

CHAPTER 1

INTRODUCTION

1.1 General background

The Lao People's Democratic Republic (Lao PDR) is located in the center of Southeast Asian peninsula, bordered by China to the north, Myanmar to the northwest, Thailand to the south and west, Vietnam to the east, and Cambodia to the south. The country occupies a total area of 236,800 km², in which supports a population of 4.8 million (Maag, 1999).

Laos has had a Communist centrally planned economy with government ownership and control of productive enterprises. After the introduction of reforms under the New Economic Mechanism (NEM) in 1986, however, the government has been transforming the economy from the centrally planned to a market-oriented system i.e., decentralizing control and encouraging private enterprise. The economical reforms and sound macroeconomic management initiated under the NEM brought about a steady improvement towards macroeconomic stability, production growth, the promotion of a small private sector, and foreign investments and trading.

Subsistence agriculture is the main occupation in the Lao PDR, accounting for about 52% of total GDP and employing 80% of the labor force (Maag, 1999). Rice is the single most important crop in Laos, which is grown on more than 80% of the cropped land area. Most of the rice produced in Laos is consumed directly by smallholder producers. Many areas do not produce enough rice to meet domestic requirements. For

the foreseeable future, agriculture will continue to be important to the Lao economy. Sustainable rural development and natural resource management will require elaborating and/or correcting policy distortions, improving agricultural productivity, and ensuring appropriate forestry management techniques for environmental sustainability.

Deforestation for food production is one of the important issues that the Lao government is trying to solve. To protect and preserve its natural resources the Lao government wants to replace shifting cultivation, especially upland rice production, with permanent agriculture. Policy targets for land area planted to upland rice project a decrease (of 64.7%) from 164,100 ha in 1997 to 58,000 ha in the year 2000(Lao-IRRI Project, 1998).

Reduction in the land area planted to upland rice requires increasing productivity to meet the growing rice demand. To ensure rice sufficiency in the future, the effective and productive technologies must be used to increase rice production from limited land. The technologies used, however, must be acceptable to local farmers as well as to government policy. In order to save time and resources “best bet” technologies, developed on-station, must be on farmer’s fields before recommending them to farmers. The general concept of the research is depicted by Figure 1.1. It is hoped that by adopting an appropriate technology, farmers would be able to shift the production output upward from a limited land, that is from A to B. The adoption of an effective technology may also help farmers accumulate capital, which is important for their future investment. A poor farmer could be self-sufficient in food consumption or have surplus if they could improve productivity of their land.

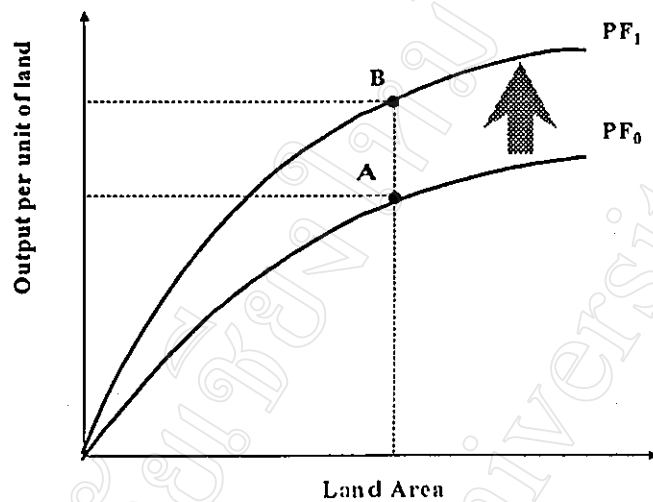


Figure 1.1 The general concept of the ongoing research activity.

Introducing pigeon pea into upland rice-based production systems could help farmers to improve their production output from limited land. In addition to food and/or feed for animals, pigeon pea may provide benefits for soil fertility that facilitates longer-term production. Developing intercropping technologies and determining how pigeon pea can be best incorporated into the upland rice-based production systems could also help farmers to accumulate capital, which is important for their future investment as well.

1.2 Statement of problems

An estimated 2.3 million ha of land, 9.7% of the Lao territory, is believed to be involved in shifting cultivation systems. About 380,000 ha of the land is cropped annually, providing livelihood for about 300,000 families (Chazee, 1994).

Shifting cultivation, with upland rice as the main crop, is widely practiced in the northern agricultural region of Laos. In 1997, upland rice was planted on 164,100 ha, 71% of which was in the northern region (Figure 1.2). Approximately 175,600 tons of upland rice was produced, representing 42% of the total rice production in the region or 15% of the national rice production.

Luang Prabang province has the highest upland rice area in the region as well as in the country. In 1997, upland rice was planted on 35,000 ha (Provincial Crops Section, 1997) which occupied 77% of the provincial rice areas, producing 52,800 tons, 60% of the provincial rice production (Figure 1.3). Areas planted to upland rice have been dramatically decreasing since the last few years, from about 60,000 ha in 1990 to 35,000 ha in 1997 (Provincial Agriculture Service, 1997), causing rice production to decrease from 106,500 tons in 1990 to 92,300 tons in 1997.

The recent government policy towards forest resources protection, the implementation of the land allocation program, causes upland rice areas under the shifting cultivation to reduce dramatically. As a result, the fallow periods, which are critical to the productivity and sustainability of upland rice production, have been shortened significantly over the last few years. Figure 1.4 shows the relationship between fallow periods and number of weedings. The number of weedings is increased

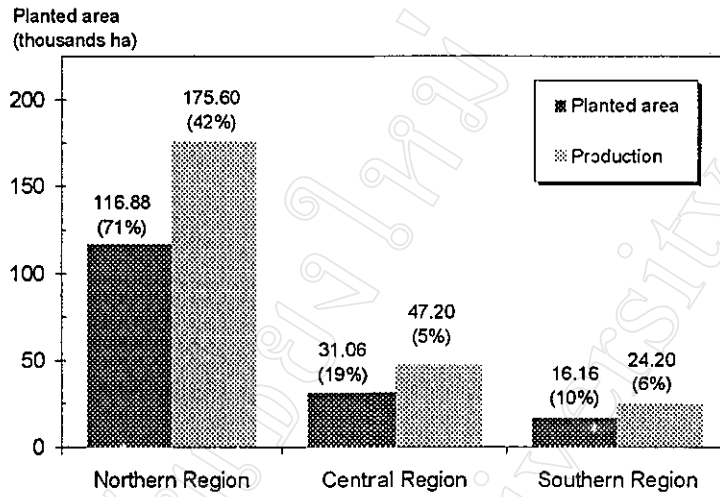


Figure 1.2 Importance of rainfed upland rice in different agricultural regions of the Lao PDR. (Source: Lao IRRI Project, 1998)

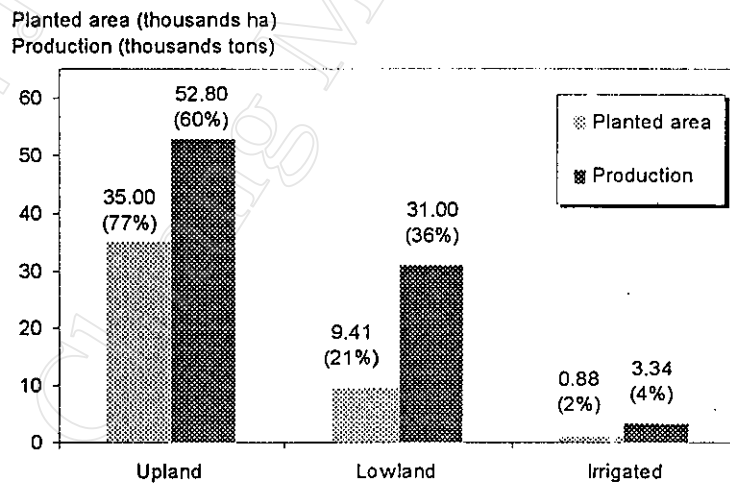


Figure 1.3 Rice production in Luang Prabang Province. (Source: Provincial Crops Section, 1997)

more rapidly when the fallow period is less than 5 years. The weeding requirement is almost stable (about 2 weedings per season) when the fallow period is more than 20 years, indicating that under long fallow periods farmers can efficiently produce upland rice that is with less labor.

Increasing population challenges the agriculture sector to produce more food and fiber. Population and rice production data for Luang Prabang province during the last 20 years (1976-98), show that the population has been steadily increasing. If the population keeps growing as the current pace the population would be almost 400,000 people in the year 2,000 (Figure 1.5), meanwhile rice production has failed to keep pace with such increasing population. The situation has been worsening for the last few years. This is perhaps because of the considerable reduction of upland rice area and corresponding decrease in production.

To be self-sufficient in rice, production must be increased locally to meet the growing demand. Small improvements made to upland rice production might have a considerable impact on the aggregate rice supply for the province and/or for the region. Efforts towards improvement of productivity and stability of the uplands have long been ignored. Rice production in the uplands, however, has recently been one of the primary national concerns that must be addressed. Shifting cultivation has created detrimental impacts to the environment and is perceived to have tremendous off-site effects caused by indiscriminate deforestation, which negatively affects biodiversity and wild life, water availability, and the stability of food production in the plains.

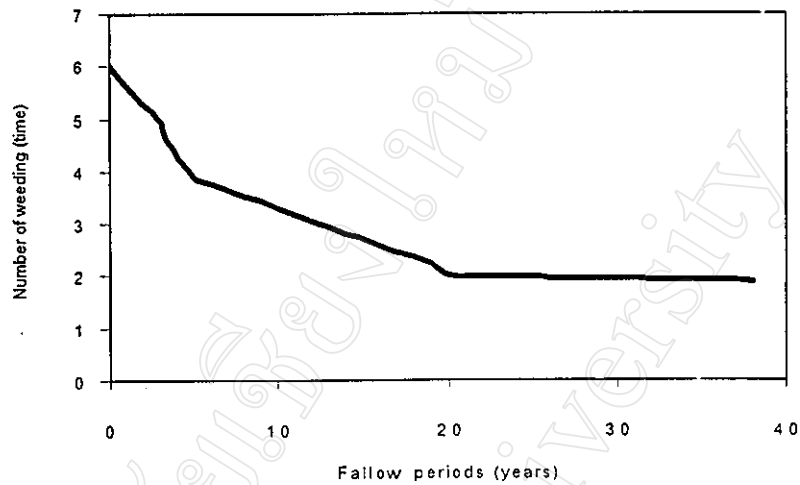


Figure 1.4 Relationship between weeding requirement and fallow periods.

(Source: Lao IRRI Project, 1994)

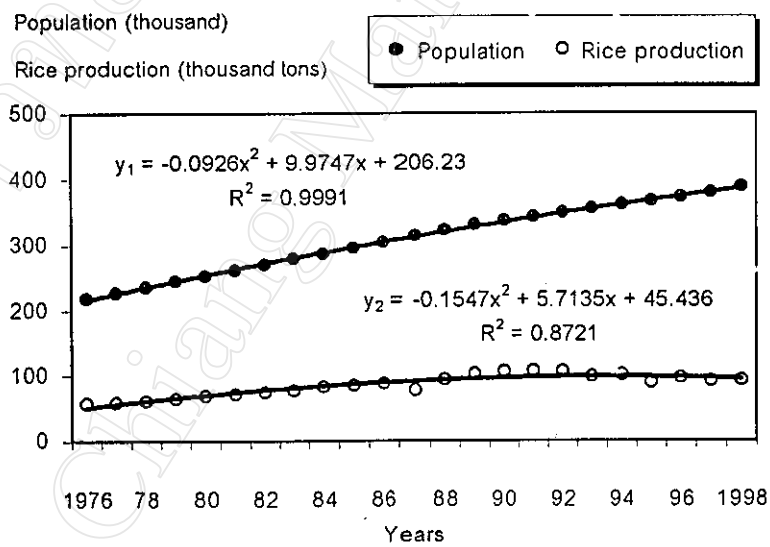


Figure 1.5 Population growth and rice production trend of the Luang Prabang province for 1976-1998.

(Source: Provincial Agriculture Service of Luang Prabang, 1997, 1998)

1.3 Rationale

As mentioned earlier, upland rice production plays a very important role to the total rice supply for Luang Prabang province as well as of the northern region and that of the nation. In producing more food, both farmers and government are faced with scarcity. They can not always get exactly what they want. To get more of something generally means a decrease in something else. It is necessary, to choose among alternatives. For farmers, the opportunity cost of producing upland rice is the cost of labor input forgone, while for the government, the opportunity cost of upland rice production is the cost of forest land forgone. As a result, the strategies used by farmers and government in producing the same amount of upland rice is absolutely different. The farmers try to produce upland rice with less labor, while government wants to produce upland rice with less land.

Efforts towards improvement of productivity and sustainability and the search for alternatives livelihood systems for the uplands have been carried out by numerous governmental and international organisations. Most projects to improve living standards of upland farmers have failed. For example, the promotion of cash crops for replacing upland rice has not succeeded because of numerous factors such as accessibility to markets. Most upland production is scattered in remote places. The rainy season increases transportation cost and reduces product quality due to improper storage hence increased cost of production. According to the data from the past 20 year data (1976-1997), there has been high variability in the production of some common upland crops (Figure 1.6). The variation might have been caused partly by the failure of reliable prices

for the products. Maize was observed to be the most stable non-rice crop planted in the uplands (CV=36%).

Government policy that national rice sufficiency should come from increased production in the lowlands seems difficult to achieve. There has been little evidence of improvements in productivity in the lowland environment (Figure 1.7). The increase in rice production by expansion of rainfed and irrigated lowland and the use of modern technology has also been primarily constrained by limited land and water. Irrigated rice production in Luang Prabang province is often supplied with water by pumping during the dry season, entailing high investment and maintenance costs.

Areas planted to upland rice in Luang Prabang have been dramatically decreasing over the last 7 years, from about 60,000 ha in 1990 to 35,000 ha in 1997. The decrease in upland rice planted areas has caused considerable reduction in rice production, so that rice production failed to keep pace with ever increasing population (Figure 1.5). The situation has been worsening for the last few years. This is perhaps because of the considerable reduction of upland rice area.

Obviously, upland rice plays a very important role in the rice supply of Luang Prabang province. A minor change made to upland rice production might have a major impact on the local and/or regional rice sufficiency as well as that of the nation. Upland rice may become even more important for food production in the future when the flat land suitable for the lowland production becomes limited as a result of population growth.

Accumulation of capital and technological progress may help to sustain and ensure food production. If farmers had more capital they would invest more. If they invested more they could generate more income, increasing willingness to adopt new technologies for increasing productivity of their land.

Intercropping systems, in which upland rice is grown as the main crop, have been developed by researchers and have shown promise for increasing productivity for small scale farmers with limited access to land and external inputs. Intercropping legumes, such as pigeon pea, into the upland rice-based production system may also help suppress weeds and reduce soil erosion, hence favoring longer term productivity. Incorporating pigeon pea into the rice-based upland production system may be an important first step for farmers to help them move to more intensive permanent agriculture.

1.4 Objectives

The general objectives of the study are to introduce pigeon pea into the upland rice-based production system and to develop technologies that optimise management of pigeon pea in the system. Specific objectives of the study are as follows:

1. To investigate the existing upland rice-based production systems in Luang Prabang.
2. To identify potentials and constraints of introducing upland rice/pigeon pea intercropping practices.
3. To evaluate agronomic performance of different rice/pigeon pea intercropping systems.

1.5 Usefulness of the Study

The study aims mainly at providing information to the decision-makers, government officials and farmers with the following knowledge:

1. Information how the different rice/pigeon pea intercropping technologies may help to improve productivity and sustainability of rice-based upland production system.
2. Farmer's perception on the incorporation of rice/pigeon pea intercropping practices into the existing land use system.

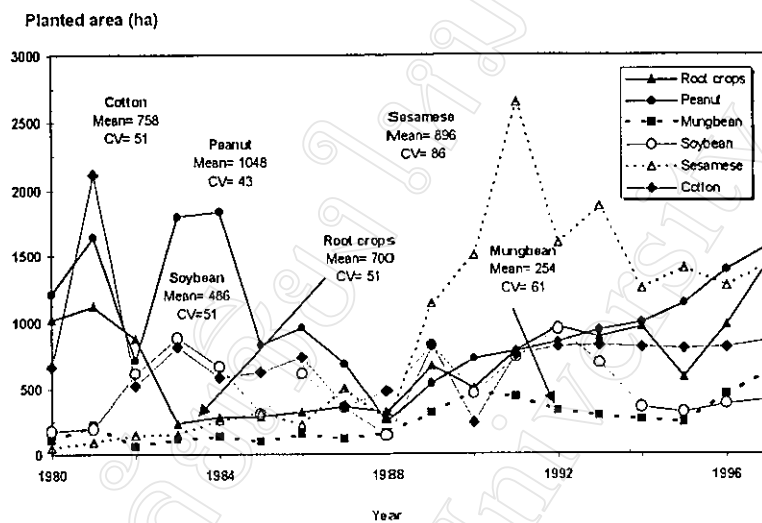


Figure 1.6 Production of some common upland crops for the last 20 years.
 (sources: Provincial Agriculture Service of Luang Prabang, 1997)

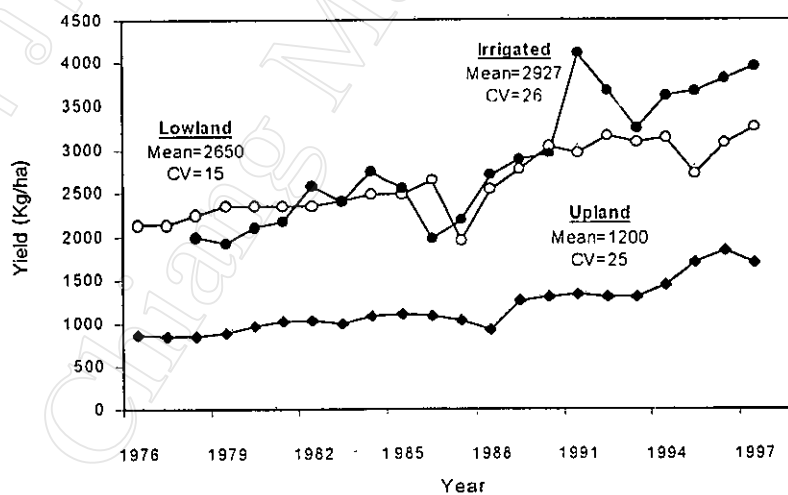


Figure 1.7 Trend in rice yield for different rice environments over the last 20 years.
 (sources: Provincial Agriculture Service of Luang Prabang, 1997)