

Household Resources and Practices Toward Native Rice Sufficiency in Khoune District, Xiengkhouang Province, Lao PDR

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ABSTRACT. A case study was conducted in Na-Ou and Xang villages in Khoune district, Xiengkhouang province, Lao PDR to discuss the households' resources and practices in attaining native rice sufficiency. Data were gathered through a combination of methods that included a survey of 91 households, focus group discussions, key informant interviews, actual field observations, and secondary data analysis. The study villages are largely rural, popular nationwide for their native sticky rice varieties, and regarded as models in native sticky rice production. There are also areas of wetland for rice cultivation that are suited to grow the age-old native sticky rice varieties.

The native rice farmers in these villages are rice self-sufficient because of their household resources and practices. In their households, they possess adequate farming experiences, land parcels, household technology, farm tools, basic farm machinery, organic fertilizers, rice storage system, and positive attitude and unwavering intent to crop their age-old sticky rice varieties. Their household level practices that contribute to their native rice sufficiency are use of technology that is fundamentally traditional and suitable to the place; engaging in husband-wife enterprise; familial and communal rice farming; and seed variety preservation.

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A SWOT analysis of the existing native rice production system reveals a number of strengths as well as weaknesses. However, there are also a lot of opportunities, which the farmers can exploit, to address the weaknesses and the threats confronting native rice production.

Keywords: *native rice sufficiency, household resources, household practices, Lao PDR*

INTRODUCTION

Sticky or waxy rice (*Oryza sativa var. glutinosa*), also known as glutinous rice, is the main staple food of the Lao PDR people as it is more preferred than plain or ordinary rice (Gorsuch, 2006). Consequently, sticky rice production is considerably important in the country.

Xiengkhouang, a province in the northern part of Lao PDR, is a producer of glutinous rice. Being mountainous and having a considerably high elevation of 1,200 meters above the sea surface level [Provincial Agriculture and Forestry Office (PAFO), 2012], the paddies in this province are rainfed and the farmers practice single cropping per year.

The study villages, Na-Ou and Xang, belong to the Khoune district, Xiengkhouang province. Held as model villages in native rice production, rice is sufficient in the study areas at the household and community levels as compared with the provincial production level. At the household level, the average annual rice yield is 5,047 kg/ha, a figure that is twice higher than the provincial average (2,454 kg/ha). At the community level, the two villages' computed average annual rice production of 2,622 kg/ha during the 2012 cropping season is slightly higher than the provincial average.

However, comparing the community and provincial annual rice yields with the national level of 3,084 kg/ha (Lao PDR Ministry of Agriculture and Forestry Agricultural Master Plan

2011-2012) shows that there is rice insufficiency. This national rice yield corresponds to a per capita value of 336 kg, which is 14 kg short of the 2015 target of 350 kg, which is considered the sufficient per capita value to achieve food security (PAFO, 2012). Considering this national target, rice sufficiency is reflected at the household level.

The native rice farmers' household resources and practices were identified to be some of the contributing factors for their attainment of native rice sufficiency. The study therefore aimed to:

1. Describe the household resources for native rice sufficiency;
2. Discuss the household level practices that bring about native rice sufficiency; and
3. Explain the strengths, weaknesses, opportunities, and threats of the native rice production in the study areas.

Conceptual Framework

Figure 1 illustrates the interrelationship of socio-demographic and economic characteristics, household and community level practices on native rice production, native rice sufficiency at the household and community levels, and household and community resources that support native rice production. All the elements play important parts in attaining rice self-sufficiency.

Selected socio-demographic and economic characteristics of the respondents are hypothesized to determine the household and community level practices, attainment of native rice sufficiency, and resources that support native rice production. In like manner, all those three components (i.e., household and community level practices, native rice sufficiency, and resources related to native rice production) are interrelated with each other. Specifically, the household and community level practices determine the household and community resources to be utilized in native rice production and also define the native rice sufficiency at the household and community levels. The native rice sufficiency at the household and community levels determines the farmers' household and community level practices and resources. Correspondingly,

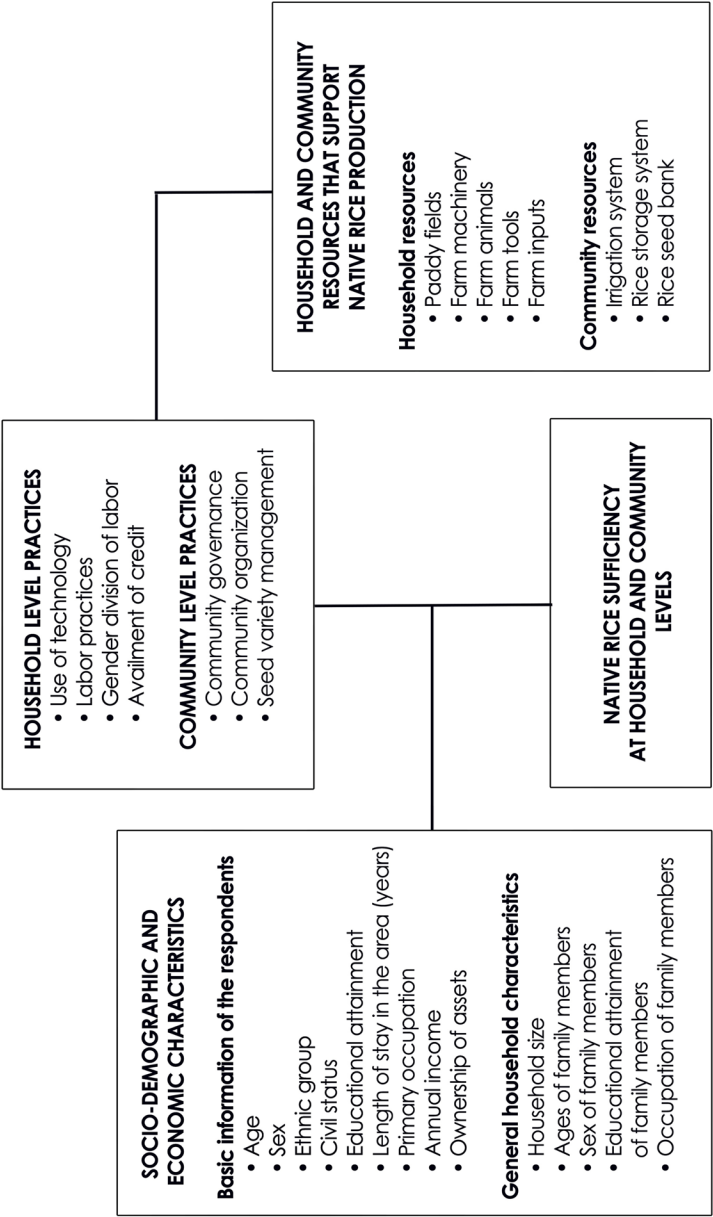


Figure 1. Conceptual framework of the study

the farmers' household and community resources shape and affect native rice sufficiency and practices at the household and community levels. These assumed relationships were analyzed in this study.

METHODOLOGY

The case study was conducted in Na-Ou and Xang villages, Khoune district, Xiengkhouang province, Lao PDR. These villages were chosen as study sites on the bases of their being largely rural, their practice of wetland rice cultivation to grow the age-old native sticky rice varieties, their being popular nationwide for their native sticky rice varieties that have distinct aroma and taste, and their standing as models in native sticky rice production.

From the total of 119 households in the two villages, a sample of 91 household respondents was determined using the formula:

$$n = \frac{N}{1 + Ne^2}$$

where n=the number of respondents, N=total households in the village, and e=desired margin of error set at 5 percent. The sampled respondents were chosen to answer the structured individual survey.

Data were gathered from October to November 2013. The results of the survey were analyzed using descriptive statistics such as frequency, percentage, mean, and range.

Key informant interviews (KIIs) and focus group discussions (FGDs) using guide questions and direct observation were also conducted to validate information and to ensure reliability of results. Direct observation and gathering of first-hand impressions on the biophysical and socioeconomic conditions of the villages were done by the principal researcher after the conduct of the KIIs and the FGDs through a village walk.

The key informants were composed of seven individuals who were aged 29 to 64 years old, which reflected the variability in the ages of the KIs. Five of them were males and two were females. They were model farmers, village heads, Small Chicken Rice Farmers' Organization officers, and technical staff members of Khoune District Agriculture and Forestry Office (DAFO) Crop Sections. They were community members, heads of local community organization, and representatives of the local Agriculture and Forestry Office who were able to provide information on the topics of concern based on their knowledge, skills and experience.

The FGD participants were composed of eight males and three females whose ages ranged from 23 to 60 years old. They were model farmers (those who were successful in native rice production), deputy heads of the study villages, and technical staff of Xieng cluster Agricultural Office, Khoune District Development Office, Xiengkhouang Provincial Development Office, and Provincial Agriculture and Forestry Extension Section.

Secondary data were obtained from local stakeholders involved in rural development, Khoune DAFO, Xiengkhouang PAFO, and libraries. Other reference materials included published and unpublished documents related to the subject matter, such as official reports, articles, seminar papers, and internet materials.

RESULTS AND DISCUSSIONS

The study discussed the Na-Ou and Xang rice farmers' household resources and practices in support to native rice production. Their household resources included paddy fields, farm machinery, farm animals, farm tools, and farm inputs. Their household practices included using technology, labor practices, gender division of labor, and seed preservation. But before these sections, the socio-demographic and economic attributes of the respondents will be described.

Respondents' Socio-Demographic and Economic Characteristics

The respondents were mostly 20-60 years old, male, married, have attained secondary level of education (6-8 years in school), and residents in the study villages for an average of 32 years. They were all Lao Loum by ethnicity. Farming was their primary occupation and livestock-raising was their secondary occupation. Most of the respondents had 1-5 household members, 1-2 children, and 1-2 family members who helped in native rice farming (Appendix 1).

The average household annual income from rice production was 5,858,947 Kip (US\$732) that ranged from 600,000 Kip (US\$75) to 4,000,000 Kip (US\$5,000). Most of them derived their annual income from livestock production at an average of 4,925,942 Kip (US\$616) and ranged from 400,000 Kip (US\$50) to 27,000,000 Kip (US\$3,357). Their non-farm income was very minimal.

The average total income of the households annually was 35,195,195 Kip (US\$4,373), which ranged from 200,000 Kip (US\$25) to 176,000,000 Kip (US\$21,869). This came from farm and non-farm sources. When compared with the poverty threshold of the country based on the 2013 data of the World Bank Group, their economic status was below the poverty line.

Most (57%) of the respondents had one parcel of agricultural land, which usually measures 1 ha. All of them owned the house where they reside. They also possessed home appliances, namely: television sets, satellite discs, radios/cassette recorders, refrigerators, mobile phones, and vehicles (mostly motorcycles).

Household Resources in Support to Native Rice Production

Paddy fields. While the Food and Agriculture Organization (2010) reported that the average size of farm parcels in

Xiengkhouang province is 0.5 ha, the present study found that the farmers in the area had an average of 1.27 ha of paddy fields ranging from less than 1 ha to more than 3 ha. More than half (53%) of them had less than 1 ha, while more than one-third (36%) possessed 1-2 ha of paddy fields. However, the study did not look into the different implications of land size on household practices. In terms of land tenure status, majority (90%) of them owned the land parcels they were using for native rice farming, and only a few (10%) utilized the land parcels either as tenants or as renters.

They were experienced native rice growers as majority (88%) of them have been farming native rice for more than 30 years now. They had an average farming experience of 31 years that ranged from 4 to 67 years.

They were farming on sandy loam soil that was aptly described by agriculturists in the province as moderately fertile; hence, the farmers used fertilizers. The key informants and participants during the FGD affirmed that most of the farmers used organic fertilizers although a few farmers still applied chemical fertilizers.

The size of the respondents' paddy fields, with an average of 1.27 ha, was relatively small to yield high production of native rice. Even so, the maximum volume of production could be attained by capitalizing on the farmers' long experience in farming.

Farm machinery. The farmer-respondents owned farm machinery. All of them used tractors, but not all of them owned these units. All of the respondents used two-wheel tractors during land preparation. Their paddy fields were normally located in hilly areas where it would be very difficult to transport and use four-wheel tractors because most of their terraced paddies were located in sloping land.

Aside from two-wheel tractors, a few of the farmers owned a thresher. Farmers who did not own these kinds of machinery resorted to borrowing from relatives, renting, or doing

the corresponding tasks manually. It is along this aspect of rice production that both the government and the NGOs can provide support to the farmers through granting of financial support or loans for farm machinery. Availability of necessary machinery can minimize production cost and increase volume of production and income.

Farm tools. All of the respondents owned farm tools, specifically hoes, shovels, sickles, spades, bolo knives, knapsack sprayers, and winnowing baskets.

For rice harvesting, the respondents used sickle, a half moon-shaped hand-held knife used for manual cutting of rice stalks just below the panicle. The native rice farmers' practice of manual harvesting is justified in the International Rice Research Institute (2009) article stating that this system best suits lodged crop conditions. Findings in the present study showed that all of the respondents owned sickles. Its importance became evident as the survey showed that majority (75%) of the farmers had five or more sickles.

Majority (87%) of them also owned one to two spades. They used this in composting and digging paddy canals and gardens. Machete or bolo knife, a multi-purpose tool for cutting, was also an essential tool of the farmers. All of them owned two units but some had as many as 25 pieces of bolos. More than half (61%) of them had five and more bolo knives.

Unlike sickle and bolo knives, a knapsack sprayer was not considered as a necessity for most (98%) of the respondents who did not have this kind of farm tool. Only two farmers (2%) had a knapsack sprayer because 39 percent of them practiced organic farming. They manufactured their own fertilizer from the manure of their livestock. Many households had a composting facility made of a roofed and cemented box that normally measures 2 by 3 m. However, some (17%) of them preferred inorganic fertilizers because they are readily available.

Premature grains in threshed grains needed to be separated from massy grains through winnowing. In the past, the native rice farmers used winnowing baskets, a fan-shaped tool, to wind-winnow the threshed grains. The farmers, usually women, stood on a mat, held the winnowing basket filled with threshed grains, raised that basket overhead, and slowly dropped the grains to the mat such that chaffs would be blown away and good grains would drop to the mat just by their feet. However, at present, the farmers no longer practice manual winnowing. They now use threshing machines that also winnow premature grains, stalks, and leaves. The winnowing baskets of the respondents were used to soak rice to be grown into seedlings in the nursery or seedbeds. In their kitchens, the winnowing basket was a useful container as well when preparing vegetables and other ingredients. Majority (89%) of them had one winnowing basket.

Farm animals. Livestock served as source of additional income and food, provided manure for fertilizer, and aided in transportation and mobility. The farmers owned livestock such as cow, buffalo, pig, and horse. Majority (92%) of them owned cows, pigs, and poultry only. They did not own buffaloes and horses because they used tractors in ploughing and hauling the fields. Neither did they own goats as these animals sometimes destroy the plants of their neighbors, which caused conflicts.

None of the respondents owned grazing lands as these were natural areas and were considered communal. Commonly, farmers grazed their farm animals in grasslands, while others practiced the cut and carry system of feeding their farm animals. The KII and FGD participants provided the same information but supplemented that farmers grazed cattle only in communal grasslands because they had pigsty for their pigs and coops for their poultry.

Aside from poultry, some farmers also owned fishponds. Ownership of fishpond in the study sites reflected the owner's proximity to a stream because of the availability of water. Moreover, rain water was just enough to water their paddies. Fishponds in these villages were usually small-sized, which were just enough

to raise fish for family consumption. This upland rice fishing was practiced during rainy season only when the water level in streams was relatively high. The pond dried up during the dry season and there was no irrigation system available that would provide and sustain water into it just like in lowland paddies. After the farmers had finished planting rice and while they were tending (weeding and applying fertilizers) the rice field, they would start preparing their pond by digging and raising its wall to catch water. Afterwards, they would spawn the pond. Fingerlings were either bought or solicited from owners of adjoining fishponds. They spawned and grew common carp, bighead carp, catfish, and tilapia in rice paddies. Harvest period of upland rice fish was from December to March.

Among the respondents, only 38 percent owned a fishpond. In the 2006 Comprehensive Food Security and Vulnerability Analysis (CFSVA) Community Survey conducted by the World Food Program (WFP) Lao PDR, it was reported that among the food insecure households were the 72 percent farmers who did not fish nor hunt. This underscored the significant contribution of fishing or having a fish pond to the economic status of the farmers.

Farm inputs. The UN's FAO reported in 1998 that sticky rice production in Lao PDR was predominant, and it comprised 80 percent of cultivated land in the country. The Encyclopedia of Nations stated that in 2013, about 93 percent of rice production areas is devoted to sticky rice production. The farmers in the study areas were found to be predominantly producers of native rice or sticky rice. According to the respondents, they took pride in their produce that had a distinct aroma and taste. All of them used their own native rice seeds for rice production.

During the FGD, the participants recounted that in 2013, they were provided with hybrid rice seeds by the Provincial Agriculture and Forestry Office (PAFO) to grow in their area. They tried growing these seeds in some portions of their paddies alongside the native rice varieties in other parts. The result was unexpected as the hybrid seeds took a longer period to grow and did not yield much. The yield was lower than that of the native rice

variety. The FGD participants wondered why because the same hybrid rice variety was planted in Vientiane, and it yielded the expected volume and was grown in only three months as projected. Most of the FGD participants, being experts and experienced in rice farming, attributed the negative results of planting hybrid variety in Xiengkhouang to the province's elevation and insufficient water as it is an upland area and had no irrigation system.

During the 2012 native rice production season in the study sites, the respondents used varying quantities of native rice seeds because they had diverse sizes of paddy fields. Native seeds ranging from 10 to 300 kg with a mean of 90 kg were used during this season.

Bestari, Shrestha, and Mongcopa (2006) stated that aside from being the staple food of the people, rice was significant to their cultural and religious practices. They had traditions and rituals related to rice production. An example they presented was the Khamu farmers in Luang Prabang province who considered black sticky rice as the 'father' variety. They planted this variety "with special purpose and in small quantities near the hut, in memory of the dead parents and also at the edge of the rice field to indicate that the parents are still alive."

The villages of Na-Ou and Xang, being part of Xiengkhouang province, are known for organic small chicken rice. Findings show that most (40%) of them used organic fertilizers or did not fertilize at all. Only a few (18%) of them chose to use chemical fertilizer and others (16%) opted for the combination of organic and chemical fertilizers.

Rice straw was used as fodder for cows and buffaloes and was an unintentional component in composting. When the cows were fed with rice stalks, some leftovers fell on the ground. As the cows stepped on them, they were mixed with the dung and eventually served as compost material. In the study sites, majority (87%) of the farmers used rice straw as compost. Ordinarily, farmers laid the stalks directly on the rice field to dry before using these as fodder for their animals, while others mixed these with

manure and other materials to be used as organic fertilizer. Only a few (15%) did not make the most of the rice straws.

Rice storage system. Rice storage was individually owned. Almost all (99%) of the respondents had rice storages in their own backyards. In these villages, just like in the entire country, the rice storage was a small wooden structure that measured 2 m by 3 m or wider, depending on the household's volume of harvest. Its walls and floor were made of wood, and the roof was made of galvanized iron. The structure resembled a box-type hut, except that their rice storage appeared to be a little bit sturdier and had only one opening. Its floor was elevated about 1-2 m from the ground to protect the grains from the moisture of the soil, from possible flood, or from insects. The storage was built just beside the owner's residential house and had only one opening (i.e., a window that looked like a door) because it was single-framed and had a width that was almost equivalent with that of a door. Windows had different styles, but the dominant style was a window made of wooden panels/boards, which the farmers removed one at a time when getting or storing grains inside.

Household Level Practices for Native Rice Sufficiency

Use of technology. At the household level, the farmers used hand tools, two-wheel tractors, threshers, traditional seed selection technique, organic fertilizers, and organic insecticides that they considered effective and helpful. Each stage of native rice production had corresponding tools and/or machinery.

In seed selection, all of them used sickle and a winnowing basket. The winnowing basket was likewise used as they prepared for the seeds to be soaked. Hoe and shovel were used in building dikes or bunds and in watering the paddies. In building fences, they used bolo knives and hoes. When harvesting, all of them used sickles. They did not use any tool but used their bare hands when transporting manure to the field, sowing, uprooting seedlings, and weeding. Moreover, the farmers mentioned no hand tools

in plowing, harrowing, threshing, and transporting because they used simple farm machinery such as two-wheel tractors and threshers. According to the survey respondents and the KII and FGD participants, the native rice farmers have found, in their many years of farming, the effectiveness of combining these farm tools and simple machinery. Though the kinds of tools that could be used by the farmers were determined by their geographical location, work was made easier and faster because of these tools and equipment. According to them, using the two-wheel tractor and the thresher was enough and very helpful.

The farmers in these villages, like most of the farmers in Lao PDR, used a traditional technique of seed selection. This was described during the KII and FGD. According to the participants, the farmers would put water in a bowl and then mix it with salt. They would test the adequacy of salt by dropping an egg into the solution. If the egg sunk, they needed to add salt; if the egg floated, salt was enough. Then seeds were soaked in the salty solution. Seeds that floated were not used and were thrown away, while seeds that sank were used as seeds. This technique was further facilitated by the PAFO under the System of Rice Intensification (SRI) program.

The farmers indeed used organic fertilizers. It was a traditional practice handed over from generation to generation. However, this practice intensified and improved through the facilitation of the PAFO in the SRI program. Through this program, the farmers were given formal and informal trainings on making compost.

The farmers did not use chemical insecticides but used the traditional organic insecticide handed to them by their forefathers. The basic ingredients are 1 mg tobacco, 1 L Lao traditional rice wine (distilled spirit from rice wine and locally called *Lhao Lao*), and 1 L water. These are mixed and boiled until half is left. When cooled, they mix 1 spoon of this solution to 5 liters of water and spray this directly to the rice plants that are affected by aphids or other kinds of insects.

Labor practices. Worner (1997, as cited in Appa Rao, Bounphanousay, Shiller, & Jackson, 2000), reported that in Lao PDR, family labor remains to be a distinct input in rice cultivation. In the stages of native rice production, the family was still the primary source of labor for majority of the respondents, followed by exchange labor with other farmers in the community, and hiring of laborers.

The family shared labor in all stages of native rice production including land preparation, transplanting, harvesting, and hauling. Exchange labor with other farmers in the community was practiced during transplanting, harvesting, and threshing. Labor exchanges on land preparation and hauling were less common among the farmers. In terms of paid labor, workers were hired during transplanting and harvesting stages only. Meanwhile, land preparation and hauling, which required less manpower, were performed by family members.

Gender division of labor. In a household in Lao PDR, both men and women are involved in agriculture. The FAO's (1998) Fact Sheet of Lao PDR: Women in Agriculture, Environment, and Rural Production reported that women held dual responsibility for farm and household management. Women also had substantial and enlarging roles in agriculture. The report also presented the gender division of farm labor in the country (Table 1).

Furthermore, the FAO Report (1998) stated that in agriculture production in the country, female labor force constituted 69 percent, while male labor force amounted to 55 percent. Despite this, the report stated that women's contribution as family labor was undervalued and was never included in national accounting as work.

This study acknowledged both men and women's contribution to native rice farming in the study sites. Gender division of labor in terms of native rice production is illustrated in Table 2.

Table 1. Gender division of labor in rice farming of the Lao Loum ethnic group (Schenk, 1995 as cited in FAO, 1998)

TASK	MALE ADULT	FEMALE ADULT	BOTH MEN AND WOMEN
Selecting seeds		X	
Soaking seeds			X
Making bunds	X		
Making fences			X
Transporting manure			X
Plowing	X		
Harrowing	X		
Sowing			X
Uprooting of seedlings	X	X	
Transporting	X	X	
Irrigating	X		
Guarding the field at night	X		
Weeding	X	X	
Harvesting			X
Threshing	X		
Packing hay		X	
Threshing by hand	X	X	
Transporting to storage			X
Marketing rice		X	

Table 2. Gender division of labor in native rice production

TASK	MALE		FEMALE		BOTH		PAID WORKER		NO ANSWER	
	No.	%	No.	%	No.	%	No.	%	No.	%
Seedbed preparation	18	19.8	2	2.2	71	78.0	-	-	-	-
Fencing	20	22.0	2	2.2	43	47.2	-	-	26	28.6
Land preparation	53	58.2	-	-	36	39.6	-	-	2	2.2
Fertilizer application	1	1.1	1	1.1	84	92.3	-	-	5	5.5
Transplanting	-	-	-	-	91	100.0	-	-	-	-
Weeding	1	1.1	6	6.6	84	92.3	-	-	-	-
Water controlling	16	17.6	-	-	75	82.4	-	-	-	-
Harvesting	-	-	-	-	91	100.0	-	-	-	-
Hauling	9	9.9	-	-	82	90.1	-	-	-	-
Threshing	7	7.7	-	-	84	92.3	-	-	-	-
Drying	7	7.7	-	-	84	92.3	-	-	-	-

In the paddy field, generally both husbands and wives shared equal responsibilities from preparing the seedbed, constructing the fence, applying fertilizer, transplanting, weeding, controlling water, harvesting, hauling, threshing, and drying the grains. In Lao PDR, the farmers' wives helped their husbands because they were concerned with their family's income and subsistence. Most (87%) of them participated in their husbands' farming occupations; thus, they also went to the rice fields and worked. Moreover, accomplishing native rice farming tasks became faster and easier when wives helped their husbands (Chanthavong, 2012). However, preparation of the paddy field was predominantly the job of the males as the task was strenuous and required much physical strength.

The rice field was fenced manually by members of the family. Land preparation was either done through the traditional method with the use of manual plows being pulled mechanically by a two-wheel tractor. Both seed sowing and transplanting were done manually. Farmers from neighboring rice fields, family members, and relatives congregated to transplant the seedlings; then, they moved to the next fields of participating families. Fertilizer application and weeding were commonly done manually as the farmers did not use chemical fertilizers and weedicides.

Harvesting, hauling, and threshing were festive communal activities. Farmers from neighboring rice fields, family members, and relatives flocked to work together to harvest, to bundle using bamboo strip twines, to dry, and to thresh the grains. They even brought food and drinks to be shared with everyone in the group including hired laborers.

Some families did the hauling by themselves without the help of their neighbors. Hauling was performed two days after cutting. After the ripened yields were cut, they were bundled (as they were still in the stalks) by young bamboo strip twines. The bundles were left on the rice fields for two days to dry. Some families hung the bundles in elevated poles usually made of bamboo to dry. After drying, the bundles of rice stalks were hauled to be threshed. Threshing was done by the small community of neighbors, relatives, and hired workers as well. The key informants and FGD participants reported that there were five rice threshers available in the study sites. During the 2012 native rice production in the area, the farmers paid five sacks for every 100 sacks of clean rice to the owners/operators of the threshing machines. Compared with the previous years, the threshing charge of 7 sacks per 100 sacks was considered lower.

The clean grains were immediately packed in sacks and hauled again towards the family's rice barn either through tractors or motorcycles. Some simply carried the sacks at their back one at a time if the distance from the field to their barn was less than 100 meters. Milling came after drying, and milling was done by individual families. In milling, those who did not have a rice mill or a rice polisher would go to the nearby milling stations owned by

private individuals and pay for the service. Farmers commonly did not pay in cash but in kind. They would leave the rice bran with the rice mill owners as payment for the service. Milling stations sold the rice bran as animal feed.

Availing of credit for native rice production. Only two respondents (2%) availed credit for native rice production. The two farmers loaned money from Nayobay Bank that is located in Phonesavanh village, Pek district, Xiengkhouang province. The soft loans of the two respondents were spent on native rice production and livestock breeding. They filed for 5,000,000 Kip (US \$621) loan, and it was granted. They still borrowed money from the bank to buy a tractor as they aspired to increase farm production. However, one FGD participant said that the two loan grantees found the monthly interest of 14 percent as high, and so, they paid their loans after a few months only. Majority (97%) of them did not borrow for several reasons, namely: high interest rate, unawareness of the loan grant, reluctance to process papers, apprehension for inability to pay, and distance to the bank.

Seed variety management. Almost all (98%) of the farmers declared that they did preserve traditional native rice varieties. They chose the best seeds while they were still in the field right after harvesting. Afterwards, they stored these well-chosen seeds in sacks and kept them in their rice storage together with other sacks of rice for consumption. The sacks of rice seeds to be used for planting the next season were marked for proper identification.

According to the KII and FGD participants, the farmers believed that the cycle of using native rice varieties in this area should be changed every three years. Otherwise, as grounded on their forefather's experience, rice yield would decrease. Farmers practiced seed exchange (native species only) with other farmers in the same village, and they found this effective in achieving their rice crop's expected yield.

The respondents had criteria in choosing the seed variety aside from yield. Most of them considered grain quality on taste, visual aspect, and milling characteristics as primary bases. Only

some considered high and stable productivity in low-to-medium input environment.

The farmers in the study area differed in their choice of native rice variety to be planted. Most of them planted the yellow glutinous rice variety. This was followed by those who planted the red glutinous rice, which was the variety used for making the famous Xiengkhouang rice noodles. There were a few who planted the black glutinous rice variety.

The native rice variety is synonymous to the small chicken rice. The black (dark) and red varieties have the same seed size, and the yellow variety is slightly smaller. The three varieties have the same duration of production period from germination to maturation stage. The yellow variety had the highest yield among the three varieties, while the black variety had the lowest yield. Thus, the farmers would quip: yellow > red > black. All three had the same height and were cultivated using the traditional method. They were all susceptible to certain pests and diseases compared with the hybrid varieties.

As regards to aroma, the black variety had the best aroma, while the red had better aroma than the yellow variety, and thus, black > red > yellow. All three varieties, when planted in Xiengkhouang, generated a distinct aroma that was valued to be superior over the same varieties planted elsewhere in the country.

Based on all of the respondents' experience in native rice farming, only the traditional seed variety could grow best in the area given the study sites' geographical location and climatic conditions. Private enterprise companies, government line agencies, and foreign institutions did not introduce other exotic native rice varieties in the study sites. This was because the farmers themselves did not solicit any other rice variety from outside the community. They bred only their own native rice varieties to assert the suitability of these varieties in their geographical location and farming traditions.

Their pride in their own native rice varieties was complemented by the appreciation of the people in the entire

country about the fine quality of the Xiengkhouang native rice. Its excellence was well-known nationwide. In fact, Vientiane Times (2014) reported that Lao Brewery Company (LBC), brewer of Beer Lao (famous in the country and is exported to 20 countries worldwide), chose the native rice from Xiengkhouang and Huaphan provinces to be the most important source of raw material for its new beer brew—the Beer Lao Gold. Mr. Saysavanh Boutthavong, LBC Brand Manager said:

Khao Kai Noi rice is rich in nutrients and low in sugar. It is resistant to disease, and it yields a high productivity at three tons per hectare, which farmers grow using organic methods, causing it to be in high demand (Vientiane Times, 2014, p. 1).

An agreement was signed between the LBC and the Provincial Governments of Xiengkhouang and Huaphan stipulating that LBC would purchase 800 tons of the Khao Kai Noi (small chicken rice, which is a particular variety of native rice) yearly and would increase its buying price. The LBC also pledged to assist the two provinces in establishing a research center, in establishing a farmers' organization, and in organizing a Khao Kai Noi rice festival yearly to help promote this produce. This contract would further encourage the rice farmers to improve and increase the production of native sticky rice. Na-Ou farmers were specifically mentioned in this news article. It said that Na-Ou village, together with other villages, would benefit from this deal. The Vientiane Times news article likewise mentioned that "many countries are also interested to import Khao Kai Noi rice for domestic consumption especially the European countries as well as Japan and Vietnam."

SWOT Analysis of Native Rice Production System in the Study Villages

Strengths. There were positive points for the farmers' native rice production system. As a family activity, there was availability of manpower or family labor needed for the different activities; thus, farmers very seldom resorted to hired

labor. Husband-wife partnership and collaboration with other neighboring farmers were also frequent. The strong collaboration among the farmers in the neighborhood allowed them to exchange labor, which did not only help in reducing labor cost but also in maintaining their social capital. The farmers possessed the skills and experience, which made them very knowledgeable about rice production. Their indigenous knowledge and practices on native rice production were contributory factors to attaining sufficient production levels as compared with those of the district and provincial levels. The farmers also owned the needed tools and machinery related to native rice farming. As rice growers, their preference for native rice varieties over other varieties was cultural. The presence of the farmers' organization in the villages was another factor because the people's organization could serve as conduit for government assistance. They had attitudes and traditional practices such as the use of organic fertilizers and pesticides that complemented their farming resources. All of these contributed to their sufficiency in native rice.

Further, the villages were endowed with geographical and climatic conditions, which were suitable for native rice production, namely: good soil, favorable climate, natural resources such as rivers and streams, among others.

Weaknesses. The areas needing attention were basically outside support and community level resources. Infrastructure, such as an irrigation system and a rice seed bank, were very expensive, which the farmers could not afford themselves. They needed material, financial, and technical support from the government and other institutions.

Although the presence of the farmers' organization had been pointed out as a strength, there was a concern over the low membership. The DAFO extension/community development workers should focus on motivating the farmers to join the organization. Another point was the non-availing of credit by the farmers. This could be both positive and negative. It was positive since it indicated that farmers had more than enough capital. In their traditional practice, they used minimal inputs and labor as

they made their own fertilizers and pesticides, and used their own seeds. It was negative since non-availment of credit may limit their capital; hence, the ability to engage in other livelihood activities. The last point was the non-inclusion of non-cash income in the computation of total income from crop and livestock production because the products were meant for home consumption. This translated to a low reported income.

Opportunities. Despite the weaknesses, there were also opportunities that could be exploited. The native rice that the farmers grew had a good market, and the country's number one beer manufacturer had promised them of a sure market and support. This means that they could produce more than what they needed at the household level. In other words, they should strive to produce surplus to supply the market demand. On this aspect, the presence of credit facilities becomes important. Availment, though, may become a problem due to the distance of the credit providers as well as the submission of the required documents.

In addition, the government through its district and provincial offices provided support to the rice farmers particularly on the technical aspect like the implementation of the System of Rice Intensification program. Lastly, although there was no rice seed storage facility in the villages, the presence of a cold rice seed storage at the Agricultural Research Center in Vientiane was a good opportunity for preserving the native rice varieties that they were currently planting.

Threat. The only threat that could be mentioned is the initiative of the government to introduce hybrid varieties throughout the country. Obviously this move would replace the traditional varieties that the farmers have been planting. During the FGD, the participants recounted that in 2013, they were provided with hybrid rice seeds by the PAFO to grow in their area. The result was rather negative as the hybrid took longer to grow and did not yield much as expected. Most of the FGD participants, being experts and experienced in rice farming, attributed the negative results of planting hybrid variety in Xiengkhouang to the province's high elevation and water insufficiency. Fortunately, the

Xiengkhouang province has been identified as one of the native rice production areas in northern mountainous region of Lao PDR.

CONCLUSIONS

In the light of the foregoing discussions, the following conclusions were drawn:

1. The farmers had the necessary household resources that supported native rice production. In the households, they were adequately experienced farmers, owners of small land parcels, and equipped with household technology/appliances, farm tools, and basic farm machinery. The sloping land in their villages prevented them from acquiring sizable wheeled-machinery. Land tenure was not a problem to them. Soil fertility status challenged them to produce fertilizers that they could afford, that is, from their own compost. They take pride in cropping their age-old sticky rice varieties, and this attitude was complemented by their need to use such varieties because of their geographical conditions.
2. Their practices and resources in the household level were helpful in attaining rice sufficiency. Native rice farming in the study villages was a husband-wife enterprise, and familial and communal in nature. The women had remarkable contribution in farming. Borrowing money from outside institutions was difficult for them and not part of their culture. Preserving the traditional native rice variety was an individual household-initiated endeavor.
3. Based on the SWOT analysis, the native rice farming system had positive aspects (strengths) as well as negative aspects (weaknesses). On the other hand, there were opportunities available that could help address these weaknesses or harness their strengths. However, the possible threat (e.g., hybrid rice varieties) to the sustainability of the native rice production should be addressed by the native rice farmers.

RECOMMENDATIONS

The following recommendations are put forward to the native sticky rice farmers:

1. Outside efforts should be balanced with cooperation. When meetings are called, all the native rice farmers in the study villages should positively respond to demonstrate willingness to participate in rural rice farming development efforts.
2. As with inland fishery production, cash crop production and kitchen gardening were found to potentially augment income. Hence, farmers in the study villages should re-examine their farming system and strive to be fully equipped with knowledge and skills on these farming activities. For instance, active participation in the Organic Small Chicken Rice Producers Association will be a venue for them to learn more and to hone their farming skills further.
3. Since a community radio is available to them, they could bring their radio sets to their farms so that they could listen and learn from the broadcast programs especially those related to rice farming.
4. Since farming is a husband-wife enterprise, the women should be given equal opportunity to participate actively in the rice farmers' association; they must have equal access to education and health; and they must have opportunities to be heard and decide on matters concerning native rice farming and domestic concerns.

To the Government of Lao PDR through its line ministries, the following are recommended:

1. Efforts to increase food security through crop diversification in the study villages should be prioritized. As the farmers would not allow other rice varieties, government efforts

should be directed towards improving systems of kitchen gardening, livestock breeding, fish pond maintenance, and cash crop production.

2. The Ministry of Public Works should strive hard to repair the non-functional irrigation system in the study sites. Assistance on the installation of wells and pumps should also be considered.
3. The Ministry of Agriculture and Forestry, Veterinary Division, should assist the farmers in their livestock problems. Its veterinarians should be regularly trained and fairly compensated so that they can respond to the farmers quickly and efficiently on livestock problems.
4. The Ministry of Agriculture, Forestry and Fisheries (MAFF) should assist the native rice farmers in setting up their own fish ponds as this was found to be helpful in augmenting the latter's income.

For future researches, the following are suggested:

1. That the same study should be conducted in other villages in Xiengkhouang province to determine how households and the community contribute towards attaining rice sufficiency.
2. An in-depth study on the women's contributions towards rice sufficiency should be conducted. The suggested methods are direct observation and case study because the Lao women are generally much occupied with both house and farm works.

LITERATURE CITED

Appa Rao, S., Bounphanousay, C., Shiller, J. M., & Jackson, M. T. (2000). Collection and classification of rice germplasm from the Lao PDR between 1995 and 2000. Vientiane: Ministry of Agriculture and Forestry/Lao-IRRI Project.

- Bestari, N. G., Shrestha, S., & Mongcopa, C. J. (2006). Lao PDR: An evaluation synthesis on rice. A case study from the 2005 sector assistance program evaluation for the agriculture and natural resources sector in the Lao People's Democratic Republic. Vientiane City, Lao PDR: Operations Evaluation Department, Asian Development Bank Lao PDR. Retrieved from <http://www.adb.org/sites/default/files/evaluation-synthesis-rice-lao.pdf> on August 27, 2013.
- Chanthavong, A. (2012). Household and community level practices towards attaining food security in Long district, Luangnamtha, Lao PDR. Unpublished Master's thesis, University of the Philippines Los Baños, College, Laguna, Philippines.
- Encyclopedia of Nations. (2013). Laos - agriculture. Retrieved from <http://www.nationsencyclopedia.com/economies/Asia-and-the-Pacific/Laos-AGRICULTURE.html> on September 17, 2013.
- Food and Agriculture Organization. (1998). Fact sheet Lao PDR: Women in agriculture, environment, and rural production. Bangkok, Thailand: Food and Agriculture Organization of the United Nations Regional Office for Asia and the Pacific. Retrieved from <ftp://ftp.fao.org/sd/sdw/sdww/Lao.pdf> on June 9, 2013.
- Food and Agriculture Organization. (2010). Profile of Lao People's Democratic Republic. Retrieved from www.fao.org/lao/Lao%20Background.pdf on November 21, 2013.
- Gorsuch, J. (2006). Rice: The Fabric of Life in Laos (A Lao-IRRI Project). Vientiane, Lao PDR: Ministry of Agriculture and Forestry of Lao PDR, International Rice Research Institute, and The Swiss Agency for Development and Cooperation.
- International Rice Research Institute. (2009). Cutting. Retrieved from <http://www.knowledgebank.irri.org/rkb/cutting.html> on April 23, 2014.
- Lao PDR Ministry of Agriculture and Forestry Agricultural Master Plan 2011-2012. Laos: MAFF.
- Provincial Agriculture and Forestry Office (PAFO). (2012). Report of the Xiengkhouang Province, LAO PDR. Laos: PAFO.

- Vientiane Times. (2014). Kai Noi rice adds crispness to new Beer Lao Gold. Vietstock. Retrieved from <http://en.vietstock.vn/2014/02/kai-noi--rice-adds-crispness-to-new-beerlao-gold-117-167994.htm> on May 3, 2014.
- The World Bank. (2013). Lao PDR rice policy study. Retrieved from <http://www.worldbank.org/en/country/lao/publication/lao-pdre-rice-policy-study> on August 27, 2013.
- World Food Program-LAO PDR. (2006). Comprehensive Food Security and Vulnerability Analysis (CFSVA), Vulnerability Analysis and Mapping Branch, WFP-Lao PDR. Laos: WFF.

APPENDIX

Appendix 1. Respondents' socio-demographic and economic characteristics

SOCIO-DEMOGRAPHIC AND ECONOMIC CHARACTERISTICS	NO. (n=91)	%
Age		
Teenager (13-19)	1	1.1
Young adult (20-39)	30	33.0
Adult (40-59)	45	49.4
Senior (>60)	15	16.5
Range	18-78	
Mean	46	
Sex		
Male	56	61.5
Female	35	38.5
Civil status		
Single	2	2.2
Married	86	94.5
Widow/Widower	2	2.2
Separated	1	1.1
Educational attainment		
No formal education	5	5.5
Primary (1-5 years in school)	28	30.8
Secondary (6-8 years in school)	46	50.5
High School (9-13 years in school)	8	8.8
College (14-18 years in school)	4	4.4

Appendix 1. Respondents' socio-demographic...(Continued)

SOCIO-DEMOGRAPHIC AND ECONOMIC CHARACTERISTICS	NO. (n=91)	%
Length of stay in the area (years)		
≤10	10	11.0
11 to 20	12	13.2
21 to 30	18	19.8
31 to 40	26	28.6
41 to 50	18	19.8
> 50	7	7.7
Range	4 - 72	
Mean	32.32	
Primary occupation		
Farming	80	87.9
Employee	11	12.1
Secondary occupation		
Farming	7	7.7
Animal raising	55	60.4
Retail	5	5.5
Driving	2	2.2
Noodle-making	22	24.2
None	2	2.2

Note: Multiple responses for those that do not total 100

Appendix 1. Respondents' socio-demographic...(Continued)

SOCIO-DEMOGRAPHIC AND ECONOMIC CHARACTERISTICS	NO. (n=91)	%
Rice production income (Kip)		
<5,000,000	36	39.6
5,000,001 - 10,000,000	11	12.1
10,000,001 - 15,000,000	8	8.8
15,000,001 - 20,000,000	1	1.1
> 20,000,000	1	1.1
None	34	37.4
Mean		5,858,947.37
Range		600,000-40,000,000
Total annual household income (Kip)		
<5,000,000	6	6.6
5,000,001 - 10,000,000	13	14.3
10,000,001 - 15,000,000	3	3.3
15,000,001 - 20,000,000	5	5.5
> 20,000,000	45	49.4
Mean		35,195,195.60
Range		200,000-176,000,000