Australian Government
Australian Centre for International Agricultural Research

Project final report

project	**Facilitating farmer uptake of ACIAR project results: World Vision collaborative program**
date published	July 2008
prepared by	Soda Souvannaphong ICY Manager, Savannakhet Province, World Vision Laos
Co-authors/ contributors/ collaborators	Mr Jonathan Treagust, World Vision Australia Dr John Schiller, School of Land and Food Sciences, University of Queensland Siddhartha Sahu, World Vision Laos Dr Monthathip Chanphengxay, Director General, National Agriculture and Forestry Research Institute Dr Phoudalay Lathvilayvong, Director, Thasano Rice Research and Seed Multiplication Centre, Savannakhet Province Agriculture and Forestry Office Mr Phoumi Inthapanya, Head, Naphok National Agricultural Research Centre Head, Provincial Agriculture and Forestry Office, Savannakhet Province Heads, District Agriculture and Forestry Office for districts of Outhoumphone, Atsaphangthong, Phalanxai, Atsaphone, Phone and Xonnabouly Provincial Agriculture and Forestry Service Offices, Savannakhet Province
Approved by	Dr John Skerritt
project number	FR2008-36 [PLIA/2000/165]

ISBN 978 1 921434 96 9

published by ACIAR
GPO Box 1571
Canberra ACT 2601
Australia

Contents

1 Acknowledgments

The Improving Crop Yields Project (ICY) would like to acknowledge the following centres and services who kindly supported and collaborated on the project: National Agriculture and Forestry Institute; Naphok National Agricultural Research Centre (NARC); Thasano Rice Research and Seed Multiplication Centre (TRRSMC); Savannakhet Provincial Agriculture and Forestry Services (SPAFS); and, the District Agriculture and Forestry Offices (DAFOs) of Atsaphangthong, Outhomphone, Phalanxai, Atsaphone, Phine and Xonnabouly. A special thanks goes to Dr John Schiller who conducted the Review and Planning meetings, and Dr Phoudalay Latvilayvong and Mr Phoumi Inthapanya who provided seed and training in the application of the new technologies. The project would like to acknowledge the farmers in the target areas who enthusiastically supported the project and welcomed project staff onto their lands. Finally, the ICY project would like to thank ACIAR who generously funded World Vision Lao PDR (WVL) to run the ICY project via World Vision Australia (WVA).

2 Executive summary

The goal of the Improving Crop Yields (ICY) project Phase 2 was to improve food crop yields in central Laos, Phalanxai, Atsaphangthong and Outhomphone thus contributing to improved household food security and economic security. The project's purpose was to improve local skills for extending and applying research outputs, to achieve increases in wet season food crop production (particularly rice), using proven, low-input, sustainable technologies. At the same time farmers were assisted to develop their dry season cropping skills through training in crop production and soil management. The goal of Phase 3 was to extend the gains made by the ICY Phases 1 and 2 to three more districts in Savannakhet province, namely Atsaphone, Xonnabouly and Phine.

Phases 2 and 3 of the project have seen numerous achievements, leading to improved farmer knowledge and capacity.

- During Phases 2 and 3, eight training events were held actively engaging 815 farmers from 52 villages in six districts. The training covered: improved rice and cash crop farming techniques including sowing, transplanting, harvesting and seasonal cultivation; composting; judicious use of biological and compost fertiliser; pest control; and accessing agricultural extension from government departments. Farmers observed demonstrations of improved rice varieties, and participated in study tours of agricultural research facilities.
- 20 tonnes of improved rice seed were provided to 11,659 farmers in 318 villages in six districts during the wet seasons of 2006 and 2007.
- One training event was held for seven counterparts (six district agriculture and forestry staff members and one provincial agriculture staff member) in the National Agriculture Research Centre on rice and cash crop planting technology.
- A baseline rice production survey was completed in the Phase 3 districts.
- 60 farmers from the Phase 3 districts visited farmers in Outhomphone district (targeted in Phase 2) to learn about their experience in cultivating improved rice varieties.
- 49 farmers from three new districts learned soil management techniques, and how to grow peanuts and cash crops such as sweet corn, cucumber, eggplant, chillies, long beans and watermelon.

- Consultant to the project, Dr John Schiller, facilitated four review meetings each attended by 16 representatives of the district and provincial Agriculture Departments, National Agriculture and Forestry Research Institute (NAFRI) and the ICY project.

Although no formal evaluation has been conducted yet, it is likely that most farmers who participated in the cultivation of improved varieties of rice in the target areas will continue to use these improved rice varieties. As a result, the local varieties will remain but in reduced quantities. It is predicted that the wellbeing of households in the target villages will improve. It is likely that they will have sufficient rice for consumption and a surplus for selling.

Farmers are more aware of the agricultural extension resources available to them and post-project, the District Agriculture Extension workers can continue to deliver improved rice production technology to farmers remains. However it is predicted that more remote communities will miss out because of the limited district government budget. World Vision Laos (WVL) has initiated a long-term (13 to 15 years) Area Development Program (ADP) in four districts targeted by the project. It is predicted these will allow the gains made by the ICY project to be built upon and extended to more farmers, which should lead to higher yields of rice and other crops and an overall improvement in food security for these farmers.

3 Background

The majority of the population of Savannakhet province, Laos, live in lowland areas along the Mekong River and its tributaries. The communication between villages and district settlements is very poor during the wet season. There are two main ethnic groups in the Savannakhet province: the Lao Loum (lowland Lao) and the Lao Theung (midland Lao). The majority of Lao Theung live in rural areas and support themselves through rice cultivation and livestock raising.

Phase 1 of the project ran from 2000 – 2003 in three districts in Savannakhet (Phalanxai, Atsaphangthong and Outhomphone) (See Appendix 1). Following an ACIAR evaluation of the project, it was decided that an extension was appropriate as it would further benefit the communities of Savannakhet. Based in the same districts as Phase 1, ICY Phase 2 ran from 1 January 2004 until 31 December 2006.

The initial selection of the three target districts for Phases 1 and 2 was based on a combination of poverty-related criteria and household and community rice self-sufficiency criteria. Before the commencement of the project, the target villages identified by the ICY project typically had high incidence of rice deficit, high unemployment rates, poor living conditions and limited cultivatable land. It was identified that farmers in these locations largely did not know about the use of agricultural technology in rice production. It was also recognised that factors including recurrent droughts and floods caused rice deficit for several months a year in many of these communities.

Building on similar activities in Phase 1, the primary objective of the ICY Phase 2 project was to improve household, food and economic security in target districts by increasing rice production, through a combination of improved crop yields and improved stability of production. Phase 2 aimed to address the limited knowledge of farmers and the lack of availability of improved rice varieties, increase local farmers skills, provide training and support on wet and dry season farming, and provide training in the use of sustainable technologies in rice-based agricultural systems.

ICY Phase 3 ran from 1 January 2007 until 31 December 2007 in three districts in the Savannakhet province (Atsaphone, Phine and Xonnabouly) (See Appendix 1). The project was extended into a third phase following the request for an extension by the Provincial Office for Agriculture and Forestry Services (PAFO) and NAFRI. The objective of Phase 3 was to address the high incidence of poverty and food insecurity, especially the chronic household rice deficits, found in these three districts, particularly amongst ethnic minority groups. The locations were chosen due to their levels of poverty and food insecurity, as well as the long-standing WVL involvement in and knowledge of two of the three districts (Atsaphone and Xonnabouly).

Baseline Survey

In August 2007, a baseline rice production survey was undertaken by the Policy Research Centre of NAFRI, which gave a picture of rice insufficiency in the Phase 3 project area. About 40% of surveyed households reported that they had a chronic rice deficit (based on their own production relative to their household needs), or that they suffered rice shortages. About 26% of respondents reported that they were generally able to produce sufficient rice to meet the requirements of the household, while about 30% of respondents reported having a rice surplus, relative to household needs, in most years.

Rice self-sufficiency status varied across villages, ranging from some villages having no households reporting a rice surplus relative to needs, to as many of 75% of households in one village reporting a surplus. Similarly, the incidence of chronic rice deficits among households varied among villages, ranging from about 12% of households in one village to as high as 80% of households in another. For households with a deficit, the average reported number of months of rice deficit across all three districts was 5.4 months per village. The highest deficit was in Atsaphone district where villages reported an average deficit of 6.3 months, while the lowest deficit was in villages in Xonnabouly district with an average of 4.2 months. There were villages in both Atsaphone and Phine districts with rice deficits of more than 8 months.

The survey reported that the causes of rice insufficiency mentioned by rice-deficit households were:

1. drought/insufficient water access (mentioned by 65% of households)
2. insufficient agricultural land (45%)
3. poor soil quality (40%)
4. pests (32%)
5. insufficient labour (29%)
6. lack of funds
7. diseases
8. flooding
9. weeds.

Causes 6 – 9 were each mentioned by less than 21% of households.

Although the survey took place in Phase 3, the results validate the importance of the Phase 3 extension of the ICY project, in terms of addressing many of the key causes of rice insufficiency within the target locations.

While all ACIAR-funded phases of the project have been completed, World Vision Australia (WVA) has funded a three-month extension to allow final project activities to take place. These are:

- ICY Project Benchmark Impact Survey of target districts by NAFRI Socio-Economic Research Unit (SERU)
- Monitoring of rice demonstration in dry-season 2007-08.
- Soil management training
- Formal project closure meeting to disseminate lessons learnt among all key stakeholders.

4 Objectives

The six objectives of the ICY Project Phase 2:

Objective 1. Utilisation of research outputs from the Lao National Rice Research Program and related ACIAR projects.

Objective 2. Empowerment of WV Lao staff in agricultural extension.

Objective 3. Skilling of Government District staff in agricultural extension.

Objective 4. Farmers able to conduct and interpret own trials.

Objective 5. Improved productivity of rice and non-rice crops.

Objective 6. Extension tools approaches used and packaged.

The outcome of the ICY Project Phase 3:

Increase in rice crop yields for households in Atsaphone, Phine and Xonnabouly districts of Savannakhet Province.

5 Methodology

5.1.1 Phase 2

Project staff met with the district agriculture staff in 3 districts and prepared the project implementation plan. They also collaborated to select the target villages for each year and farmers who would participate in the demonstration of improved rice varieties. Phase 2 continued to work in the same three districts as Phase 1, but in 5 to 10 new target villages each year. The selection of target villages was based on agreed criteria:

- Levels of poverty
- Rice deficit
- Not located very close to the district headquarters.

Table 1 indicates the locations.

Table 1: Villages of rice demonstration in target villages Phase 2

District	Villages Year 1	Villages Year 2	Villages Year 3
Phalanxai	Kalong Nua Kalongtai Nuanchan Kalong kok Bungtale Nua Bungtale Tai Nakangse	Naporkang Huaiyaphuk Naphotai Nonsaeng Nonkhamxai Nakangthong Naphovat	Nonsavang Nakae Dongbang Nonseng Tomai Nasaku Oudomxai
Atsaphangthong	Nachan Koktan Napaekyai Tabongphet Sapangkeo	Nonhang Nakhamtai Kokokong Dongmakyang Ban Huai	Sivilai Nalaikok Nongbua Nonvai Phosikeo
Outhomphone	Nonngang Huamuang Sanamxai Xaisaad Thampha Huai mao Don Mee Koodcai Nakasor	Nasanod Dongmakngeo Sompavilai Nanokkhian Nasakham Nasaithong Kangphosi Chomcheng Nondokmai Nong Ahong	Tadkadeng Nonpalai Naphosai Napong Phonthong Ay Nakaeng Nachan Nonsavang Nonkung

Each target village was visited and project staff explained the goals and objectives of the demonstration followed by open discussions about benefits, issues, challenges in farmer participation in the demonstration. Following this process, project activities were implemented.

Trial/demonstration of improved varieties

In Phase 2, the project collaborated with district and provincial agriculture departments to train three farmers from each village (Year 1, 63 farmers; Years 2 and 3, 66 farmers each) in three districts, who had been selected for participation in rice demonstrations according to the following criteria:

- Voluntary participation in demonstration
- Farmer with adequate manpower in the family to do the demonstration effectively
- Farmer with enough land to spare for the demonstration
- Nearness of the demonstration plot to the village.

These farmers each participated in one training event on rice demonstration, held in their district and facilitated by district and ICY staff. This training included information about the varieties selected for demonstration, improved cropping practices, use of fertiliser and pest control. They then commenced the trials.

The 9 improved varieties used in the trial in Years 1 and 2 (2004 and 2005) were: Phonengam 1; Thadokkham 1; Thadokkham 5; Thadokkham 6; Thadokkham 7; Thasano 1; Thasano 2; Thasano 3; and Thasano 4. The best available seed that was provided was usually Generation 1 = breeder seed (good for multiplication by farmers) or Generation 2 which is also good for multiplication.

Groups of five or six families per village were formed. They received inputs to set up demonstration plots. Each farmer planting nine improved varieties and one traditional variety in a row of 10 plots, each measuring 3 x 5 metres. The trial involved two similar parallel rows, with one of the rows grown using chemical fertilizers and the other without the use of any fertilizer. Adequate seed of several improved varieties was provided. Generally a total of 10 to 13 kg of seed was supplied per family. Seeding rate was in the order of 60 kg/ha. The project also supplied 4.43 kg of fertilizer (1.66 kg of urea and 2.77 kg NPK-15-15-15) to each farmer. This amount of fertilizer was sufficient for 1,600 square metres per family.

The use of about 150 kg/ha of 15-15-15 fertilizer and 100 kg/ha 46-00-00 was recommended. All 15-15-15 was normally applied during the last soil preparation before transplanting and the 46-00-00 broadcasted in two equal applications at about 20-25 days (tillering) and 40-45 days (panicle initiation) after transplanting. Timing of the urea depended on whether it was a long or short maturity variety, but in general was applied early.

Larger plots of about 1,600 square metres were also used with and without recommended fertilizers. For the larger plots farmers were encouraged to match soil type with variety requirements. Farmers were also encouraged to experiment/compare recommended fertilizer with their own fertilizer/organic manure treatments.

Evaluation of trials

ICY and district staff monitored the demonstrations/trials in each village on a monthly basis. The farmers involved in the trial, other farmers and the ICY and district staff visited each trial site, observed the rice growth and availability of water, and examined the plots for pests and diseases. After observation, the project team discussed progress, issues and challenges, facilitated the identification of solutions to address difficulties, and provided the necessary technical input for effective demonstration.

Based on the evaluation of trials in Years 1 and 2 and the reviews of the varieties, it was decided to change and reduce the varieties for trial to the following three in Year 3 (2006): Phonengam 1; Thadokkham 6; and Thasano 2.

During each of the three years of Phase 2, approximately 50 to 60 farmers from each village, including those farmers involved in the trial, visited another village undertaking trials for exchange of information and cross-learning. The villagers, project staff and district agriculture staff usually walked to the other target village to observe the trial there and learn from it. This village-to-village visit also provided the opportunity for farmers of one village to meet and discuss many different issues related to rice growing with farmers of another village. There was exchange of ideas, good practices, solutions to problems and many other benefits. The project considers this as one of the high points of Phase 2 because it clearly indicated the enthusiasm and interest of the farmers in the trial, which is so critical to the success and long-term sustainability of the outcomes of the project.

Review meetings

Review meetings were held twice a year during Phase 2. The review meetings were led by the project and facilitated by Dr John Schiller. Representatives of the Agriculture Department from the target districts and Savannakhet province, NAFRI, NARC and WVL participated in the review meetings, usually held in the TRRSMC of the Agriculture and Forestry Department in Savannakhet.

The Agriculture Department from each target district and the ICY staff presented successes, challenges and issues related to the trial of the improved rice varieties. Each

review meeting sought appropriate ways of addressing the issues and challenges while strengthening the success and good practices.

Dr Schiller submitted a report of each review meeting to the donor and these reports were included with previous project reports.

Evaluation

Each year at harvest time, the ICY project manager, along with the district staff, travelled to each district to evaluate the results of the trial/demonstration.

Project staff, district counterparts farmers participating in the trial and other farmers from the village all participated in carefully harvesting the rice crop in each plot. The harvested grain was weighed and recorded in everybody's presence. The results of the harvest were disseminated to the villagers and this was followed by open discussions of lessons learnt, good practices and benefits of the trial with improved varieties. This also gave opportunity to the farmers to evaluate and compare the differences in yields, pest and drought resistance and the dependence on fertilizer of each variety.

A variety assessment protocol form (Appendix 2) was agreed upon in a Review and Planning meeting and this form was used to collect the variety data from the rice demonstrations.

Once completed, the results of the trials were compiled and presented in each district and also to the larger group of stake-holders during the review meetings. Based on the evaluation of the trial of 9 improved varieties in 90 villages, four of the most popular and locally suitable varieties were identified. These were: Phonengam 1; Thadokham 6; Thasano 2; Namtan 1.

Extension to other farmers

Based on the results of the trials it was decided to procure 10 tonnes of the above varieties for distribution to 1,659 farmers (excluding the 90 farmers involved in the demonstration) in 45 villages of the three target districts, in time for planting in the 2006 wet season. They were distributed in the following quantities:

Phonengam 1	3.5 T
Thadokkham 6	3.5 T
Thasano 2	3.0 T

ICY project negotiated with the Rice Multiplication Centre in Thasano to conduct dry season multiplication of the above three varieties of rice during the 2005-06 dry season, so that 10 tonnes of seed could be made available to the farmers in time for the beginning of the wet season.

5.1.2 Phase 3

The planning of Phase 3 of the project was carried out due to growing awareness at the district, province and the national levels in the Ministry of Agriculture, of the positive impacts the ICY project in popularising improved rice varieties and improved cropping practices. This was contributing to the enhancement of food security in the Savannakhet province, in spite of the relatively small size and low budget of the project. There were several consultations between WVL and the provincial and district agriculture officials, facilitated by Dr Schiller, which resulted in the planning of the project. Phase 3 extended the project's activities to further districts in Savannakhet. Three districts were selected, based on the following criteria:

- Priority areas for development assistance recommended by PAFO for Savannakhet

- Comparatively high incidence of poverty
- High proportion of ethnic minority groups in the population and a proportionately higher level of poverty in these ethnic groups
- High levels of food insecurity (based on chronic household rice deficits) being the main contributing factor to high levels of poverty.

The districts selected were areas WVL was familiar with. It had existing projects in two districts (Atsaphone and Xonnabouly) and planned to initiate long-term development interventions in the third district (Phine) from early 2007.

The ICY manager and assistant worked with the district agriculture staff to select 10 target villages in each district, following the same criteria as in the selection of target villages in Phase 2.

The ICY team visited each target village and followed the same process of explaining the project goals and objectives to the villagers as in Phase 2, explaining the objectives of the wet season demonstration with 30 farmers from each district.

The Phase 3 methodology was similar to the third year of Phase 2. The demonstration of the four identified rice varieties was carried out simultaneously with the supply of 10 tonnes of rice of the same four varieties to 10,000 farmers (excluding those involved in the demonstration) in 268 villages of the three districts.

The monitoring, review and evaluation of the trials of rice varieties in Phase 3 was very similar to that of Phase 2.

Project Collaborations

Project collaboration was important for sourcing research outputs. At the national level the project collaborated with the National Agriculture and Forestry Research Institute (NAFRI), the National Rice Research Program (NRRP) of the Ministry of Agriculture and Forestry, the Lao IRRI Project and the National Agricultural Research Centre. At the provincial and district level, the agencies involved were the Provincial Agriculture and Forestry Service Office (PAFSO), the District Agriculture and Forestry Service Office (DAFSO), Thasano Rice Research and Seed Multiplication Centre.

Transfer of Technologies

The project intervention was based on a number of established technological recommendations for improved wet season rice production, soil management and general soil improvement. The technological recommendations were made available to communities through small–scale demonstration plots that were followed up and monitored by district agriculture staff and World Vision staff.

6 Achievements against activities and outputs/milestones

6.1.1 Phase 2

Objective 1: Utilisation of research outputs from the Lao National Rice Research Program and related ACIAR projects

Objective 2: Empowerment of WV Lao staff in agricultural extension.

No.	Activity	Outputs/ Milestones	Completion date	Comments
1.1	Review and planning meeting	Dr John Schiller facilitated these meetings in which representatives from NARC, TRRSMC, PAFSO, DAFSO and WVL participated. The results of the activities of each season were presented and plans were made for the upcoming season.	In October and March of each year for the life of the project	Participants discussed the rice demonstration implementation, the improved technologies for rice production and farmer participation.
1.2	Review and planning meeting	2007-2008 dry season demonstration activities had been implemented in: Xonnabouly (15 households from 5 villages participated) Phine (9 households from 3 villages participated) Phalanxai (6 households from 2 villages participated)	December 2007	The Phase 3 baseline survey results were presented by Mr Vongpaphanh from Research Policy Centre, NAFRI: Rice deficit: 40% of households; sufficient rice: 26%; surplus of rice to households needs: 30% It was noted that Phase 3 target villages that were still impoverished should be given increased access to improved technologies for rice production.
1.3	Rice and cash crop planting technology training facilitated by NARC staff at their centre	15 participants (3 women), including 2 WV staff, 1 PASO staff, 6 DAFSO staff and 6 farmers from 3 districts (Outhomphone, Phalanxai and Atsaphangthong)	18 March 2005	This training increased the knowledge and skill of WV staff in the extension technologies that should enable farmers to increase the yield of rice and non-rice crops.
1.4	Social impact and community sciences training workshop conducted by Australian consultants selected by ACIAR	Two WV staff participated	January 2006	The participants exchanged experiences with each other from the implementation of 20 projects in Lao PDR.
1.5	Project management training	One WV staff member participated	August 2006	Staff who participated this course increase their knowledge of project management

Objective 3: Skilling of Government District staff in agricultural extension.

No.	Activity	Outputs/ milestones	Completion date	Comments
3.1	Agricultural technology training	28 DAFSO staff (including 4 women) participated in the training course in 10 districts (Phalanxai, Atsaphangthong, Outhomphone, Xonnabouly, Atsaphone, Sepone, Nong, Vilabouly, Phine, Thaphangthong)	April 2004	Agriculture staff from the three districts provided the training to strengthen district staff capacity in extension work.
3.2	Rice and cash crop planting technology training	1 PASO staff member and 6 DAFSO staff from 3 districts (Outhomphone, Phalanxai and Atsaphangthong) participated.	18 March 2005	This training increased the knowledge and skill of Government District staff (including three women) to transfer technology to farmers.

Objective 4: Farmers able to conduct and interpret their own trials

No.	Activity	Outputs/ milestones	Completion date	Comments
4.1	Rice demonstration training	Participants were 63 farmers, including 2 females, from 21 villages in Outhomphone, Phalanxai and Atsaphangthong districts	20 May 2004	Training was provided by the district agriculture staff
4.2	Rice demon-stration training	69 farmer participants from 22 villages of 3 districts (Outhomphone, Phalanxai and Atsaphangthong)	17 April 2006	Training provided by the district agriculture staff.

Objective 5: Improved productivity of rice and non-rice crops.

No.	Activity	Outputs/ Milestones	Completion date	Comments
5.1	Dry season cash crop and vegetables training (provided by district agriculture staff)	123 farmer participants from 41 villages of 3 districts (Outhomphone, Phalanxai and Atsaphangthong)	26 May 2005	Project supported farmers to plant cash crop and vegetables for consumption in their families and the surplus sold by distributing the seeds to farmers.
5.2	Cash crop and vegetable training	362 farmers including 116 female participants from 22 villages of 3 districts (Outhomphone, Phalanxai and Atsaphangthong)	9 December 2005	Training provided by project and district agriculture staff
5.3	Visits to ICY phase 2 on-farm demonstration sites	60 farmers from phase 3 of 3 districts (Atsaphone, Phine and Xonnabouly) visited ICY phase 2 on-farm demonstration site at Nachan village. They exchanged experiences of new methods of rice production.	30 October 2006	The farmer visits to phase 2 on-farm demonstration sites gave them the opportunity to observe the experiences from the other locations and understand the new technologies of rice production so they could practise them on their own farms.

5.4	Study tour to TRRSMC and Khantha-chan village in Saiphou-thong district	49 farmers visited TRRSCM and Khanthachan village to learn about rice plantation and vegetable planting.	11 January 06	Farmers had the opportunity to visit a location outside their district and exchanged experiences farmer to farmer such as the practice of peanut plantation and soil improvement. Dr Phoudalay (Head of Thasano Centre) advised on making compost fertilizer and improved technologies of rice production.
5.5	Distribution of 10 tonnes of rice seed	1,659 households from 45 villages in 3 districts (Outhomphone, Atsaphangthong and Phalanxai) received 10 tonnes of rice seed.	5 May 2006	Farmers had the opportunity to learn about the new varieties in their farms and the adoption of improved rice production technologies.

Objective 6: Extension tools approaches used and packaged

No.	Activity	Outputs/ Milestones	Completion date	Comments
6.1	Selected Villages and farmers for rice demonstration	21 villages (63 farmers) participated in selected rice demonstrations in 3 districts (Phalanxai, Atsaphangthong and Outhomphone)	December 2004	Farmers selected to implement rice demonstrations needed to be interested in rice production, be proactive farmers and have sufficient labour and land near their village and community. 3 households were selected from each of 21villages
6.2	Selected villages and farmers for rice demonstration	22 villages (66 farmers) participated in rice demonstration in 3 districts (Phalanxai, Atsaphangthong and Outhomphone)	March 2005	Farmers selected to implement rice demonstrations needed to be interested in rice production and be proactive farmers and have sufficient labour and land near their village and community. 3 households were selected from each of 22 villages
6.3	Selected Villages and farmers for rice demonstration	23 villages (69 farmers) participated in selected rice demonstration in 3 districts (Phalanxai, Atsaphangthong and Outhomphone)	March 2006	Farmers selected to implement rice demonstrations needed to be interested in rice production, be proactive farmers and have sufficient labour and land near their village and community. 3 households were selected from each of 23 villages

6.1.2 Phase 3

Outcome 1: Increased rice crop yields, higher levels of food security, and improved socio-economic security for households in lowland rice growing areas in the districts of Atsaphone, Phine and Xonnabouly in Savannakhet Province.

No.	Activity	Outputs/ Milestones	Completion date	Comments
1.1	Selected Villages and farmers for rice demonstration	30 villages (80 farmers) participated in selected rice demonstration in 3 districts (Phine, Atsaphone and Xonnabouly)	April 2007	Farmers selected to implement rice demonstrations needed to be interested in rice production and be proactive farmers.
1.2	Rice demonstration training (provided by district agriculture staff)	88 farmers from 30 villages of 3 districts (Atsaphone, Phine and Xonnabouly) participated in the training	26 April 2007	This training provided hands-on experience for farmers

1.3	Distribution of 10 tonnes of rice seed	10,000 households from 268 villages in 3 new districts (Atsaphone, Phine and Xonnabouly) received 10 tons of rice seed.	7 May 2007	Bags of seed should be printed by the name of variety, project's name and donor's name and some picture of rice bundle in bags are better.
1.4	Benchmark Socio-Economic survey	The NAFRI Socio-Economic Unit conducted the benchmark Socio-Economic survey from July 25, to August 2, 2007. The survey covered 10 villages of each the 3 districts (Atsaphone, Phine and Xonnabouly), there were 300 households were interviewed. The interview questionnaire is in Appendix 4.	25 July 2007 to August 2007	The survey was going well by participating of district Agriculture staff and world vision staff. All interviewers were trained by NAFRI survey staff before starting to collect data.

7 Key results and discussion

Rice sufficiency, rice yields and household income

The baseline survey conducted in 2004 as part of the project confirmed that rice sufficiency was a good indicator for general socio-economic well being in the lowland area of Lao PDR. Lack of rice for consumption was clearly the one of the biggest problems and causes of poverty for the majority of households surveyed.

Apart from an immediate lack of rice, insufficient land for cultivation, insufficient manpower and lack of cash to purchase supplementary rice or inputs like fertilizer to increase rice and other production were the most frequently mentioned problems by the farmers surveyed. In line with the insufficiency rice for consumption, total household income in the villages surveyed was well below the national GDP in both Phalanxai and Atsaphangthong districts. An exception in both regards was many villages of Outhoumphone district.

The overall rice sufficiency in Outhomphone district was significantly higher than some of the individual villages within Outhomphone, and than in all villages surveyed in the other two districts, Atsaphangthong and Phalanxai. In Outhomphone, rice was sufficient for 12 months in 69 of the 114 households surveyed. According to the survey, rice sufficiency, rice yields and average household income were markedly lower in many villages in Atsaphangthong and Phalanxai, such as Ban Nakhamtai (ATH) and Ban Noneseng (PLX), where rice was only sufficient for an average of six months.

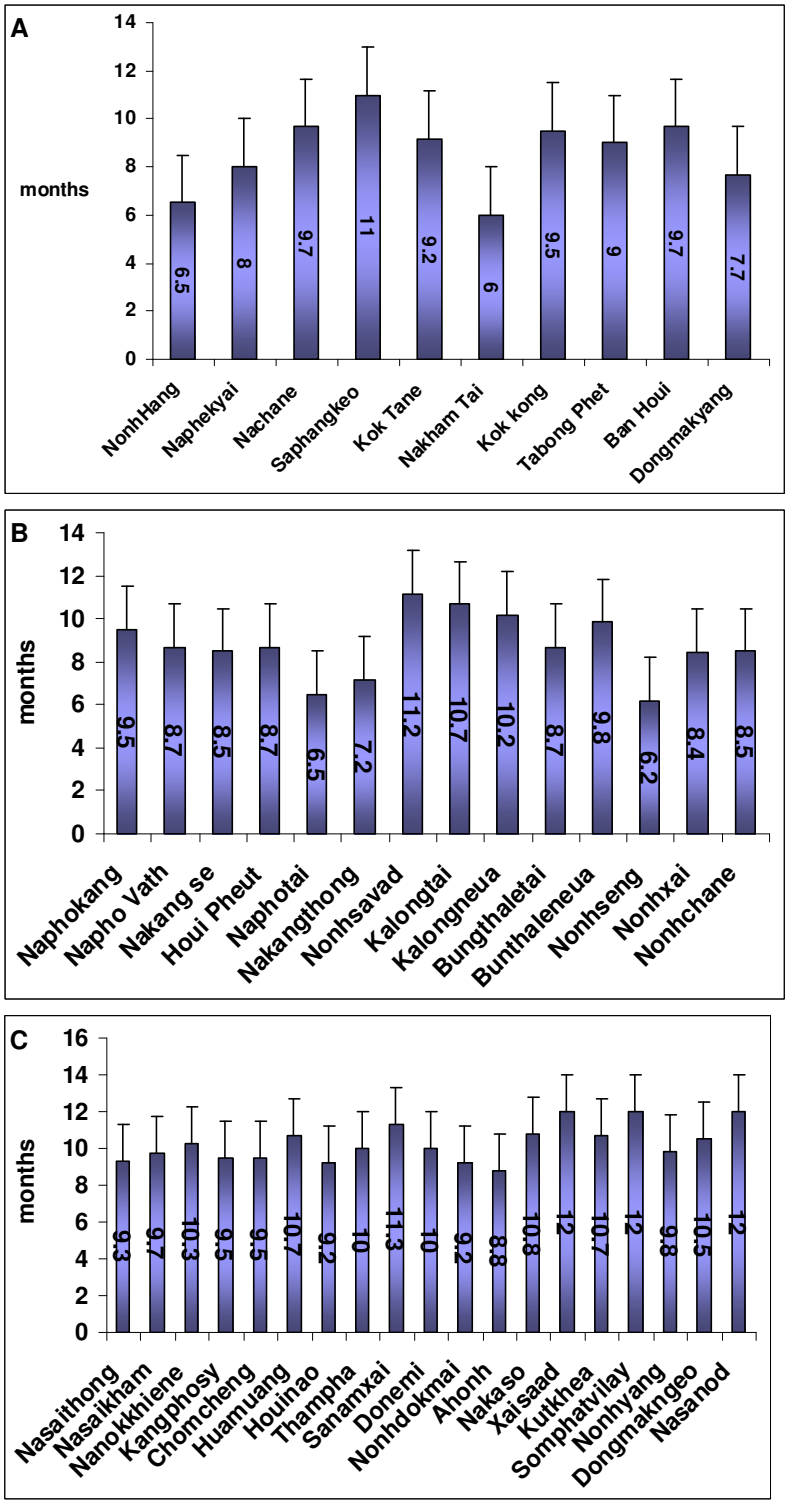
Rice sufficiency was used as a key indicator of the socio-economic wellbeing of a community. For the year 2005 wet-season harvest, average rice sufficiency was more than six months with an average of 10.5 months in Outhomphone (fig 2C), 8.7 months in Phalanxai (fig 2B) and 8.6 months in Atsaphangthong (fig 2A). The lowest average was found in Ban Nakhamtai (ATH) with only six months. Xaisaad, Somphayvilay and Nasanod villages (OUT) had the highest level of rice sufficiency, with 12 months (fig 2C). On a household level, lowest levels of rice sufficiency were found in Ban NaKangthong, Naphotai and Ban Nonseng (PXI), where some households had rice for only one or three months.

Other household characteristics

Comparison in three districts showed that Phalanxai district lagged behind Outhomphone and Atsaphangthong districts with regards to education levels of heads of households,

household assets and economic characteristics. The amount of cash on hand was not asked for by the survey, but some households indicated low amounts. The difference between the three districts may be due to different perceptions of the value of money.

Figure 1: Rice sufficiency (months after wet season harvest 2005) in 43 villages surveyed in A: Atsaphangthong, B: Phalanxai and C: Outhomphone Districts, Savannakhet Province.



Values are means of 6 households per village and 259 households. Bars represent the standard error of means.

Income generation

Rice production was the most important household activity in term of time and labour input but contributed little to the generation of household income. Non-farm activities were the most important source for the generation of cash for all villages surveyed in the three districts, although the nature of the activities varied greatly between villages and districts. Of all income sources undertaken by households, wood sawing and working in Thailand and sending funds home, were the most frequent activities. These sources also generated the most significant contribution to average household income.

The majority of households grew some non-rice crops for home consumption such as chillies, eggplant, watermelon, cucumbers and other vegetables. The diet of rural households appears to be more often supplemented with wild vegetables such mushroom, bamboo shoots, small rattan and other wild vegetables. The survey showed that household income from crop production as a whole (rice and non-rice) had the potential to contribute significantly to household incomes and, despite the relatively small quantities and low returns per specific crop and transaction, the sale of non-rice crops is more frequent throughout the season than that of rice. The interest in growing non-rice crops for marketing is still relatively small due to limited marketing opportunities.

The main constraints to non-rice crop cultivation, stated by the households, were insufficient labour in the wet season due to high labour demand for rice cultivation and insufficient access to water in the dry season.

Rice production technologies

The main constraints to rice production in the three districts were lack of manpower and lack of water. Many households perceived additional land or rental area for cultivation to be the best solution for their lack of rice. Taking into account the labour constraint and the time necessary for land preparation and transplanting, increasing the area available for cultivation seems a questionable solution. In Phalanxai district, more people need to live off smaller areas of land with lower yields.

Increased mechanization of rice production such as mechanical threshing and land preparation by hand tractors, appear to have the potential to greatly reduce the labour requirement thus freeing capacity for the pursuit of the other productive activities.

The yields of rice demonstration plots in 6 districts (including districts of phase 3 of ICY extension project) of ICY project from 2004-2007 are summarized below:

Table 3: The Yield of rice demonstration plots in wet season 2004

District	Strategy	Varieties (All measurements in T/Ha)									
		TSN1	TSN2	TSN3	TSN4	TDK1	TDK5	TDK6	TDK7	PNG1	NN1 (NangNuan)
Outhomphone	1	3.47	3.38	3.09	3.25	3.79	3.64	3.97	3.67	3.53	2.18
	2	2.69	2.38	2.35	2.47	2.48	2.25	2.49	1.97	2.29	2.17
Atsaphangthong	1	2.62	6.66	3.48	3.32	5.35	2.8	4.29	3.42	3.26	3.38
	2	2.28	3.45	3.0	3.66	4.69	2.42	3.85	3.18	3.34	3.03
Phalanxai	1	3.13	3.05	3.06	3.1	3.05	3.06	2.98	3.13	3.01	2.58

	2	2.58	2.56	2.60	2.45	2.48	2.40	2.23	2.60	2.40	2.22

Strategy classification: 1. With fertilizer 2. Without fertilizer

Note: The varieties that farmers preferred in wet season 2004 on rice demonstration plots were TDK5, TDK7, PNG1 and TSN1. These varieties were suitable for their paddy fields.

Table 4: The Yield of rice demonstration in wet season 2005

		Varieties (All measurements in T/Ha)								
District	Strategy	TSN1	TSN2	TDK1	TDK5	TDK6	TDK7	PNG1	NTN1	NN1
Outhomphone	1	3.6	3.8	3.8	3.7	4.0	4.1	3.6	3.6	3.1
	2	3.3	3.3	3.1	3.2	3.5	3.4	3.3	3.1	2.9
Atsaphangthong	1	3.8	3.9	4.5	4.0	4.10	3.7	3.7	2.7	2.3
	2	2.6	2.3	3.1	2.7	2.7	2.4	2.6	1.8	1.4
Phalanxai	1	3.4	3.65	3.4	3.6	3.6	3.8	3.7	2.9	2.5
	2	2.5	2.6	2.8	2.9	2.6	3.0	3.1	2.3	1.8

Strategy classification: 1. With fertilizer 2. Without fertilizer

Note: The varieties that farmers preferred in wet season 2005 on rice demonstration plots were TDK5, TDK7, PNG1 and TSN2. These varieties were suitable for their paddy fields.

Table 5: The Yield of rice demonstration plots in wet season 2006

		Varieties (All measurements in T/Ha)						
District	Strategy	PNG1	NTN1	TDK5	TDK6	TSN2	TSN4	Local
Outhomphone	1	4.17	3.8	4.02	4.16	4.02	3.97	-
	2	3.3	2.93	2.97	3.18	2.93	2.99	3.3
Atsaphangthong	1	4.62	3.82	3.5	3.5	2.98	2.87	-
	2	3.7	2.9	2.75	2.75	2.27	2.43	1.82
Phalanxai	1	4.3	3.42	3.98	4.2	3.85	4.06	-
	2	3.5	2.8	3.26	3.6	3.39	3.09	2.03

Note: The varieties that farmers preferred in wet season 2006 on rice demonstration plots were TDK6, PNG1, TSN2 and NTN1. These varieties are suitable for their paddy field.

Table 6: The Yield of rice demonstration in wet season 2007

District	TDK6 (T/Ha)		TSN2 (T/Ha)		PGN1 (T/Ha)		NTN1 (T/Ha)		Local Variety (T/Ha)	
	Fertilizer	Without Fertilizer	Fertilizer	Without Fertilizer	Fertilizer	Without Fertilizer	Fertilizer	Without Fertilizer	Fertilizer	Without Fertilizer
Atsaphone	3.19	2.78	3.15	2.79	3.34	2.84	3.43	2.87	2.89	2.52
Phine	2.3	2.0	2.0	1.8	2.6	2.4	2.4	2.2	2.4	2.0
Xonnabouly	3.0	2.6	2.8	2.3	2.3	1.9	3.1	2.5	2.1	1.4

Note: Phine district faced severe drought negatively impacting the results of rice demonstration unexpectedly. The varieties that farmers preferred in wet season 2007 on rice demonstration plots were TDK6, PNG1, TSN2 and NTN1. These varieties were suitable for their paddy fields.

Recommendations

For the improvement of wet season rice production, the project focussed on the use of recommendations for the use of higher yielding varieties, adjustments in plant populations and timing of planting, and a balanced, well-timed and low-moderate fertilizer program.

The recommendations in regard to the use of seeds, concerned the use of a mix of varieties, both improved and local, in order to spread risk. This also took advantage of the different soil/field types.

Table 7 lists the determinants of rice yield for the rainfed lowland environment, the relevance to the ICY project target area and the recommendation of the meeting as to whether there was sufficient technical information available to warrant inclusion in a technology package for testing by farmers.

Table 7: Rice Yield Determinants

Yield Determ-inant	Detail	Relevance to ICY Area	Inclusion in Technology Package
Variety	Introduction and evaluation of most recent improved varieties released by the Lao NRRP	Important	Yes
Sowing date	Early sowing for drought avoidance	Potentially important but practicality yet to be demonstrated. Sowing date will still be determined by rainfall distribution	No specific recommendation. Sowing date to follow normal practices and to be determined by rainfall distribution
Soil fertility and fertilizer use	Yield potential of improved varieties dependent on soil fertility and/or fertilizer inputs	Districts being targeted by ICY have poor soils (sandy, with low organic matter levels). Although saline soils exist in Savannakhet province, the soils in the districts being targeted by ICY are not in this category	Yes A recommendation for low levels of input for NPK-based inorganic fertilizers to be included in the technology package.
Plant spacing	Yield potential of improved varieties and fertilizer responses strongly influenced by plant spacing/density	Important	Yes
Plant protection (IPM)	Pests	Rodents- present in project area but not regarded as a yield constraint (farmers are able to manage infestations).	No specific action recommended
Plant protection (IPM)	Pests	Gall midge – a significant problem in some years	No practical recommendation possible as improved varieties do not have resistance and the only known local variety with resistance is regarded as having poor eating qualities.
Plant protection (IPM)	Pests	Rice bug – present in some years but generally not a significant problem	No specific action recommended
Plant protection (IPM)	Pests	Paddy crabs- present but not a problem	No specific action recommended
Plant protection (IPM)	Pests	Bakanae disease – although present in some areas of Laos, not expected to be a problem in project area	No specific action recommended

Yield Determ-inant	Detail	Relevance to ICY Area	Inclusion in Technology Package
Plant protection (IPM)	Pests	Golden apple snail – a problem in irrigated areas but not present in the ICY target area	No specific action recommended
Drought alleviation and avoidance	Potentially important under rainfed conditions as sandy soils are drought prone in project target areas	Varieties	Some of the varieties recommended for evaluation are known to have reasonable drought tolerance
Drought alleviation and avoidance		Direct seeding- shown to assist in reducing effects of early season drought, and in allowing early harvest, thereby avoiding potential effects of late-season drought	Further on-farm assessment needed before direct seeding can be recommended
Drought alleviation and avoidance		Supplementary irrigation	Little opportunity in project area due to lack of access to water
Weed manage-ment	In most areas of rainfed lowland rice cultivation, weeds are not a major production constraint	Not important and farmers usually undertake appropriate weed control measures. Problem will probably increase with fertilizer use	No specific action recommended
Seed technology consider-ations	Seed multiplication	Important in project area as part of the strategy for distribution of improved varieties	Recommendations to be made in second year, following the identification of the most suitable improved varieties
	Maintenance of seed supply	Important following adoption of improved varieties	Training to be Year as part of community seed multiplication training
	Seed storage	Important for the maintenance of seed viability	A component of community seed multiplication training

Detail of Recommended Components of Technology Package

Table 8 summarises the recommendations of the planning meeting on the rice yield determinants for the ICY target areas.

Table 8: Recommendations of Planning Meeting

Yield Determinant	Recommendation	General Comments
Varieties	V1- Thadokkham (TDK) 1 V2- TDK-5 V3- TDK-6 V4- TDK-7 V5- TDK-9 V6- Phonengam (PNG)-1 V7- Thasano (TSN)-1 V8- TSN-2 V9- TSN-3 V10-TSN-4 V11- Nang Nuan V12- Local preferred variety (if any)	TDK1, TDK5, TSN1 and PNG1 were varieties included in Phase 1of the ICY Project TDK6, TDK7, TDK9 and Nang Nuan are additional varieties recommended for evaluation by NARC TSN2, TSN3 and TSN4 are additional varieties recommended by Dr Phoudalay Lathvilayvong (Thasano Station) All varieties are glutinous Varieties TDK9 and Nang Nuan are photoperiod sensitive with TDK9 flowering in early October
Fertilizer	Application of 60 N: 30 P_2O_5: 30 K_2O (kg/ha) It was also recommended that there should be one treatment plot in each village (containing all varieties) for which no fertilizer will be applied, to provide a contrast between the performance of varieties under fertilized and unfertilized conditions.	Basal application: 30:30:30 Topdressings of 30 kg/ha N at each of 25 and 45 DAT Fertilizers available commercially are 15:15:15 (N:P_2O_5:K_2O) and 46:00:00 (N in form of urea)
Hill spacing and plant population	Hill spacing 20 cm x 20 cm Seedlings per hill 2-3	
Plot size	3m x 5m	This is the plot size for each variety in each fertilizer Treatment
Demonstration per village	Three	One demonstration (with one farmer) will provide the contrast of fertilizer Treatments for all varieties, while for the other two demonstrations (2 farmers) variety performance will be assessed only under a fertilized regime
District level commitment	Outhomphone district (2 officials to collaborate)	Year 1 - 10 villages Year 2 - additional 10 Year 3 - additional 10
	Atsaphangthong district (2 officials to collaborate)	Year 1 - 5 villages Year 2 - additional 5 Year 3 - additional 6
	Phalanxai district (2 officials to collaborate)	Year 1 - 7 villages Year 2 - additional 7 Year 3 - additional 7
Site monitoring visits	Recommended timing of minimum visits for each demonstration site	Site selection Sowing Transplanting Top-dressing (2 visits) Flowering Post-flowering/pre-harvest Harvest (yield data)

Use of improved rice varieties

More than 50% of the farmers in target villages in Atsaphangthong and Outhomphone used improved rice varieties as a result of the trials while 38% used improved varieties in Phalanxai District.

The impact survey of the ICY project will be conducted in March 2008. This is currently under negotiation and the project is being continued until the end of March with WVA funding. This research will show the actual improvement in adoption of improved rice varieties and farming techniques and the impact on the rice yields and rice sufficiency in these districts.

8 Impacts

8.1 Scientific impacts – now and in 5 years

8.1.1 The utilisation of new rice varieties

Farmers in the target villages have transplanted more than 9 new varieties in their farms and have greater opportunities to select varieties most suitable to their conditions. Local or traditional varieties decreased year-by-year, but are still being used extensively. They have lower yields than new varieties but they have resistance to local pests. Most of the farmers who visited the rice demonstration sites to observe and evaluate the varieties preferred PNG-1 (Phonengam-1), TDK-6 (Thadokkham-6), NTN-1 (Namtan-1) and TSN-2.

The new varieties are unlikely to have resistance to local pests and hard manual threshing but they are of good quality for eating. For example, Thasano-2 resulted in higher yields than traditional varieties.

Despite susceptibility of the new varieties to pests such as gall midge, in the next few years, use of the new varieties is likely to increase in the target areas. The percentage of rice planted by farmers that was improved varieties was higher than 50% in Atsaphangthong and Outhomphone, and 38% in Phalanxai.

It is foreseen that within 5 years the positive impact the ICY project has made during the last two phases will be multiplied in the target villages, as more and more farmers understand and assess the benefits and advantages of using improved rice varieties and improved rice growing techniques to increase rice yield, diversifying cropping and growing vegetables and cash crops. The impact is most likely to be scaled-up significantly in four of the six ICY districts (Phalanxai, Xonnabouly, Atsaphone and Phine) where WVL operates ADPs. These are long-term projects, continuing for about 13 years, that will have a strong focus on food security and will continue to build on and scale up the gains made by the ICY project.

However in terms of the impact of the Phase 3 activities, it is worth noting the comments of Dr Schiller in the April 2007 Review and Planning Meeting report, which suggest acceptance of new varieties is likely to be less in Phase 3 districts, particularly Atsaphone:

> In considering the potential likely impact of the Phase 3 ICY seed distribution activities in the three districts of Atsaphone, Phine and Xonnabouly, it is recognized that it would be difficult to achieve the same level of variety acceptance as in the Phase 2 target districts of Outhomphone, Phalanxai and Atsaphangthong. In the on-farm demonstrations in the latter districts, collaborating villages and farming households (together with district level government officials) went through a 'learning

phase'. In the first year, often the on-farm, farmer participatory variety demonstrations had weaknesses; these were usually overcome in the second year. In the third year when farming households commenced the multiplication of seed of the most promising varieties selected from the on-farm demonstrations, the benefits of the program were quickly becoming apparent.

The limited potential benefit of the currently available improved varieties to the district of Atsaphone is acknowledged. This district, with its high chronic level of gall midge infection that is recognized as a major constraint to yield improvement, together with the acknowledgment that the improved varieties currently available, including those being evaluated within the ICY project, have limited gall midge resistance, make it unlikely that significant benefits from the seed distribution program will accrue to Atsaphone district. Farmers in this district have a high level of adoption of the Thai variety RD6 on account of its relatively higher level of tolerance, than currently available Lao improved varieties. Farmers in the district have also adopted other measures (particularly early seeding of the wet season crop) to reduce the incidence of gall midge.

8.1.2 The utilisation of fertilizer on rice production impacts

Farmers in the target villages need to use the fertilizer in their farms in order to improve yields, but they lack money to buy it. Most of the fertilizers farmers who used basal applications (NPK: 16-20-0 and Urea 46-0-0) accepted that they obtained higher rice production with fertilizer than without it. Most of the farmers who have livestock used organic fertilizer and cattle manure in their fields. The reasons given for the application of organic fertilizers and manure related mostly to improvement of soil quality, the improvement of crop growth and yield, and the ready availability of these on-farm.

The percentage of households applying chemical fertilizer was, in Atsaphangthong, Phalanxai and Outhomphone Districts, 53%, 52% and 58% respectively. More than half of the households in all villages used chemical fertilizers.

There were no similarities in most of fertilizer applications. In Atsaphangthong 28.3% of households used fertilizer as top dressing, 20.5 % in Phalanxai and 17.5 in Outhomphone. The most widely used chemical fertilizers in three districts were the compound fertilizer NP 16.20.00, followed by NPK16.8.8 (Table below).

Table 9: Percentage of households applying chemical fertilizers and the most common types of applications made in villages surveyed.

Application	Atsaphangthong	Phalanxai	Outhomphone
% households			
Fertilizer use	53.3	52.6	58.7
Basal	8.3	24.4	14
Top dressing	28.3	20.5	17.5
Basal and top dressing	16.7	7.7	26.3

8.2 Capacity impacts – now and in 5 years

The provincial counterpart staff, the district counterpart staff level and World Vision staff participated in training extension of rice production technologies. After receiving training, district counterpart staff could enable farmers in target villages of ICY project to implement rice demonstrations and demonstrated how to make bio-extract and organic fertilizer. They transferred the technologies on rice production to farmers by training and hands-on practical experience.

Now most of the farmers who participated in rice demonstration in the 3 districts (Atsaphangthong, Phalanxai and Outhoumphone) can adopt the technologies and transfer the information and practices farmer-to-farmer. For example farmers in Nachan village of Outhoumphone district have the know-how to produce Bio–Extract and compost fertilizer and use NPK15-15-15 and Urea 46-0-0. They have independently obtained improved rice varieties to plant and have used fertilizer under the supervision of district agriculture staff to increase their rice production.

8.3 Community impacts – now and in 5 years

Five years ago, most farmers in the target villages of the project planted traditional varieties of rice in their farms, resulting in low rice yields. Insufficient cultivable land also caused rice deficit in their families. However, when farmers learned to use the new varieties and technologies on rice production and saw the benefits demonstrated, many adopted the new varieties resulting in higher yields. Now, most farmers within the target villages of the ICY project are using the new rice varieties and improving their rice yield by using organic fertilizers and cattle manure.

The returns from farmers' adoption of new varieties and technologies has improved the well-being of the communities inside as well as outside the project. The factors causing rice deficit have been decreased. Some farmers are able to sell surplus rice in villages such as Ban Na village of Outhomphone. Before the project began operating, farmers rarely had surplus rice to sell. Now they have farm produce such as eggplants, cucumbers, watermelons, and chillies to sell in local markets. They have cash incomes of about 20,000 kip per day. Earlier, they did not obtain any income at all from rice or cash crop production. They only produced enough, or less than enough for their own families.

Low yields of rice and insufficient rice for household consumption have, in the past, negatively impacted the health of women and children as well as well-being more generally. The communities' health status has improved and when there is illness they can afford to buy medicines for treatment from their own income.

It is likely that these changes will be sustained over the next five years, meaning a permanent improvement in income and yields. In addition, if the predicted multiplication of use of improved varieties occurs, it is likely these community impacts will spread in target villages, leading to higher incomes and improved social outcomes such as health and education.

8.3.1 Economic impacts

In the initial years of the project in the target villages, a minority of farmers had surplus rice and vegetables and other farm produce to market, and most had few assets. But now some farmers have been able to buy hand tractors[1] to transport their produce to district market to sell, indicating their increased income and surplus products. Most of the farmers have started cultivating vegetables such as lettuce, cucumber, eggplant, chilli, cabbage, long-bean, and watermelon to sell in local markets and outside their village. They adopted the technologies of rice and vegetable production transferred by project and district staff to them and pursued rice and vegetable cultivation. In addition many farmers now own and rear livestock such as chicken, cattle and pigs for generation of additional income and as an insurance against crop failure or other emergencies. The households' economy has improved. They are able to earn about 20,000 kip to 30,000 kip per day from selling agricultural produce.

[1] A hand tractor is a power tiller or small tractor which is used to pull trailers, power pumps, grindstones or other small machines.

In sharp contrast between the time ICY project began and now, several households have made purchases such as televisions, motorbikes, and hand tractors. This suggests that the increase in income has been sustained, rather than one-off, for many households. Thus it is likely that increased incomes will be maintained over the next five years and beyond.

8.3.2 Social impacts

The rural communities still preserve traditional and ethnic cultures, particularly through their style of clothing. Each year after harvest they celebrate the traditional harvest festival on the success of rice production.

The project staff have observed significant increases in women's participation in the ICY project over the past four years since the district Women's Union trained young men and women of the target villages in gender and development. This has reduced the inequalities between women and men to some degree, but more change is needed.

8.3.3 Environmental impacts

Farmers in the target villages of ICY project generally want to use chemical fertilizer in their farms but lack the money to buy it. Most of the fertilizer that farmers used were single basal applications (urea). Given the fact that they have obtained higher rice production with fertilizer application than without it, fertilizer use has increased. However, most farmers who have livestock use organic fertilizer and cattle manure in their fields.

There is general awareness about the dangers of inappropriate use of chemical fertilizer and the reasons given for the application organic fertilizers and manure related mostly to improvement of soil quality, followed by the improvement of crop growth and yield, as well as the ready availability on-farm. Chemical pesticide is not yet used in project areas, but traditional pesticides made of tree bark or other natural products are used. The natural resources still remain unaffected.

However, care must be taken by the government and NGOs operating in these districts to ensure adequate farmer access to information on the environmental impact of inappropriate use of chemical fertilizers, pesticides and other chemicals. WVL will continue to promote these messages through its ADPs in the area, to ensure the environmental impact of improved yields and new cropping methods is minimised.

8.4 Communication and dissemination activities

The project aimed to give farmers access to improved seed and technology and provide them with the knowledge to use them independently in their own fields. The project examined approaches to enable optimal adaptation of introduced methods, through giving farmers an increased ability to assess the value of the product (technology or improved seed) in terms of yield, productivity and reduced drudgery. This brought about sets of practical experiences that related to social, economical and environmental factors of farming system. The project therefore identified and looked at ways to best support and strengthen the skills that are required to work in this way. In this process, different actors had a role to play and fill in the areas required by the farmers to help improve crop yields hence improving the livelihood of the farmers in a sustainable manner.

World Vision organized a meeting at the end of each cropping season to provide an opportunity to all professional stakeholders to share their experiences in this particular project. Lessons learned (positive and negative) were shared with others in the form of a case study so that follow up strategy could be developed promptly.

In March 08 project will organize a formal project closure meeting where the results, impact, improved practices, lessons learnt and challenges faced by the ICY project will be discussed by all key stakeholders.

9 Conclusions and recommendations

9.1 Conclusions

During the period of the ICY project, work was based on a number of established technological recommendations for improved wet season rice production, soil management and soil improvement. The technological recommendations were made available to communities in 6 districts (Outhoumphone, Atsaphangthong, Phalanxai, Phine, Atsaphone and Xonnabouly) through small-scale demonstration plots, 20 tonnes of the improved rice variety was supplied to farmers (Phase 2: 6 kilo per farmer to 1,659 farmers and Phase 3: 1kg of seed per household to 10,000 households). This way of rice seed distribution to farmers in target villages in six districts (Outhomphone, Atsaphangthong, Phalanxai, Atsaphone, Phine and Xonnabouly) will help the farmers to obtain higher rice yields as well as scale out the improved varieties to other villages fast. The extension methodology of rice production through farmer participation has improved rice yield and the welfare of farm households.

9.2 Recommendations

- The challenge that farmers in most villages in Savannakhet province face is rice deficit. Not all farmers in the ICY target villages in phases 2 and 3 have benefited yet from the transfer of technologies in rice production. There are some who still plant rice using traditional methods and do not know how or how much fertilizer to use in their paddy fields. Additionally, farmers lack fund to raise livestock which are their main source of income outside of rice production and their insurance against any emergencies. Continued promotion within the target districts of the varieties and methods used in the project, would help to address this issue.
- That World Vision continue to work with farmers and district Department of Agriculture staff in the target villages to promote and provide training in the use of improved rice varieties, appropriate fertiliser regimes, rice management practices and soil management strategies. At this point the varieties and practices would be those identified during the life of the project. In the future, there may be other varieties or practices which might need evaluation.
- That farmers be encouraged to continue to evaluate varieties, fertiliser regimes and management practices, using experimental plots.
- That the survey evaluating final impacts, currently schedules for March 2008, be completed, submitted to ACIAR and other stakeholders, and used to inform further WV and district Agriculture Department work in the area.
- That training of trainer (TOT) training for district Agriculture Department staff be considered, as it would improve their extension capacity.
- That WV and the district Agriculture Department should continue to distribute information leaflets/brochures produced by NAFRI, Lao IRRI project and NARC on improved rice varieties and cropping practices.

10 References

10.1 References cited in report

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Impact Assessment of Improved Rice Production Technologies for the Rainfed Lowland Environment in the Lao PDR report (1999), National Rice Research Program and Lao-IRRI Project.

10.2 List of publications produced by project

Baseline Survey Improving Crop Yields report, August 2004, World Vision Lao PDR and the Lao-IRRI Research and Training Project.

Baseline Rice Production Survey report, December 2007, World Vision Lao PDR and Policy Research Centre National Agriculture and Forestry Research Institute.

11 Appendices

11.1 Appendix 1:

Figure 2

11.2 Appendix 2: Protocol for Farmer Evaluation of Lowland Rice Varieties, ICY Project, Savannakhet: Year ?? Wet Season

1. Farmer collaborator

1	Name	
2	Farm size	
3	Family size	
4	Number of varieties Currently grown	

2. Growing condition and data relating to farmer's main rice crop

1	Rainfed	Yes	No			
2	Irrigated	Yes	No			
3	Supplementary irrigation	Yes	No			
4	Land preparation	Buffalo	Machine			
5	Labour	Family	Family + hire			
6	Names of varieties currently (2004 wet- season) grown by collaborator	Traditional varieties Yield (kg/plot)		Improved varieties Yield (kg/plot)		
7	Fertilizer use Type Rate (kg/ha)	Traditional varieties		Improved varieties		
8	Fertilizer application details - Fertilizer type - amount (kg/ha)	sowing		Tillering	Booting	Other times

3. General information relating to varietal evaluation plots

Seedbed sowing date	
Fertilizer application in seedbed fertilizer type rate of application (kg/ha)	Yes/No

Transplanting date	
Seedling age at transplanting (days)	
Fertilizer application after transplanting - fertilizer applied yes No N.B. it is assumed all farmers will follow recommendations made Relating to fertilizer application	

4. Specific information about varieties being compared in variety evaluation plots

		TDK1	TDK5	TDK6	TDK7	TDK9	TSN1	TSN2	TSN3	TSN4	PNG1	Nang Nuan	Popular Variety1	Popular Variety2
1	Flowering date													
2	Any damage at flowering?													
3	Is flowering uniform?													
4	Are there standing water At flowering?													
5	Harvesting date?													
6	Grain yield per plot?													
7	What are the good qualities	TDK1	TDK5	TDK6	TDK7	TDK9	TSN1	TSN2	TSN3	TSN4	PNG1	Nang Nuan	Popular Variety1	Popular Variety2
	1													
	2													
	3													
	4													
	5													
8	What are the bad qualities? 1													
	2													
	3													
	4													
	5													
9	How does the improved variety													

	compare with the common popular varieties (better, worse, about the same)												
10	Does the farmer want to test this variety in his own field in the 2005 wet season												
11	List any Pests and diseases Observed in the field												
12	List production constraints in 2004	1			2			3			4		

5. Ranking varieties

1	Rank new and common varieties according to the ranking system below	TDK1	TDK5	TDK6	TDK7	TDK9	TSN1	TSN2	TSN3	TSN4	PNG1	Nang Nuan	Popular Variety1	Popular Variety2

Use rating below to rank the varieties
Highly acceptable = 1 This variety has all the characteristics 1 like
Acceptable = 2 This one has most of the characteristics I like
Acceptable = 3 This one has most of the characteristics of the most common popular varieties
Some what acceptable = 4 Although possessing some good characteristics, I would not grow this variety
Not acceptable = 5 This variety is not acceptable

6. List any other comments here.

11.3 Appendix 3: Characteristics of varieties recommended for 2006-2007 dry-season multiplication and subsequent distribution in the 2007 wet-season in ICY project target areas of Savannakhet province

Characteristics of varieties recommended for 2006-07 dry-season multiplication and subsequent distribution in the 2007 wet-season in icy project target areas of Savannakhet province

Variety[1] designation	Variety Name	Photoperiod sensitivity	Maturity time (days)[2]	General characteristics of variety*
TDK-6	Thadokkham-6	non-sensitive	135-140	Well suited to poorer soils and, both wet and dry season production in the central agricultural region; milling percentage higher than TDK1 (>60%); moderate susceptibility to leaf and neck blast, and moderate susceptibility to stem borer.
TSN-2	Thasano-2	non-sensitive	135-140	Nitrogen responsive, good tillering ability, well suited to fertile soils, good milling and eating qualities, mildly aromatic, good resistance to bacterial leaf blight but not resistant to blast or brown plant hopper.
PNG-1	Phone Ngam-1	non-sensitive	125-130	Broad adaptability and well suited to sandy loam and loamy sand soils; good resistance to blast; moderate resistance to bacterial leaf blight; no resistance to BPH or gall midge; good eating and milling characteristics.
NTN-1	Namtane-1	non-sensitive	130-135	Reasonable drought tolerance; suited to both wet and dry season production; long grain with good milling and eating qualities; moderate resistance to bacterial leaf blight; moderate resistance to blast. Weaknesses include no resistance to brown plant hopper; at maturity, the plants tend to open and not remain totally upright.

* updated as of 24.4.2007

[1] All four varieties have glutinous endosperm

[2] Varieties grown in the wet-season in the central and southern agricultural regions, including Savannakhet province

11.4 Appendix 4 Questionnaires used for household interviews

Questionnaires used for household interviews

Village:..... District:..... Province:.....
Date:..... Interview:..... Interviewee:.....
Wealth status ( ) Wealthy, ( ) Average, ( ) Poor
Project participants: ( )Yes; ( ) No If yes, what project?.....

1. Basic household information

Household head	Name	Age	Ethnic	Easily understands spoken Lao	Year of schooling
( ) Household				( )Yes; ( ) No	
( ) Wife				( )Yes; ( ) No	

Total household member	<13 years of age	>13 years of age	Main labour	Minor labour	Can't work

2. Land tenure status

Plot	Land ownership (Code A)	Type of land (Code B)	Area (ha)
1			
2			
3			
4			
5			
Code A: 1: Own, 2: Lease, 3: Share cropping, 4: Borrow Code B: 1: Wet season rainfed rice, 2: Wet season irrigated rice, 3: Dry season irrigated rice, 4: Upland, 5: Vegetable or fruit tree garden, 6: Others (Specify: …….)			

3. Rice production practices

3.1 Rice cultivation (Last year)	Variety name	Variety type (Code C)	Rice type (Code D)	Variety source (Code E)	Area (ha)	Production (kg)	No. of year growing this variety	Reason growing this variety
Wet season rainfed rice								
Wet season irrigated rice								
Dry season irrigated rice								

Upland rice								
Code C: 1: Modern, 2: Traditional Code D: 1: Glutinous, 2: Non-glutinous Code E: 1: Farmer to farmer exchange, 2: Given free from other farmers/relatives, 3: Borrow from other farmers/relatives, 4: Buy from other farmers/relatives, 5: DAFO provided, 6: Project provided, 7: Private company provided, 8: Others (Specify)								

3.2 Preference ranking of modern and tradition varieties grown

Variety name	Variety type (Code C)	Preference ranking (1= the most like, 2= less like, etc)	Reason
Code C: 1: Modern, 2: Traditional			

3.3 From where do you get advice about fertilizer techniques? (Put ✓ in front of the sentence)

( ) Neighbours\friends
( ) Family
( ) District\ Provincial Agriculture and Forestry staff
( ) Researchers
( ) Fertilizer dealer
( ) Agriculture Promotion Bank staff
( ) Radio: Lao _____ Thai _____ Other _____
( ) TV: Lao _____ Thai _____ Other _____
( ) Formal training
( ) NGO\Project _____
( ) Others _____

3.4 From where do you get advice about pest control techniques? (Put ✓ in front of the sentence)

( ) Neighbours\friends
( ) Family
( ) District\ Provincial Agriculture and Forestry staff
( ) Researchers
( ) Pesticide dealer
( ) Agriculture Promotion Bank staff
( ) Radio: Lao _____ Thai _____ Other _____
( ) TV: Lao _____ Thai _____ Other _____
( ) Formal training
( ) NGO\Project _____
( ) Others _____

3.5 Did you use chemical fertilizer and/or manure to your rice? ( ) Yes, ( ) No
If no, why? ……..……..

If yes,

Fertilizer application (last year)	Fertilizer kind	Fertilizer type (Code F)	Amount applied (kg)	Area applied‹ (ha)	Application rate (kg/ha)	Application time (Code G)	Which rice variety applied
Wet season rainfed rice							
Wet season irrigated rice							
Dry season irrigated rice							
Upland rice							
Code F: 1: Chemical fertilizer, 2: Manure Code G: 1: Basal application, 2: Top-dressing application							

3.6 Did you use chemical fertilizer and/or manure to your non-rice crops? ( ) Yes, ( ) No

If no, why? ……..……..…...

If yes, which crops and which fertilizer?

Crops	Type of fertilizer or manure (Code H)
Code H: 1: Chemical fertilizer, 2: Cattle\buffalo dung, 3: Poultry dung, 4: Rice husk, 5: Crop residues, 6: Others (Specify)	

If use manure, why do you use organic manure?

( ) Available within the farm
( ) Cheaper than chemical fertilizer
( ) Improves soil condition
( ) Improves soil moisture retention
( ) Improves crop growth and yield
( ) Other reasons (Specify): ……..……..……..

If not use manure, why?

( ) No knowledge about them
( ) Difficult and bulky to handle
( ) Not available sufficient quantity
( ) Already use to chemical fertilizer
( ) Limited benefit
( ) Other reasons (Specify): ……..……..

3.7 After threshing your rice, what do you do with the straw?

( ) Repair house

( ) Burn
( ) Feed to animals
( ) Leave them in the field
( ) Compost or manure
( ) Other (Specify): ……..……..

4. Problems related to rice production

4.1 Problem encounter of rice production (Ranking: 1= the most serious, 2= less serious, etc)

Wet season (last year)		Dry season (last year)	
Problems	Ranking	Problems	Ranking
( ) Lack of agriculture land		( ) Lack of agriculture land	
( ) Lack of labour		( ) Lack of labour	
( ) Credit access		( ) Credit access	
( ) Drought		( ) Drought	
( ) Flooding		( ) Flooding	
( ) Cold		( ) Cold	
( ) Diseases		( ) Diseases	
( ) Insect/pests		( ) Insect/pests	
( ) Weeds		( ) Weeds	
( ) Soil quality		( ) Soil quality	
( ) Variety available		( ) Variety available	
( ) Seed access		( ) Seed access	
( ) Irrigation/Water supply		( ) Irrigation/Water supply	
( ) Others (Specify): ……		( ) Others (Specify): ……	

4.2 What are the main diseases and insects/pests that you have encountered?

Problem	Type	Solution
Diseases		
Insects/pests		

5. Household Income (Last year)

	Season	Crops	Area (ha)	Production (kg)	Consume (kg)	Sell (kg)	Amount (Kip)
5.1 Rice		Rice					
5.2 Non-rice crops	Wet season	Corn					
		Lettuce					
		Cabbage					
		Onion					
		Garlic					
		Soy bean					
		Mung bean					

		Peanut					
		Cassava					
		Pineapple					
		Water melon					
		Banana					
		Cucumber					
		Tomato					
		Chilli					
		Eggplant					
		Tobacco					
		Custard apple					
		Mango					
		Others(specify)					
	Dry season	Corn					
		Lettuce					
		Cabbage					
		Onion					
		Garlic					
		Soy bean					
		Mung bean					
		Peanut					
		Cassava					
		Pineapple					
		Water melon					
		Banana					
		Cucumber					
		Tomato					
		Chilli					
		Eggplant					
		Tobacco					
		Custard apple					
		Mango					
		Others(specify)					

5.3 Livestock	Have now (head)	Sold last year (head)	Amount (kip)
Buffalo			
Cattle			
Horse			
Goat			
Pig			
Duck			
Chicken			
Goose			
Turkey			

Fish pond	Pond:…..	kg:……..	
Egg			
Others (specify): …….			

5.4 Non-farm income (last year)	Details	Amount (Kip)
Fish and fish products		
Construction wood		
Firewood/charcoal		
NTFPs		
Livestock		
Handicraft		
Service (bus service, rice miller, …)		
Small trade (retail shop, trading, …)		
Sell labour (workers, wage for agricultural production, saw wood, …)		
Salary		
Pension		
Family members/relatives working in other provinces within Laos		
Family members/relatives overseas		
Other (Specify): ……..		

6. Food security

How was last year's rice production from your land consumed by your family?

( ) Surplus
( ) Enough
( ) Lack

If surplus rice, how did you do with the surplus rice?

( ) Sell
( ) Reserve in case of emergency
( ) Let relatives/others borrow
( ) Give free to relatives/others
( ) Others (Specify): ……

If lack rice, how many months are you shortage of rice? …….. Months

During the rice-shortage months how did you get rice?

( ) Borrow rice
( ) Exchange products with rice
( ) Beg for rice
( ) Labour exchange for rice
( ) Buy rice
( ) Others (Specify): ……

If buy rice, sources of money are from

( ) Sell labour (workers, wage for agricultural production, saw wood, …)
( ) Sell crops or vegetables
( ) Sell livestock
( ) Sell construction wood
( ) Sell firewood or charcoal
( ) Sell NTFPs

( ) Sell handicraft
( ) Small trade (retail shop, trading, …)
( ) Service (bus service, rice miller, …)
( ) Family members/relatives working in other provinces within Laos
( ) Family members/relatives overseas
( ) Other (Specify):……..

What are the main causes of rice shortage?
( ) Lack agricultural land
( ) Lack labour
( ) Soil quality
( ) Drought
( ) Flood
( ) Cold
( ) Diseases
( ) Insects/pests
( ) Weeds
( ) Irrigation/water supply
( ) Other (Specify): ……..….

11.5 Appendix 5: Causes of rice insufficiency

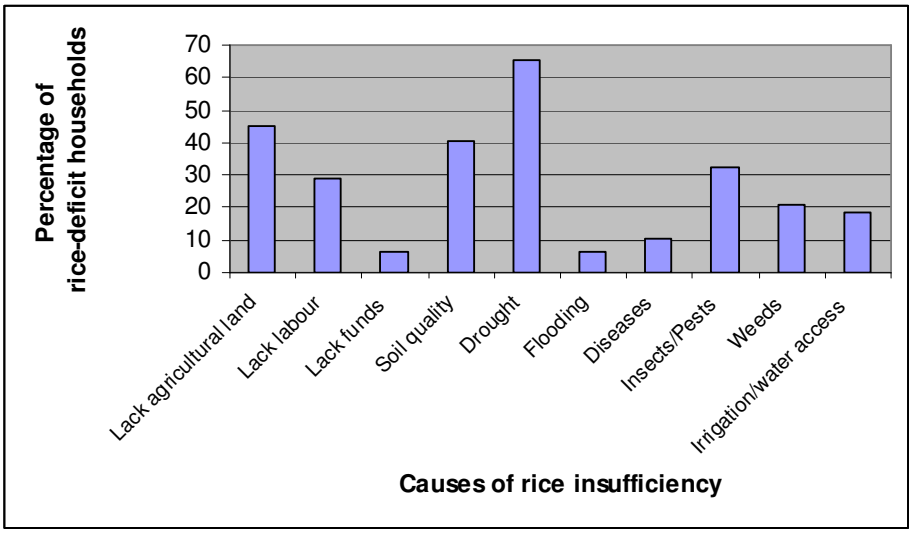

Figure 3: Causes of rice insufficiency

11.6 Appendix 6: the pictures of ICY implemented activities.

ERROR: syntaxerror
OFFENDING COMMAND: %ztokenexec_continue

STACK:

-filestream-