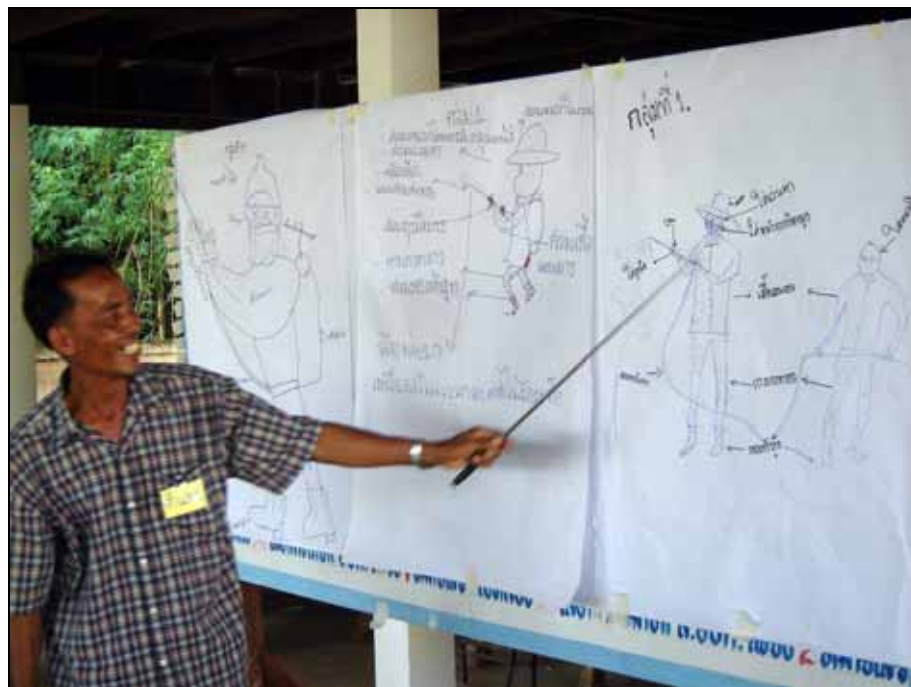




Pesticides-Health survey

Data of 79 farmers in
Petchaboon, Thailand
January 2005



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Summary

In December 2004 a group of farmers in Petchaboon received an intensive training on the health effects of pesticides. In January 2005 they conducted a survey among other farmers in their community. This survey yielded 79 sets of data which are presented in this report.

The majority of the 79 farmers in this survey grow tobacco (92%) and vegetables (49%).

Among the 79 farmers, 37 different pesticides were being used. These include 6 very toxic chemicals belonging to WHO toxicity classes Ia and Ib. The list also includes 3 banned chemical: Parathion methyl, Endosulfan, and Monocrotophos. Of these 3, Parathion methyl and Endosulfan had been banned just 3 months before the survey was conducted. However, Monocrotophos had been banned for 4½ years (since May 2000) but was still used by 8% of the farmers.

Analysis of spraying behavior shows that almost all farmers get easily exposed to pesticides. 60% of the farmers get wet during spraying, 35% works with leaking equipment. About 35% of the farmers do not use gloves during spraying, and even more farmers (53%) do not use gloves when they are mixing the chemicals.

As a result of their exposure to pesticides the farmers in Petchaboon often experience signs or symptoms of poisoning. 60% of the farmers had experienced mild signs or symptoms of poisoning, and 29% had moderate signs or symptoms of poisoning.

Storage of pesticides and disposal of empty containers were found to be especially a risk factor for children and farm animals. 86% of the farmers have a way of storage that is not safe for children and 87% of the farmers put children at risk through the disposal of empty containers.

Farmers can reduce their risks in several ways, especially by reducing the frequency and volume of spraying, and by switching from highly toxic chemicals to chemicals with lower acute toxicity. This requires intensive IPM training for the farmers so that they can manage their crops with fewer and less toxic pesticides. Another way to reduce risks is by taking better precautions during the handling and storage of pesticides and the disposal of empty containers.

The Thai government can also help reducing risks for farmers by banning the most toxic chemicals. Three of the chemicals found during this survey have been banned already (Parathion-methyl, Endosulfan, and Monocrotophos). Other very toxic chemicals that were used in Petchaboon include EPN, Carbofuran, Dicrotophos, Methomyl, and Paraquat. Banning these chemicals would ensure that the farmers will in due course switch to safer alternatives.

It is not sufficient to ban the most toxic chemicals. It is equally important to enforce the law and take action against persons who import or distribute the banned products.

Introduction

The IPM DANIDA project has in the past three years organized several training courses for groups of farmers on “the health effects of pesticides”. During this training the farmers learn to make a so called “cross-sectional survey”, which is a one point in time “snap-shot” survey of the “pesticide-health” situation in their own farming community. The training helps the farmers to understand how and when they are most likely to be contaminated by chemicals. The training model used was developed by Ms. Helen Murphy.
(See website: www.ipmthailand.org/en/pesticides/pesticides_survey.htm)

During the 5-day training the participating farmers learn about various aspects of pesticide use. The training includes 5 major topics:

1. ***Identification of chemicals***

Farmers learn to identify the types of pesticides used and to classify them according to their acute toxicity. Farmers learn to read and understand labels, and understand the colored warning signs on containers. They also learn about the toxicity classification used by WHO and they learn about the different chemical families (organophosphates, carbamates, pyrethroids, etc.).

2. ***Spraying behavior***

Farmers learn to make observations of how the pesticides are used. They observe and analyze the protective measures that are taken during mixing and application. They observe how they can get contaminated during the handling of pesticides.

3. ***Storage of pesticides and disposal of containers***

Farmers learn to make observations of how storage of pesticides and disposal of empty containers can form a risk for children, food, water, farm animals, etc.

4. ***Frequency and volume of pesticide use***

Farmers calculate the volume of pesticides that are used during one year and they calculate the frequency of applications (number of risk days per year).

5. ***Signs and symptoms of poisoning***

Farmers learn to recognize signs and symptoms of pesticide poisoning and how they differ from other signs and symptoms of poor health. For example they discuss about differences between sweating because of hard labor and sweating as a result of contamination with poisons.

During the 5-day program the farmers collect data about themselves, and each of them practices data collection with one other farmer. After the 5-day program the trained farmers get the task to each interview and observe 3 or more of their neighboring farmers. When they have completed this survey, the farmers meet again to analyze the data and to formulate their own conclusions.

This process of making a survey in their own community helps the farmers to make decisions that reduce the risks of pesticide use. For example they quickly understand that they can reduce risks by avoiding the most toxic substances (WHO class Ia and Ib) in favor of less toxic products (class III or IV). They also have learned how to better protect themselves

during spray operations and how to improve their storage of pesticides and the disposal of empty containers. Generally the training creates a lot of awareness on the pesticide hazards and farmers become interested to learn Integrated Pest Management, as this can help them to reduce pesticide use and minimize the risks.

In December 2004 a group of farmers in Petchaboon received an intensive training on the health effects of pesticides. In January 2005 they conducted a survey among other farmers in their community. This survey yielded 79 sets of data which are presented in this report.

Data of 79 farmers

Data sets of 79 farmers in Petchaboon province were entered in a computerized database. All these data were collected in December 2004 and January 2005. The following tables give an overview of these data.

Type of farmers in this survey

The 79 farmers in this survey grow a variety of crops. Almost all of them grow tobacco and about 50% grow one or more types of vegetables. None of these farmers had been previously trained in an IPM farmer field school.

Table 1 – Crops grown by 79 farmers

Crops	No. of farmers	% of farmers
Vegetables	39	49.4
Fruits	1	1.3
Rice	14	17.7
Egg plant	24	30.4
Yard long bean	16	20.3
Cabbage	6	7.6
Broccoli	5	6.3
Corn	2	2.5
Water melon	1	1.3
Garlic or onion	1	1.3
Tobacco	73	92.4
Total *	79	

* Some farmers grow more than one type of crop

Table 2 – Gender of 79 farmers

Gender	No. of farmers	% of farmers
Male	62	78.5
Female	17	21.5
Total	79	

Analysis of pesticides used

The farmers make an overview of all the pesticides that are being used. These chemicals are then grouped according to their toxicity classification and according to the chemical family to which they belong.

Table 3 – Overview of 37 pesticides used by 79 farmers in Petchaboon

Toxicity class	Common name	Chemical family	Status	No. of farmers
Ia	EPN	Organophosphates	Registered (on watch list)	12
Ia	Parathion-methyl *	Organophosphates	Banned	1
Ib	Carbofuran	Carbamates	Registered (on watch list)	3
Ib	Dicrotophos	Organophosphates	Registered (on watch list)	1
Ib	Methomyl	Carbamates	Registered (on watch list)	61
Ib	Monocrotophos **	Organophosphates	Banned	6
II	Beta-cyfluthrin	Pyrethroids	Registered	2
II	Carbaryl	Carbamates	Registered	1
II	Carbosulfan	Carbamates	Registered	4
II	Chlorfenapyr	-	Registered	1
II	Chlorpyrifos	Organophosphates	Registered	15
II	Cypermethrin	Pyrethroids	Registered	30
II	Endosulfan *	Organochlorines	Banned	6
II	Paraquat dichloride	Paraquat	Registered	60
II	Quizalofop-p-tefuryl	-	Registered	28
III	Acephate	Organophosphates	Registered	31
III	Alachlor	-	Registered	5
III	Butralin	-	Registered	16
III	Metalaxyl	-	Registered	1
III	Pendimethalin	-	Registered	4
III	Propanil	-	Registered	3
U	Bacillus thuringiensis subsp. aizawai	-	Registered	1
U	Flumetralin	-	Registered	5
U	Gibberellic acid	-	Registered	1
U	Mancozeb	Thiocarbamates	Registered	1
U	Maneb	Thiocarbamates	Registered	1
U	Sulfur	-	Registered	2
U	Zineb	Thiocarbamates	Registered	2
Not listed	2,4-D, isobutyl ester	-	Registered	3
Not listed	Abamectin	-	Registered	13
Not listed	Acetamiprid	-	Registered	2
Not listed	Beta-cypermethrin	Pyrethroids	Registered	1
Not listed	Flumethrin	Pyrethroids	Registered	1
Not listed	Glyphosate-isopropylammonium	-	Registered	3
Not listed	Haloxypop-R methyl ester	-	Registered	13
Not listed	Propamocarb hydrochloride	Carbamates	Registered	3
Not listed	White oils	-	Registered	2

* The use of Parathion-methyl and Endosulfan has been banned in October 2004 (3 months before this survey)

** The use of Monocrotophos has been banned since May 2000 (4½ years before this survey)

Table 4 – Toxicity classification of 37 pesticides used by 79 farmers in Petchaboon

Toxicity class	No. of chemicals	No. of farmers	% of farmers
Ia	2	13	16
Ib	4	63	80
II	9	72	91
III	6	45	57
U	7	11	14
Not listed	9	28	35
Total	37	79	

Table 5 – Chemical families of 37 pesticides used by 79 farmers in Petchaboon

Chemical family	No. of chemicals	No. of farmers	% of farmers
Carbamates	5	65	82
Organochlorines	1	6	8
Organophosphates	6	44	56
Paraquat	1	60	76
Pyrethroids	4	34	43
Thiocarbamates	3	3	4
Other	17	53	67
Total	37	79	

Among the 79 farmers, 37 different pesticides were being used. These include 6 chemicals belonging to WHO toxicity classes Ia and Ib. Of these six, two are already banned and the other four are on the “watch list” (EPN, Carbofuran, Dicrotophos, Methomyl).

Parathion-methyl, a chemical that has been banned in Thailand since October 2004, was in January 2005 still being used by 1 farmer. Endosulfan, also banned since October 2004, was used by 6 farmers (8%). Monocrotophos, which is banned since May 2000, was being used by 6 farmers (8%).

Analysis of the volume and frequency of pesticide use

Farmers calculated the frequency of pesticide use (number of risk days in a year) and the volume of use.

Table 6 – Number of risk days and volume of pesticide use by 79 farmers in Petchaboon

	Spray days per year	Volume per year (l)
Minimum	3	225
Maximum	73	14,600
Average	21	3,534

Analysis of spraying behavior

The farmers observe and analyze the spraying behavior of themselves and of other farmers. The results of these observations are used to start discussions on the risks of handling pesticides.

Table 7 – Spraying behavior of 79 farmers in Petchaboon

Spraying behavior	No. of farmers	% of farmers
Uses gloves when mixing	37	46.8
Uses protective clothes when mixing	46	58.2
Touch eyes when spraying	2	2.5
Touch face when spraying	29	36.7
Gets wet when spraying	47	59.5
Watches wind direction	55	69.6
Equipment is leaking	28	35.4
Smoking while spraying	3	3.8
Eating while spraying	1	1.3
Drinking while spraying	25	31.6
Washing after spraying	75	94.9
Wash clothes together with other	8	10.1
Uses 2 types of hats	9	11.4
Uses monkey cap	32	40.5
Uses helmet	1	1.3
Uses normal cap	2	2.5
Uses big hat	32	40.5
Uses other hat	15	19.0
No hat	6	7.6
Uses eye glasses	8	10.1
Uses cloth mask	43	54.4
Uses sponge mask	8	10.1
Uses mask with filter	0	-
No mask	28	35.4
Shirt with long sleeves	75	94.9
Shirt with short sleeves	4	5.1
No shirt	0	-
Long pants	73	92.4
Short pants	6	7.6
Cloth gloves	6	7.6
Medical gloves	0	-
Rubber gloves	45	57.0
No gloves	28	35.4
Boots	62	78.5
Canvas shoes	0	-
Slippers	7	8.9
Other shoes	2	2.5
No shoes	8	10.1

These data give an idea of how farmers are handling pesticides and the precautions they take. The surveys show that even though farmers know that pesticides are poisons, most of them don't follow the proper procedures when handling the chemicals.

Most farmers don't realize that they run a very high risk during mixing of the chemicals because that is the moment that they handle the undiluted chemicals. The use of gloves at the time when they mix the chemicals (47% of the farmers) is lower than during the spraying (65%).

Signs and symptoms of pesticide poisoning

During the survey farmers were also interviewed about signs and symptoms of pesticide poisoning. Data on signs and symptoms of pesticide poisoning were analyzed and discussed by the farmers. Signs and symptoms were then grouped in 4 levels (none, mild, moderate and severe).

Table 8 – Signs and symptoms of pesticide poisoning of 79 farmers in Petchaboon

No	No. of farmers	% of farmers
Sweating	17	21.5
Burning nose	9	11.4
Excessive salivation	2	2.5
Burning stinging itchy eyes	6	7.6
Red eyes	3	3.8
Dizziness	29	36.7
Exhausted	29	36.7
Head ache	20	25.3
Dry throat	48	60.8
Short of breath	7	8.9
Shaky heart	10	12.7
Muscle weakness	9	11.4
Skin rashes	12	15.2
Itchy skin	9	11.4
Numbness	10	12.7
Cough	4	5.1
Sore throat	2	2.5
Twitching eyelids	1	1.3
Blurred vision	3	3.8
Nose bleed	0	-
Runny nose	2	2.5
Excessive tearing	0	-
Insomnia	4	5.1
Tremor	5	6.3
Muscle cramps	2	2.5
Malformed Loss fingernails	1	1.3
Staggering gait	0	-
Diarrhea	1	1.3
Stomach cramps	2	2.5
Nausea	11	13.9
Chest pain (tightness burning)	3	3.8
Wheezing	0	-
Vomiting	3	3.8
Convulsions	0	-
Seizure	0	-
Loss of consciousness	0	-

Table 9 – Summary signs and symptoms of poisoning of 79 farmers in Petchaboon

Signs & Symptoms level	No. of farmers	% of farmers
- none	9	11.4
* mild	47	59.5
** moderate	23	29.1
*** severe	0	-
	79	100.0

It appeared that 88% of the farmers had experienced mild (59%) or moderate (29%) signs or symptoms of pesticides poisoning.

No blood tests were carried out during this survey in Petchaboon.

Observations of pesticide storage and disposal of empty containers

Farmers observed the storage of pesticides and the disposal of empty containers to see how this could form a risk for children and farm animals, and to see how this could form a risk of contamination of food and drinking water.

Table 10 – Storage of pesticides and disposal of empty containers by 79 farmers in Petchaboon

	No. of farmers	% of farmers
Storage child safe	11	13.9
Storage food safe	70	88.6
Storage water safe	57	72.2
Storage animal safe	17	21.5
Disposal child safe	10	12.7
Disposal food safe	66	83.5
Disposal water safe	54	68.4
Disposal animal safe	17	21.5

It is clear that in many farms, children and farm animals can easily come in contact with chemicals. This is especially the case when pesticides are not kept in locked storage rooms and when empty pesticide containers are left behind in the field. Only 14% of the farmers have storage which could be considered safe for children.



Farmers are analyzing how their pesticides are stored. They discuss if there is a risk for children, for farm animals, or a risk of contaminating food or water.

Conclusion

Farmers in Petchaboon are regularly exposed to pesticides and consequently they frequently experience signs and symptoms of poisoning. These problems are partly due to the types of pesticides used (they use many highly toxic chemicals belonging to the carbamates and organophosphates) and partly because farmers are not taking the necessary precautions.

The following options should be considered to improve this situation.

1) *Switch to less toxic chemicals*

Farmers can considerably reduce their risks by switching from chemicals with a high toxicity to chemicals with lower toxicity.

Chemicals that belong to WHO class Ia and Ib form an unacceptable high risk. The farmers in Petchaboon who use these chemicals (i.e. EPN, Parathion-methyl, Carbofuran, Dicrotophos, Methomyl, Monocrotophos) can easily reduce their risk by switching to less toxic insecticides, for example chemicals belonging to WHO class III or IV (=U).

But also WHO class II chemicals should be avoided in favor of less toxic alternatives. For example Endosulfan is an Organochlorine insecticide which in Thailand has already been banned because of its hazardous effects. Paraquat is the most toxic herbicide in Thailand and farmers can reduce the risk by switching to less toxic herbicides.

2) *Reduce the use*

Farmers can reduce their risk by spraying less frequently and by using lower volumes of pesticides. But this can only be done if farmers are educated in Integrated Pest Management (IPM) so that they learn how to manage the pests with fewer and less toxic chemicals.

It is recommended that the farmers receive IPM training in a Farmer Field School (FFS). This will help them protect their crop, while they can reduce the use and switch from highly toxic chemicals to chemicals of relatively lower toxicity.

3) *Take adequate precautions when handling pesticides*

Risk can also be reduced by making sure that contact with the chemicals is avoided as much as possible. During the pesticide-health training the farmers learn how they get contaminated and how they can improve their handling of chemicals to minimize risks. Unfortunately the necessary protective measures are not always easy to follow. Protective equipment may not be available or it may not be convenient to use it because of the warm weather conditions in a tropical climate. Special care should be taken when handling the undiluted chemicals.

4) *Banning chemicals*

The Thai government can reduce risks by banning the most toxic chemicals. Banning a chemical has an immediate positive effect for all farmers in the country.

Of the chemicals used by the 79 farmers in Petchaboon, use of Monocrotophos, Parathion-methyl and Endosulfan has already been banned. Considering the chemicals used by these

farmers, a ban of EPN, Carbofuran, Dicrotophos, Methomyl, and Paraquat would be most effective to further reduce their risk.

The fact that Monocrotophos is still being used 4½ year after it was banned indicates that there are problems with enforcing the law. It is clearly not sufficient for the government to just issue a ban. Efforts should be made to also enforce the ban and take action against illegal imports and dealers who continue distributing the banned chemicals.