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Farmers' Perceptions of Rice-Growing Techniques in Laos: "Primitive" or "*Thammasat*" ?*

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Introduction

Agricultural practices in Laos are still performed predominantly by traditional means. Agricultural techniques are often said generally to remain backward or, in some cases, primitive, as a result of which production levels are very low, and most farms are said to operate at the subsistence level outside the monetary economy [LeBar and Suddard 1960; FAS 1971]. This is quite true from the viewpoint of production or productivity, but agriculture may not be said to be just "backward" or "primitive" in terms of its adaptability to the given conditions, whether natural or socioeconomic. Emphasizing this viewpoint, this paper deals with some research findings related to traditional rice-growing techniques, making special reference to the Laotian term *thammasat*, which has the same meaning as *thammachat* in Thai and *natural* or *nature* in English, and provides some points for further discussion in order to bring about a better understanding of the significance of traditional rice-growing techniques conventionally practiced in Southeast Asian countries.

I *Thammasat*: "This Is Our Agriculture"

According to the 1991 basic statistics for Laos, the agricultural sector accounts for 57.3% of GDP and occupies some 85% of the total population. Cultivated land is estimated to cover approximately one million ha or 4% of the total area, and the harvested area is estimated to have been about 763 thousand ha in 1990 and about 673 thousand ha in 1991, of which rice, including both upland and wet, accounted for more than 80% in both years. Production amounted to 1,491 thousand tons in 1990 and 1,223 thousand tons in 1991, accounting for 85% and 83% of the total production of cereals, tubers and root crops in the respective years [SSC 1992]. As these figures indicate, rice is by far the most important crop in Laos.

Although my visit to Laos was limited to the period from 29 July to 7 August 1992 and

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to the surroundings of just three main cities, Vientiane, Luang Prabang and Savannakhet, I was able to observe some of major types of rice cultivation in Laos, including upland-rice growing in the northern mountainous regions, irrigated wet-rice growing in the inter-montane basins of northern Laos, and rainfed wet-rice growing in central Laos. All of my research findings derive from observations in these regions.

Before giving my research findings on rice-growing techniques, I should clarify why I choose the subtitle "primitive or *thammasat* ?" In my first interviews with farmers in a village near Vientiane, they always answered my questions by saying that their methods of growing rice were still *thammasat*, that they did not practice weeding after transplanting, apply chemical fertilizers, pesticides, or insecticides, or employ any machinery. They offered such negative answers without any clarification or explanation of how they have maintained the productivity of their lands and successfully continued their rice-growing activities in spite of such low input and low management levels. This was my first acquaintance with the word *thammasat* in Laos.

On another day, a farmer who lived in the outskirts of Luang Prabang talked about his farming practices. His account was the same : "our agriculture is *thammasat*." However, he also mentioned that he had applied chemical fertilizers and received new varieties since 1989, and that although most of their farming methods still remained in the *thammasat* tradition, they had begun to adopt new technologies and enjoy the benefits thereof.

In a village near Savannakhet, where modern technologies have already partly been disseminated, a farmer gave the following answer to my question on conventional farming practices in his village. He said that the *thammasat* and the modern methods each had their own advantages : "If I can well afford to purchase input materials, I will of course buy and apply them. However, I don't feel it necessary, for example, to apply chemical fertilizers to the wet-rice fields located at the low and middle elevations of the *nong*." A *nong* is a saucer-shaped depression where rainfed-rice is grown and is topographically the most suitable location for rice cultivation in the rainfed rice-growing regions of central Laos. Then he added : "Of all wet-rice fields I own, it is enough to apply fertilizers just to those at higher elevation."

Almost all of my interviews with farmers yielded similar accounts. And I gradually came to pay particular attention to their comments about their current rice-growing techniques. Sometimes they unconsciously expressed a feeling of shame by laughing at themselves for the backwardness of their techniques. They often used the word *thammasat* self-contemptuously. On the othre hand, they sometimes consciously used the word *thammasat* with a feeling of self-respect or pride : "Although we labor under such difficult conditions as you have seen, we have continued our subsistence farming by the conventional methods for a long time without any deficit. Why, therefore, should we receive new technologies from outside, which require additional expenditures ?"

The dualism that was thus observed with regard to the traditional technologies in Laos

is considered to contain many important implications for the investigation of and prospects for the future development of rice-growing techniques in Southeast Asian countries.

II Environment-Adaptive Technology and Environment-Formative Technology

Rice culture has been established through the accumulation of two types of technologies: environment-adaptive and environment-formative. The reciprocal application of the two types of technologies has brought about the present technological conditions of rice culture in every Asian rice-growing country or region, each with its own natural conditions and historical characteristics as the background of its development.

The concept of these two types is indicated in the following explanation:

> In the premodern period, there were two types of technologies pitted against nature: one utilized the natural environment as it was without making any modification or change to the environment; and the other worked actively upon the natural environment to modify it and form a new environment for rice cultivation. The former is environment-adaptive technology and the latter is environment-formative technology [Tanaka 1991: 565].

These terms are thought to be useful for investigating the historical development of rice culture. For instance, in some regions, both types of technologies were either reciprocally or simultaneously applied. People constructed infrastructures like irrigation facilities and consolidated field plots, then they began to adopt new rice-growing techniques which were better adapted to the new infrastructures. In other regions, environment-adaptive technologies alone were long applied without any modification of locational conditions. But in such regions, once an environment-formative technology was introduced and used successfully to change the infrastructure, people were obliged to change their former adaptive technologies to other forms more suited to the new environment. It was only with the introduction of modern engineering technologies, which was very recent compared to the long history of rice culture in Asia, that the transformation of locational conditions began in these regions [*ibid.*: 564-570].

Generally speaking, rice culture in Laos is thought to have long been environment-adaptive, especially compared with other rice-growing countries. However, even though environment-formative technology has been least applied, this does not mean that the rice culture in Laos remains at the primitive stage or backward in technological development. Rather than developing environment-formative technologies, it has developed various kinds of techniques which are adapted to its own natural conditions. Traditional rice-growing techniques and knowledge on maintaining sustainable farming systems themselves represent just such environment-adaptive technology.

III Some Examples of Rice-Growing Techniques in Relation to Environment-Adaptive Technology

1. Nursery Beds near Luang Prabang

To the southeast of Luang Prabang along the Nam Khan, a tributary of the Mekong, stretches a chain of small alluvial basins. As shown in Fig. 1, this area has rice fields on both upland and lowland. Wet-rice fields located in the basins are surrounded by mountain slopes where upland fields had been cleared by the slash-and-burn method. The people, Lao Lum and Lao Theung, are engaged in both wet-rice and upland-rice cultivation, though the Lao Lum are less engaged in the slash-and-burn system.

In this area, farmers select suitable places for nursery beds in anticipation of rainfall and in accordance with hydrologic conditions. They also choose from a set of nursery-making methods, which consists of *sak ka*, *sam ka* and *wang ka*. A *sak ka* nursery is prepared in an upland field by dibbling seeds with a pointed wooden stick called a *sak*. About one month after seeding, the seedlings raised in this dry nursery are transplanted to the nearby wet-rice fields.

When rainfall is not enough to allow transplanting to wet-rice fields, the seedlings grown in *sak ka* are transplanted to a second nursery (*sam ka*) prepared in a wet-rice field located at comparatively higher elevation in a basin. Soil of the nursery bed is not soft enough to allow transplanting of seedlings by hand, and the seedlings from the *sak ka* are therefore transplanted into holes punched in the ground with a stick. As the planting density is high, this second nursery looks like a *sak ka* in spite of its being prepared in a wet-rice field.

The second transplanting takes place about one month after the first transplanting from *sak ka* to *sam ka*. The *sam ka* method is commonly employed in this area, and farmers reported that this double transplanting is a good means to adjust the timing of transplanting in accordance with unstable and unreliable rainfall condition, and that it can

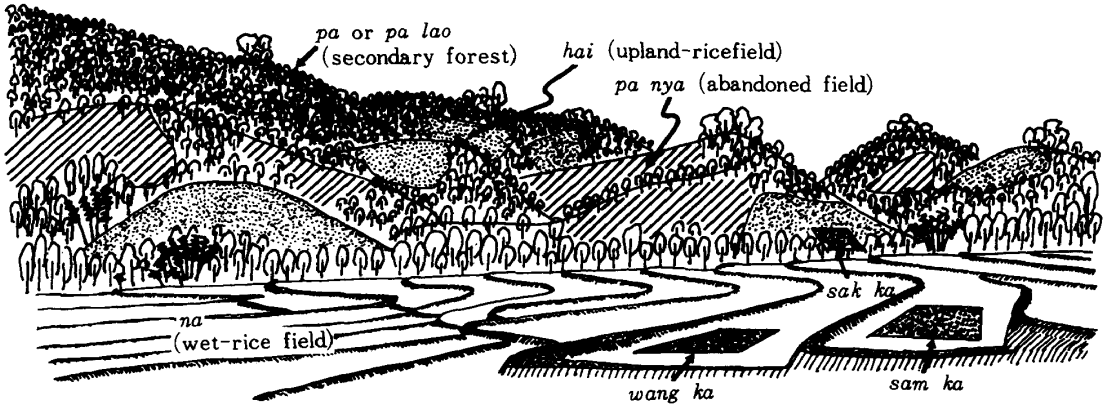


Fig. 1 Landscape in a Basin of the Nam Khan

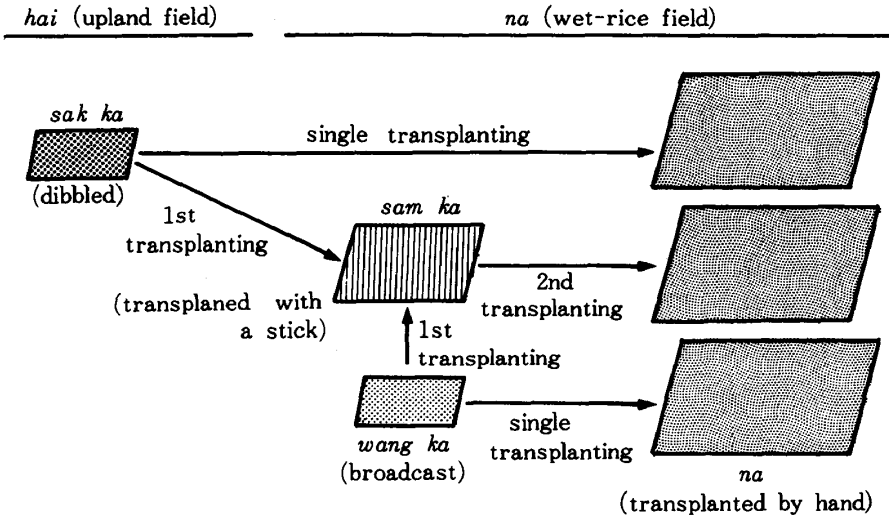


Fig. 2　Three Types of Nursery

prevent damage by flood and drought.[1)]

The third method, *wang ka*, involves a conventional nursery in which seeds are broadcast and the seedlings are transplanted about one month after seeding. It is prepared at slightly lower elevation than the *sam ka* but still in the elevated portion of the basin.

From this set of methods, farmers choose one, or combine two or three methods, as shown in Fig. 2, in order to spread the risk of damage due to unstable rainfall conditions.

2. Nursery Beds in the Shade of a Tree

In the vicinity of Savannakhet, there extends a broad area of rainfed wet-rice fields where scattered trees have been left standing, providing a park-like, savanna-like landscape. This landscape is also common in Northeast Thailand. Takaya and Tomosugi [1972: 81], who described the rice fields in Northeast Thailand, characterized the rice fields on valley slopes in upland hill regions as "wooded rice fields" surrounded by "rice-producing forests." The rice fields in the vicinity of Savannakhet have the same character as those "wooded rice fields."

In the "wooded rice fields" in the vicinity of Savannakhet, some nurseries are prepared in the shade of a tree. The method of preparing the nursery bed is as usual, and there is no significant difference between the shaded and the open nursery except that the seeding density is slightly higher in the shaded nursery.

It is not clear to me why such nurseries are prepared, but there should be some reason. According to farmers, who were uprooting seedlings for transplanting, the shaded nur-

1) According to Dr. Walter Roder [personal communication], an IRRI scientist staying at Luang Prabang, the reduction of crab damage is said to be an additional advantage of double transplanting. Crabs cause considerable damage to transplanted rice in Luang Prabang and other northern provinces. Planting of the older plants produced by double transplanting is said greatly to reduce the crab damage.

series are more convenient than those in the open because they allow a longer wait for a good time for transplanting. Although the advantage of the shaded nursery can readily be assumed to be the suppression of evapotranspiration, a more important point is that the farmers can wait longer than they can with an open nursery when the onset of the rainy season is delayed.

A further advantage mentioned by farmers is that the elongated seedlings are easier to transplant. From an agronomic standpoint, the shaded nursery seems to be not suited to growing healthy and vital seedlings. But for the farmers, the controlability of the nursery period seems to be more important than raising healthy seedlings. Under the unreliable rainfall conditions commonly found in rainfed rice-growing regions, such an adaptational approach might be more rational than following the general directions based on scientific knowledge.

3. Location-Specific Adoption of New Technology

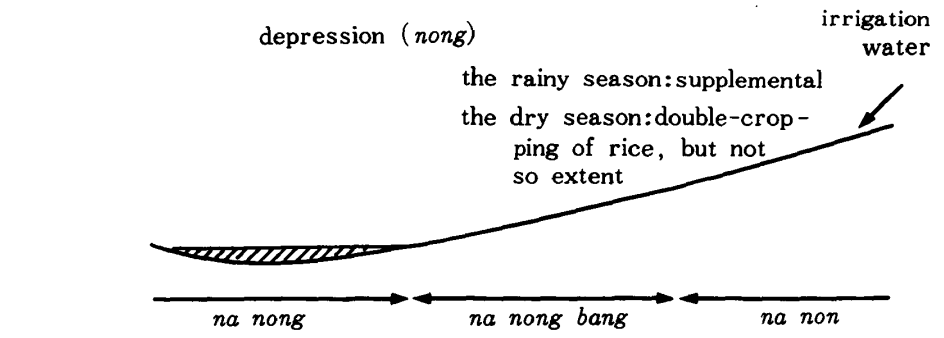
Vientiane and its surrounding areas contain a concentration of government-supported schemes or programs for agricultural improvement. Irrigation facilities implemented under government projects for both the rainy and dry seasons has allowed rapid dissemination of new technologies and, in some places, double cropping of rice. Ban Namhoum, located about 25 km north of Vientiane, is one such advanced area.

In the early 1980s, farmers in this village introduced improved varieties from Thailand at their own expense and under their own management, and three or four years ago they began to apply chemical fertilizers. They did not adopt new technologies through government agencies but at their own initiative.[2] And they introduced them in an intelligent and selective way.

Fig. 3 shows a schematic diagram indicating the rice cultivation in the village. The rice-growing area is basically confined to the *nong*, a saucer-shaped depression with a gentle gradient from the elevated periphery to the bottom. Rice-growing in the *nong* is practiced in accordance with the variation in water conditions deriving from this unique topography, which is also common in Northeast Thailand [Miyagawa *et al.* 1985].

Even though about ten years have passed since they adopted new varieties, farmers still keep a number of local varieties to grow in accordance with the variation of field conditions, particularly water conditions, which depend on the elevation of the rice fields. They still follow the same varietal arrangement as before : deep-water or late-maturing rice in the bottom of the depressions, medium-maturing varietie on the middle slopes, and

2) Although it is usually said that farmers in Laos had not been exposed to improved varieties and agricultural inputs, this is of course not true. Dr. Walter Roder [personal communication] wrote me on this matter : "some farmers in the northern provinces have, for example, started to grow hybrid rice (seed imported annually from China) on their own." In the wet-rice growing regions facing the Mekong river in central Laos, it is natural to suppose that farmers have introduced many new varieties from Northeast Thailand, where the improvement of rice varieties is much advanced.



Variety	late-maturing varieties, deep water rice	medium-maturing varieties	early-maturing varieties
Fertilizer	not applied	not applied	applied
Yield increas	2 ton/ha	1 ton/ha	0.5ton/ha
(early '80s ↓ present)	3 ton/ha	1.5ton/ha	2.5ton/ha

Fig. 3　Rice Cultivation in the *nong* in Ban Namhoum

early-maturing varieties at higher elevation. In this ways, varietal selection has remained traditional even after the adoption of new varieties.

Their attitude to fertilizer application is also selective. Among the various locations of wet-rice fields, only those at higher elevation and planted with new varieties receive chemical fertilizers. As a result, the performance of rice production in the village has changed drastically, as shown in Fig. 3.

It is usually pointed out that the major problem in Laos in relation to wet-rice cultivation is a lack of psychological motivation to increase productivity [Halpern 1964: 40]. However, as might be expected from this example, the farmers around Vientiane show a positive approach to new technologies. As for their selective adoption of new technologies, their motivation to improve production and their adaptive way of adoption seem to be very rational from the viewpoint of sustainability of rice-growing, which bears closely upon the relation between natural conditions and technology.

IV　Need for Farming System Research with a Location-Specific Point of View

Although my experience in Laos was very limited, my interviews with farmers and observation of their agricultural practices left a strong impression. In spite of the "backwardness" of agriculture in Laos, its conventional techniques and knowledge have significant implications, of which the most important one applicable to other Asian countries is the kind of location-specific or site-specific adaption that was shown in the

preceding section.

To cope with unstable and unreliable water conditions, farmers have long established environment-adaptive techniques which are location-specific or site-specific in nature. In addition, as the last example shows, the farmers apply the location-specific concept in the selective introduction of new technologies, which is also a reflection of their adaptive approach to the given environment. Thus, the conventional rice-growing techniques appear to contain accumulated knowledge and techniques which are most adaptive to the given locational conditions.

In Laos, extension works for disseminating new technologies have recently been formulated. Therefore, even in areas where new technologies have already been adopted, the conventional and the new technologies can be observed side by side. This circumstance should provide researchers interested in cropping systems or farming systems with a useful and important opportunity to evaluate and reform their research activities.

In my experience in Laos, it was also impressive that a farmer living in Ban Namhoum, who was very selective in introducing new technologies, expressed great delight in achieving an increase in production after the introduction of new technologies. He told of his delight in harvesting the rice and selling the additional surplus beyond his needs for home consumption : "I feel as if I have become more powerful than before." This may seem to be very straightforward expression of the farmer's feelings when he achieved an expected result. But it is important that this farmer, and others like him, has maintained his traditional techniques and does not intend to introduce new technologies into his fields which are not suited to receive them.

In the face of such conventional, but rational and reasonable, behavior by the farmers, farming system research or extension work should not be formulated without giving due consideration to locational conditions and farmers' behavior. Although this type of suggestion has been made for long time, it seems still to be easier said than done, and the improvement of rice-based farming systems in Laos is no exception. It is important that Laos has just launched its improvement schemes at a time when most Asian countries have already accumulated considerable experience in improving farming systems. These experiences should be fully utilized for the enhancement of production standards and the improvement of farming systems in Laos.

Conclusion

In terms of economic and technological development, the present performance of Laotian agriculture cannot be compared with that of Thai agriculture, for example. However, very rapid changes in accordance with this development have begun to produce adverse effects in Thailand. The increased application of artificial measures in agricultural inputs, like the use of chemical products and fossil fuels, has brought about not only socioeconomic but also environmental problems. Harmonization of the *thammasat* nature

of Laotian agriculture with various schemes for promoting the modernization of rice-based farming systems is the key issue, so that Laos will not follow earlier examples.

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