

ການເຕົ້າໂຮມ ແລະ ອະນຸລັກເຊື້ອພັນເຂົ້າ ຈາກແຂວງພາກກາງ ແລະ ພາກໃຕ້ ຂອງ ສປປ ລາວ

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ບົດຄັດຫຍໍ້

ປະເທດ ສາທາລະນະລັດ ປະຊາທິປະໄຕ ປະຊາຊົນລາວ ເປັນປະເທດໜຶ່ງທີ່ນອນຢູ່ເຂດໃຈກາງ ຄວາມຫຼາກຫຼາຍຂອງແນວພັນເຂົ້າໃນເຂດອາຊີ (*Oryza sativa*), ໂດຍສະເພາະແມ່ນເຂົ້າໜຽວ. ການປູກເຂົ້າຂອງຊາວນາລາວສ່ວນຫຼວງຫຼາຍຍັງນໍາໃຊ້ແນວພັນພື້ນເມືອງ.

ໂດຍການຮ່ວມມືລະຫວ່າງ ກົມປູກຝັງ ແລະ ສົ່ງເສີມການກະເສດ ແລະ ສະຖາບັນຄົ້ນຄວ້າເຂົ້ານາ ໆ ຊາດ ((IRRI) ໄດ້ຈັດຕັ້ງປະຕິບັດໂຄງການເຕົ້າໂຮມອະນຸລັກເຊື້ອພັນເຂົ້າ (ເຂົ້າພື້ນເມືອງ ແລະ ເຂົ້າປ່າ) ໃຫ້ໄດ້ຫຼາຍເທົ່າທີ່ຈະເຮັດໄດ້ ຈາກເຂດສະພາບແວດລ້ອມນາປີ ແລະ ເຂົ້າໂຮ່. ການເຕົ້າໂຮມແນວພັນໃນປີ 1995 ນີ້ ສາມາດເກັບແນວພັນເຂົ້າພື້ນເມືອງໄດ້ທັງໝົດ 2226 ຕົວຢ່າງ ແລະ ເຂົ້າໂຮ່ໄດ້ 72 ຕົວຢ່າງ. ຊຶ່ງເກັບຈາກ 6 ແຂວງພາກກາງ ແລະ 4 ແຂວງພາກໃຕ້ ຂອງປະເທດ. ໃນລະບົບນິເວດຂອງເຂົ້ານາປີນີ້ ຕາມຕົວຈິງແລ້ວ ແນວພັນທີ່ຊາວນາປູກ ແມ່ນສະໜໍາສະເໝີດີ, ຊາວນາ ຄອບຄົວໜຶ່ງປູກ 3-5 ແນວພັນຊຶ່ງມີອາຍຸເຂົ້າແຕ່ 90-160 ມື້ . ແຕ່ວ່າຢູ່ໃນລະບົບນິເວດເຂົ້າໂຮ່ແລ້ວ ຊາວໂຮ່ພັດປູກເຂົ້າປີນກັນຫຼາຍແນວພັນ ໃນໂຮ່ຜືນດຽວ ຊຶ່ງມັນປະກອບໄປດ້ວຍຫຼາຍລັກສະນະຮູບຮ່າງ ດັ່ງນັ້ນ, ເພື່ອຄວາມສະດວກໃນການສະຫງວນ ແລະ ນໍາໃຊ້ ຈິ່ງໄດ້ເກັບເອົາແນວພັນເຂົ້າໝົດທຸກຊະນິດ ໂດຍແຍກກັນໄວ້ແຕ່ລະຕົວຢ່າງ. ເຂົ້າພື້ນເມືອງສ່ວນໃຫຍ່ ມີຄວາມແຕກຕ່າງກັນທາງດ້ານ: ອາຍຸ, ການແຕກກໍ່, ຂະໜາດ, ຮູບຮ່າງ ແລະ ຄວາມແໜ້ນໜາຂອງຮວງ; ສີ, ຮູບຮ່າງ ແລະ ຂະໜາດຂອງຂໍ້ກາດອກ; ສີ, ຂະໜາດ, ຮູບຮ່າງ ແລະ ຄຸນນະພາບຂອງເນັດ. ແນວພັນເຂົ້າໂຮ່ສ່ວນຫຼາຍປາກົດເຫັນຈໍາພວກຢາວານິກາ (Javanica) ຫຼື ພວກຢາປອນນິກາ (Japonica) ເຂດຮ້ອນ. ແນວພັນເຂົ້າພື້ນເມືອງທີ່ເກັບມາໄດ້ສ່ວນຫຼາຍແມ່ນເຂົ້າໜຽວ. ຄວາມຫຼາກຫຼາຍຂອງແນວພັນເຂົ້າທີ່ໜ້າສົນໃຈນັ້ນ ຍັງໄດ້ພົບເຫັນໃນຈໍາພວກລກປະສົມທີ່ເກີດຂຶ້ນຕາມທໍານະຊາດ ລະຫວ່າງເຂົ້າພື້ນເມືອງ ແລະ ເຂົ້າປ່າ.

ເຊື້ອພັນເຂົ້າທີ່ເກັບມາໄດ້ທັງໝົດດັ່ງກ່າວນີ້ ໄດ້ອະນຸລັກໄວ້ສາງເຢັນທີ່ສູນຄົ້ນຄວ້າທົດລອງກະສິກໍາແຫ່ງຊາດ ຊຶ່ງຕັ້ງຢູ່ກໍາແພງນະຄອນວຽງຈັນ ແລະ ອີກໜຶ່ງຊຸດ ໄດ້ສົ່ງໄປຝາກໄລຍະຍາວທີ່ ທະນາຄານເຊື້ອພັນເຂົ້ານາ ໆ ຊາດ ທີ່ສະຖາບັນຄົ້ນຄວ້າເຂົ້ານາ ໆ ຊາດ (IRRI) ປະເທດຟີລິບປິນ.

¹ ຊ່ຽວຊານອະນຸລັກເຊື້ອພັນ, ໂຄງການ ລາວ-888 , ກົມປູກຝັງ ແລະ ສົ່ງເສີມການກະເສດ, ກະຊວງກະສິກໍາ-ປ່າໄມ້
² ຫົວໜ້າໜ່ວຍງານເຕົ້າໂຮມອະນຸລັກເຊື້ອພັນ, ສູນຄົ້ນຄວ້າທົດລອງກະສິກໍາແຫ່ງຊາດ, ກົມປູກຝັງ ແລະ ສົ່ງເສີມການກະເສດ, ກະຊວງກະສິກໍາ-ປ່າໄມ້
³ ພະນັກງານວິຊາການດ້ານຝຶກອົບຮົມ, ສູນຄົ້ນຄວ້າທົດລອງກະສິກໍາແຫ່ງຊາດ, ກົມປູກຝັງ ແລະ ສົ່ງເສີມການກະເສດ, ກະຊວງກະສິກໍາ-ປ່າໄມ້.
⁴ ຫົວໜ້າຊ່ຽວຊານປະຈໍາໂຄງການ ລາວ-888, ກົມປູກຝັງ ແລະ ສົ່ງເສີມການກະເສດ, ກະຊວງກະສິກໍາ-ປ່າໄມ້
⁵ ຮອງຫົວໜ້າກົມປູກຝັງ ແລະ ສົ່ງເສີມການກະເສດ, ກະຊວງກະສິກໍາ-ປ່າໄມ້
⁶ ຫົວໜ້າສູນອະນຸລັກເຊື້ອພັນ, ສະຖາບັນຄົ້ນຄວ້າເຂົ້ານາ ໆ ຊາດ, ນະນີລາ, ປະເທດຟີລິບປິນ.

INTRODUCTION

The Lao People's Democratic Republic (Lao PDR) lies within the center of diversity of Asian rice (*Oryza sativa* L.). Rice cultivation in the country currently accounts for more than 80% of cropped land area. In 1995, approximately 642,000 ha were cultivated to rice in the rainfed lowland, rainfed upland, and irrigated environments. The Lao PDR is the largest producer and consumer of glutinous rice in the region. Many traditional rice varieties are still grown by subsistence farmers. In addition to traditional varieties, wild rices and interspecific hybrids between wild and cultivated rices are also found. However, improved varieties are being adopted rapidly by farmers in the rainfed lowland and irrigated environments, which is causing genetic erosion among traditional and wild rices. To preserve this biodiversity, the Lao Department of Agriculture and Extension (DAE) and the International Rice Research Institute (IRRI), initiated some joint collecting activities as early as 1989. At that time, 38 samples of *O. sativa*, and 27 samples of wild rice consisting of *O. nivara* (5), *O. rufipogon* (20) and *O. granulata* (2) were collected from the Vientiane plain and Luang Prabang valley (Vaughan 1994). Some further collections were made in 1991 and 1994 (Phouaravanh, 1995; Schiller 1994; Roder *et al.* 1995). More than 1,000 samples of traditional varieties were characterized and evaluated in the northern part of the country. Several cultivars were selected and distributed to farmers (Phouaravanh *et al.* 1994, Roder *et al.* 1995). However, these early collecting activities were not carried out in a systematic manner. In a joint program supported by the Swiss Agency for Development and Cooperation (SDC), the DAE and IRRI implemented a more systematic collection scheme in 1995, representing the first

year of a four-year collection program for the whole country. Collections were made in five central and four southern provinces in 1995.

This paper describes the strategy adopted in these collecting missions and the sampling methods followed, the diversity observed in the material collected.

GERMPLASM COLLECTION

The collection area

The Lao PDR lies entirely within the tropics and is located between latitudes 14° 10' N to 22° 10' N and longitudes 100° 20' E to 107° 50' E (Fig. 1). The elevation ranges from about 200 m above sea level in the major rice-growing plains, to about 1,300 m in the Boloven Plateau of Champassak Province. Annual rainfall in the collection area ranges from 1,500 to 3,000 mm. Soils are predominantly loam to sandy loams, though heavy clay soils are found occasionally.

The collection strategy

Three collecting missions were launched during October, November, and December 1995, to coincide with the maturity of early, medium, and late maturing varieties, in four southern and five central provinces. Local agricultural extension officers from the districts and provinces concerned were also involved in the collecting effort. They first attended a one-week training course on the practical aspects of collecting and sampling.

Sampling methods

The objective was to collect enough material to represent maximum diversity through a minimum number of samples. The target was to collect a sample of each variety grown in each district. The coarse grid sampling method of Brown and Marshall (1995) was

followed. Standard procedures for collecting rice were used (Vaughan and Chang 1995). When sampling from relatively uniform fields, only one random sample was collected, supplemented by rare phenotypes. When there were several morphological types in the same field, each type was collected separately to facilitate conservation thereafter, and enhance utilization.

Types of material collected

Traditional rice varieties grown in the rainfed lowlands and uplands, together with wild rices and spontaneous interspecific hybrids between wild and cultivated rices, were collected from nine central and southern provinces (Fig. 1). Panicle and seed samples were obtained from farmers' fields, threshing floors, and stores. Indigenous knowledge about the varieties was obtained from farmers who donated the samples. Wild species and hybrids were collected from their natural habitats on field bunds, road side ditches, swamps, and canals.

GERMPLASM COLLECTED AND ITS CHARACTERISTICS

A total of 2,226 samples of cultivated rice, together with 73 wild and weedy forms were collected. Some of the latter can be considered as spontaneous interspecific hybrids between wild and cultivated forms. About 60% of the samples were collected from farmers' fields, 25% from the threshing floors, and 15% from farmers' stores. The majority of the samples had glutinous endosperm. This reflects Lao consumer preferences. The samples represent considerable diversity at the ecosystem, varietal, and species levels.

Ecosystem diversity

All the samples were collected from the rainfed lowland and rainfed upland environments during the 1995 wet season or immediately after (October to December). Collections were not made from the dry season (November to March) irrigated environment, where only improved varieties are grown. About 80% (1,774 samples) of the samples collected were from the rainfed lowland ecosystem, while 20% (452 samples) were from the rainfed uplands (Table 1).

Rainfed lowland ecosystem: This is the most important ecosystem in the Lao PDR, accounting for about 67% of the area under rice cultivation. Much of the area comprises a system of low-level terraces with an altitude of about 200 m. Soils are generally low-fertility loam, sandy loam and loamy sand, derived from old alluvial deposits. The production system is a single wet season crop, grown with minimum inputs. A low level of technology adoption prevails. Improved varieties are grown over about 20% of the area. The traditional varieties are relatively uniform. They are taller than improved varieties (80 - 300 cm), produce several thin culms (5 - 16), and have narrow leaves, short panicles, usually small and well-filled grains. Farmers usually grow several varieties in a relatively small area (Fig. 2). Crop duration of traditional varieties ranges from 90 to 180 days.

Rainfed upland ecosystem: Most upland rice cultivation is done under a "slash-and-burn" system and is concentrated on slopes ranging in altitude from 300 to 600 m, but the upper limit in the northern part of the country is about 1500 m. Slope gradients are mostly in the range 15-60%. Acrisols, alfisols, and leptosols predominate in the hilly areas, and they are generally strongly leached and acidic. Only traditional varieties are grown in the uplands, representing mixtures of different types

in the same field. In general, most upland varieties are early-maturing (90 - 120 days), produce fewer and thicker culms than lowland varieties, have broad and long leaves, and large, drooping, and sickle-shaped panicles (Fig. 3). The grains are large, rounded, and often not well-filled. Upland rice is rarely monocropped, and a range of other grain, and vegetable crops is grown in mixed culture with rice.

Varietal diversity

Farmers grow varieties representing three maturity groups—the early-maturity group which takes care of the immediate food requirement in the elevated area; the medium-maturity group which accounts for most of the area; and the late-maturity group which is strongly photoperiod-sensitive. While most farmers grow three varieties, some grow up to seven. These varieties are grown in a single field (Fig. 2) or in different fields. Farmers in a single village often grow up to 10 varieties (Fig. 5). Varieties differ in several characters such as crop duration, plant height, tillering, pigmentation on various plant parts, panicle shape and size, grain shape, size and color, and cooking and eating qualities, the latter representing varietal preferences for different traditional food preparations. Tremendous variation was also observed for brown rice color from black to red, to brown, or white. A unique feature of rice from the Lao PDR is the inclusion of several aromatic varieties in both the glutinous and non-glutinous groups. To produce good quality grain, farmers grow photoperiod-sensitive varieties which mature when the rains stop. As rice is grown under different ecosystems and under diverse agroclimatic conditions, farmers must have selected different varieties to suit the diverse growing conditions. There are some interesting varieties grown by farmers. The variety

Pua-mia consists of what appear to be two isogenic lines that differ only in glume color (Fig. 4). One produces purple to brown glumes, while the other produces green glumes, which turn yellow upon maturity. They are not only similar morphologically but they also flower and mature at the same time, and farmers grow them together as if they constituted a single variety. From one farmer's field near Pakse, 11 different phenotypes were identified that differed in shape and size of panicles and pigmentation of grains (Fig. 2). These differences may be related to seed selection practices followed by many farmers. Different rice varieties are associated with the 68 ethnic groups found in the Lao PDR. For example, the varieties grown by the Bolikhans produce long peduncles, as it is their practice to cut the peduncles with a small blade and put them in a bundle. The subethnic group-Phouthai who live around Xepon in Savannakhet Province strip the grain from a standing crop. The varieties thus produce fewer but larger panicles with larger grains. Some ethnic groups have strong preferences for particular grain quality attributes, as in the case among the Hmong and Yao (Lao Sung) who prefer non-glutinous rice. The Lao Loum, who live near urban areas and along the border with Thailand, grow aromatic varieties because of the high market demand and premium paid for such quality grain. Some varieties are well-suited for specific food preparations such as *Khao kam* since its black pericarp is best cooked with coconut milk in hollow bamboo, and *Lepnuk* which is used to make wafers. The strong preference for such types must have led to varietal diversity in grain quality attributes.

Species diversity

Several wild relatives of rice are endemic to the Lao PDR including *O. rufipogon*, *O. nivara*,

and *O. granulata*. The related genus *Hygroryza* has also been reported from the Lao PDR (Vaughan, 1989). *O. rufipogon*, a perennial species found in ponds and road side ditches, grows 3-4 m tall and produces long, loose open panicles with long red awns. It flowers between September and October, and matures between October and December. Seed production is low, spikelet fertility is reduced, and propagation is through seeds and vegetatively. *O. nivara* is an annual species that grows up to 2 m tall in shallow ponds, and produces several compact panicles with red long bristles. It flowers between August and September, matures between September, and seed production is abundant with good fertility. *O. rufipogon* and *O. nivara* often grow together with the former occupying the deeper areas of a pond and *O. nivara* the shallow portion. *O. granulata* was also found growing in Sekong and Attapeu provinces.

Spontaneous interspecific hybrids: Wild species growing in and along the borders of farmers' fields flower at the same time as *O. sativa*, leading to the production of hybrids. We found several hybrids and their derivatives that are more vigorous than the wild forms with which they grow, or occupying disturbed habitats and forming separate colonies. Intermediate weedy forms were found mostly along with the wild forms, while some populations were found to grow along with the cultivated forms. These hybrids have some characteristics of cultivated rice such as purple pigmentation on the peduncle and glumes, larger grain size, thicker stems, and larger panicles. In general, most of them are more vigorous than the wild forms. The most important character of the wild forms, absent in cultivated rices, is the presence of awns of varying length and color.

Indigenous knowledge

As farmers grow several varieties, they are identified by a specific name that often describes the morphological characters or quality attributes unique to that particular variety. The Katu farmers classify rice seeds based on pericarp color, presence or absence of awns, and grain length and width. The major criterion relates to endosperm characteristics, such as *Khao nieaw* (glutinous), *Khao chao* (non-glutinous or flaky), or *Khao hom* (aromatic). Based on pericarp color, varieties are classified as *Khao* (white), *Deng* (red), or *Khao kam* (black). As to grain filling and density, *Khao phannak* rice has large and heavy grains. Crop maturity is an important trait. Farmers identify *Khao sam deuan* rice that matures in three months, and *Sanpatong ngnun* rice that matures in six months. On the basis of glume pigmentation, varieties are classified as *Khao deng* (red), *Khao sam si* (stripes of yellow, red or purple), and *Khao kam* (black). Some varieties are identified by quality attributes like fast cooking time or aroma. Some of the characteristics have taxonomic importance. Glume length is used by farmers to classify varieties. For example, if sterile glumes are long, the variety is called *Khao pek*. Other characters include panicle shape (a variety with a sickle-shaped panicle which resembles the fruit of a tamarind is called *Khao mak kam*) plant height, tillering habit, and resistance to birds and insects. Some varieties are called by the names of fish or flowers indicating their cultural heritage. A source of considerable confusion is the practice of calling the same variety by different names, or different varieties by the same name.

Center of diversity of glutinous rice

Glutinous varieties have high amylopectin (95%) and low amylose content (4%). The

endosperm is opaque when dry and becomes sticky when cooked. More than 80% of the traditional rice varieties grown in the Lao PDR are glutinous (Cho and Kuriyama, 1960). There is tremendous variation in these varieties, and people prefer to use different varieties to make traditional food preparations rather than identify types that can adapt to the short growing season and the dry mountainous environments (Golomb 1975). Mekong delta which includes the Lao PDR, appears to be the center of diversity of glutinous rice. Though they are relatively low yielders, they are still grown by the farmers of the Lao PDR because of strong preference for such types. Steamed glutinous rice is eaten with fish, meat, chili sauce or tamarind, along with a variety of fresh green leaves collected from the forests. Glutinous varieties may gradually disappear unless similar high-yielding varieties become available.

Variation and adaptation

Under upland conditions, where soil moisture is a major constraint, early-maturing varieties are grown that may escape drought. On the other hand, long duration varieties are grown in areas that receive more rainfall. Non-glutinous varieties that are used to make noodles are grown near urban areas where the demand for such products is high. Varieties in the three maturity groups are grown to spread the family labor requirement over a longer period and secure stable production despite uncertain rainfall patterns.

Seed selection

Most lowland farmers select uniform fields for the purpose of producing seed. Katu farmers describe three kinds of rice varieties: ordinary rice seeds with a black "skin", i.e. the pericarp; those with "tails", i.e. awns; and those that are "good looking" (Sullivan and Costello 1994).

The most common practice is to remove off-types on the threshing floor and select uniform panicles for seed purposes. Selected material is threshed and kept separately. Some farmers take the bulk seed from the threshing floor and this is sieved to eliminate unfilled or partially filled seeds. Upland farmers often select and mix different phenotypes in a particular proportion. Materials destined for seed production are packed and carefully kept separately.

Seed exchange

Farmer to farmer exchange of seeds of improved varieties is very common especially along the border with Thailand, Cambodia, or Vietnam. Farmers select varieties introduced from neighboring countries based on either yield potential or grain quality. Such varieties are called by their local names or they are named after the place where they were obtained. Names of some varieties indicate that they have been introduced from the Philippines and the USA. Promising varieties from one region of the country are also introduced to another region. For example, the variety *lloup* which is popular around Champassak Province was recently introduced to Vientiane because of its high yield potential. Promising varieties are also exchanged among farmers within a village.

Genetic erosion

Due to the concerted efforts of the DOAE, high-yielding varieties such as RD4, RD6, RD8, RD10, PN1, PN2, and TDK have become quite popular with farmers, especially in the rainfed lowland rice-growing areas of the southern and central provinces. During the wet season, about 15-20% of this area is planted to improved cultivars. During the dry season, only improved varieties are grown under irrigation. With a more open market

economy and the availability of fertilizers, farmers are adopting improved varieties for favorable rainfed lowland environments. Some farmers in Savannakhet, Champassak, and Vientiane municipality and those in Vientiane Province no longer grow traditional rice varieties. This shift has led to the loss of traditional varieties.

Germplasm conservation

Ex situ conservation of genetic resources in genebanks is the most secure and cost-effective strategy for the long-term preservation of rice germplasm (Ford-Lloyd and Jackson 1986; Jackson and Huggan 1993, Jackson, 1995). The country's first national cold storage facility to conserve germplasm was built at the National Agricultural Research Center in Vientiane Municipality in 1994. The facility is designed for seed storage at two different temperatures, namely 10°C and 4°C, and about 50% relative humidity (RH). A small seed laboratory was also built to process seed for preservation and to monitor seed viability. All the collected germplasm will be preserved in the newly established facility at NARC (Fig. 7). A duplicate set of all the collected materials will be preserved in the International Rice Genebank at IRRI.

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Figure 1. Map showing the provinces and some places from where rice germplasm samples were collected from the Lao PDR during 1995



Figure 2 Seven diverse varieties grown in a small rainfed lowland field. The relatively morphologically uniform varieties mature at different times.



Figure 3. Several panicle types found in a single upland rice field. Broad long leaves, thick culms and large panicles could be seen which are characteristic features of upland varieties.



Figure 4. Rice variety called husband and wife. Two presumed isogenic lines called pua (husband on the right) and meia (wife on the left) are grown as a single variety, the two lines resemble each other and are indistinguishable until grain filling.

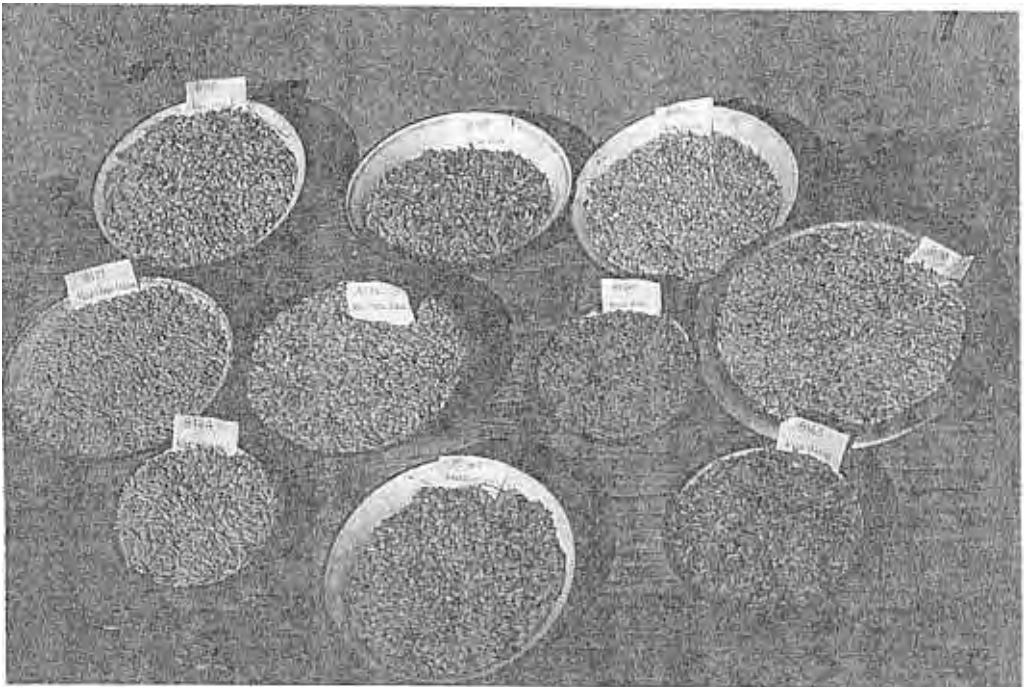


Figure 5. Seeds of 10 varieties collected in a single village in Vang Vieng District

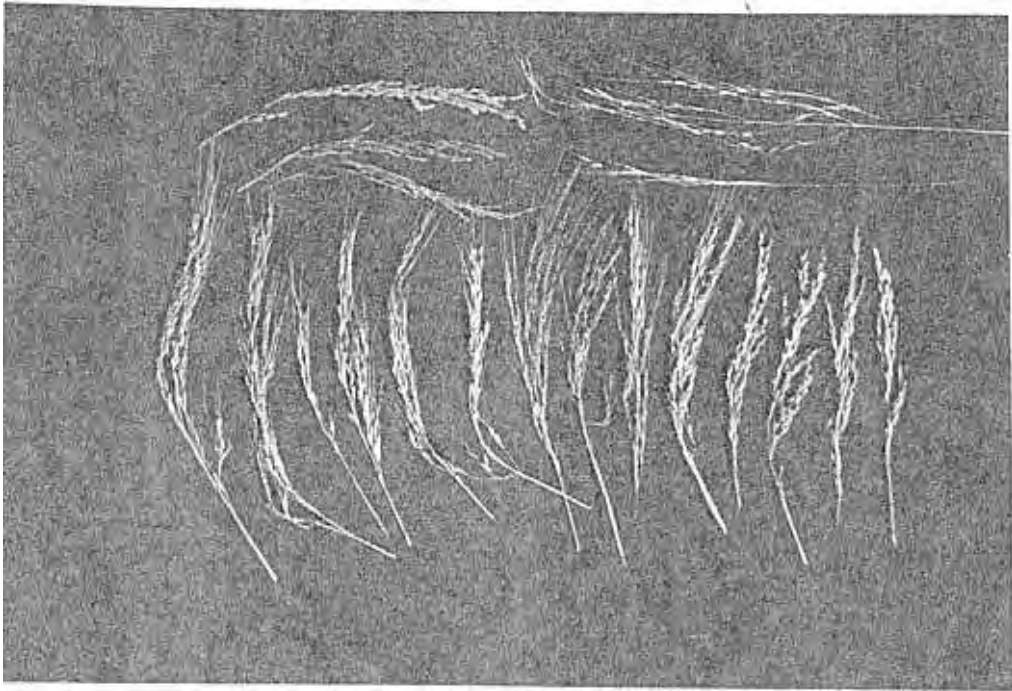


Figure 6. Panicles of wild (bottom left), cultivated (bottom right) and presumed spontaneous interspecific hybrids found in Nong Ping village near Vientiane



Figure 7. Variation for panicle and grain characters in some rice varieties collected from the Lao PDR during 1995.

Table Classification of germplas collected from the southern and central provinces of the Lao PDR during 1995

	TOTAL	Li	UI	Gt	Ng	In	Jp	Jv	Hb	EI	Md	Lt
ATTAPEU												
Sanxay	12	8	4	9	3	10	1	1		7	4	1
Xaisettha	36	30	6	28	8	33			3	14	22	
Samakhhixay	116	102	14	85	31	111	2	3		38	53	25
Sanamxay	43	28	15	36	7	43				21	14	8
Phouvong	9	2	7	9		9				7	2	
Total	216	170	9	167	49	206	3	4	3	87	95	34
CHAMPASAK												
Xanasomboun	42	39	3	39	3	42				20	18	4
Bachingchaleunsouk	9		9	9		9				9		
Pakse	22	22		20	2	22				1	20	1
Phonthong	52	47	5	45	7	52				21	29	2
Champasak	54	54		47	7	53	1			15	38	1
Pathoumphon	30	29	1	28	2	25		5		7	19	4
Soukhoumma	25	25		23	2	25				8	17	
Khong	33	33		28	5	32		1		8	22	3
Total	267	249	18	239	28	260	1	6		89	163	15
SEKONG												
Kaleum	10		10	7	3	10					10	
Thateng	34	11	23	28	6	31		3		17	17	
Lanam	53	45	8	47	6	51		2		15	34	4
Total	97	56	41	82	15	92		5		32	61	4
SARAVAN												
Lakhonpheng	17	17		16	1	17					17	
Vapi	53	52	1	47	6	50		2	1	9	35	9
Khongsedon	44	36	8	43	1	38		5	1	18	22	4
Saravan	65	58	7	61	4	57	2	5	1	7	51	7
Laongam	23		23	19	4	16	6	1			22	1
Total	202	163	39	186	16	178	8	13	3	34	147	21
SAVANNAKHET												
Xaybouli	58	53	6	55	4	58				13	40	5
Outhoumphon	38	37	1	36	2	31	2	5		5	29	4
Atsaphangthong	56	56		56		51	3	2		7	39	10
Xepon	20	1	19	17	3	19	1			19	1	
Khanthabouli	63	63		61	2	61		2		5	43	15
Champhon	63	63		61	2	63				2	36	25
Phin	18	15	3	17	1	18				5	12	1
Songkhon	47	47		45	2	47				1	41	5
Thapangthong	2	2		2		2						2
Total	365	337	29	350	16	350	6	9		57	241	67

	Total	LI	UI	Gt	Ng	In	Jp	Jv	Hb	EI	Md	Lt
KHAMMOUAN												
Hinboun	46	13	33	43	3	46				21	22	3
Nakay	19	17	2	18	1	17		2		15	2	2
Gnommalat	47	7	40	47		46	1			16	16	15
Thakhek	65	2	63	59	6	65				13	51	1
Mahaxai	23	1	22	22	1	21	1		1	2	18	3
Nongbok	38	2	36	31	7	38				11	25	2
Xebangfai	77	8	69	74	3	75	2			14	48	15
Total	315	50	265	294	21	308	4	2	1	92	182	41
BOLIKHAMXAI												
Bolikhhan	25	14	11	24	1	25				12	13	
Thaphabat	16	8	8	14	2	16				9	6	1
Pakxan	82	63	19	76	6	82				22	47	13
Pakkading	37	22	15	32	5	35	2			8	28	1
Khamkeut	29	15	14	26	3	29				4	23	2
Total	189	122	67	172	17	187	2			55	117	17
VIENTIANE Prov.												
Kasi	90	71	19	80	10	88	2			46	22	22
Vangvieng	77	30	47	72	5	75	1	1		14	39	24
Keo Oudom	15	1	14	15		14		1		14		1
Phonhong	30	22	8	29	1	28	1		1	7	17	6
Thoulakhom	45	41	4	43	2	45				7	24	14
Total	257	165	92	239	18	250	4	2	1	88	102	67
VIENTIANE Mun.												
Chanthabouli	4	4		2	2	4					2	2
Xaisettha	4	4		3	1	4				1	2	1
Sikhottabong	12	7	5	12		10		2		3	9	
Hatxayfong	11	11		4	7	11					8	3
Xaithani	19	19		18	1	19				4	12	3
Sangthong	29	14	15	28	1	24		5		2	22	5
Pakngeum	6	6		5	1	6					3	3
Total	85	65	20	72	13	78		7		10	58	17
Grand total	1,993	1,377	617	1,801	193	1,909	28	48	8	544	1,166	293

LI = Lowland, UI = Upland, Gt = Glutinous, Ng = Nonglutinous, In = Indica,
 Jp = Japonica, Jv = Javanica, Hb = Hybrid, EI = Early, Md = Medium, Lt = Late.

Collection and Preservation of Rice Germplasm from Southern and Central Regions of the Lao PDR

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ABSTRACT

The Lao People's Democratic Republic (Lao PDR) lies within the center of diversity of Asian rice (*Oryza sativa* L.), particularly for glutinous rices. Subsistence rice farmers in the Lao PDR still grow many traditional varieties. Efforts are being made by the Lao Department of Agriculture and Extension, in collaboration with the International Rice Research Institute (IRRI), to undertake the collection and preservation of as many of these varieties and wild rices as possible from rainfed lowland and upland environments. In 1995, three collecting missions obtained a total of 2,226 samples of traditional varieties and 72 samples of wild rices from five central and four southern provinces of the country. In the rainfed lowland ecosystem, cultivation of a few relatively uniform varieties is the normal practice, and farmers usually grow 3-5 varieties with maturity ranging from 90 to 160 days. However, in the uplands, farmers grow varietal mixtures consisting of several phenotypes. To facilitate utilization and conservation, each phenotype was collected as a separate sample. Traditional varieties often differ in crop duration, tillering, panicle size, shape and compactness, glume color, shape and size, and grain color, size, shape, and quality attributes. Most upland varieties appear to be javanica or tropical japonica rices. The majority of the samples collected have glutinous white endosperm. Considerable diversity was also found in spontaneous interspecific hybrids between wild and cultivated rices. One germplasm set is being conserved at the National Agricultural Research Center in Vientiane Municipality. A duplicate set is being preserved at the International Rice Genebank at IRRI in the Philippines.

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