wild plants, respectively. On the other hand, 907 ingredients were confirmed in the dry season, of which 218 and 167 were derived from wild animals and wild plants, respectively. This shows that each household uses one or two wild animals and/or plants everyday on average. Wild animals and plants serve as major sources of ingredients in the diets/eating habits of local people. Lower-income households, in particular, depended on wild animals for 75% of the animal foodstuff component in their diet in the wet season, and on wild plants for 42% of the plant foodstuff component in the dry season. From the viewpoints of household economy and nutrition, this implies that the decrease in wild animals and plants would have serious negative impacts on the daily living of lower-income households.

According to local people's accounts, it has become harder to get wild animals and plants than before. Therefore, the promotion of subsistence farming methods such as vegetable cultivation, livestock raising, and aqua-farming is necessary to meet the demand for food while ensuring the sustainable utilization of wild animal and plant resources.

Katsumi Hasada
Rural Development Division


Fish


Bamboo shoots


Frog dish


Rats


Dwarf four leaf clovers


Bamboo shoot dish


Bamboo worms


Banana flower

Photo 1. Wild animals and plants caught/collected in the village


Algae dish

Photo 2. Dishes using wild animals and plants

JIRCAS TODAY

Letter of Acknowledgement from the Chinese Academy of Agricultural Sciences

The Department of International Cooperation, Chinese Academy of Agricultural Sciences (CAAS), presented JIRCAS with a letter of acknowledgement for "having maintained a longstanding cooperative relationship that has achieved fruitful results in research and cultivated a great number of talented professionals." JIRCAS and CAAS have been conducting various joint research projects since 1997, and are currently working on the ongoing project, titled "Design and Evaluation of Recycling-Based Agricultural Production System in Upland Farming Areas of Northern China," which has "correspondingly contributed to sustainable agriculture development."


ACKNOWLEDGEMENT

Chinese Academy of Agricultural Sciences (CAAS) and Japan International Research Center for Agricultural Sciences (JIRCAS) have maintained longstanding cooperative relationship, which has achieved fruitful results in research and cultivated a great number of talented professionals.

The ongoing joint project "Design and Evaluation of Recycling-Based Agricultural Production System in Upland Farming Areas of Northern China" correspondingly contributed to the sustainable agriculture development in upland farming areas in terms of both technological and economic analysis. We truly appreciate the cooperative efforts made by JIRCAS and hope that our future cooperation will continue to make contributions to agricultural development of both countries.

Department of International Cooperation
CAAS

Letter of Acknowledgement

Issues concerning agriculture and food in China have a global impact. Stable food production in China is believed to contribute to the stability of Japan's food market, thus technological exchanges and economic studies on the effective use of local resources are being implemented to address this concern.

"Golden Gerege" from the Mongolian State University of Agriculture

On June 30, 2015, JIRCAS Researcher Aritsune Uehara of the Rural Development Division was awarded a "golden gerege" by the Mongolian State University of Agriculture (MSUA) as a symbol of honor and appreciation for his efforts in building the capacity of young researchers through joint research.

The actual golden gerege, issued by the emperor during the era of the Mongol Empire, was a tablet with an inscription delegating authority and signifying special privileges to its bearers. In the same vein, MSUA awarded the symbolic golden gerege to confer the title of "Friendship Ambassador" on Mr. Uehara.


JIRCAS Researcher Aritsune Uehara accepts the award certificate and the "golden gerege" from MSUA Vice President Gombo Gantulga.

Award for Best Oral Presentation at the International Soil Conference (ISC2015)

On August 18, 2015, Director Satoshi Tobita of the Crop, Livestock and Environment Division was awarded first place in the oral presentation category for his lecture, titled "JIRCAS achievements in sustainable land management and soil fertility enhancement in Africa," at the International Soil Conference (ISC2015) in Cha-am, Phetchaburi Province, Thailand. The four-day event, held from August 18 to 21, was organized by the Land Development Department (LDD) of the Thai Ministry of National Development. In the lecture, Dr. Tobita discussed JIRCAS's soil-related research activities, aimed at improving agricultural production and sustainability in sub-Saharan Africa.


ISC 2015
International Soil Conference on
"Sustainable Uses of Soil in Harmony with Food Security"
present this certificate
to
Dr. Satoshi Tobita
"Achievements of JIRCAS Research Projects for Sustainable Land Management and Soil Fertility Enhancement in Africa"
18th – 21st August, 2015
at The Regent Cha Am Beach Resort, Phetchaburi, Thailand
(Dr. Apichart Jongkol)
Director General
Land Development Department


Award certificate and souvenir (soil horizon)

Kinoshita Prize (Journal Award) from the Northeast Agricultural Economics Society

On August 28, 2015, Director Kunihiro Doi of the Research Strategy Office received the Kinoshita Prize (Journal Award) from the Northeast Agricultural Economics Society. The Kinoshita Prize (awarded for the 32nd time this year) was handed out to


Dr. Kunihiro Doi


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Award certificate

JIRCAS TODAY

"academic publications that provide significant contributions to the development of agriculture in northeastern Japan." Society President and Hirosaki University Professor Chousei Shibuya presented the award certificate during a gathering in Niigata.

Dr. Doi, who also delivered a separate report titled "Discussion of the food supply risk in the Tokyo Earthquake" during the event, has been receiving high praise for his research on the government's food procurement logistics system, which became a major issue for the victims of the 2011 Great Eastern Japan Earthquake. The research results have provided important guidance for research involving resilient food systems for the future.

○JIRCAS Visitors

* from Taiwan

On August 28, 2015, three officials from Taiwan's Department of Science and Technology, Council of Agriculture, and the Food and Fertilizer Technology Center for the Asian and Pacific Region (FFTC) visited JIRCAS.

JIRCAS's research on traditional foods of Southeast Asia and biomass-related studies, as well as on agricultural production and cultivation techniques, were presented to the visitors. Conversely, the visitors introduced their activities to JIRCAS officials, thus fostering a better understanding and appreciation of each other's activities and goals.

Slide presentation of JIRCAS project

JIRCAS officials with visitors from Taiwan

*from Thailand

On September 2, 2015, five officials from the Ministry of Agriculture and Cooperatives, Kingdom of Thailand, together with a staff from the Embassy of Thailand in Tokyo, visited JIRCAS.

Joint research related to biomass, food resource use, and new sugarcane varieties that have been registered in Thailand were presented, followed by an exchange of views on the promotion of international agricultural research and the adoption of a management system.

Presentation of current JIRCAS projects in Thailand

JIRCAS President Masa Iwanaga (3rd from right) and Vice President Osamu Koyama (3rd from left) together with visitors from Thailand

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