

Chapter 3

Research Method

This chapter will present the research methods which consists of research area, initiative of FFLP, field visit based on framework and requested, data analysis, participatory workshop approach including the scaling up to new area and network building. Furthermore the research framework will present for being the guideline of the research.

3.1 Research Area

3.1.1 Introduction

This research was carried out from during 2005 to 2009. In 2005, we chose southeastern Khon Kaen Province as the target area to develop the new method of farmer-to-farmer learning and innovation and scaling out of the farmer experimental group approach. In this research, the scaling out was from one subdistrict (*tambon*) to multiple *tambons*, moving the scale up from the *tambon* level to the level of a sub-region of a province, southeastern Khon Kaen Province. For this purpose, we sought to identify factors affecting homogeneity of villages (lower scale) and factors affecting diversification before initiating scaling out of farmer-to-farmer learning and innovation. Data collection was carried out in a census of selected villages in eight *tambons* initially in 2005, and from sample farm households in selected villages in four of the original eight *tambons* from 2006 to 2009. The process for selection of *tambons* and villages, sampling design, types of data collected at each stage, and methods used for analysis of the data are presented in general terms here. Specific methods used for each set of results are presented in the respective chapters for each. Then the study on to new districts have done from 2010-2012 to show the results of FFLP.

3.1.2 Research area

The research area was four Districts (*amphoes*) in Khon Kaen province, Northeast Thailand (Figure 37). Selection of these districts was done with the Provincial Extension Office, and selection of *tambons* and was done with District Agricultural

Extension Offices. The selection at each stage was purposive, based on criteria that are necessary for the scaling out process. *Tambon* and villages selection was based on a match-pair design. In each *amphoe*, two *tambons* were selected to be as similar as possible. One *tambon* in each pair was designed an intervention *tambon*, and the other *tambon* was selected as a control *tambon*. Details of the selection process and criteria are presented in this Chapter.

For new districts (Muang and Ban Fang) had been placed in Khon Kaen



Project Area

Figure 37 Research area located in the southern part of Khon Kaen province

3.2 Methods

Research methods have been divided in three main activities, and also depending on each research or each sup-topic

3.2.1 Activity 1: Assessment of the target villages before FFLP and assessment of impacts of FFLP and innovation

3.2.2 Activity 2: The characteristics and mechanize of FFLP technologies on cost and assessment of effects of FFLP technologies on income of land

3.2.3 Activity 3: Dissemination of FFLP to local administration organization and scaling out to other areas and network building

3.2.1 Activity 1: The method Assessment of the target villages before FFLP and assessment of impacts of FFLP and innovation

3.2.1.1 Activity 1.1 : for Assessment of the target villages before FFLP

1) Census and baseline survey

A census of a total 2,308 households was carried out in the selected villages in the four intervention *tambons* and the four control *tambons*. Stratified proportional sampling was used to draw a sample of 25 farmers from each *tambon*. Farmers with ponds were stratified (divided) into eight groups (strata) in order of diversification. A baseline survey was then developed and implemented with 25 farmers in each *tambon* in the scaling out area. The baseline survey was carried out with 200 farmers in the eight scaling out *tambons*, both intervention and control during November and December 2005. This survey was modified and repeated in 2006, 2007, and 2008, to assess the impact of farmer-to-farmer learning process (FFLP). The Chapter presents details of the original baseline survey, and presents modifications made for the assessment versions implemented in 2006-2009.

1.1 Amphoe, tambon, and village selection

This research was done in the southeastern sub-region of Khon Kaen Province, Northeast Thailand. Figure 1 shows the location of the province and the sub-region, and Figure 2 shows the location of the original *tambon* of Nong Saeng and the eight *tambons* selected for scaling out. We selected the eight *tambons* for scaling out using a three-stage process: 1) *amphoe* (district selection); 2) *tambon* (sub - district) selection within districts; 3) village selection within *tambons*. Selection at each stage was purposive, based on criteria hypothesized as important for homogeneity among villages in scaling out of a farmer-to-farmer learning process. Four *amphoes* in the southeastern sub-region were selected in 2004 based on discussion with the Soil Survey Department and the Department of Extension. Within each *amphoe* two *tambons* were selected with similar characteristics. One *tambon* was chosen as an *intervention tambon*, in which a farmer-to-farmer learning process (FFLP) would be implemented over three years. The second *tambon* was called the *control tambon*. FFLP would not

be implemented in this *tambon*, but data would be collected during the baseline survey and later, to compare the effects of FFLP and conventional extension. This design would enable us to do impact comparison later, as was done with the CIAL process in Columbia (Ashby, 2002).

Selection of *tambons* and villages within *tambons* was done in meetings held in each *amphoe* office in June 2005. In each meeting, the selection criteria were presented, *amphoe* officers identified *tambons* and villages that met these criteria, and finally a joint decision was made on the pair of *tambons* to be selected within the *amphoe*, followed by specific villages within each *tambon*. Two or three villages were selected in each *tambon*, so that approximately 250-350 farm households were represented in each *tambon*. The criteria were the same as those used in selecting *Nong Saeng tambon* in 2000:

- 1) topography (undulating)
- 2) soil type (predominantly sandy without large area of saline soil)
- 3) widespread presence of farm ponds
- 4) similar cropping systems (rainfed rice and upland sugarcane and / or cassava)
- 5) absence of another major development project.

1.2 Census and Frame for Farmer Selection for Baseline Survey

To identify farmers to involve in the scaling out process, a census of all eight *tambons* was first carried out. The census adapted the method used by Ando and Suphanchaimat to identify farmers for an on-farm research agenda setting process in the original *tambon* (Caldwell et al., 2006). This census had the objective of developing a frame for selection of farmers based on three factors: 1) presence or absence of ponds; 2) diversification types, and 3) diversification level. Diversification types were defined as eight combinations of three income-generating agricultural activities that use water from ponds: livestock (L), fruit (F), and vegetables (V). Diversification level was defined as the number of such activities on the farm, with a range from 0 to 3. Over four levels of diversification, there were a total of eight diversification types: level 0 (no activities); level 1 (L, F, or V); level 2 (LF, LV, or FV), and level 3 (LFV).

Village representatives indicated for each farmer which activity they carried out for income generation. If an activity was carried out primarily for household consumption only, it was not counted. Farmers who had all three activities (LFV) were termed integrated farms. After an initial practice session, village representatives then used this format to list these activities for all farmers in the village, both those who have ponds and those without ponds. This provided a complete census of income generation activities and ponds in 18 villages in the eight *tambons*. A total of 2,308 households were surveyed in the census.

The frame and census meetings were followed by an initial reconnaissance. After the meeting in each 18 villages, in both intervention (I) and control (C) *tambons* in the four districts, the researchers interviewed and observed farm activities of several representative farms. These farms were selected to include both low and high levels of diversification into new income generation activities. Researchers discussed with these farmers' issues related to their farm ponds, water use, yields, and cropping system. This provided inputs into the baseline survey design.

1.3 Baseline survey farmer selection and design

The frame was used to select 25 farmers per *tambon* for the baseline survey. Proportional stratified random sampling was used, so that the number of farmers in each diversification type was proportional to the numbers of farmers in the respective diversification type in the census. The baseline survey covered household characteristics, land areas and use, income, ponds, borehole wells, water use, farmer networks and livestock and manure use. The survey was first pretested and revised in meetings held with small groups of farmers in each village. It was then carried out with 200 farmers in the eight scaling out *tambons* and in the original *tambon* during November and December 2005. This survey was repeated each year to assess the impact of farmer-led participatory research.

2) Initiation of FFLP

Introduction of farmer-led experimentation through initial network building. FFLP was initiated with a workshop held in Nong Saeng village, on February 2, 2006. This village had three active farmer experimental groups (livestock, vegetables, and

integrated farming).organized in 2003 (Caldwell et al., 2006). Representative from each Nong Saeng farmer group presented on farm research results. Farmers from the four new *tambons* and Nong Saeng participated in discussion groups mixing the original three focuses. This process not only stimulated farmer to learn from each other but also to build a network between the original groups in Nong Saeng and four new villages, as shown in Figure 38.

Discussion was followed by visits to three farms: 1) cattle production farm for fattening using improved feed mixing; 2) water saving tomato production; and 3) custard apple pruning on an integrated farm. This process also served to stimulate farmer learning from each other on farm, as well as stimulate ideas for design and implementation of farmer experimentation and adaptation in the new villages. The representatives from each new intervention village had the responsibility to explain what they had learned about both specific technologies and farmer participatory research to other farmers in a subsequent meeting in their own villages. Figures 38 presents the process of scaling out from the original research village.

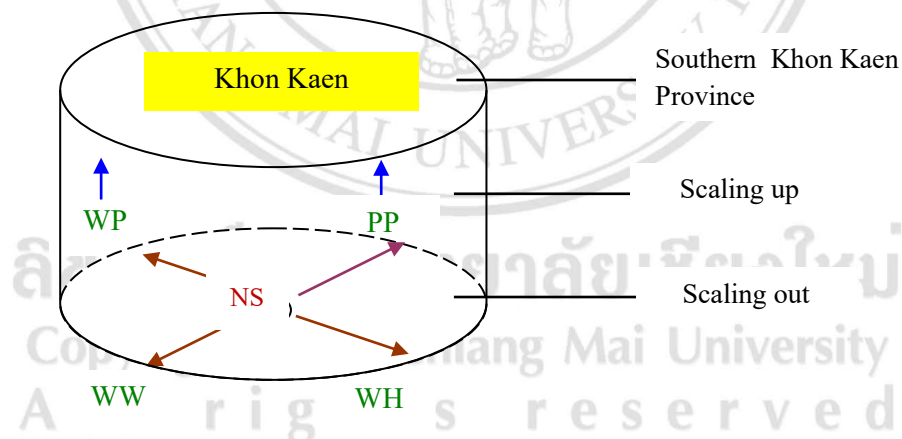


Figure 38 Scaling out and scaling up to the regional level of southern Khon Kaen Province

NS= Nong Saeng village, WW= Wang Wa village,
 WH= Wang Hin village, WP= wang Peu village,
 PP= Pa Poo village

Initiation of farmer technology development in new villages. Initial workshops were held in the intervention villages in 2006. The sequence of activities was as follows:

- 1) Opening ceremony and giving the speech by village headmen
- 2) Researcher introduced the workshop objectives, the process, and introduced the Rainfed Agricultural Research to the farmers
- 3) Farmer representatives who attended the workshop at Nong Saeng presented what they had seen and what their opinions on those issues.
- 4) Then farmers drew pictures of the present situation of their farm land, including, ponds, upland crops, paddy fields, fruit trees, vegetables, animals and other relevant activities and information, including watershed location and pond water status.
- 5) The researcher stimulated farmers to think about their overall farm situation: what were their problems, what the causes were, what was successful, and what could be improved
- 6) Each participant presented their own picture in front of all the farmers in the meeting
- 7) The researcher stimulated other farmers to ask questions about what they wanted to know more. Other farmers could support and add more information.
- 8) The researcher also asked farmers questions to make clear different activities on farms, watershed, capacity of pond and water use.
- 9) Everyone put their own farm picture on a large piece of paper titled "*Today's farm picture*"
- 10) The researcher summarized the overall *Today farm picture* to the meeting
- 11) To know how their lives were including farm status, the ladder of life's satisfaction (7 steps) was presented. The researcher explained how farmers identified which step they have been currently. Especially, they concentrated on farm, such as, activities, incomes, water, yield etc.
- 12) Farmers were asked to write own name on the card, then, put the name card on the satisfaction step. (step 1st = less, step 7st = most)

- 13) The group discussed on what they have seen on the ladder of life's satisfaction picture. And also researcher let them thought which step they wanted to reach in next 3 years of project period
- 14) The farmers were stimulated to draw an own farm picture that they want to see in next 3 years
- 15) After that, everyone presented the picture to the farmer meeting. Moreover, they had actually focused on what kinds of activity they wanted to implement: fruit, vegetable, animal or integrated with pond water use or other activities which raise incomes and supply to house hold consumption
- 16) Everyone, in addition, asked and shared the formation including suggestion
- 17) After that, farmers put their pictures on a big paper. It was called "*Future farm picture*"
- 18) And also researcher introduced the linkage between "*Today farm picture to Future farm picture* to the meeting"
- 19) The farmers were stimulated to select the activities which he/she wanted to participate and implement on farm. Then, they were also divided into the activity groups that they really needed to implement, namely, fruit, vegetable, animal and integrated farm.
- 20) Farmers, next, discussed and wrote the issues which related to either improve farms or start to do agriculture activities as follows :
 - (1) Name of activities
 - (2) Why wanted to do
 - (3) How to do / start
 - (4) Where to visit if need more knowledge/ skill
 - (5) Farmer's needs
 - (6) Term leader/ representative selection
 - (7) Where was learning point / learning hut
- 21) Team leader or representatives presented the discussion results to farmer meeting. Moreover, another group member asked and also supported data, if need.
- 22) Researcher concluded the results and stimulated farmers to discuss what they wanted to do first. Then, the research and the representatives would contact each other to implement the farmer participatory on farm research

23) After closing session, farmers who were available and researcher went to visit farms. Then, discussion, questions and recommendation had been done on farm

24) Furthermore, the results have been proposed to village headmen and group representatives to know and remind

This process provided opportunity to farmer knew and learnt forms each other in terms of farm activities, appreciate technology, problems and how to solve. Furthermore, it also provided the chance for them to join the group.

3) The following field visit based on farmer needs and requested

According to workshop, one farmer need and requested were to visit the place that using organic matter on farms, especially vegetable and rice production. Moreover, another efficient water use technology and bio-extraction were actually requested. Thus, the second field visit was organized.

Various activities were introduced and new village farmers had participated the demonstration and real practices were: 1) efficient underground water use (mini-sprinkler) for vegetable, flower and animal production (forage crop) and organic matter making and 2) water save for chemical free vegetable production by using the mini-sprinkler and bio-extraction making at Tapra village. Both villages managed by the group and also located in Khon Kaen province. There were 85 farmers participated. After field visited, each intervention village had discussed at the visiting site what have seen and what should be applied to their farms and how they learnt including they built the new network with new group. According observation during the second field trip, farmers in intervention *tambons* were more familiars with each other and asked the questions about their own farms including shared the knowledge more than first workshop at Nong Saeng village. This also implied that the network building has continued after the meeting at Nong Saeng village.

Regarding this visit, in short, the farmers have learnt 1) efficient water use by using mini-sprinkler, 2) compost making, 3) liquid organic fertilizer making, 4) bio-extraction, 5) application of liquid organic fertilizer mixing with liquid bio-extraction into sprinkler system, 6) farmer learning process, 7) insect trap, and also 8) group management and network building.

In the second year, the project provided the field visits following farmer requested on six introduced technologies. The visiting in villages played the important role for farmer exchange information. However, the necessity is farmer have learnt and built network during the research area closely. They actually know each other and were willing to tell the secret or best practices without ignorance.

4) Farmer evaluate

In this process, the farmer have evaluated the on farm research in two methods: 1) each farmer has talked and discussed during they met each other in the village and consider from receiving information, then visited farm, and 2) farm visit after workshop in the village was actually done. According the first method, some farmers have only interviewed without farm visit, they known roughly data such as good or bad, how much gained from tomato, how much invested on mango garden. On the one hand, visiting farm after workshop led them gain more information since the researcher stimulated them to asked more questions and gained more farm data. Importantly, they have really seen farm activities. This caused them clearer understood and carefully made decision to adapt developed technologies or certainly reject.

In this research, many on farm research activities are on this process. However, the researcher will collect more data in terms of economic on farm activities, then analyzing data and share the data with farmers. This will also help them to clearly make decision to adapt the technology or new practice. However, the farmer learning process on farm participatory research will also be evaluated.

5) Adaptation new practice or developed technology and scale - up

Farmers will adapt either developed technology or new practice when they have received the satisfied results. Many indicators will be evaluated, for instance, simply, uncomplicated, worthy, sustainability, suitably, low maintenance, etc. These also lead to farm cost reduction and incomes increase. In short, the economic issue is also the main normally component of decision making to adaptation.

Up to a present, many developed technologies and new practices will be adapted, namely, custard apple pruning and growing, integrated farming, organic matter making, efficient water use and cattle raising. More detail of each activity will be

described after farmers have adapted and implemented continuously. Other farmers in villages will be informed about the results of on farm research. This process can be done by many ways, for examples, participating on rice harvesting, observation activities on farm, informing the result and technique during meeting, participating the workshop including organize training course by Tambol Administration Organisation (TAO), Agricultural Extension Department, research organizations and other organization involved. This will also be the step of scaling up and dissemination.

6) Adaptation and dissemination

This process seems to be the farmer to farmer learning process. It also replies that the farmer in intervention villages have successfully tested on farm research and have basically prepared to inform and share knowledge and experience with other farmers. Especially, not only the current trial results but also the learning knowledge will be discussed and conducted. The farmer will be as a node of farmer participatory research unit in the village where other farmers can come to learn and participate the process. In short, it implies that this is also the communication step to inform other farmers know developed technology and new agricultural practices.

7) Feedback to researcher

On farm research result from farmers usually should be feed back to the researchers both expected and unexpected results. In case of farmer do not adapted the new issues, this will actually lead researchers go back to have a meeting with the farmers, then, the problems, causes and effects will be raised to discuss. The diagnosis of these will be concretely rethink again. The investigation on farm will be found out. Importantly, both farmers and researchers will investigate t either new practices or developed technology again.

8) Assessment methods

According to census, data from the census on numbers of farms in each diversification type and level were tested for homogeneity with and without ponds and between intervention and control *tambons* using Chi-square analysis. Relationships among household composition and income from the baseline survey were tested by

correlation analysis. The effect of pond size on diversification level and income were tested by regression analysis. The homogeneity of diversification types and levels at different levels of income was assessed using Chi-square analysis (Gomez and Gomez, 1976). Relationship among diversification and six parameters, i.e. household member, land area, number of ponds, pond volume, and agricultural income were tested by Student's t-test. All statistical tests were carried out using SPSS version 11.5.0 (SPSS, 2002).

A survey instrument was developed and implemented in October 2005. For baseline data, the original survey covered household size and characteristics, land use, income, land location, farm ponds, pond volume, water use periods, animal husbandry, and manure use and destination and membership in groups. Modifications in 2006, 2007 and 2008 added sources of technologies, adapted technologies, adapting and non-adapting farmer incomes, and loans. All data were entered in a standard computer-based spreadsheet. Statistical assessment of differences among farms was done using SPSS (Version 11.5.0, 2002). The Chi-square test was used to analyze the adapting and non-adapting farmers in terms of the effects of farm size and diversification on farm income. Furthermore, the percentage has been analyzed for the change of farm revenue and contribution of FFLP activities. The regression also was used to analyze the correlation between diversification, technology and farm income.

This chapter was shown the research method such as: farmer selection, survey, interviewed farmer, research area, data collection, workshop and data analysis. Next chapter will present the research results in six sub topics.

9) Data analysis

Data from the census on numbers of farms in each diversification type and level were tested for homogeneity with and without ponds and between intervention and control *tambons* using Chi-square analysis. Relationships among household composition and income from the baseline survey were tested by correlation analysis. The effect of pond size on diversification level and income were tested by regression analysis. The homogeneity of diversification types and levels at different levels of income was assessed using Chi-square analysis. Relationship among diversification and six parameters, i.e. household member, land area, number of ponds, pond volume, and agricultural income were tested by Student's t-test. All statistical tests were carried out using SPSS version 11.5.0 (SPSS, 2002).

3.2.1.2 Activity 1.2 : for Assessment of impacts of FFLP and innovation

1) Sample selection

This research was done in four districts of the southeastern sub-region of Khon Kaen Province in Northeast Thailand: Ban Haed, Ban Phai, Peuy Noi and Nong Song Hong. The selection of four sub-district (*tambons*) for scaling out used a three-stage process: (1) *amphoe* (district) selection; (2) *tambon* (sub-district) selection within districts; (3) village selection within *tambons*. A census was then carried out and a typology of farmers based on diversification was developed.

In each *amphoe*, 25 farmers were selected from the census frame using proportional stratified sampling within the typology classes. Typology classes were based on three types of income-generating agricultural activities that used water from ponds: (1) fruit, (2) livestock and (3) vegetables: when all three activities were combined, this was termed integrated (fruit + livestock + vegetable). This followed the same method as Ando and Suphanchaimat used in August 2003 to identify farmers for the September 2003 farmer research agenda setting process (Caldwell et al. 2006), for comparison with the original research village.

2) Design of the FFLP

Farmers were introduced to the concept and methods of on-farm experimentation and learning in an initial workshop. Four farmers from each new village participated in an initial workshop and visited farms on 10 February 2006, in the original site, Nong Saeng village. When they went back to their villages, they conducted a workshop in each village for other farmers. A total of 85 farmers attended these workshops. During these workshops, farmers made farm plans and selected technologies that were suitable for their own farms. Some farmers then began to do experiments with the new technologies. The FFLP focused on four technologies: 1) Cassava-based animal feed, 2) Herbal repellent extraction, 3) Liquid organic fertilizer and 4) Custard apple pruning and cultivation.

Farmers were exposed to these technologies through four methods: group visits to farms carrying out custard apple pruning and cultivation, herbal repellent extraction, liquid organic fertilizer and cassava-based animal feed Farmer workshops in each village to exchange information confirm and discuss Farmer trials with the new

technologies Observation of adapted technologies, farm visits and farmers' meetings to share experiences and new knowledge from the trials

The type and time of FFLP activities and assessment are as shown in Table 10-13 below:

Table 10 Learning process and assessment activities in 2005

Month	Activities	No. of farmers
July–August	Introduced the project in four new villages	84
October–November	Baseline survey in four villages	100

Table 11 Learning process and assessment activities in 2006

Month	Activities	No. of farmers
February	Obtaining knowledge by workshop on new technologies	16
March-April	Needs identification	85
June-November	Trials with adapted technologies	52
August	Obtaining knowledge by field visit to custard apple farm	4
November	Sharing results in a workshop	56

Table 12 Learning process and assessment activities in 2007

Month	Activities	No. of farmers
January-February	Assessment	100
March-April	Needs identification	57
March-April	Obtaining knowledge by workshop on new technologies	85
July	Obtaining knowledge by field visit to adapting farm	55
August	Obtaining knowledge by field visit to custard apple farm	21
May-November	Trials with four technologies	83
November	Sharing results in a workshop	67

Table 13 Learning process and assessment activities in 2008

Month	Activities	No. of farmers
February-March	Assessment	100
June-July	Obtaining knowledge by field visit cassava and custard	25
May-June	Trials with four technologies	83

3) Assessment method

A survey instrument was developed and implemented in October 2005. For baseline data, the original survey covered household size and characteristics, land use, income, expenditures, farm ponds, water use periods, animal husbandry and manure use, and destination and membership in groups. Modifications in 2006 and 2007 added sources of technologies, adapted technologies, adapting and non-adapting farmer incomes, and loans. All data were entered in a standard computer-based spread sheet. Statistical assessment of differences among farms was done using SPSS (version 11.5.0, 2002).

3.2.2 Activity 2: The characteristics and mechanize of FFLP technologies on cost and assessment of effects of FFLP technologies on income of land

3.2.2.1 Activity 2.1 : The characteristics and mechanize of FFLP technologies on cost

1) Sample selection

Eight-five farmers who adapted and implemented the introduced four technologies were selected, then they applied the solution on farms. Four technologies were Liquid organic fertilizer use, Herbal Bio Repellent Extraction use for insect expelling, Custard apple cultivation and pruning and Cassava production technology for animal feed.

2) Data collection

Farmer have, normally, record the FFLP technologies they did both characteristics and mechanism such as kinds of plants and raw material, weight, cost, how to make, how to apply for crops and the results after application.

3) Data analysis

Data that farmers corrected had been analyzed by focus on how to, how much for investment and cost per unit.

3.2.2.2 Activity 2.2: Assessment of effects of FFLP technologies on income of land

1) Sample selection

This research was conducted in four districts of the south-eastern sub-region of Khon Kaen Province Northeast Thailand: Ban Haed, Ban Phai, Peuy Noi and Nong Song Hong. The selection of four sub-districts (*tambons*) for scaling out used a three-stage process: 1) *amphoe* (district) selection; 2) *tambon* (sub-district) selection within districts; 3) village selection within *tambons*. A census was carried out and a typology of farmers based on diversification was developed.

In each *amphoe*, 25 farmers were selected from the census frame using proportional stratified sampling (Johnson and Christensen, 2007) within the typology classes.

Typology classes were based on three types of income-generating agricultural activities that used water from ponds: 1) fruit; 2) livestock; and 3) vegetables. When all three activities were combined (Fruit + Livestock + Vegetable), this was termed integrated. This followed the same method as Ando and Suphanchaimat used in August 2003 to identify farmers for the September 2003 farmer research agenda setting process (Caldwell et al., 2006) for comparison with the original research village.

2) Design of the farmer-to-farmer learning process (FFLP)

Farmers were introduced to the concept and methods of on-farm experimentation and learning in an initial workshop. Four farmers from each new village participated in an initial workshop and visited farms on 10 February 2006 in the original site, Nong Saeng village. When they went back to their villages, they organized and conducted a workshop for other farmers. A total of 85 farmers attended these secondary workshops. During these workshops, farmers made farm plans and selected technologies that were suitable for their own farms. Some farmers then began to experiment with the newly introduced technologies. Taweekul et al. (2009) explained that the farmer-to-farmer learning process focused on four technologies: 1) custard

apple pruning and cultivation; 2) liquid organic fertilizer; 3) herbal repellent extraction; and 4) cassava-based animal feed.

Farmers were exposed to these technologies through the following four methods:

1. Group visits to farms carrying out custard apple pruning and cultivation, herbal repellent extraction, liquid organic fertilizer, and cassava-based animal feed;
2. Farmer workshops in each village to exchange information;
3. Farmer trials with the new technologies; and
4. Observation of adapted technologies, farm visits and farmers' meetings to share experiences and new knowledge from the trials.

3) Assessment method

A survey instrument was developed and implemented. For baseline data, the original survey covered household size and characteristics, land use, income, land location, farm ponds, pond volume, water use periods, animal husbandry, and manure use and destination and membership in groups. Modifications in 2006, 2007 and 2008 added sources of technologies, adapted technologies, adapting and non-adapting farmer incomes, and loans. All data were entered in a standard computer-based spreadsheet. Furthermore, the percentage has been analyzed for the change of farm revenue and contribution of FFLP activities. The regression also was used to analyze the correlation between diversification, technology and farm income. Statistical assessment of differences among farms was done using SPSS (version 11.5.0, 2002).

3.2.3 Activity 3: Dissemination of FFLP to local administration organization and scaling out to other areas and network building

3.2.3.1 Activity 3.1 : Dissemination of FFLP to local administration organization

Site selection of this research had implemented in four districts :Ban Haed, Ban Phai, Peuy Noi and Nong Song Hong, in Khon Kaen province, Northeast Thailand. Research methods were both interview and focus group with 75 TAO' staff to collect data. TAO officers such as presidents, chairman of TAO council, members of TAO council, agricultural extension and community development staff were interviewed. Furthermore, the farmer-to-farmer learning process focused on four technologies: 1)

custard apple pruning and cultivation (CA), 2) liquid organic fertilizer (OF), 3) herbal repellent extraction (HE), and 4) cassava –based animal feed (CF). Percentage was used for data analysis.

3.2.3.2 Activity 3.2: Scaling out FFLP to new area on efficient water use for vegetable production and network building

Ban Fang district located in the west of Khon Kaen city, is selected to scaling out FFLP and technology. Initially, farmer in the village went to learn the group production and FFLP technologies, then they came back to make a plan by using participatory approach.

Two research methodologies have been used for collecting data, there were as following:

- 1)The interviewing 31 farmers, who were the member of chemically free vegetable production group at Don Han village, Khon Kaen province Thailand, were done. Then, the 3 focus groups also used for deeply discussion. The data has been analyzed by the number and explanation.
- 2)The setting small watering system to irrigate the chemically free vegetable production on farmer farm about 0.55 hectares had been done. This plot of land also has been used for the learning unit of group members (Figure 2 and 3). The farmer recorded data according to irrigation operating time, number of labor, investing cost, energy cost etc. The data was used for comparing between the old irrigation technology system and the current irrigation technology system. The data was analyzed by the figure and the description.
- 3) Two districts: 2 villages in n Muang and 2 villages in Prayeeun in Khon Kaen province were selected to prove the network building model. Free chemically vegetable production by using the water from the solar cell system pump. Famers worked on the public land to generated vegetable cultivation as group.

3.3 Research framework

1. Study on farmer socio-economic such as:

- 1.1 Sex, age, education
- 1.2 Land occupied and land use

- 1.3 Family member
- 1.4 Number member work on farm
- 1.5 No. of farm pond and capacity
- 1.6 Farm pond utilization
- 1.7 Group member and status
- 1.8 Income from farm and off farm
- 1.9 Expenditure both farm and off farm
- 10.10 Income and expenditure of main crop : rice, sugarcane and cassava
2. Study on learning development and technology acceptance
 - 2.1 FFLP technology acceptance and reasons
 - 2.2 Number and type of technology and using
 - 2.3 FFLP technology characteristics, mechanize and cost
3. Study on Farmer-to-Farmer Learning Process (FFLP)
 - 3.1.Steps of farmer learning process
 - 3.2.Scaling out of technology to community
 - 3.3. Technology acceptance and utilized
4. Study on economic and number of integrated farm
 - 4.1. Income of activity and technology 1 type (V L F)
 - 4.2. Income of activities and technologies 2 types (VL VF LF)
 - 4.3. Income of activities and technologies 3 type (VLF)
 - 4.5.Income from basic crops
5. Study on economic between income from agricultural basic and integrated farm
 - 5.1. Income from basic crops: rice, sugarcane and cassava
 - 5.2. Income from integrated farm: vegetable, cattle, and apple sugar)
 - 5.3. Income from FFLP technology
6. Study on FFLP acceptance by TAO's officers
 - 6.1. TAO's learning
 - 6.2. FFLP utilizing of farmers on TAO officer view
 - 6.3. Benefits of FFLP to farmers.
7. Study on networking building through FFLP
 - 7.1. FFLP network building

7.2. Technology from FFLP in the village

7.3. Network scaling up in new tambol

7.4. Result of income of network from FFLP

3.4 Conclusion

This chapter already presented about the research methods which consists three main activities, there were, activity 1: assessment of the target villages before FFLP and assessment of impacts of FFLP and innovation, activity2: the characteristics and mechanize of FFLP technologies on cost and assessment of effects of FFLP technologies on income of land, and activity 3: dissemination of FFLP to local administration organization and scaling out to other areas and network building. This chapter had been focus on the research area, initiative of FFLP, field visit based on framework and requested, data analysis, participatory workshop approach including the scaling up to new area and network building. Finally, the research framework has been shown.



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