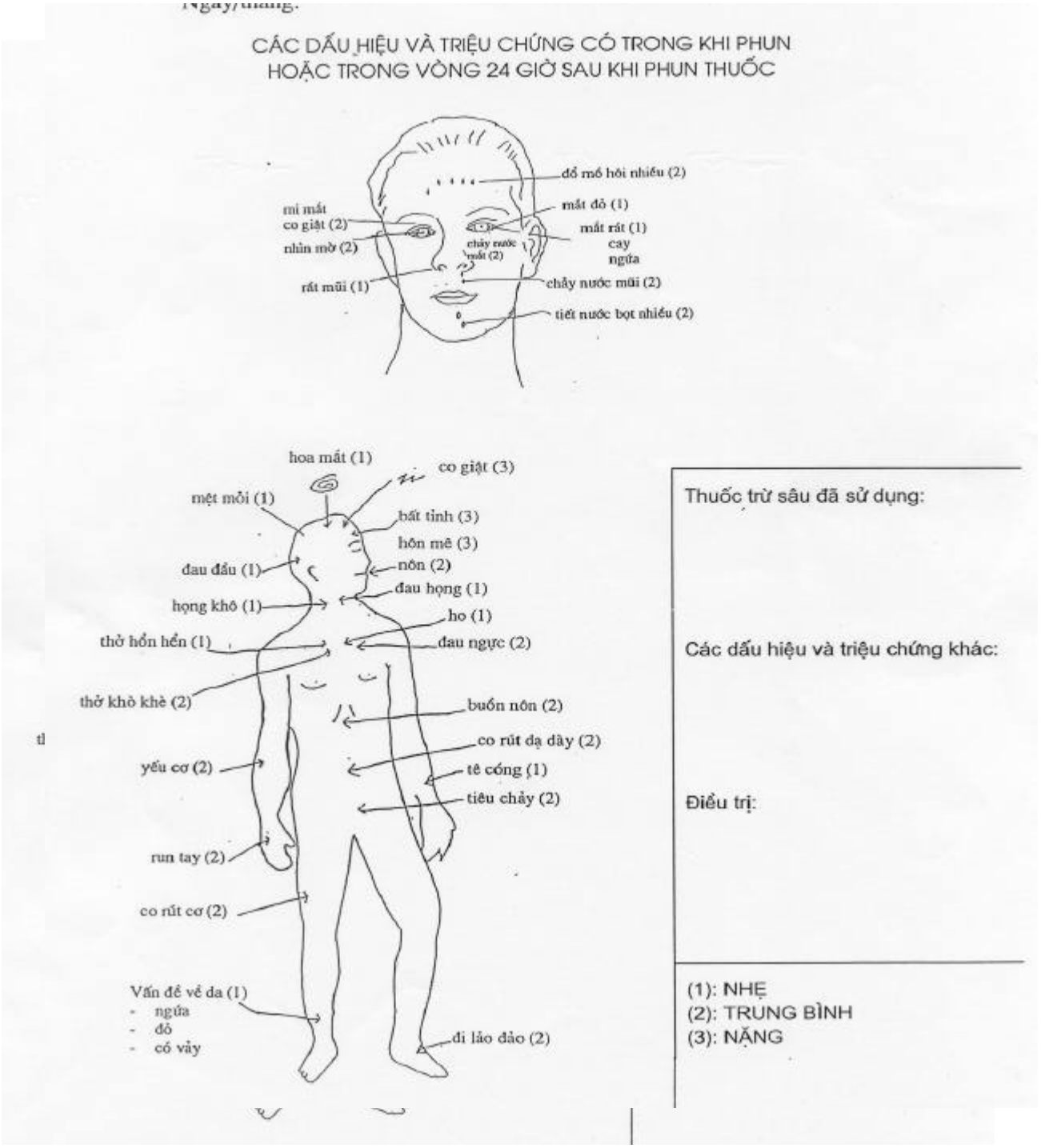
Farmer Self-Surveillance of Pesticide Poisoning Episodes

Report on One Month Pilot: August 15-Sept 15, 2000



FAO Programme for Community IPM in Asia
Field Document, 2001

Rationale:
Reliable data on the incidence of pesticide poisoning is rare in most countries. At best it is an underestimate because the source of the surveillance data from which these figures are derived is health facilities. These figures represent only a small fraction of pesticide poisoning for a number of reasons. First, only a small number of severe poisonings present to the health care system. These usually are suicide attempts. The bulk of cases - milder, occupationally related - will not necessarily report to the health care system due to costs, inaccessibility of services, or fear of reporting and loss of employment. Finally, those few farmers that do present themselves for treatment are often misdiagnosed because pesticide poisoning mimics other health problems. Therefore the magnitude of occupational pesticide poisoning is so underestimated that it cannot effectively inform policy.

Although most of the unreported occupationally related adverse health effects of pesticide use would be classified as mild and transient, there may be long-term effects that are not yet fully identified or understood. Repeated assaults to the nervous system from cholinesterase inhibitors (organophosphates and carbamates) may lead to chronic polyneuropathies. There are other groups such as pyrethroids and organochlorines that are suspected to alter hormonal balance and the reproductive system because such effects have been identified in animal populations. Given these potential long-terms effects, we have an ethical responsibility to keep the users of these products fully informed of the known acute effects and those that yet have to be ruled in or out.

Surveillance systems also do not provide feedback to their client communities. Commonly the data is seen as the domain of the health care system domain and upper level policy makers. Rather than being analyzed and used at a local level, the data migrates only up to central government institutions. As a result, communities from which the data are derived are not aware of the magnitude of pesticide poisoning nor are they given the opportunity to take preventive action or develop community solutions.

To address these issues, the IPM project in Vietnam has been piloting a farmer based surveillance system in one community. Based on the data and feedback of the participating vegetable farmers, reporting will continue one year. Thereafter, each participant will be enrolled in a farmer field school for ethical reasons. Once these farmers are aware of the health effects of the pesticides, they need alternative pest control methods.

There are three objectives for this self-surveillance initiative:

(1) To gain information on the rates of signs and symptoms and the severity of pesticide poisoning under normal occupational use.
(2) To provide information to the reporting farmers and community on the level of pesticide poisoning among them.
(3) To determine if monthly self reporting and feedback to the participants about pesticide poisoning changes pesticide application behaviors in terms of i) spray frequency and ii) choice of pesticides.

This paper reports on the second of two 1-month self- surveillance pilots in Nam Dinh Province. (The first was conducted in Bac Ninh Province)

Study Site:

The pilot was conducted in Nam Duong village, which is in Nam Truc District, Nam Dinh Province. It is located about 10 kilometers from Nam Dinh City. The village has a total population of 9,890 distributed in 13 sub-villages. Out of the total population, 9,336 live on agriculture. The village Cooperative has a total of 17 production teams. The total cultivation area of Nam Duong is 1,009 hectares, of which:

- 50% is used to grow secondary crops like potato, tomato, peanuts, field cabbage, etc. (Farmers who grow secondary crops can obtain income of VND 25,000,000 per hectare per crop per season.)
- 10% is used to grow two rice crops and one secondary crop
- 40% is used to grow two rice crops (Farmers rice yields range from 69,000kg – 71,000kg per hectare per season.)

Nam Duong village was selected as the site for the farmer self surveillance pilot based on two reasons:

(1) The availability of IPM farmer field school graduates who could become the core group or farmer trainers in carrying out the study. Two farmer field schools have been conducted in the village, one in rice (25) in Spring1997 and the other one in tomatoes (25) in winter 1999. 25 farmers attended each field school.

(2) Farmers' high use of pesticides. The total pesticide use per season reported by the Cooperative is about 8 – 10 tonnes, of which 60% is insecticide used for vegetables and secondary crops. In one year, the total pesticide use in the village is about 16 – 20 tonnes.

Pesticide use in Nam Duong decreased slightly after the introduction of IPM. But with only 25 farmers trained in vegetable IPM, use is still higher compared with other neighboring villages among the general population.

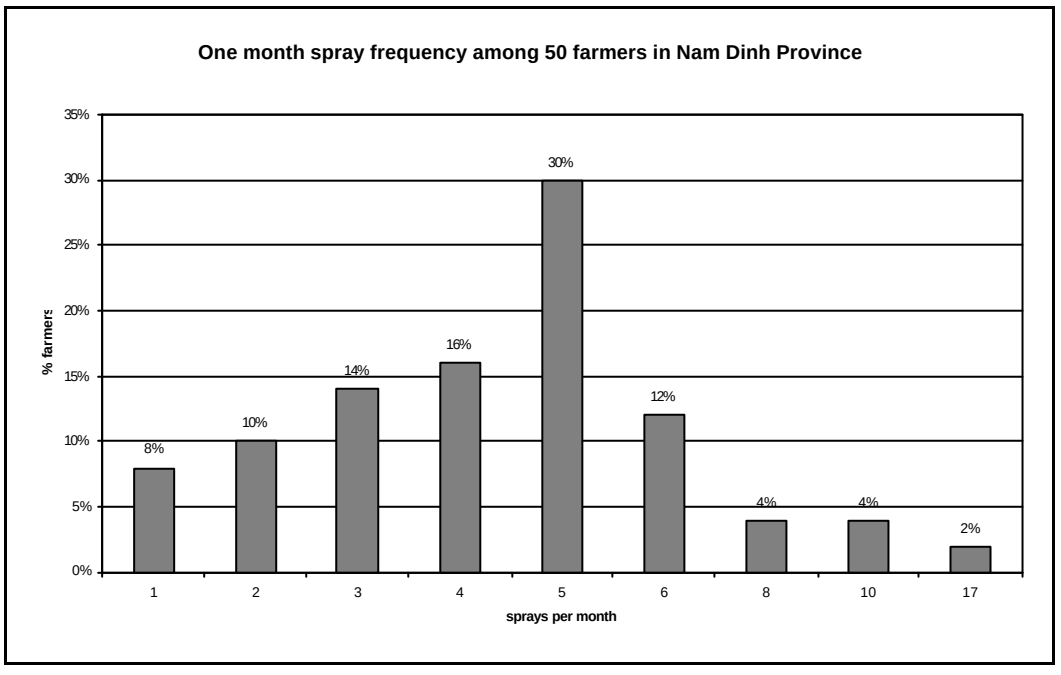
Participants and Training:

Ten IPM farmers were selected to form the core group or farmer trainers for the project. Each of the farmers represented a sub-village. All were men. They were trained over two days August 9-10. Training covered the definition and recognition of pesticide- related signs and symptoms, other conditions that mimic pesticide poisoning, the surveillance methodology, and how reporting is to be done. They in turn identified five non-IPM farmer households in each of ten sub-villages (total: 50 households; five households per sub-village) who would take participate in the self-surveillance pilot exercise. These households gathered for a meeting on August 11. One other household member was brought along to help the participant to remember appropriate self-reporting. Seventy people participated. The IPM farmers trained the households using the same content with which they themselves were trained: objectives, signs and symptoms, and how to use the reporting form.

Methods:
Each farmer is asked fill out a form after each time he or she sprays. The information that is to be recorded includes name, gender (if female specify if pregnant), address, date, and spray event number, list of pesticides used, and home treatment used. Any sign or symptom experienced during or up to 24 hours after spraying must be circled on the body map that shows 29 potential signs and symptoms associated with pesticide poisoning. At the end of the month, each of the 10 IPM farmers collect the forms from their 5 households and summarize the results. A community meeting is held with these reporting farmers each month to discuss and graph the data.

Results:

Spray events:
During September 15- October 14, the fifty farmers reported on the physical effects of pesticide use from 231 spray events; an average of 4.2 spray operations per farmer. A little less than a third (32%) sprayed less than once a week (1-3 times per month) while over half (58%) sprayed 4-6 times per month. A small group were spraying 8,10 and 17 times per month. This variation undoubtedly is related to the type of crops, not reported specifically by spray operation.



***Pesticides per tank*:** A little more than one third (34%) of the spray events were cocktail mixtures of 3 or more pesticides.

Table 1: Pesticide cocktails

# pesticides in one tank	Spray events	% of Spray Events
1	32	14
2	120	52
3	60	26
4	16	7
5	3	1
TOTAL	231	100

Types of pesticides used:

During 28% of their spray operations, the 50 farmers used a pesticide that WHO classifies as a highly hazardous product to human health (Ib). These were, Monitor and Filitox (*methamidophos)* which has officially been banned for use in Vietnam[1]. The most popular products were Padan (*cartap)*, Kassai (*kasugamycin)*, and Validacin (*validamycin A)* used in 60, 40, and 31% of spray operations, respectively. Neurotoxic products (organophosphates or carbamates) were used in a third of all spray operations.

No	Trade name	Ingredient	Chemical type	WHO class	Main use	% spray events
1	Monitor	Methamidophos	OP	Ib	I	25.1
2	Filitox	Methamidophos	OP	Ib	I	2.6
3	Dipterex	Trichiorphon	OP	III	I	0.4
4	Ofatox 400 EC	Fenitrothion +Trichlorfon	OP	II	I	2.2
5	Bi 58	Dimethroat	OP	II	I	1.7
6	VIBASA	Fenobucarb	C	II	I	0.9
7	Bassa	Fenobucarb	C	II	I	6.9
8	Fastac 5 EC	Alphamethrin	PY	II	I	5.2
9	Cyperkill	Cypermethrin	PY	II	I	1.3
10	Cypermethrin	Cypermethrin	PY	II	I	0.4
11	Vifas	Alphacypermethrin	PY	II	I	1.3
12	VIFENVA	Fenvalerate	PY	II	I	2.6
13	Padan	Cartap	-	II	I	60.6
14	Shachong shuang	Nereistoxin	-	II	I	18.2
15	Shachongdan	Nereistoxin	-	II	I	0.4
16	Netoxin	Nereistoxin	-	II	I	1.3
17	Validacin	Validamycin A	-	IV	F	30.7
18	Jinggangmeisu	Validamycin A	-	IV	F	10.4
19	Fuji one	Isoprothiolane	-	III	F	6.1
20	VIFUKI	Isoprothiolane+Iprobenphos*	-	III	F	0.4
21	KITAZIN	Iprobenphos*		III	F	0.4
22	Daconil	Chlorothalanil	-	IV	F	0.4
23	Zineb	Zineb	-	IV	F	0.4
24	Sasa	Sai ku zuo (MBAMT)	?	?	F	11.7
25	Kassai	Kasugamycin		IV	F	39.0
26	Otus	Chlofenson		III	I	0.9

***Reported signs and symptoms*:**

[1] Ministry of Agriculture and Rural Development. "List of Pesticides Permitted, Restricted and Banned To Use in Vietnam. 1999.

The health effects are summarized in three ways:

1. The most commonly reported signs and symptoms (% of spray operation)
2. Rate per spray event of mild, moderate, severe and total signs/symptoms
3. Proportion of spray events that constitute a mild, moderate, severe or non-pesticide related illness.

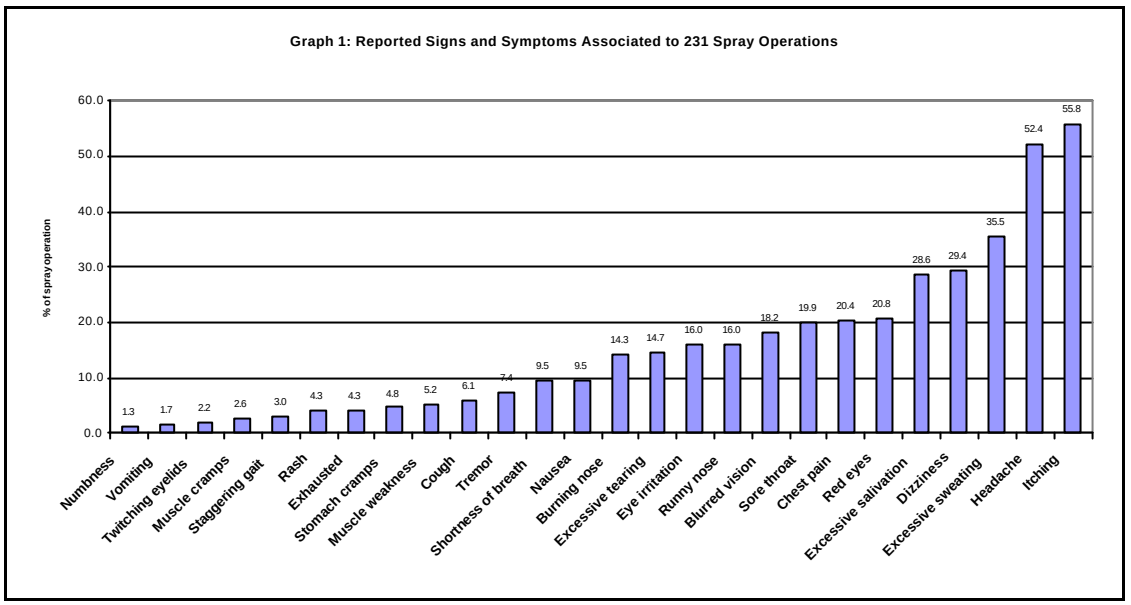
1. The most commonly reported signs and symptoms (>20% of spray operations) are either vague or ill defined (headache and dizziness) or those that may be associated with the irritant effects of the pesticides. Both excessive sweating and salivation may be a result of gland over-stimulation, an effect of the cholinesterase inhibitors (organophosphates, carbamates), or simply the effect of heavy work and hot weather.

Table 1: Reported signs and symptoms by spray operation

	Sign or symptom	Reporting Incidence	% of spray events
1	Itchy skin	129	55.84
2	Headache	121	52.38
3	Excessive sweating	82	35.49
4	Dizziness	68	29.44
5	Excessive salivation	66	28.57
6	Red eyes	48	20.78
7	Chest pain	47	20.35
8	Sore throat	46	19.91
9	Blurred vision	42	18.18
10	Itchy, stinging, burning eyes	37	16.02
11	Runny nose	37	16.02
12	Excessive tearing	34	14.72
13	Burning nose	33	14.29
14	Shortness of breath	22	9.52
15	Nausea	22	9.52
16	Tremor	17	7.36
17	Cough	14	6.06
18	Muscle weakness	12	5.19
19	Stomach cramps	11	4.76
20	Rash	10	4.33
21	Exhausted	10	4.33
22	Staggering gait	7	3.03
23	Muscle cramps	6	2.59
24	Twitching eyelids	5	2.16
25	Vomiting	4	1.73
26	Numbness	3	1.3
27	Diarrhea	0	0.0
28	Convulsions	0	0.0
29	Loss of consciousness	0	0.0

More verifiable are reports of nausea, vomiting, gait/balance disturbances and tremors. There were 4 reports of vomiting, 22 of nausea, 7 gait problems and 17 reports of tremors. Therefore it appears that 2-10% of spray operations could potentially be associated with some degree of poisoning. Of interest, a number of farmers reported sleep

disorders, which is a central nervous system effects from organophosphates. This was reported 16 times or related to 7% of the spray operations.



2. During 231 spray operations the 50 farmers reported a total of 933 instances of some sign or symptom after spraying. For the purposes of field surveillance the symptoms are classified as follows:

(1) minor: vague, ill-defined, or results of the irritant effects of pesticides.
(2) moderate: any neurotoxic effect
(3) serious: serious neurotoxic effects (loss of consciousness, seizure)

There were 4.0 complaints per spray operation, of which 2.3 were minor, 1.7 moderate and none serious.

3. Of the total 231 spray operations, 2% were asymptomatic, 25% would be considered a mild event (only associated with minor symptoms), while 73 % had at least one neurotoxic effect. This latter high proportion is likely attributed to over reporting of excessive sweating and salivation, both of which could be heat associated as opposed to a true neurotoxic effect. There were no instances of serious poisoning (convulsion, loss of consciousness, coma).

Community Meeting Feedback

On September 30-October 1 the self-reporting 50 farmers and the10 IPM alumnae gathered for a meeting. The data was presented to the farmers by the IPM farmers. Unfortunately discussion with the farmers was limited due to the formal nature of the venue. But they were asked to give 'testimonials' describing the nature of the symptoms that the epidemiologist thought were possibly over-reported (sweating, excessive salivation). Through this and an in-depth description of other symptoms such as chest pain, we were able to get a clearer idea of what effects they reported. The 50 farmers then broke into discussion groups to answer some key questions about the process. Since the answers were all rather uniform, it is doubtful if we gained any insights as to their

genuine attitudes. Given that, they all were interested in continuing the exercise, felt it was not too difficult, and stated they were learning more about the health effects of pesticides. They also reported other symptoms not included on the body map to include dry skin, disturbed sleep, and stiff hair (likely from the surfactants).

One of the most useful contributions to the meeting was the presentation of clinic data on pesticide poisonings by the local doctor, Dr. Tran Minh Dat. He reported an increased caseload as follows:

1994	2
1995	13
1997	21
1998	27
1999	31

These were a mix of occupational and food-born poisonings, rather than suicide attempts (suicide attempts are rarely admitted to by patients or family). He only sees 2-3 suicide attempts per year, which are reported elsewhere. He was quite keen to be involved in the surveillance program and agreed to serve as a consultant if questions arise. Furthermore, he will join the monthly farmer feedback meetings. He himself is quite concerned about increasing pesticide poisoning, feels the data which is otherwise unreported to the health care sector is vitally important to the health care system and would like the self-reporting broadened to more farmers in the population. He feels that this information is critical for future pesticide policy formulation.

The following day the 10 IPM alumnae gathered for a planning meeting. Dr. Dat joined us. The epidemiologist discussed the signs and symptoms again, asking for more qualitative details and reviewed the severity scores. There was a good deal of animated discussion about the terms (e.g. numbness, exhaustion) and what severity score to assign to the latter. We opted for Dr. Dat's decision to define exhaustion as mild because it is ill defined but used the farmer's local term for numbness. The group further described the common complaint of ringing in the ears. Although this effect is not a known effect, the epidemiologist asked this be included on their "other symptoms" reporting. She will investigate this in the literature. Another complaint farmers report is tongue numbness. This is should be included as general numbness.

The group decided to graph the data on a monthly basis. The cases seen by Dr. Dat will be added to their charts. They decided to monitor for an entire year. They also decided to gather data on an equal number of non self-reporting farmers to compare spray frequency and choice of pesticides as a means to measure the behavioral impacts of self-surveillance project.

Recommendations:

- Add to form: # of tanks sprayed (illness factor). The farmers decided to report this by crop
- Add to form: hours sprayed (illness factor)
- Delete: home remedies (not analyzed)
- Redefine sweating: wet extremities hours after spraying (sweating too easily confused with hot weather and work)
- Change severity score of excessive sweating, tearing, and salivation from (2) to (1) as these can be confused with the irritation effects of pesticides and are ill defined.
- Change severity score of muscle weakness as this may be confused with muscle fatigue associated to hard work.
- Add insomnia (1)
- Define on form "spray session pesticide poisoning illness category:
  (0): no signs and symptoms
  (1): mild - only (1)'s marked
  (2): moderate - at least one (2) marked
  (3): serious – at least one (3) marked
- Gather control information on pesticide use in non-participating farmers to validate behavior changes among the reporting farmers in terms of spray frequency and pesticide choices. This will control for weather and pest related reasons to change spray frequency and pesticide selection. Two methods will be used and compared to each other

  Method 1: Each IPM farmer will select another 5 non-reporting farmers in their hamlet, matching by crop to those reporting farmers. Each month he will gather data on spray frequency and the pesticides used. The following will be compared between the reporting and non-reporting farmers
  - % farmers using a Ib and II pesticide
  - average spray frequency

  Method 2: Conduct a PRA activity with the 50 reporting farmers who will plot by crop their normal spray frequency by week and pesticides usually used.