

CHAPTER IV

RESEARCH RESULTS

This research investigated the effectiveness of participatory learning program on pesticide utilization among agriculturists in Srinakorn district, Sukhothai province. Experimental group was in Nongbua sub-district and control group was in Khlongmaplab sub-district. The research was conducted by giving the participatory learning program and evaluating the effectiveness of this program using pre- and post-test questionnaires. The study results are presented in 3 parts: (1) participatory learning program on pesticide utilization, (2) data analysis of personal characteristics, and (3) effectiveness of participatory learning program on pesticide utilization.

4.1 Participatory Learning Program on Pesticide Utilization

I arranged the meeting with stakeholders to hear and receive their feedbacks on how the participatory learning program should be developed. After the meeting, I integrated all stakeholders' comments and developed the program. The training site was selected to be at Nongbua temple, the heart of Nongbua sub-district. Therefore, the training site would be easily accessed by all the participants in the community. The program was structured for 2 days so that most participants would be able to participate in the entire program and so as to reduce a number of lost to follow up. The schedule of the participatory learning program is shown in Table 5 and participatory learning modules are shown in Table 6.

The participatory learning program consisted of four modules. Activities of each module were conducted either in four small groups or in one large group depending on the activity.

There were 41 agriculturists participated in the program and the subjects were divided into four groups depending on the modules. For modules 1, 2, and 3 the subjects were randomly divided into four groups with one group having 11 subjects. For module 4 the subjects were divided into four groups depending on the location where they lived. Subjects living in the same village would be in the group and some groups would include subjects living in villages nearby in order to generate four groups as equal as possible. Each module was started with a recreational activity to draw attention of all the participants so that they could concentrate on the program. The participants were encouraged to take part in all activities. Sharing experiences among the participants was completed using brainstorming and discussion. In every module there was a main trainer who guided a discussion and tried to stimulate interactions among the participants. In addition to the main trainer, there were facilitators, researcher, research assistants assigned to coordinate activities in each group. Details of each module are shown in Table 6. Brief summary are discussed below.

Module 1: Pesticide Introduction

After this module, the participants should be able to describe type of pesticides, classification and hazards of pesticides, and the correct method for

choosing pesticides. The main trainer was a staff from Srinakorn District Health Office. This module lasted 1.45 hours and its activities were organized in both small groups and one large group.

Module 2: Safe use of pesticide

After this module, the participants should have more awareness about safe use of pesticide. The main trainer was a staff from Srinakorn Agriculture Extension Office. This module lasted 1.30 hours and its activities were all organized in one large group.

Module 3: First aids (basic nursing)

After this module, the participants should know more about the impact of pesticides on health and understand first aid for pesticide poisoning and patient transfer system. The main trainer was a staff from Srinakorn District Hospital. This module lasted 1.15 hours and its activities were organized in both small groups and one large group.

Module 4: Effective Microorganism (EM)

After this module, the participants should know more about alternative biotechnology and practice to make EM by themselves. The main trainer was a staff from Sukhothai Land Development Office. This module lasted 2.15 hours and its activities were organized in both small groups and one large group.

Table 5: Schedule of participatory learning program

Day 1 Activities	
08.00 - 08.30	Participants' registration
08.30 - 09.30	Administration of pre-test questionnaire
09.30 - 10.00	Introduction to participatory learning program
10.00 - 10.15	Break
10.15 - 11.00	Self-introduction and recreational activities
11.00 - 12.00	Module 1* on pesticide introduction
12.00 - 13.00	Lunch Time
13.00 - 13.45	Module 1* continued
13.45 - 14.00	Break
14.00 - 14.30	Recreational activities
14.30 - 16.00	Module 2* on safe use of pesticide
Day 2 Activities	
08.30 - 09.00	Participants' registration
09.00 - 10.00	Review pesticide information from the first day
10.00 - 10.15	Break
10.15 - 10.45	Recreational activities
10.45 - 12.00	Module 3* on first aids (basic nursing)
12.00 - 13.00	Lunch Time
13.00 - 13.30	Recreational activities
13.30 - 14.30	Module 4* on effective microorganism (EM)
14.30 - 14.45	Break
14.45 - 16.00	Module 4* continued

* Detail of each module is shown in Table 6

Table 6: Participatory learning module

Module 1: Pesticide Introduction			
Content: - Type of pesticides - Classification and hazards of pesticides in Thailand - Correct methods for choosing pesticides			
Time: 1.45 hours			
Objectives	Participatory learning	Activities	Materials
The participants will be able to describe type of pesticides, classification and hazards of pesticides in Thailand, and the correct method for choosing pesticides.	Experience Four small groups (25 minutes)	- Give each group a vessel contained pesticide, then, let them study from its label.	- a vessel contained pesticide
	Reflection/discussion Four small groups (35 minutes)	- In each group, let the participants share their opinions about what we should consider for choosing pesticides. Then, let's them write the opinions on a paper.	- pens - papers
	Experimental/application All groups (20 minutes)	- Let each group present the result of the group discussion.	-
	Conceptualization All groups (25 minutes)	- The trainer summarizes and discusses the content as shown above.	-
Evaluation: - The participant's discussion and the participant's attention in the group activities. - Group presentations			

Table 6: Participatory learning module (cont.)

Module 2: Safe use of pesticide			
Content: - Pesticide uses and impact on the environment - Guidelines for safe use of pesticides - Using personal protective devices self-care			
Time: 1.30 hours			
Objectives	Participatory learning	Activities	Materials
The participants will have more awareness about safe use of pesticide.	Experience All groups (15 minutes)	- Let the participants watch a picture of a man who did not use the personal protective devices.	- A picture shows a man who did not use personal protective devices.
	Reflection/discussion All groups (25 minutes)	- Let the participants share their opinions about the picture: (What did they feel?, what would be the causes of this situation?, and how to solve this situation?).	- pens - flipchart
	Conceptualization All groups (25 minutes)	- The trainer summarizes and discusses on safe use of pesticide.	- posters related to the pesticide save used
	Experimental/Application All groups (25 minutes)	- A representative of participants demonstrates wearing personal protective devices (bonnet, eyeglasses, mask, rubber groves, long-sleeve shirt, trouser, rubber napkin, boots)	- personal protective devices
Evaluation: - The participant's discussion and the participant's attention			

Table 6: Participatory learning module (cont.)

Module 3: First aids (basic nursing)			
Content: - Pesticide utilization and the pesticide problems			
- Impact of pesticides on health			
- First aid for pesticide poisoning and patient transfer system			
Time: 1.15 hours			
Objectives	Participatory learning	Activities	Materials
The participants know more about the impact of pesticides on health and understand first aid for pesticide poisoning and patient transfer system.	Experience All groups (15 minutes)	- A representative of participants reads a case study of agriculturist who had a pesticide poisoning.	- a case study about pesticide poisoning
	Reflection/discussion Four groups (20 minutes)	- In each group, let the participants share their opinions about what they should do if they were in that situation. Then, let them write the opinions on a paper	- pens - papers
	Experimental/application Four small groups (20 minutes)	- Let each group present the result of group discussion.	-
	Conceptualization All groups (20 minutes)	- The trainer summarizes and discusses the first aids (basic nursing).	-
Evaluation: - The participant's discussion and the participant's attention in the group activities. - Group presentations			

Table 6: Participatory learning module (cont.)

Module 4: Effective Microorganism (EM)			
Content: - Alternative biotechnology to pesticide use			
Time: 2.15 hours			
Objectives	Participatory learning	Activities	Materials
The participants know more about alternative biotechnology and practice to make EM by themselves.	Experience Four small groups (20 minutes)	- Play a 10-minute game by letting each group write down a list of methods to reduce pesticide utilization on papers and the group coming up with the longest list wins.	- pens - papers
	Reflection/discussion All groups (20 minutes)	- Let each group present the result of group.	-
	Conceptualization All groups (20 minutes)	- The trainer summarizes and explains alternative biotechnology or effective microorganism (EM) to pesticide use.	- EM posters - EM handout
	Experimental/application Four small groups (1.15 hours)	- Learning by making the effective microorganism (EM).	-fertilization tank - fermenting agent - molasses - organic substances (plant, vegetable, and herb - knife for cutting the organic substances
Evaluation: The participant's attention in the group activities			

The researcher observed and evaluated behaviors of the subjects during the training of each module. Results showed that the subjects were willing to participate in each activity. They were interested and tried to participate in group processes and brainstorming activities. They were eager to exchange their experiences. They were excited to learn more about pesticide problems in Thailand, hazards of pesticides, impact of pesticide on health and environment, methods of save use of pesticide, and EM process. They frequently asked questions and were very friendly to one another as well as to facilitators, researcher and researcher assistants. They even continued to discuss their ideas during the breaks.

The subjects found that demonstration and practice of EM were the most interesting topics. Everyone enjoyed a part of hands-on experience. After the training, every one was very pleased to learn an alternative method of using EM rather than using pesticide. They mentioned that this training program was very useful to apply in their daily life.

In summary, the participatory learning program was carried out successfully. The researcher and research assistants gave the lecture, group discussion, demonstration and practices for the subjects. All of them had opportunities to ask questions and shared their experiences. All of them liked and thought that this program was usefulness.

4.2 Data Analysis of Personal Characteristics

Personal characteristics (gender, age, marital status, and highest education level) of experimental and control groups are shown in Table 7. Fifty-nine percent of experimental group was female while a majority (66%) of control group was male. A majority of the subjects in both groups (41.5 %) were between 40 – 49 years old. Average ages of experimental and control groups were 43.5 and 46.3 years old, respectively.

Most subjects in experimental group (78.0%) and control group (92.7%) were married. Both groups had a similar education level, with a majority in both groups being grades 1-6 (68.3% in experimental and 70.7% in control groups).

The analysis of differences between experimental and control groups using chi-square and independent t-test (Table 7) showed that there was a statistically significant difference in only gender variable while the other personal characteristics were comparable between the two groups.

Agricultural characteristics of experimental and control groups are showed in Table 8. Those characteristics include years in agriculture occupation, type of ownership, area for plantation, type of cultivated plants, type of plants, annual household income from cultivatable plants, and frequency of pesticide application per month

Table 7: Number and percentage of participants classified by personal characteristics

Characteristics	Experimental group (n = 41)		Control group (n = 41)		x ²	P-value
	n	%	n	%		
Gender					4.904	0.027
male	17	41.5	27	65.9		
female	24	58.5	14	34.1		
Age*					-	-
< 30	3	7.3	2	4.9		
30 - 39	10	24.4	7	17.1		
40 - 49	17	41.5	17	41.5		
50 - 59	9	21.9	11	26.8		
> 60	2	4.9	4	9.7		
Mean ± S.D.	(43.5 ± 9.8)		(46.3 ± 8.8)			
Min - Max	(23 - 65)		(29 - 62)			
Marital status					4.114	0.128
single	7	17.1	3	7.3		
married	32	78.0	38	92.7		
widowed/divorced/ separated	2	4.9	-	-		
Education level					2.494	0.476
illiteracy	-	-	2	4.9		
grades 1-6	28	68.3	29	70.7		
grades 7-9	7	17.1	6	14.6		
grades 10-12	6	14.6	4	9.8		

* $t = 0.327$, P-value = 0.569 using independent t -test

Most subjects in both experimental and control groups (92.7% and 97.6%, respectively) had been growing plants for more than 2 years (see Table 8). In term of ownership, most of experimental group was "owner" and "owner and renter" (41.5%, equally). In control group, most of them was "owner and renter" and followed by "owner" (46.3% and 34.2%, respectively). Most of the samples in experimental and control groups (92.7 % and 97.6%, respectively) had been growing plants more than 2 Rais. The majority of experimental group grew "2 types" (34.1%) and "3 types" (34.1%) of plants. Most grew rice (73.2%) and chili (73.2%) followed by sugarcane, bean, mango, and watercress (29.3, 22.2, 19.5, and 14.6, respectively). In control

group, the majority grew “2 types” (41.5%) of plants. Most grew rice (90.2%) followed by watercress, chili, mango, bean, and sugarcane (53.7%, 29.3%, 26.8%, 24.4%, and 14.6 %, respectively). A majority of experimental (68.3%) and control (43.9%) groups received more than 30,000 Baht per year from selling their cultivatable plants.

As for frequency of pesticide application per month (see Table 8), the majority of the samples in experimental group sprayed pesticides four times (36.6%) per month, followed by three times, twice, and once per month (26.8%, 26.8%, and 9.8%, respectively). In control group, the majority of the samples sprayed pesticides four times (39.0%) and three times (39.0%) per month, followed by twice, once, and more than four times per month (12.2%, 4.9%, and 4.9%, respectively).

The analysis of differences between experimental and control groups using chi-square (see Table 8) showed that there was a statistically significant difference in only annual household income variable while the other agricultural characteristics were no significant difference between the two groups.

4.3 Effectiveness of Participatory Learning Program on Pesticide Utilization

4.3.1 Levels of knowledge, attitude, and practice on pesticide utilization in both experimental and control groups measured before and after applying participatory learning program (see Table 9).

Table 8: Number and percentage of participants classified by agricultural characteristics

Characteristics	Experimental group (n = 41)		Control group (n = 41)		x ²	P-value
	n	%	n	%		
Duration in agriculture occupation					2.051	0.359
less than 1 year	2	4.9	-	-		
between 1-2 years	1	2.4	1	2.4		
more than 2 years	38	92.7	40	97.6		
Type of ownership					0.468	0.749
owner	17	41.5	14	34.2		
renter	7	17.0	8	19.5		
owner and renter	17	41.5	19	46.3		
Area of plantation					1.051	0.305
not larger than 1 Rai	-	-	-	-		
between 1-2 Rais	3	7.3	1	2.4		
larger than 2 Rais	38	92.7	40	97.6		
Type of cultivated plants					3.319	0.345
1 type	9	22.0	8	19.5		
2 types	14	34.1	17	41.5		
3 types	14	34.1	8	19.5		
4 types	4	9.8	8	19.5		
Type of plants					-	-
rice	30	73.2	37	90.2		
sugarcane	12	29.3	6	14.6		
bean	9	22.2	10	24.4		
watercress	6	14.6	22	53.7		
chili	30	73.2	12	29.3		
mango	8	19.5	11	26.8		
Annual household income from cultivatable plant					21.020	<0.001
less than 10,000 Baht	1	2.4	6	14.6		
between 10,000-20,000 Baht	2	4.9	15	36.6		
between 20,001-30,000 Baht	10	24.4	2	4.9		
more than 30,000 Baht	28	68.3	18	43.9		
Frequency of pesticide application per month					5.875	0.209
once	4	9.8	2	4.9		
twice	11	26.8	5	12.2		
three times	11	26.8	16	39.0		
four times	15	36.6	16	39.0		
other (more than four times)	-	-	2	4.9		

Knowledge of pesticide utilization was divided into 3 levels (good, moderate, and low) using mean score and the standard deviation of the total samples before and after the intervention (see Section 3.5). An average mean score of all the four measures (before and after apply the program in both groups) was 9.48 and the standard deviation was 2.57 (see Table 9). Before the intervention, the majority of experimental group had moderate level (61.0%) of knowledge followed by low level (34.1%) and good level (4.9%). The majority of control group had moderate level (85.4%) of knowledge followed by low level (9.7%) and good level (4.9%). After the intervention, knowledge of both groups was still mostly at a moderate level, but the percentage of moderate level was increased to 75.6% in experimental group and to 87.8% in control group.

Right health attitude of pesticide utilization was divided into 3 levels (good, moderate, and low) using the same method as in categorizing knowledge. An average mean score of all the four measures was 87.67 and the standard deviation was 11.37 (see Table 9). Before the intervention, the majority of experimental group had moderate level (80.5% of right health attitude followed by low level (14.6%) and good level (4.9%). The majority of control group had moderate level (68.3%) of knowledge followed by good level (26.8%) and low level (4.9%). After the intervention, right health attitude of both groups was still mostly at a moderate level, but the percentage of moderate level was increased to 92.7% in experimental group while the percentage was decreased to 58.5% in the control group.

Safe practice of pesticide utilization was divided into 3 levels (good, moderate, and low) using the same method as in categorizing knowledge and right health attitude. An average mean score of all the four measures was 62.15 and the standard deviation was 9.01 (see Table 9). Before the intervention, the majority of experimental group had moderate level (73.2%) of practice followed by low level (19.5%) and good level (7.3%). The majority of control group had moderate level (85.4%) of practice followed by low level (14.6%) and good level (0%). After the intervention, safe practice of pesticide utilization of both groups was still mostly at a moderate level, but the percentage of moderate level was increased to 87.8% in experimental group while the percentage was decreased to 78.0% in the control group.

Table 9: Levels of knowledge, attitude, and practice on pesticide utilization in both experimental and control groups measured before and after applying participatory learning program

Level of knowledge, attitude, and practice on pesticide utilization	Experimental group				Control group			
	Before intervention		After intervention		Before intervention		After intervention	
	n	%	n	%	n	%	n	%
Knowledge level								
Low (0-6)	14	34.1	-	-	4	9.7	2	4.9
Moderate (7-12)	25	61.0	31	75.6	35	85.4	36	87.8
Good (13-15)	2	4.9	10	24.4	2	4.9	3	7.3
Mean ± S.D.	(7.6 ± 2.7)		(11.8 ± 1.4)		(9.2 ± 1.9)		(9.3 ± 2.1)	
Attitude level								
Low (0-76)	6	14.6	1	2.4	2	4.9	10	24.4
Moderate (76-99)	33	80.5	38	92.7	28	68.3	24	58.5
Good (100-124)	2	4.9	2	4.9	11	26.8	7	17.1
Mean ± S.D.	(82.8 ± 7.6)		(92.5 ± 8.7)		(89.2 ± 11.2)		(86.0 ± 14.5)	
Practice level								
Low (0-53)	8	19.5	4	9.8	6	14.6	7	17.1
Moderate (54-71)	30	73.2	36	87.8	35	85.4	32	78.0
Good (72-75)	3	7.3	1	2.4	-	-	2	4.9
Mean ± S.D.	(60.1 ± 11.7)		(66.1 ± 6.9)		(61.1 ± 6.5)		(61.1 ± 8.9)	

4.3.2 Comparisons of mean scores before and after applying PLP on knowledge, attitude, and practice on pesticide utilization in experimental group (Table 10) and control group (Table 11).

Table 10 shows the results of KAP assessment before and after receiving the participatory learning program in experimental group. All the mean scores of KAP on pesticide utilization were significantly increased after receiving the program. The total knowledge, right health attitude, and safe practice scores were increased from 7.60 to 11.80, 82.87 to 92.51, and 60.12 to 66.19, respectively.

On the other hand, in control group, which did not receive the program, there was no significant difference in the mean scores of KAP between pre- and post-tests (see Table 11). The total knowledge, right health attitude, and safe practice scores on pre-test were 9.21, 89.29, and 61.14, respectively while on post-test were 9.31, 86.02, 61.17, respectively.

Table 10: Comparisons of mean scores before and after applying PLP on knowledge, attitude, and practice on pesticide utilization in experimental group

Experimental group Variables	Total score	Pre		Post		Paired t-test	P -value
		Mean	S.D.	Mean	S.D.		
Total knowledge score	15	7.60	2.70	11.80	1.43	9.20	< 0.001
Total attitude score	124	82.87	7.67	92.51	8.74	5.28	< 0.001
Total practice score	75	60.12	11.74	66.19	6.90	3.51	< 0.001

Table 11: Comparisons of mean scores before and after applying PLP on knowledge, attitude, and practice on pesticide utilization in control group

Experimental group Variables	Total score	Pre		Post		Paired t-test	P -value
		Mean	S.D.	Mean	S.D.		
Total knowledge score	15	9.21	1.94	9.31	2.12	0.30	0.76
Total attitude score	124	89.29	11.20	86.02	14.59	1.25	0.21
Total practice score	75	61.14	6.52	61.17	8.93	0.01	0.98

4.3.3 Percent differences of pre- and post-mean scores on knowledge, attitude, and practice on pesticide utilization in both experimental and control groups were shown in Table 12. In experimental group, after the intervention the mean scores of on knowledge, attitude, and practice were increased by 28%, 7.8%, and 8.1%, respectively. In contrast, in control group there were only slight differences between mean scores of pre- and post-tests. While the knowledge and practice scores were slightly increased by 0.67% and 8.1%, respectively, the right attitude score was slightly decreased by 2.6%.

Table 12: Percent differences of pre- and post-mean scores on knowledge, attitude, and practice on pesticide utilization in both experimental and control groups

Variables	Total score	Experimental group			Control group		
		Mean score		Percent difference	Mean score		Percent difference
		Pre	Post		Pre	Post	
Total knowledge score	15	7.60	11.80	28.00	9.21	9.31	0.67
Total attitude score	124	82.87	92.51	7.77	89.29	86.02	-2.64
Total practice score	75	60.12	66.19	8.09	61.14	61.17	0.04