



Tropentag 2008
University of Hohenheim, October 7-9, 2008
Conference on International Research on Food Security, Natural
Resource Management and Rural Development

**Germplasm collection - Variety Tests – Seed Production - Marketing.
Experiences with Local Vegetables in Lao PDR**

Plewa, M.¹

German Development Service (DED) at Haddokkeo Horticulture Research Center (HHRC),
National Agriculture and Forestry Research Institute (NAFRI), P.O. Box 811 Vientiane, Lao PDR;

1. Introduction

A 24 hours consumption survey in the Lao PDR showed, that a total of 96 different food items are consumed, 48 of them are vegetables. On an average, each family member consumes 11 different food items, of which five are vegetables (Siphandouang *et al.* 2002). Vegetables are the major source of vitamins A and C and one of the most important sources of calcium, iron, and vitamin B2. By diversifying the diet with vegetables, the nutritional status of consumers is improved, leading to better health conditions. Vegetables provide one of the cheapest sources to balance micronutrients deficiencies (Siphandouang *et al.* 2002).

In the Lao PDR, vegetables are grown mostly in permanent home gardens, on riverbank gardens during the dry season, on irrigated fields and in mixed cropping systems with upland rice. The Lao PDR is a primary centre of origin and diversity for cultivated rice and several other crops. Other than for rice, very little efforts have been made to collect, conserve, characterise, and utilise for development such crops that are traditionally used by the Lao farmers. Sustainable management of agrobiodiversity is the only option to achieve food security and reduce poverty (Government of the Lao PDR, 2004).

Between 2002 and 2007, the German Development Service (DED) supported the vegetable section at Haddokkeo Horticulture Research Center (HHRC), belonging to the National Agriculture and Forestry Research Institute (NAFRI) with a project entitled “*Conservation & Utilization of Agrobiodiversity – Vegetable Seed Production for Lao Farmers*”. Some experiences from activities concerning collecting and screening of local vegetable varieties and vegetable seed production are summarized here.

2. Biodiversity of local vegetables and variety tests

2.1. Material and Methods

Between 2002 and 2006, the HHRC research team conducted nine field trips for the collection of local varieties of vegetables by visiting 281 villages inhabited by various ethnic groups in 76 districts of all 16 provinces including the Vientiane municipality and the Saisomboun Special Zone in the Lao PDR.

At local markets, all information on vegetable growing villages was gathered and sometimes local seeds or fruits were bought, which were processed afterwards. With official permission of the Ministry of Agriculture and Forestry/NAFRI and the assistance of provincial or district authorities, the village heads (naiban) were contacted who supported the seed collection in their areas. Seeds from farmland, upland fields, home gardens, and home seed storages were obtained and kept in airtight film boxes or plastic bags. As much as possible data about village, district, province, farmers name, ethnic group, local name of the crop and variety were collected. These passport data were used for the documentation in forms used by the Asian Vegetable Research and Development Center (AVRDC). Furthermore, a serial number for each sample and the name of province were provided. The seed samples were processed and dried before

¹ Email: matthias.plewa@gmx.de

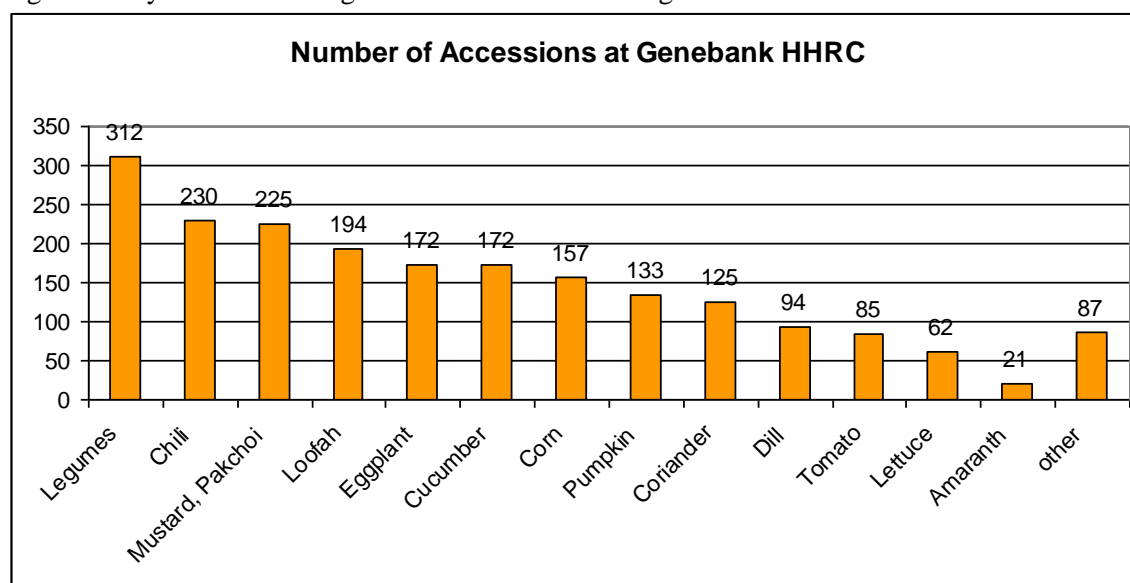
storage in a refrigerator maintaining a temperature of 5 °C at HHRC. All information is accessible from the database.

Screenings of several accessions maintained in this gene bank were conducted at HHRC and in farmers' fields. Questionnaires filled in by farmers, traders and HHRC staff provided information for selection of varieties. For the description of biodiversity of eggplant, a detailed research program was undertaken at HHRC for 150 accessions from all provinces of the country. The AVRDC descriptors were used for this screening. For every accession, ten plants were transplanted in the field to study the vegetative, flowering, fruit and seed stages, and three single plants were selected to study yield components.

2.2. Results

At HHRC, a vegetable genebank with a total of 2,100 accessions of local vegetable varieties collected in Laos was established. The largest groups are the legumes consisting of several kinds of upland beans, yard long beans, lab lab beans, soybean and mung bean. The second largest crop collections were chili and pakchoi/mustard, followed by loofah, eggplant, cucumber, maize, pumpkin, and coriander (Fig. 1).

Fig. 1 Survey on the local vegetables within the HHRC genebank



The crops partly characterised and evaluated at HHRC are chili, tomato, lettuce, and yard long bean. As the result of several trials, four extremely promising tomato varieties were identified. These are HHRC 5, and HHRC 6 for the rainy season and HHRC MT and HHRC DK for the dry season. Further an accession of lettuce for dry season could meet the critical demand of the Lao market and was selected. They are already released to the Lao farmers and were included in the seed production and multiplication program for further distribution to them.

The 150 accessions of eggplant, so far characterised, were separated into eight groups, namely 'very long', 'long', 'round - green', 'round - violet/white', 'egg shaped', 'very small - round', 'broader than long', and 'big - oval'. The analysis was especially focused on yield in combination with quality parameters, like yield per plant of marketable fruits, number of fruits per plant, percentage of marketable fruits, and percentage of fruit infestation by fruit and shoot borer. A genotype from Luang Prabang province was found to be high-yielding with more than 3 kg marketable fruits per plant. Five genotypes from Attapeu, Vientiane Capital, Huaphan and Xienkuang were also high-yielding between 2.1 and 2.6 kg marketable fruits per plant. Less than 5 % fruit and shoot borer infestations were analysed for the genotypes from Luang Prabang, Xienkuang and Champassak belonging to type 'very long', and Vientiane Capital from the 'very small - round' group.

Pre-test screenings for sources of resistances to bacterial wilt were carried out with seedlings at the greenhouse. A number of six accessions exhibited a high level of resistance, and five genotypes appeared to be moderately susceptible. The information from the first trials concerning bacterial wilt resistances has to be subsequently verified in additional greenhouse trials. The detailed results of the research will be prepared for publishing in a later article.

3. Vegetable seed production and marketing

3.1. Material and Methods

The project on seed production activities started in the dry season of 2002 with a farmer network around Vientiane Capital. Every year in September, an annual meeting of the farmer network was organised at HHRC to monitor the results of the previous season, to discuss and plan the coming season and to sign the contracts for seed multiplication. The contracts include agreements on the crops, the quantity and quality of the seeds as well as the price to be paid per kilogram. During the crop season, monthly follow up visits take place to the fields, to provide advice and to estimate the yield and the expected quality and quantity of seed likely to be produced. Some farmers multiply HHRC varieties while some use their own selections. After harvesting and pre-processing a sample is taken to test the germination at the HHRC lab. The centre only accepts seeds with a germination capacity above 80 % and being kept in the cool storage.

To finance all seed activities, a special seed fund was established with the income generated from the marketed seeds. An initial amount of money was supplied by DED, which was gradually reduced and replaced by the money earned through the sale of seed.

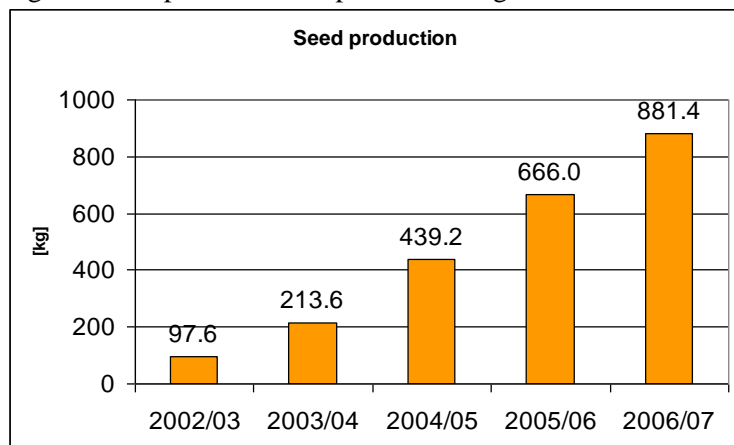
The seeds are stored in plastic containers at temperatures between 15 and 18°C at the HHRC seed store. Packaging is done on demand from special shops, markets, national and international projects. The seed packets are labeled with the HHRC logo and important information about the seeds, like germination percentage, date of testing and packaging, place of multiplication and instructions for cultivation. For nine crops, leaflets containing more detailed information were developed.

3.2. Results

In the pilot years 2002/03, seven farmer families produced around 100 kg of vegetable seeds (Fig. 2). In 2006, all of them are still continuing seed production together with 23 additional farmer families in 11 villages and four districts in Vientiane Capital. During 2006/07, a very good result was achieved of around 880 kg vegetable seeds with a germination rate of around 80 %. Every seed producing family was able to earn an additional average income of 2 Million LAK (around 200 USD). The predominant crops were Chinese mustard, pakchoi, yard long bean, cucumber, eggplant, tomato, and lettuce. In the second and third years, new crops, for which no selections from HHRC had been available, were introduced successfully to the market; they are cucumber (dry season and rainy season varieties), dill, French bean, amaranth, chili, tomato (dry season and rainy season varieties).

Most of the seeds are sold during the year of production. Forty four percent were packed for national and international projects in the whole country, 23 % were sold to special seed shops and markets in Vientiane, 13 % were bought by farmers directly from HHRC and 11 % were used by HHRC staff. The rest was provided for training courses. Each year, there are two peaks for selling seeds, in May for the rainy season and between August and October for planting in the dry season. The newly introduced home garden plastic seed bags, using locally available material, were very successful for packing small amounts and for short storage periods. For bigger amounts of seeds or longer periods of storage, airtight aluminum foils have proved the most adequate.

Fig. 2 Development of seed production together with the farmer network in Vientiane



4. Impact of the intervention

Vegetables play a more and more important role in the discussion of plant genetic resources in the Lao PDR. The Lao Country Report of the FAO on Plant Genetic Resources considered in 2007: "*the vegetable seed program has created a new dimension of utilization of genetic resources with an understanding of agronomic, social and economic aspects of biodiversity. This program is a successful example of utilization of biodiversity for annual and perennial crops in Laos.*" By working with several teams of HHRC, the colleagues improve their practical knowledge, how to collect, protect and use local varieties.

The project could improve the market supply of local vegetable seeds, in order to provide more crops (e.g. amaranth, dill, French bean) and more information about the seeds. Improved varieties were screened and some are already released to farmers. After introduction of HHRC seeds into the market, the customers appreciate the quality of these seeds with reasonable prices, and recognized HHRC seeds by the developed logo. The farmers got the option to select Lao seeds instead of imported ones. Several projects in Lao PDR include seeds and crop information leaflets into their countrywide extension service.

Following the inclusion of seed production into their farming activities, farmers are able to generate an additional income. Buying Lao vegetable seeds at the market and growing at their fields, farmers can earn money at the fresh vegetable market and contribute to improve the nutritional diversity in Lao kitchens.

5. Outlook for the future

The germplasm of local vegetable varieties should be maintained at the gene bank and used for the future. A duplication of the accessions should be prepared for a long term conservation by storing them at -15°C at an international institution or gene bank.

Screening and conducting vegetable variety trials should be continued and extended to the Northern provinces with a view to identify varieties suitable for upland conditions and the different preferences of the diverse ethnic groups. The gene bank offers an unique opportunity to exchange upland varieties collected among different mountainous areas in the Lao PDR. It is possible to successfully introduce crops from other regions and to include them in the seed production program.

The contract seed program should be continued under supervision of Lao experts, strengthening the farmer group and developing more and more independently acting associations. The farmer group around Vientiane should collect experiences as a successful pilot association. The Lao market needs more vegetable seeds. Many efforts should be done in order to support several farmer associations for seed production in other regions. There is a big potential for future.

References

Government of Lao 2004. National Agricultural Biodiversity Programme in LAO PDR. Vientiane.

Siphandouang, P. *et al.* 2002. Lao PDR. In Ali, M. (ed.). The Vegetable Sector in Indochina Countries: Farm and household perspectives on poverty alleviation. AVRDC-ARC, Bangkok, Thailand. Technical Bulletin No. 27, 188 p.

World Bank 2006. Lao PDR: Rural and Agriculture Sector Issues Paper, 44 p.