

### Introduction

In Laos, cassava (*Manihot esculenta* Crantz), known as 'Man Ton', is one of the main food crops for smallholder farmers in remote upland areas. Recently, the crop has become an important cash crop for either domestic use or for export because it can be used for food and feed as well as for industrial processing into starch, sweeteners and ethanol. Due to the lack of improved varieties and appropriate agronomic practices, cassava yields are still low (7.06 t/ha in 2006) in traditional systems as the crop is basically used only for direct human consumption after boiling or baking.

With financial support from the Nippon Foundation in Japan, CIAT has conducted cassava research in Lao PDR since 2004, in collaboration with national research partners, mainly the National Agriculture and Forestry Research Institute (NAFRI), and with Provincial and District Agriculture and Forestry Offices.

### Objectives

- > improving the livelihoods of smallholder farmers in the uplands
- > enhancing the sustainability of cassava-based cropping systems

### Methodology

Farmer participatory research (FPR) approaches were used to involve farmers more directly in the decision making process, by assisting farmers in the conducting of FPR trials on their own fields, testing new cassava varieties, appropriate fertilization practices, and improved cassava harvesting tools, as well as the use of cassava roots and leaves for animal feeding.

### Results

#### Enhancing sustainable production by improved cassava varieties and better agronomic practices

The introduced CIAT-derived Thai cassava varieties, such as Kasetsart 50 and Rayong 72, have produced the highest fresh root yields with the highest starch contents. These were significantly higher than those of the local varieties. In on-farm trials, root yields varied from 7 to 75 t/ha/year, depending upon soil fertility status and climatic conditions.

Intercropping cassava with other crops may have certain advantages for smallholder farmers, such as reducing the risk of complete crop failure, as well as having positive effects on soil fertility and soil erosion. Trials indicated that intercropping with grain legumes such as peanut (*Arachis hypogaea*) will provide farmers with better cash flow and reduce soil erosion.



Application of balanced fertilizers significantly increased yields and net income. In Xieng Khouang province, the application of 25 kg N, 100 P<sub>2</sub>O<sub>5</sub> and 100 K<sub>2</sub>O/ha produced a root yield by Kasetsart 50 of 33.2 t/ha as compared to 12.4 t/ha without fertilizers (net income 2.52 million kip/ha as compared to 0.66 million kip/ha). This compares to 17.5 and 5 t/ha, respectively, for the local variety.



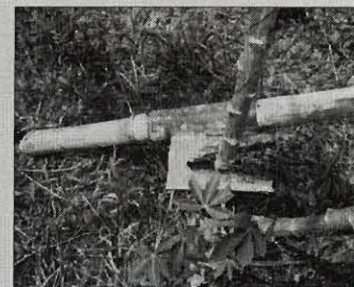
The harvesting tool, developed by Thai farmers, has reduced farmers' labor to between 25 to 50% as compared with harvesting by hoe, and the chipping tool has improved work efficiently by 5-8 times as compared to chipping by knife.

### Conclusions

Improved cassava varieties and production technologies can significantly increase both the fresh root yield and starch content. At the farm level, cassava roots and leaves are easily made into dry root chips, root meal or root silage, and leaf meal or leaf silage, which can be fed to livestock, either on-farm or as a component of commercial feed.

In Lao PDR, the prospects for increased cassava production in the immediate future are very bright as new markets for dry chips and cassava starch have recently opened in the country as well as in neighboring China, Vietnam and Thailand. There is a need, however, to ensure the availability of enough cassava supplies for both export and domestic markets. Therefore, farmers urgently need to improve yields and the sustainability of production, and to reduce production costs, which will all have large income implications for smallholder farmers.

Farmer participatory research and extension approaches are a good way to develop and disseminate improved cassava varieties and production practices, as well as the on-farm utilization of cassava, in order to improve the living standard of farmers.



Results of an on-farm variety trial\* in Oudomxay province, Laos (planted on 2 April 2006 and harvested on 29 April 2007)

Variety	Fresh root yield (t/ha)	Starch content (%)	Starch yield (t/ha)
Kasetsart 50	75.0	29.4	22.05
Rayong 90	64.0	26.5	16.96
Rayong 72	53.0	30.0	15.90
Rayong 2	55.0	17.8	9.79
Local	15.2	17.0	2.58

\*without fertilizer

#### Improving cassava utilization and the use of appropriate tools

Cassava roots are a good source of energy and its leaves are an excellent source of protein for livestock. Drying or ensiling of roots and leaves are good preservation methods that will also reduce the HCN content in the feed to acceptable levels (<50 ppm). Pigs can be fed approximately 10-30% of leaf silage or leaf meal in the feed ration.

Simple tools, which can be fabricated locally, are now available for harvesting cassava roots, for slicing roots to make dry chips and for chopping leaves for silage production.