

Chapter 1

Introduction

Rice is the staple food of the people in Lao PDR. It is accounted for more than 80% of the total cropped area. Rice is cultivated in three main different agroecosystems: irrigated, rainfed lowland and rainfed upland. In Lao PDR the proportion of glutinous rice to total rice production and consumption is the highest in Asia. It is estimated that about 85 % of total rice production in Laos is of glutinous type because most Lao, except people of Lao Soung ethnic groups, prefer to eat glutinous rice (Schiller *et al.*, 2001). Some 15.31% of rice area in Lao PDR is planted as upland rice (Linguist *et al.*, 2006). Most upland rice cultivation is in the northern part of the agricultural region with the slope gradients mostly ranging from 15 to 60% and with altitude ranging from 300 to 1500 msl. Most upland rice grown are traditional cultivars.

Diversity of traditional cultivars particularly landrace are defined as

“geographically or ecologically distinctive populations, which are conspicuously diverse in their genetic composition both between landraces and within them,”

(Brown, 1978) and they are each identifiable by their unique morphologies and well established local names (Harlan, 1992). Landrace are the traditional varieties of rice, grown by local farmers, which are passed down from generation to generation.

Landraces represent a unique and critical source of genetically variable traits that can serve as a resource for future rice improvement.

In situ or on-farm conservation of landraces means preserving, in their original agroecosystem. In addition to these “natural” process, the management practices of local farmers strongly influence the distribution and apportionment of variation through the process of seed selection and exchange (Parzies *et al.*, 2004). Consequently, farmer’s management may affect the dynamic of crop genetics either increasing or decreasing diversity and thus influence the evolutionary dynamics of local crop varieties.

Since 1993, the widespread and rapid adoption of higher-yielding improved varieties, traditional rice varieties are dramatically disappearing in rainfed lowland and irrigated areas and are slowly disappearing in upland areas (Phengchanh, 2007). In upland ecosystems, the process of disappearance of local traditional rice varieties is mainly associated with the substitution with superior traditional rice varieties from other areas. These superior varieties have been identified from evaluation of traditional upland varieties collected during the survey between 1995 and early 2000. In some areas where variety selections have been introduced to upland farmers in northern Laos, they are already being adopted and are expected to replace many of the varieties that have been grown for many years. The erosion of the upland rice germplasm base might also be accelerated as a result of a gradual decline in the area of upland rice cultivated throughout Laos, in line with government policy of moving from annual cropping (rice and other annual crops), to more sustainable agricultural practices in the uplands throughout the country.

Therefore, bases on the on-farm conservation of local rice varieties are important to genetic resources and are needed for varieties improvement. To assist *in situ* conservation strategy, the existing local germplasm and farmer management in

the areas need to be examined. Therefore, this study aim to identify genetic diversity of local rice in four villages in Luang Prabang. This will improve our understanding genetic diversity of local populations for on-farm conservation strategies and identify useful characteristics for breeding program.

The overall objectives this thesis was to evaluated genetic diversity of local rice germplasm and examine farmers' use and management of local rice varieties. More specific objective the study was aiming to:

1. Determine the range of local rice germplasm grow in the study area, and identify the varieties, attributes of these varieties considered important by farmers and farmers' management practices for traditional varieties.
2. Evaluate the genetic diversity of local rice varieties using morphological, physiological traits, and
3. Examine the genetic structure of local rice varieties with the same names in the study area