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Executive Summary

This report details the results of a community monitoring study aimed at investigating the use and impacts of pesticides in affected communities in Asia, and observance of the International Code of Conduct on the Distribution and Use of Pesticides (the Code of Conduct). The monitoring took place in the context of increasing use of pesticides and associated impacts on farmers, agricultural workers and their communities in the Asian region. The approach used in this initiative was based on Community Pesticide Action Monitoring (CPAM) a participatory method that involves community members who undertake the research, and encourages organising and action.

In 2008, 1304 farmers and agricultural workers were interviewed from 12 communities in 8 Asian countries. Data was gathered through face-to-face interviews conducted in local languages. The community interviews covered various sectors including vegetable farmers (Cambodia, Sri Lanka, China, Philippines, Indonesia and Vietnam), paddy farmers (India and Vietnam), cotton farmers (Orissa, India), agricultural workers in varied farm crops (Andhra Pradesh), and agricultural workers in palm oil plantations (Perak and Bintulu, Malaysia). Respondents from a wide range of nationalities and ethnic groups were involved, and consisted of 399 (31%) women and 903 (69%) men, and 69 incident reports[1] were gathered. Partners also endeavoured to survey 10 retail stores each. The results were analysed in 2009 and the local and regional results are presented here.

Toxicity analysis shows that 66% of the pesticide active ingredients reported in the monitoring have highly hazardous characteristics, according to PAN International criteria, presenting unacceptably high risks to communities, and especially to sensitive sub-populations such as women, children, the malnourished or those suffering from diseases. Some pesticides are widely used that have known and documented health effects or are subject to bans or restrictions elsewhere, such as paraquat, endosulfan and monocrotophos.

Such pesticides are used under varying conditions of use that presents a high level of exposure. Sources of exposure include:

- Partial, inadequate, or complete lack of Personal Protective Equipment (PPE), with a wide variance of responses.
- Spillages while mixing, spraying and/or loading.
- Non-observance of the wind direction, with some respondents spraying against and along the wind direction, or answering unknown about the wind direction.
- Poor storage and disposal practices.

[1] *Using the Human Health Incident report form developed by the Rotterdam Convention Secretariat (www.pic.int)*

In such conditions, a range of pesticide poisoning symptoms were experienced by respondents, by between 5% (in Yunnan) and up to 91% (Sri Lanka) of respondents in the monitoring sites.

In addition to direct impacts on pesticide users, the wider community is put at risk through practices that contaminate the environment. For example, disposal of containers in open fields was the most common method of disposal used in all three study sites in India, and a practice that was reported in the study sites in Vietnam. A further concern was expressed regarding the available water-bodies nearby fields. Often the water-bodies are used for multiple purposes including washing equipment, for example in Kerala and Orissa. Chemical run-off from the fields also enters the water, which is in some cases used for bathing and drinking.

The findings reveal that a huge effort needs to be made to implement International Codes and Conventions on pesticides in order to meet the Johannesburg Plan of Implementation goal: "by 2020, chemicals are used and produced in ways that lead to the minimization of significant adverse effects on human health and the environment" (UNEP 2006).

RECOMMENDATIONS

PAN AP recommends the following actions are taken in order to alleviate the worst pesticide problems in developing countries particularly in Asia:

- Develop a global partnership to rapidly reduce and eliminate highly hazardous pesticides;
- Governments should phase out highly hazardous pesticides and progressively phase-in non-chemical pest management approaches including supporting the investigation, education, and promotion of agro-ecological practices, Biodiversity Based Ecological Agriculture and Integrated Pest Management.
- Governments and industry ensure that pesticides that require PPE are not registered, sold or used in developing countries in which the conditions of use are such that these pesticides cannot be used safely, in particular because of a lack of, or inadequacy in, or inability to purchase PPE;
- Governments ensure systematic health monitoring of those exposed to pesticides;
- Governments ensure that all retailers of pesticides are trained, licensed and able to advise on how to use them; and that there is systematic compliance monitoring of all pesticide retailers;
- Governments ensure that health workers are trained in diagnosing and treating pesticide poisoning;
- Sufficient funding is made available to achieve the above recommendations in developing countries and those with economies in transition. ◆

Contents

1. Background and Context

This study aimed to investigate the use and impacts of pesticides in pesticide affected communities in several Asian countries. The monitoring has taken place in the context of increasing use of pesticides and their impacts on farmers and agricultural workers and their communities in the Asia-Pacific region.

THE PESTICIDE MARKET

Asia dominates the global market for agrochemicals, accounting for 43.1% of global agrochemical revenue in 2008 (Agronews, 2009). China is the world's biggest user, producer, and exporter of pesticides (Yang, 2007). India is the second largest pesticide producer in Asia and 12th globally (WHO, 2009). Globally, due to consolidation in the industry, the top five global multinational corporations control almost 78% of the market. In India, however, the industry is very fragmented with about 30-40 large manufacturers and about 400 formulators (Abhilash & Singh, 2008). Participants of an international workshop on the implementation of the Code of Conduct, held in 2005, estimated the overall annual pesticide use in the region at close to 500,000 tonnes of active ingredients valued at US$8.3 billion (FAO, 2005). This figure was higher than earlier estimates.

REGULATION OF PESTICIDES

Almost all members of the Asia and Pacific Plant Protection Commission[2] (APPPC) have legislation on pesticides (FAO, 2007). The International Code of Conduct on the Distribution and Use of Pesticides (the Code of Conduct) provides voluntary standards on the distribution and use of pesticides. The revised version of the Code of Conduct, adopted in 2002, is backed by all FAO member states, covering all countries in this survey. These standards apply to all those involved in the distribution and use of pesticides, particularly in countries where regulatory systems on pesticides are still developing. However, challenges in implementing the Code are acknowledged as existing in the region, such as illegal trade, weak enforcement capacity and continued pesticide poisoning (FAO 2005).

PESTICIDE POISONING

Acute health effects of pesticides include skin disorders, respiratory, gastrointestinal, circulatory, and neurological effects, and can result in death. Chronic health effects include cancer, reproductive problems, birth defects, developmental and behavioral impacts, and effects on the immune, endocrine and neurological systems. A full list of references is available (PAN International, 2007).

Accurate statistics on health effects of pesticides are not available. However, it is estimated that globally, every year, between 1 and 41 million people suffer health effects

[2] *The 24 APPPC member countries include Bangladesh, Cambodia, China, India, Indonesia, Japan, Korea DPR, Korea Rep. of, Lao PDR, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Viet Nam.*

from exposure to pesticides (PAN International, 2007). WHO (2009) estimated that a minimum of 300,000 people die from pesticide poisoning each year, with 99% of these from low- and middle- income countries. In 2008, the World Bank put the number of deaths at 355,000. However, FAO (2005) referring to recent data from Sri Lanka indicated that 300,000 deaths per year may occur in the Asia-Pacific region alone.

Official figures based on hospital registries reflect only the most severe cases, and significantly underestimate unintentional pesticide poisonings. Most rural poor have no access to hospitals, and pesticide poisonings are often not recognized and reported by medical staff. Acute pesticide poisoning cases are inconsistently reported and often occupational and non-intentional cases are excluded (Watts, 2010, forthcoming) Thundiyil et al., 2008). Most estimates also exclude chronic poisonings and pesticide-related disease, and the full impact of pesticides in terms of the chronic effects including systemic damage and diseases, cancer, reproductive health problems and hormonal disruption is unquantified (Watts, 2010 forthcoming). Community based efforts, and intensified surveillance exercises highlight this gap. For example, a surveillance exercise in Central America revealed a 98 % rate of underreporting, 76 % of the incidents being work-related (Murray et al., 2002). In a South African study, a 10 fold increase of poisoning rates was found through intensive surveillance compared with routine methods. It also found that occupational cases were underreported compared to suicides, and the risks to women were underestimated (Ross & Baillie, 2001). In Vietnam, a 12 month farmer self-surveillance found that 54 moderate poisonings were reported per month, compared to only 2 per month reported at the local health care centre (Murphy et al., 2002).

Currently, Southeast Asian countries have a total of only 15 functioning poisons information centres in operation, with capacity to respond to a maximum of 5,000 cases per year (WHO, 2009). If it is taken that there are at least 300,000 poisonings in the Asian region annually, this capacity would not be sufficient.

Some available data on pesticide poisoning in some Asian countries are summarized below:

Bangladesh: in 2008, pesticide poisoning was recorded as a leading cause of death, and was officially recorded as the second highest cause of death among the 15-49 year old age group, accounting for 8% of deaths (DGHS, 2009).

Cambodia: At least 88% of farmers surveyed in Cambodia had suffered from symptoms of acute pesticide poisoning (Sodavy et al., 2000).

China: The Organic Consumers Association (2003) cites official statistics that between 53,000 and 123,000 people are poisoned by pesticides annually, and 300 to 500 farmers die each year. Localized studies suggest much higher rates (OCA, 2003). China has recently implemented a ban on use and production of 5 organophosphate pesticides (methamidophos, parathion, methyl parathion, monocrotophos, phosphamidon).

Japan: Out of 346 pesticide poisonings recorded between 1998 and 2002 in Japanese hospitals, 70% were recorded as suicides, 16% occupational and 8% due to accidental ingestion. The most common pesticides were organophosphates and paraquat (Nagami et al. 2005)

Korea: between 1996 and 2005, approximately 2,500 fatalities were reported to occur annually due to pesticide poisoning. Paraquat was the main causal agent (Lee & Cha, 2009).

India: WHO (2009) estimates that 600,000 cases and 60,000 deaths occur in India annually, with the most vulnerable groups consisting of children, women, workers in the informal sector, and poor farmers. Andhra Pradesh, a state in Southern India, has one of the highest records, with over 1,000 pesticide poisoning cases each year and hundreds of deaths; the pesticides monocrotophos and endosulfan accounting for the majority of deaths with known pesticides in 2002 (Rao et al., 2005). Organochlorine and organophosphate pesticides are widely used in India (Abhilash & Singh, 2007). More recently, WHO (2009) estimated that the "toll of annual deaths from pesticide poisoning may exceed 5,000 and deaths from monocrotophos poisoning may be close to 2,000, or 40% of the total deaths" in Andhra Pradesh alone.

Indonesia: A one-year study of pesticide poisoning was carried out in 7 hospitals in Java between 1999 and 2000. There were 126 cases. Organophosphates were the most commonly used poisoning agents (WHO, 2002). In 2003, there were 317 cases of pesticide poisoning reported, although these are likely to be underestimates due to unreported incidents (WHO, 2004). Local studies have found higher levels. For example, in 2005, a survey of Indonesian farmers found that 21% of the spray operations resulted in three or more neurobehavioral, intestinal, or respiratory symptoms (Kishi et al., 1995).

Malaysia: Between 2006 to 2009, the pesticide poisoning cases, as referred to the National Poison Centre, are as follows:

Table 1.1 Poisoning cases referred to National Poison Centre, 2006-2009

Year	No. Cases
2006	490
2007	678
2008	841

Source: National Poison Centre (pers comms, 2010)

According to the National Poison Centre, the number of cases due to the herbicide paraquat has been rising. Table 1.2 provides a list of paraquat poisoning cases, showing an overall increase in the number of cases reported between 2002 and 2008. A ban was placed on the herbicide in 2002 but this ban was lifted in 2006, and paraquat poisoning cases have more than doubled since then.

Table 1.2 Paraquat poisoning cases reported in Malaysia

Year	No. Cases
2002	10
2003	15
2004	16
2005	36
2006	31
2007	39
2008	71

Source: National Poison Centre (pers comms, 2009).

Philippines: Between Apr 2000 and May 2001, 273 poisoning cases were reported (most commonly by ingestion) with 16 cases resulting in death (likely an underestimate). Pesticides commonly used were cypermethrin, malathion, carbofuran, cyfluthrin and deltamethrin (Dioquino, undated). Local studies using focus group discussions with those exposed to aerial spraying in the plantations have revealed a spectrum of medical complaints and symptoms consistent with acute pesticide poisoning (Quijano & Quijano 1997).

Sri Lanka: Poisoning is one of the leading causes of hospitalization and it is estimated that, for the period 1998-2000, between 15,000 and 20,000 cases of pesticide poisoning were admitted annually to government hospitals. Of these, between 500 and 2,200 people died each year. Self-poisoning with suicidal intent was very common (WHO, 2002). WHO Class 1 organophosphates (OPs) were restricted between 1991 and1994, then banned in Jan 1995. More recently (1998), endosulfan was banned. A corresponding fall in the number of deaths caused by these pesticides has been observed. However, in 2003, the majority of deaths were due to WHO Class II OPs, particularly fenthion and dimethoate, and additionally the herbicide paraquat (Roberts et al., 2002).

Viet Nam: In 2002, there were 7,170 cases of pesticide poisoning reported (WHO, 2005). Blood tests of 190 rice farmers in the Mekong Delta, Viet Nam, revealed that over 35% of test subjects experienced acute pesticide poisoning, and 21% were chronically poisoned (Dasgupta et al., 2007). Blood tests (acetyl cholinesterase enzyme) of 190 rice farmers in the Mekong Delta, Viet Nam, revealed that over 35 % of test subjects experienced acute pesticide poisoning, and 21 % were chronically poisoned (Dasgupta et al., 2007).

Pesticide poisoning disproportionately affects children and infants (Goldmann, 2004), and the developing foetus is especially vulnerable. Children are often more highly exposed through the way they eat, drink and play. Women are also highly susceptible to the effects of pesticides. Physically, they have higher absorption through skin and more body fat, and are further affected through reproductive impacts. Two thirds of rural women in developing countries come from low-income households, and they often head households as men migrate to cities in search of work. Poverty and malnutrition exacerbate the effects of pesticides. Women, while frequently employed as pesticide applicators, are less likely than men to receive formal training in reduced risk practices (Watts 2010, forthcoming).

Aside from poisoning, the impacts of dependency on pesticides in the Asian region have been previously documented, including effects on livelihoods caused by debt and poverty due to the increasing chemical costs and crop losses, and loss of biodiversity which is the source of food, health and livelihood for many rural communities (Rengam et al., 2001; Rengam et al., 2007). Pesticides can infringe human rights to food, health and clean drinking water - not only those of workers and farmers that experience occupational exposure to pesticides, but also those of residents in surrounding farmland and villages, and consumers who are exposed to pesticide residues on food (Young, 2005). ◆

2. Objectives and Methods

This study aimed to monitor the use and impacts of pesticides in selected communities in several Asian countries, based on ongoing community based action monitoring in the region. 12 organisations in 8 countries participated in the project and engaged with local communities. The overall objectives of the monitoring were to highlight the impact of highly hazardous pesticides on the health of communities, with a focus on conditions of use in the field; and to document the ways in which pesticides are distributed and sold in relation to the Code of Conduct. The detailed objectives and methods of the project are described within this section.

STUDY OBJECTIVES

Objective One: Highlight the impact of highly hazardous pesticides on the health of communities (with a focus on conditions of use in the field)

Detailed objectives - pesticide use and effects:

1. Describe the demographic profile of the study participants in terms of: gender, sector, occupation, age, and education.
2. Describe what highly hazardous pesticides are in use, and identify any banned or restricted pesticides.
3. Describe the conditions of use of pesticides in terms of: Personal Protective Equipment (PPE) (wearing, availability, reasons for not wearing), activities that could lead to exposure, spillages, and wind direction.
4. Describe practices with pesticides in terms of disposal, storage, cleaning of equipment and containers.
5. Describe the level of awareness of pesticide hazards and alternatives in terms of training.
6. Describe the health impacts of pesticides:
   a. What signs and symptoms are reported while using pesticides or being exposed to them
   b. Summarise incidents in terms of pesticide used, date/place, how it happened (e.g. mixing, spraying, spillage), effects and treatment.
7. Characterize the health status of study participants in terms of the following factors:
   c. Medical history
   d. Social history
   e. Environmental history
   f. Nutritional history
   g. Signs and Symptoms (detailed).

Detailed objectives - incident reports

The study aimed to get *"a clear description of the incidents related to the problem, including the adverse effects and the way in which the formulation was used"* (part 1 paragraph g of Annex IV of the Rotterdam Convention).

Detailed objectives:

1. Describe the product identity in terms of the formulation/active used
2. Describe place of incidence, date
3. Describe how the formulation was used in the field
4. Describe the adverse effects on the user
5. Describe treatment of the person exposed.

Objective Two: Document the ways in which pesticides are distributed and sold in relation to the Code of Conduct

Detailed objectives - retail store survey:

1. Obtain a general store profile (location, type of store, proximity to other stores, and customer base).
2. Describe what highly hazardous pesticides are found in the stores, and identify any banned or restricted pesticides.
3. Describe the training of the salesperson (including training provider, mode and length of training) and whether they are able to give reliable guidance to the customer, with respect to hazards, safety precautions and disposal.
4. Describe conditions in store in relation to Code of Conduct requirements:
   a. labelling (e.g. has a label, clear and concise, include symbols and pictograms, in local language)
   b. packaging (e.g. ready-to-use, not attractive for re-use, child-proof, not repackaged unsafely).
5. Identify whether PPE is available (and if not, where it can be bought).
6. Identify whether stores have government licenses.

METHODS AND PROCESS

The community monitoring approach used in this initiative is based on Community Pesticide Action Monitoring (CPAM). CPAM is a tool, developed by Pesticide Action Network Asia and the Pacific (PAN AP), to document and create awareness of pesticide impacts on human health and the environment. The approach is based on Participatory Action Research. It involves the community members who undertake the research, and encourages organising and action. CPAM aims to empower communities to address their situation themselves and get actively involved in solving their problems, i.e. through policy advocacy at local and national level, driving the changes required to reduce the use of pesticides and stop dangerous practices. CPAM also stimulates the search for and adoption of more ecological agricultural practices.

In Asia, 12 organisations from 8 countries are participating in the project. A Regional Training of Facilitators was held in Penang, Malaysia in July 2008, during which participants gave input into the monitoring tools and procedures, were trained in their use and developed local and regional action plans. Participating organisations then translated and, in some cases, adapted the questionnaires for use in their local situation based on a pretest. The monitoring was conducted by partner organisations and communities in their respective countries from August to November 2008. Partners consulted with communities where pesticides are used (at work or otherwise) on their interest in the study objectives and interviewed approximately 100 respondents in each community. Partners also endeavoured to survey 10 retail stores in each study site. In total, 1,304 respondents were interviewed, with 69 human health incident reports gathered. More than 118 retail stores were surveyed, with some groups interviewing more than 10 stores in each location.

Pesticide use and effects

The data about pesticide use and effects was gathered through face to face interviews with farmers and agricultural workers in their local language, with the aid of a questionnaire. The questionnaire was used to establish the identity of the pesticides, conditions of use and practices with pesticides. It included demographic aspects including sex, age, ethnicity, income and educational attainment. Data was also gathered on health effects experienced, as evidenced by self-reported symptoms and incidents. Some groups also gathered detailed health data about their respondents. However this data will be subject to further in-depth analysis. In some cases the survey was supplemented with in-depth interviews, observations, background research and photographs.

Incident reports

The Human Health Incident Report form developed by the Rotterdam Convention Secretariat was used to report incidents (available at: http://www.pic.int/home.php?type=t&id=38&sid=34). Those respondents who could remember a detailed incident involving pesticide exposure were asked if they wished to answer an incident report, and some additional cases from the surrounding community may have also been gathered.

Retail store survey

These surveys focused on compliance with the Code of Conduct, and aimed to collect data on observance of the Code at the retail level, with the intention of illustrating the situation of industry accountability with regard to the Code. The monitoring teams endeavoured to survey approximately 10 stores, undertaking observations and surveys with the salespersons.

DATA STORAGE AND ANALYSIS

Generally, the questionnaires were sent to PAN AP for data entry and analysis[3]. In addition to the analysis of the survey data, insights gained through background research, observations, in-depth interviews, photographs and local knowledge of the groups are incorporated where possible.

Software used for data storage and analysis

Standard statistical software, EPI Info version 6 data entry program was the main

[3] *With the exception of the data from Wonosobo community (Indonesia), undertaken by Gita Pertiwi: the data entry and analysis was done by Gita Pertiwi, Java*

program used for data entry. EPI Info is a DOS based program built and used by US based Centre for Disease Control which was designed specifically for data entry and analysis of health based questionnaires (CDC, 2009, available at: http://www.cdc.gov/epiinfo/epi6/ei6.htm). The system has been modified to match PAN AP's data entry requirements. The same software was used to analyze the data. Data were analyzed using descriptive statistics; and summary statistics such as the proportions for qualitative variables were generated. For the other questionnaire data, summary tables were created for each of the variables and reported as a frequency or percentage of the total used. These data were presented in tabular form.

A Microsoft Access database was used to record information on the identity of pesticides and their use, pest data and related details. It was also used for long answers and the list of short codes used for data entry.

Data management

All information was written on the questionnaire and was entered into the databases for easy retrieval and analysis of data. All of the information entered into the EPI-Info database was double-checked by a supervisor or peer to ensure accuracy. Random checks of the Access database were carried out to check accuracy, and the results recorded. The questionnaires were kept in a data storage area of the PAN AP main office. Only the research staff have access to the information. These will be safeguarded and archived for a period of five (5) years and after which, the questionnaires shall be disposed of by shredding.

STUDY LIMITATIONS

Some limitations were noted in the data collecting, encoding and analysis process:

- Generally, questionnaires were administered in the local language with answers recorded on the forms in English. As some levels of translations were involved, some error may have occurred in the process. Some pesticides may not have been translated into English, which means there were 'unidentified' pesticides among the results, which may have in fact been recorded by local staff. It is also possible some errors occurred in to the cross-checking process at field level.
- Some respondents could not identify pesticides they used or were exposed to. In such cases, where possible, monitoring teams recorded the details from available pesticide containers and packaging, as a basis to assume the use of that pesticide, or were provided the details by knowledgeable co-workers. Where possible, the pesticide was cross-checked with the individual farmer.
- The questionnaire aimed to find out the identity of pesticides in current use. Pesticides used over 2 years ago were excluded from the results by reference to the 'last time used' field of the questionnaire. However, in some cases, the respondent did not specify the date of last use. So there is a small possibility that a pesticide not in current use was included in the results.
- The results assume that the pesticide product contains the active ingredient specified on the label. This may not be the case for adulterated products.
- In the community interviews, the questionnaire asked whether the respondents had received training but did not go further into what the content of the training was, the mode or length of the course. ◆

3. Consolidated Results and Analysis

PESTICIDES IDENTIFIED

This section presents the data on the pesticides reported by farmers and agricultural workers during the community interviews, identifying those that are highly hazardous according to PAN International Criteria.

Identifying the pesticide product/formulation

During face-to-face field interviews, the monitoring team asked respondents what pesticides they use or are exposed to. The pesticides identified by respondents were then entered on the survey forms. In cases where the respondent could not identify the pesticide, some interviewers recorded the details from available pesticide containers and packaging; or by asking a knowledgeable co-worker. The field methodology, which varied between communities, is described in the community case studies.

Identifying the active ingredient

Where possible, the active ingredients of the pesticides were entered on the survey forms by the interviewer. In cases where the active ingredient was not recorded during the field interview, the following procedures were used to establish the active ingredients in the pesticide products reported:

1. If a group reported one active ingredient for a certain product several times and the same product in the same country appeared again, without the active ingredient, the active ingredient was added.
2. In many cases the active ingredients were reported as product names – in such cases the active ingredient was added.
3. Product names were looked up on national registration lists (if available).

The groups delivered information on the active ingredient when the above approach failed.

There are certain limitations that could affect the results. These are described in Section 2 (Objectives and Methods).

Highly hazardous pesticides (HHPs)

For toxicity analysis, each pesticide active ingredient reported was linked with the Highly Hazardous Pesticide database hosted by PAN. This database is based on the Highly Hazardous Pesticides identified by Pesticide Action Network International, which includes internationally recognised toxicity classifications.

PAN International Criteria of Highly Hazardous Pesticides

A pesticide is considered to be highly hazardous by PAN International if it has one of the following characteristics:

- **high acute toxicity (including inhalative toxicity) and/or,**
- **long-term toxic effects at chronic exposure (carcinogenicity, mutagenicity, reproductive toxicity, endocrine disruption) and/or,**
- **high environmental concern either through ubiquitous exposure, bioaccumulation or toxicity, and/or**
- **known to cause a high incidence of severe or irreversible adverse effects on human health or the environment.**

In order to obtain an initial PAN International List of Highly Hazardous Pesticides, the criteria, classifications and sources shown in Table 3.1 were utilised.

Overview of pesticides reported

Pesticides identified

All respondents in 12 participating communities in 8 Asian countries were asked to identify pesticides they used or were exposed to. For 1185 respondents in 11 communities, the pesticides reported were consolidated for toxicity analysis. There were a total of 4,784 reports on pesticides identified (each pesticide reported by each respondent was counted). When compared with the PAN International HHP list 66% of the pesticide active ingredients are highly hazardous (Figure 3.1). 24% do not meet the criteria for HHPs, and the remaining proportion were not identified by the respondents. A full list of all reported pesticides with reference to the hazards in the PAN International HHP List can be found in Annex 1, and a list broken down according to each study site in Annex 2. Of the unknown pesticides, 8% of respondents gave no answer, or did not know the pesticide used. 2% said that they could not answer, do not remember, or were not concerned about the identity of the pesticides. However an unquantified larger number of respondents were unable to identify the pesticides they use or are exposed to. In such cases, where possible, the details were recorded from pesticide containers, or explained by knowledgeable farmers.

Figure 3.1

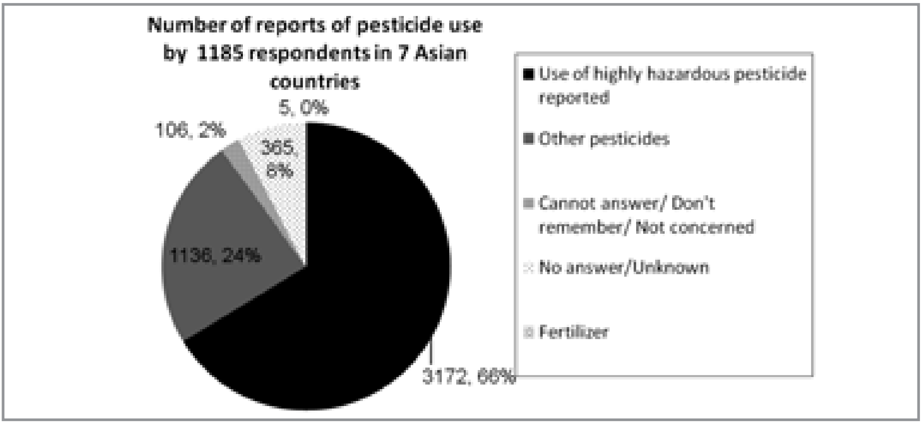


Table 3.1: Characteristics of HHPs and sources used to identify HHPs

<table>
<tr><th colspan="2">Characteristics of ‘Highly Hazardous Pesticides’ and sources used to identify HHP pesticides</th></tr>
<tr><th>Criteria</th><th>Measure</th></tr>
<tr><td>High acute toxicity</td><td>‘Extremely hazardous’ (Class Ia) or ‘highly hazardous’ (Class Ib) according to WHO Recommended Classification of Pesticides by Hazard</td></tr>
<tr><td colspan="2">‘Very toxic by inhalation’ (R26) according to EU Directive 67/548 5</td></tr>
<tr><td>Long term toxic effect at chronic exposure</td><td>‘Human carcinogen‘ according to IARC, US EPA
‘Known to be carcinogenic to humans’ according to EU Directive 67/548 (Category 1)</td></tr>
<tr><td colspan="2">‘Probable/likely human carcinogen’ according to IARC, US EPA
Sufficient evidence to provide a strong presumption that human exposure to a substance may result in the development of cancer (Category 2) according to EU Directive 67/548</td></tr>
<tr><td colspan="2">‘Possible human carcinogen/ ‘Suggestive evidence of carcinogenic potential’ according to IARC, US EPA</td></tr>
<tr><td colspan="2">‘Substances which cause concern for humans owing to possible carcinogenic effects’ (Category 3) according to EU Directive 67/548</td></tr>
<tr><td colspan="2">‘Substances known to be mutagenic to man’ (Category 1) according to EU Directive 67/548</td></tr>
<tr><td colspan="2">‘Substances which should be regarded as if they are mutagenic to man‘ (Category 2) according to EU Directive 67/548</td></tr>
<tr><td colspan="2">‘Substances known to impair fertility in humans’ (Category 1) according to EU Directive 67/548
‘Substances which should be regarded as if they impair fertility in humans’ and/or ‘Substances which should be regarded as if they cause developmental toxicity to humans’ (Category 2) according to EU Directive 67/548</td></tr>
<tr><td colspan="2">Endocrine disruptor or potential endocrine disruptor according to EU Category 1 and Category 2</td></tr>
<tr><td colspan="2">Categories 1A and 1B of the GHS for carcinogenicity, mutagenicity, and reproductive toxicity will be used for the PAN HHP list as soon as it is available</td></tr>
<tr><td>High environmental concern</td><td>Stockholm Convention: Pesticides listed in Annex A & B</td></tr>
<tr><td colspan="2">Ozone depleting according to the Montreal Protocol</td></tr>
<tr><td colspan="2">‘Very bioaccumulative’ according to REACh criteria as listed by FOOTPRINT (BCF >5000)</td></tr>
<tr><td colspan="2">‘Very persistent’ according to REACh criteria as listed by FOOTPINT (half-life > 60 d in marine – or freshwater or half-life > 180 d in marine or freshwater sediment)</td></tr>
<tr><td colspan="2">Hazard to ecosystem services – ‘Highly toxic for bees’ according to U.S. EPA as listed by FOOTPRINT data (bee toxicity: LD50, µg/bee < 2)</td></tr>
<tr><td>Known to cause a high incidence of severe or irreversible adverse effects</td><td>Rotterdam Convention: Pesticides listed in Annex III</td></tr>
<tr><td colspan="2">Incidences to be documented</td></tr>
</table>

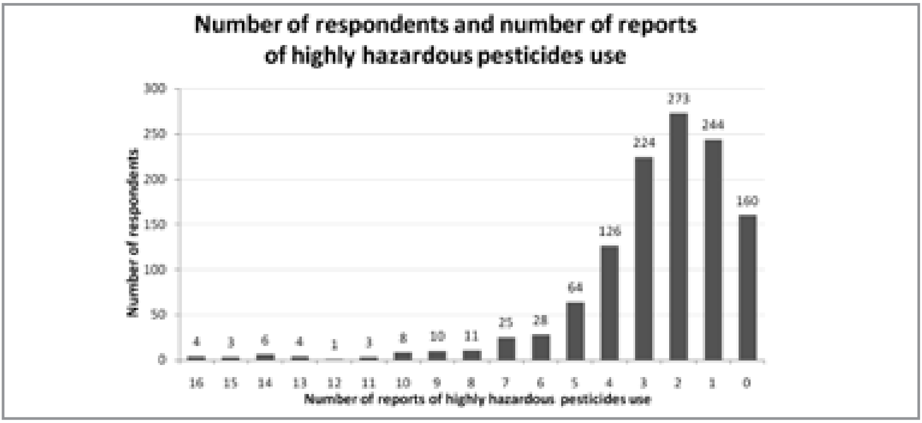
A different methodology was used by the Pesticides Eco-Alternatives Centre (PEAC) for collecting and analyzing the data from the Yunnan study site. Data was collected from pesticide products that farmers use or used recently by observing containers farmers collected. Referring to the labels and the web-based pesticide registration database, managed by the Chinese Ministry of Agriculture, PEAC analyzed the pesticides. The pesticides identified are shown in Annex 3.

Number of pesticides per respondent

For 11 communities in 7 countries, the number of reports of HHPs per respondent is graphed in Figure 3.2.

In all, 1,034 (87%) of respondents reported 1 or more HHPs. 790 (67%) of respondents identified two or more HHPs. A maximum of 16 HHP pesticides was reported by 4 respondents.

Figure 3.2



The graph shows the number of pesticides reported per respondent (e.g. 160 respondents did not report any HHPs; 244 reported 1, 244 reported 3, and so on).

Most common pesticides

The top 10 most reported pesticides are listed in the below table.

Table 3.2: Most common pesticides reported

Pesticide name	# Reported	HHP hazard (if any)
Cypermethrin	220	Possible carcinogen
Lambda-cyhalothrin	183	EU R26, EU EDC, high bee tox
Niclosamide	174	-
Chlorpyrifos	165	High bee tox
Fenobucarb	158	-
Mancozeb	141	Probable carcinogen, EU EDC
Monocrotophos	139	WHO Ib, EU R26, high bee tox
Glyphosate	132	-
2,4-D[4]	126	Possible carcinogen
Imidacloprid	120	High bee tox

[4] *Includes all reports for 2,4-D sodium monohydrate, 2-4-D dimethylamine, 2,4,D- butyl ester, 2,4-D iso-butyl ester, 2,4-D ethyl ester and 2,4-D*

Most common HHPs

Table 3.3 provides a list of the top 10 most used pesticides with **highly hazardous properties to human health.**

Table 3.3: pesticides with highly hazardous properties to human health

Pesticide name	# Reported	Hazard	Mostly reported in
Cypermethrin	220	Possible carcinogen	Cambodia, Philippines, Vietnam
Lambda-cyhalothrin	183	EU R26	India, Indonesia
Mancozeb	141	Probable carcinogen, EU EDC	Sri Lanka, Indonesia
Monocrotophos	139	WHO Ib, EU R26	India, Cambodia
2,4-D[5]	126	Possible carcinogen	Malaysia, India, Philippines
Endosulfan	112	EU R26	India
Propiconazole	110	Possible carcinogen	Vietnam
Butachlor	103	Probable carcinogen	Philippines
Paraquat	99	EU R26	Malaysia
Fipronil	83	Possible carcinogen	Vietnam
WHO Ia = Extremely hazardous **WHO Ib = Highly hazardous** **R26: Very toxic when inhaled** **Chronic toxicity information taken from EU, US EPA and the IARC (see PAN International HHP list)**			

Acutely toxic pesticides

Table 3.4 lists the 10 most commonly reported acutely toxic pesticides, with the pesticide name, number of reported applications, and the country most reported in.

Table 3.4: 10 most common acutely toxic pesticides

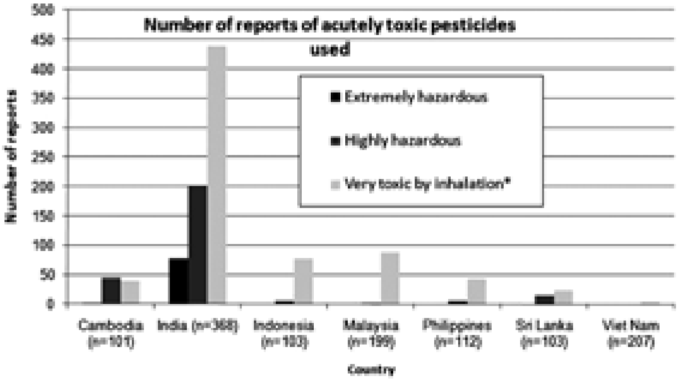
Pesticide name	# Reported	Hazard	Mostly reported in
Lambda-cyhalothrin	183	EU R26	India, Indonesia
Monocrotophos	139	WHO Ib, EU R26	India, Cambodia
Endosulfan	112	EU R26	India
Paraquat	99	EU R26	Malaysia
Parathion-methyl (methyl-parathion)	63	WHO Ia, EU R26	India
Triazophos	51	WHO Ib	India
Carbofuran	50	WHO Ib, EU R26	India, Sri Lanka
Chlorothalonil	31	EU R26	Indonesia, Sri Lanka
Beta-cyfluthrin	30	EU R26	Philippines
Phosphamidon	14	WHO Ia	India
WHO Ia = Extremely hazardous **WHO Ib = Highly hazardous** **R26: Very toxic when inhaled**			

5 *Includes all reports for 2,4-D sodium monohydrate, 2-4-D dimethylamine, 2,4,D- butyl ester, 2,4-D iso-butyl ester, 2,4-D ethyl ester and 2,4-D*

Figure 3.3 shows the number of reports of acutely toxic pesticides use, those with acute HHP properties per country.

N.B. "n" refers to the number of study participants. One respondent may have reported the use of multiple pesticides.

Figure 3.3



*the category "Very toxic by inhalation" overlaps partly with WHO Ia, Ib

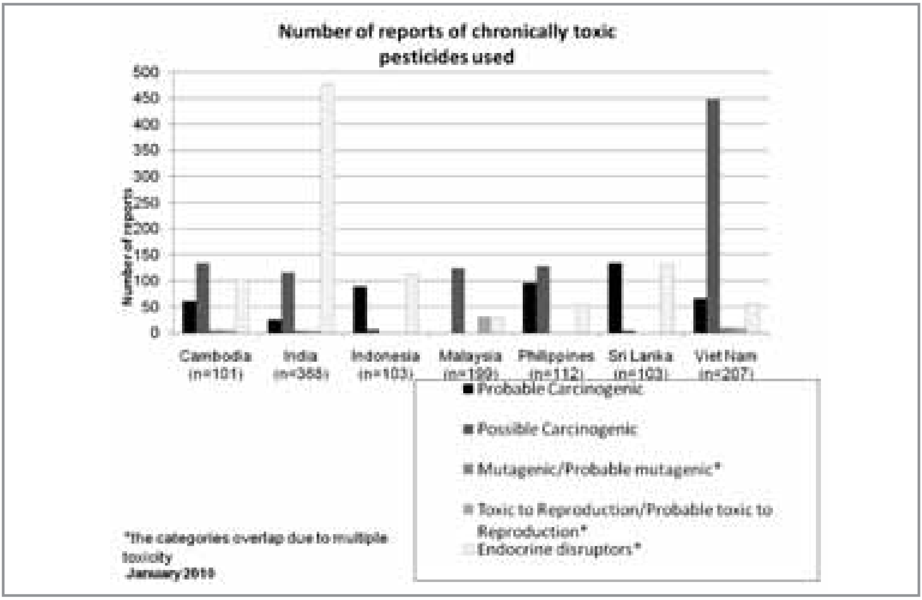
Chronically toxic pesticides

A list of the 10 most commonly reported pesticides with chronic hazards to human health is provided in table 3.5. These are compared with the properties of chronic toxicity to human health as per HHP characteristics.

Table 3.5: 10 most common chronically toxic pesticides

Pesticide name	# Reported	Hazard	Mostly reported in
Cypermethrin	220	Possible carcinogen	Cambodia, Philippines, Vietnam
Lambda-cyhalothrin	183	EU EDC	India, Indonesia
Mancozeb	141	Probable Carcinogen, EU EDC	Sri Lanka, Indonesia
2,4-D	126	Possible carcinogen	Malaysia, India, Philippines
Endosulfan	112	EU EDC	India
Propiconazole	110	Possible carcinogen	Vietnam
Butachlor	103	Probable carcinogen	Philippines
Fipronil	83	Possible carcinogen	Vietnam
Difenoconazole	75	Possible carcinogen	Vietnam
Hexoconazole	68	Possible carcinogen	Vietnam
Hazard information were taken from the EU, US EPA and the IARC (see PAN International HHP list)			

Figure 3.4



CONDITIONS OF USE

Application equipment

Pesticides were mostly applied via manual backpack spraying. Mechanical sprayers were also observed to be in use in Prey Veng (motorised mist-blower) and Wonosobo (diesel-powered pump).

Backpack sprayer, Vietnam.

Farmer prepares to carry the heavy spray machine, Cambodia

Backpack spraying, Sri Lanka

Farmer using motorized mist blower, Prek Krabrau, Cambodia

Carrying the spray machine, Wonosobo, Java, Indonesia

Cocktail mixing

Pesticides were used singly, or as a mixture, or 'cocktail'. For example,

- In the study site at Prey Veng, Cambodia, farmers were observed mixing between 3 and 8 pesticides before spraying to kill insect pests.
- In Hai Van, Vietnam, 3 brands of pesticides or more were mixed together to kill the brown plant hopper pest.

Cambodian farmer mixes 3 kinds of pesticides in preparation for spraying

It was ascertained that, in some cases, the pesticide applicators are not present when the cocktail is being mixed, so they do not know what they are exposed to or the hazards. This was the case in Perak, Malaysia. While many of the interviewed respondents had no idea what they were spraying, some informed respondents were able to identify the particular herbicide combinations, for example:

- Sentry (glyphosate), Ally (metsulfuron-methyl), in combination with two other products;
- Roundup and Sentry (two glyphosate products);
- Paraquat, Snap (ametryn), and a third product.

Personal Protective Equipment (PPE)

Respondents were asked whether they wore protective clothing when applying pesticides. Table 3.6 shows the percentage of pesticide applicators who indicated that they wear protective clothing when applying pesticides. Out of those who responded positively, items of clothing and equipment worn are shown as percentages.

In Kerala, 58% of respondents indicated they wore protective clothing when applying pesticides, including long-sleeved shirt (48%), long pants (50%), face mask (18%), gloves (9%) and boots/shoes (8%) . However, none of the farmers used the conventionally recommended protective clothing. 26% of pesticide applicators did not wear any PPE with 12% of those indicating they did not because it was *uncomfortable.*

The response rates varied between communities.

Some groups showed a very low number using protective clothing:

- Chittoor, Andhra Pradesh: only 1% of applicators indicated they wore protective clothing, and no special protectors were being worn, although most wore long-sleeved shirts (71%). Some explained to the monitoring team that they wore the same clothing for 2-3 days. The main reasons indicated why they did not wear PPE was that it was, *expensive* (42%), *not available* (31%) or *uncomfortable* (3%). Many respondents working as daily waged-workers had "no capacity to purchase [protective clothing] even though some of them are aware of the problems" (Sahanivasa).
- Padmapur, Orissa: only 6% of applicators wore protective clothing when applying pesticides. Although all wore long-sleeved shirt and long pants, adequate PPE was not worn by anybody. The majority of non-wearers did not wear PPE because it was *not available* (80%).

Table 3.6: PPE indicated by respondents

	% applicators wear protective clothing	**Items worn by wearers:** Gloves	Overalls	Eye-glasses	Respi-rator	Mask	Boots/ shoes	Long-sleeved shirt	Long pants	Other
An Giang	**94%**	3%	1%	22%	56%	10%	1%	97%	95%	1%
Andhra Pradesh	**1%**	1%	1%	1%	1%	1%	0%	71%*	7%*	1%
Digos	**94%**	5%	0%	0%	0%	43%	21%	99%	98%	10%
Nam Dinh	**80%**	68%	58%	13%	1%	97%	74%	76%	74%	24%
Orissa	**6%**	0%	0%	0%	0%	0%	34%*	97%*	98%*	8%
Perak	**96%**	95%	94%	68%	61%	33%	99%	99%	99%	31%
Prey Veng	**67%**	70%	0%	5%	0%	92%	38%	97%	94%	0%
Sarawak	**19%**	43%	21%	14%	14%	29%	79%	71%	71%	0%
Sri Lanka	**16%**	69%	13%	0%	19%	19%	13%	63%	63%	6%
Yunnan	**74%**	3%	5%	0%	2%	2%	7%	90%	88%	8%

** The number of those who indicated these items exceeds those who gave a positive response to protective clothing. This may be because the items worn are not considered as protective, or there may have been different understandings of the question.*

- Sri-Lanka: 16% of applicators said they wore protective clothing, with some wearing long-sleeved shirt, pants and gloves. Through observations it was noted that the actual clothing worn afforded very little protection, with many only wearing t-shirts which would be soaked through quickly. Non-wearers indicated PPE was *uncomfortable* (41%), *expensive* (35%) or *not available* (25%).

Some groups received a greater number of positive responses to the question of whether they wore protective clothing:

- Perak, Malaysia: 95% of applicators wore PPE including long-sleeved shirt, long pants, overalls, mask and respirator. Boots, gloves (mask / respirator / gloves) are only worn for roughly three or four hours per day because they find it too hot. PPE are therefore not appropriate to the tropical climate which discourages the applicators from wearing them throughout the course of their spraying work, and hence PPE are not preventive and protective in nature. Cotton-based clothing absorb spray drifts and leaks, which is also then not protective.
- Hai Van, Vietnam: 80% of applicators wore PPE including long-sleeved shirt, boots, long pants and gloves. Some wore overalls or a raincoat, a local initiative. However often they do not wear it because they find it too hot. Some did not wear boots and some were observed with bare feet.

While some groups had high positive responses for wearing 'protective clothing', it may not reflect the real situation of PPE use because farmer's perception of protection varies. The items worn may only protect some parts of the body, and be inadequate protection against the full range of acute and chronic hazards of the pesticides they spray. For example, in Thrissur, Kerala, 58% of respondents reported that they use protective clothing; however, none of them wore conventionally recommended PPE, such as long-sleeved shirt and long pants. In the paddy fields, they also have to roll up their pants to their knees, with bare feet. So, figures for use of protective clothing may be very misleading.

Observance of wind-direction while spraying

The respondents were asked whether they spray *against the wind, along the wind direction, or unknown,* and the results show that a significant number did not heed the wind direction while spraying.

Some groups sprayed both *against* and *along* the wind direction. For example:

- Digos (Philippines): 94% of applicators sprayed pesticides *along* the wind direction and 79% *against*, while 3% answered unknown.
- Sri Lanka: 20% of applicators sprayed *against*, 37% along, and 42% answered *unknown* regarding the wind direction.

These varied results, indicating the practice of spraying both along and against the wind direction - or not knowing the wind direction - were also observed for Prek Krabrau (Cambodia), Perak (Malaysia) and An Giang (Vietnam) monitoring sites.

Some expressed a higher observance of the wind direction. For example:

- Thrissur, Kerala: all were reported to spray *along the wind direction*
- Hai Van commune, Vietnam: 92% of applicators indicated spraying *along the wind direction.*

However, in Thrissur it was noted that the open fields are often windy, and/or when the applicator turns, the direction of wind changes and spray gets blown onto their body. This reflection may also be true in other locations. While the reason for non-observance of the wind direction cannot be concluded from the results, spraying against the wind may cause higher exposure to pesticides applicators, especially those using highly hazardous pesticides without the use of PPE.

Spraying pesticide against the wind direction, Chittoor, Andhra Pradesh

Spillage

According to the survey results, all groups reported that a number of respondents had experienced having pesticide spilled on them either while mixing, spraying or loading pesticides. The highest occurrences were in Padmapur, Orissa, where 97% had spilled pesticides during mixing; and in Yunnan where 92% had spilled while spraying. The lowest percentage was in Sarawak where at least 47% had experienced having pesticide spilled on them. The main reasons described were leakages and wind:

Leakage from the spray tank during spraying

This was the most common reason for a spillage described in the Yunnan study site. In other sites, reasons were given as to why such spills occurred. Examples of how these occurred were:

- The sprayer was too full, resulting in an overflow (e.g. Sarawak and An Giang);
- There was a loose cover (Sarawak and Prey Veng);
- The equipment was faulty.

Windy conditions:

The wind blew while loading or spraying the pesticides (e.g. Prey Veng and Perak) resulting in the spillage or drift of the pesticide onto the applicator.

Other accidents

Some accidents were reported with the pesticides, such as 'slipped and fell' (Sarawak).

Training and information about pesticides

Respondents were asked if they had received any training on the pesticides they use. An overview of results is provided in Table 3.7. However, they were not asked further about the form, length or coverage of the training. The responses of applicators to this question ranged from zero receiving training in Sarawak and Chittoor, to 96% receiving training in Digos. The survey did not look in depth at the mode and length of the training, but some insights were gained through discussions with farmers. The type of training varied. For example, annual 'technique training' is provided by the Government in Yunnan. In Thrissur, Kerala, some users have undergone some training provided by the Agriculture Department or a university. However, the survey did not distinguish the mode of training, so the data may be misleading.

Table 3.7: Percentage of applicators who have received training on the pesticides they use

Site	Yes	No	Blank
An Giang	71%	28%	1%
Andhra Pradesh	0%	90%	10%
Digos	96%	1%	3%
Orissa	2%	80%	10%
Nam Dinh	18%	80%	2%
Perak	67%	31%	2%
Prey Veng	21%	75%	4%
Sarawak	0%	93%	7%
Sri Lanka	20%	77%	3%
Yunnan	22%	76%	2%
Andhra Pradesh	0%	90%	10%

In *Thrissur, Kerala,* 23% of the respondents claim that they have received training on pesticide use, out of which only 2 claim to have received training from companies. The rest of the users have attended a few hours of classes from Agricultural Department or the Agricultural University. Most of these classes are concerned with pest management in general and do not include the precautions or the equipment to be used while spraying pesticides. The data can be misleading as the farmers refer to any kind of training on pest control to be the training on pesticides.

Labels and safety data sheets

Respondents were asked about their access to hazard information, such as labels or safety data sheets. Access to labels ranged from 44% in Chittoor, Andhra Pradesh to 100% in the Nam Dinh and Yunnan study sites. The usefulness of this information was limited in some communities as it was not in local languages. This was the case, for example, in Kerala and Prey Veng, Cambodia. In Orissa, about 20% of pesticide products were unlabelled mixtures prepared locally by the sellers.

Disposal practices

Respondents were asked how they dispose of both the pesticide containers and the left over pesticides.

Various methods of disposal of pesticide containers and packaging were indicated by the respondents and observed in the fields. These are shown in Table 3.8, and included:

- Thrown in the open field
- Buried
- Put in trash
- Other forms of disposal including returning to company/distributor

Table 3.8: Container disposal

	Methods of disposal[6]					
Site	**Returned to company/ distributor**	**Bury**	**Burn**	**Trash/ rubbish**	**Throw in open field**	**Other**
An Giang	0%	13%	35%	3%	56%	17%
Andhra Pradesh	1%	17%	19%	17%	79%	10%
Digos	0%	56%	2%	30%	0%	6%
Kerala	0%	10%	3%	1%	70%	37%*
Nam Dinh	0%	21%	40%	3%	15%	28%
Orissa	0%	39%	31%	11%	78%	0%
Perak	22%	13%	7%	8%	4%	43%
Prey Veng	3%	79%	21%	2%	27%	20%
Sarawak	3%	2%	30%	62%	33%	15%
Sri Lanka	1%	0%	69%	85%	27%	6%
Yunnan	1%	1%	1%	42%	26%	35%

**Including 33% resold to waste collectors*

Throwing in the open field was the most common method of container disposal in the Indian study sites in Andhra Pradesh, Orissa and Kerala, practiced by over 70% of respondents in all three sites. A smaller proportion sold their containers back to the seller or to a waste collector. Disposal in the open field was the most common method at the study site in Vin Hanh, Vietnam (56%), and a smaller percentage (15%) in Hai Hau.   In Yunnan, 43% were reported to throw the containers in the open field or the containers were 'randomly thrown' (described in 'other' methods), while 42% were reported to put them in the trash, with some describing other methods. In one of the Yunnan villages, where IPM Farmer Field Schools are run, some farmers returned containers to a government agency.

- In Prey Veng, Cambodia; and in Digos, *burying* the containers was most common.
- In Sri Lanka, 85% reported they throw containers *in the trash* - however a large percentage also indicated that they burn (69%) or throw them in the open field (27%).

[6] *N.B. some respondents indicated more than one disposal method*

- In Perak, methods of container disposal included returning to the company, burying, throwing, storing and reusing. Some of the workers do not have access to the containers as the pesticides are mixed off-site.
- In Wonosobo, pesticide containers were described as thrown on the farm (including near water sources), and are sometimes collected to be buried or burnt.

Re-use of containers

Respondents were asked if they reuse the containers for other purposes afterwards. Positive responses to this practice were found in Andhra Pradesh, including for storing kerosene, lamps, and domestic items. A smaller proportion reported reusing the containers in:

- Sri Lanka (13%) as flower pots, buckets, water cans and fuel containers
- Prey Veng (15%) for unspecified uses
- Bintulu (16%) for water, fuels
- Digos (14%) mainly as a container for storing pesticides.

It was not commonly reported in the other sites (Hai Hau: 1%; Yunnan, 3%).

Disposal of leftover pesticides

When asked to describe their disposal of leftover pesticides, respondents frequently reported that they would use all the pesticide up, apply it again, or to keep for future use. This was the case in Perak (Malaysia), Yunnan (China), and Hai Hau (Vietnam) study sites. Where users did describe methods of disposing of pesticides, the location was often the field, on the land, or even in a body of water. For example, in Andhra Pradesh, 78% described disposing of it on 'the land'. In Prey Veng, 54% dispose of it in the field or river.

A concern expressed was that the available water-bodies nearby fields are used for multiple purposes including washing of equipment causing pollution of the water, for example, in Kerala and Orissa. Run-off of chemicals from fields also enters the water, which is in some cases used for bathing and drinking; for example in Sri Lanka where "polluted water is used by all residences for all purposes", particularly for the community at Monaragala which receives runoff from upstream use at Nuwara Eliya and Badulla.

Woman washes in water that flows off farm fields where pesticides are highly used

Storage practices

Respondents were asked to indicate where they stored pesticides. To this, various answers were given and some respondents indicated more than one storage location. The results are shown below in Table 3.9. The most common places for storing pesticides were:

Pesticide storage inside the home

- *Home:* this is a common location for storing pesticides – as high as 97% in Padmapur (Orissa) study site, 71% in Chittoor (Andra Pradesh) study site, and 56% in Prey Veng (Cambodia). The pesticides were stored in various locations in and around the home, for example in Hai Hau they were stored in the kitchen or bathroom.
- *Field or garden:* pesticides were stored in various locations outside the home, in the field, or even in the piggery or chicken coop (Nam Dinh). In Digos they were sometimes stored in a sack, while in Prey Veng, they were sometimes hung on a tree.
- *Shed:* some respondents had access to a shed for storing pesticides, for example, 79% of respondents in Yunnan, and 47% in Kerala.

Table 3.9: Storage of pesticides

	Storage location				
Site	**Field**	**Shed**	**Garden**	**Home**	**Other**
An Giang	0%	21%	0%	59%	15% (e.g. corner, outside house, under bed)
Andhra Pradesh	23%	9%	11%	71%	0%
Digos	4%	23%	0%	32%	51% (e.g. container, box, sack, store room)
Kerala	23%	47%	2%	23%	14%
Nam Dinh	0%	13%	18%	7%	67% (kitchen, toilet, animal housing, or 'no leftover')
Orissa	0%	0%	0%	97%	0%
Perak	22%	65%	0%	11%	16%
Prey Veng	4%	15%	15%	56%	10% (e.g. hung on a tree)
Sarawak	28%	31%	5%	12%	29% (e.g. store room, farm)
Sri Lanka	32%	31%	17%	43%	1%
Yunnan	3%	79%	12%	4%	3%

In most study sites for which statistics are available, a high percentage of respondents reported storing the pesticides locked up and out of reach of children, and separated from other items. However in some sites over a quarter reported not to, for example, in Chittoor, Andhra Pradesh.

SIGNS AND SYMPTOMS OF POISONING

This section presents the data on signs and symptoms of poisoning that occurred when using or being exposed to pesticides, as reported by the respondents during the community interviews.

Methods used

Respondents were asked when using pesticides, or being exposed to them, whether they had experienced symptoms which were indicated by the interviewer in a multiple-choice question. Respondents could also describe any 'other' symptoms that they had experienced. A set of illustrations of some common acute poisoning symptoms was also made available in the handbook that may be used if needed to help understanding. To gauge the response to poisoning, respondents were also asked who they would call if they thought someone was poisoned, and were asked a multiple choice question or could describe 'other' approaches.

Frequency of experiencing symptoms of poisoning

The frequency of ever having experienced any symptoms from exposure to pesticides varied from a low of 5% of respondents in Yunnan to a high of 91% of respondents in Sri Lanka:

Yunnan	5%
Thrissur, Kerala	21%
An Giang, Vietnam	28%
Sarawak	54%
Nam Dinh, Vietnam	60%
Padmapur, Orissa	72%
Perak, Malaysia	72%
Chittoor, Andhra Pradesh	73%
Digos, Philippines	81%
Prey Veng, Cambodia	90%
Sri Lanka	91%

In Yunnan the surveyors reported that there was a low response rate regarding respondents knowledge of the hazards of the pesticides they were using. If this is because the respondents had limited knowledge of the hazards, then it may mean that they also did not connect symptoms with pesticide exposure. This may in part account for the considerably lower frequency of symptoms (5%) compared with some other areas such as Sri Lanka (91%).

Another possible factor contributing to the different level of symptoms is that a higher percentage, 75%, of respondents in Yunnan reported to wear protective clothing (consisting mainly of long-sleeved shirt and long pants), compared to only 16% in Sri Lanka. Nearly all farmers in the Yunnan study site believed they didn't experience poisoning when using pesticides. However 12 female farmers shared symptoms that they had experienced, including dizziness, weakness, nausea, difficulty in breathing, and loss of appetite, but most of them could not recall the details of poisonings.

Symptoms reported

Respondents reported a wide range of symptoms that they had experienced when using or being exposed to pesticides, all of which are commonly associated with pesticide poisoning. The frequency of these symptoms varied considerably from region to region, but overall *dizziness* was the most commonly reported symptom – in Sri Lanka (91% of respondents), Prey Veng (90%), Chittoor (73%), Padmapur (67%), Thrissur (21%), and Yunnan (5%). *Headache* was the most commonly reported symptom in Barangay Ruparan (81%), Perak (72%), and Nam Dinh (60%), whilst An Giang was alone in reporting *staggering* as the most common symptom (28%).

Table 3.10 provides a summary of the frequency of reporting of the most common symptoms in each study area.

Table 3.10: Consolidated summary of symptom frequency in respondents

Symptom	An Gia-ng	Yun-nan	Chit-toor, An-dhra	Bar-angay Rupa-ran	Thris-sur, Ker-ala	Nam Dinh	Pad-mapur, Orissa	Per-ak	Prey Veng	Sara-wak	Sri Lan-ka
staggering	28%	0%	-	-	2%	22%	6%	17%	15%	12%	9%
headache	27%	1%	67%	81%	20%	60%	38%	72%	87%	31%	90%
excessive sweating	23%	0%	28%	3%	9%	18%	9%	71%	51%	54%	24%
dizziness	19%	5%	73%	79%	21%	53%	67%	49%	90%	53%	91%
blurred vision	16%	1%	36%	1%	4%	12%	20%	46%	70%	37%	49%
difficult breathing	16%	0%	15%	0%	10%	13%	31%	23%	11%	15%	15%
hand tremor	15%	0%	11%	0%	6%	9%	29%	22%	52%	14%	17%
insomnia	11%	0%	31%	0%	8%	16%	10%	19%	11%	13%	13%
nausea	10%	4%	57%	0%	20%	25%	56%	32%	31%	11%	27%
irregular heartbeat	10%	0%	5%	0%	1%	0%	4%	22%	0%	7%	0%
convulsion	3%	0%	1%	0%	3%	0%	45%	20%	1%	4%	2%
narrowed pupils	2%	0%	0%	1%	0%	0%	11%	18%	3%	24%	2%
excessive salivation	1%	0%	59%	1%	7%	0%	72%	23%	42%	24%	10%
skin rashes	1%	2%	15%	0%	15%	10%	25%	14%	43%	12%	54%
diarrhea	0%	0%	26%	0%	2%	1%	9%	8%	7%	13%	1%
other	0%	1%	9%	1%	23%	44%	47%	8%	-	5%	-

Other symptoms reported included:

- In Chittoor District, Andhra Pradesh (9%) - body pain, cough, itching, eye problems, stomach pain, and weakness;
- In Thrissur, Kerala (23%) - itching (7%), stomach ache, pain or swelling (3%), chest pain, allergy, shivering, teary eye, and mouth dryness;
- In Nam Dinh Province, Vietnam (44%) - itching (15%), tired, or very tired (15%), pain including body pain and chest pain (6%), articulation problem, dry mouth, sneezing, belly ache.

Response to poisoning

Respondents were asked who they would call if they thought someone was poisoned. Responses varied, with the hospital being the most common response in Yunnan, Barangay Ruparan and Thrissur. In contrast, in Perak 67% would call the company (and an additional 34% said they would call the foreman, clerk or health advisor), with only 2% calling the hospital.

Table 3.11: Response to poisoning

	Hospital	Doctor	Friend	Company	Self-treat	Other
An Giang	21%	47%	31%	0%	7% drink lemon juice or lemonade	18% go to first aid, clinic, or infirmary
Yunnan	96%	0%	0%	0%	2% drink sweet water; or take rest at home	0%
Chittoor	45%	76%	11%	0%	0%	0%
Barangay Ruparan	91%	0%	1%	0%	4% drink coconut milk, or eat grated coconut & sugar	2% Health care centre
Thrissur	97%	8%	0%	0%	0%	0%
Perak	2%	20%	0%	67%**	0%	34% (foreman, clerk, health adviser)
Prey Veng	49%	38%	28%	1%	0%	0%
Sarawak	71%	33%	35%	0%	0%	0%
Sri Lanka	48%	50%	98%	3%	0%	0%
Nam Dinh	0%	59%	24%	22%	2% drink sugar water, 1% drink fresh orange juice	11% commune health centre, 3% others
Padmapur	98%	0%	0%	0%	0%	0%

** An additional 34.3% said they would call the foreman, clerk or health advisor, and would wash their body.

Incident reports

Following their reporting of symptoms, respondents were asked if they could recall any detailed incidents. A number of poisoning incidents were reported in detail from Kerala (21), Nam Dinh (9), Sri Lanka (22), Wonosobo (6), Chittoor (7), Padmapur (3) with one from Yunnan.

In Yunnan a 41 year old female farmer said that "one day in September 2007, she mixed Methamidophos EC and Triadimefon WP together and sprayed peas in the field. She was wearing a long-sleeved shirt and long pants while working, but after about 2 hours working in the farm field, she felt dizziness and nausea. Instead of going to the hospital or seeking help from a doctor, she went home to bed without eating any food."

Table 3.12: Kerala

Sl #	Work undertaken	Pesticide	Nature of illness
1	Worker Applicator	Hinosan + Metacid	Slurred speech, uneasiness, nausea, vomiting. Hospitalised for 1 week
2	Worker Applicator	Hinosan	Sweating, fainted. Hospitalised
3	Worker Applicator	Dimecron	Itching, allergy
4	Worker Applicator	Endrin, Paramour	Vomiting, dizziness. Hospitalised
5	Worker Applicator	Endrin	Vomiting. Hospitalised
6	Worker Applicator	Hinosan + Paramour	Head ache, dizziness, blurred vision, excessive sweating, hand tremor, excessive saliva, sleeplessness, vomiting. Hospitalised
7	Worker Applicator	Does not remember	Nausea, diarrhoea, dizziness. Hospitalised
8	Worker Applicator	Hinosan	Vomiting, stomach swelling. Hospitalised
9	Worker Applicator	Does not remember	Dizziness, head ache, blurred vision, excessive sweating, hand tremor, excessive salivation, nausea, vomiting, difficult breathing, skin rashes, irregular heart-beat, stomach pain. Hospitalised
10	Worker Applicator	Dimecron	Dizziness, excessive sweating, fainted
11	Worker Applicator	Karate	Headache, vomiting
12	Worker Applicator	Hinosan + Metacid	Vomiting, dizziness, sweating, skin rashes. Hospitalised
13	Worker Applicator	Does not remember	Excessive sweating, convulsion, vomiting, hand tremor, difficult breathing. Hospitalised Dizziness, head ache, excessive salivation,
14	Worker Applicator	Metacid	vomiting Dizziness, head ache, blurred vision,
15	Worker Applicator	Does not remember	excessive sweating, hand tremor Eye sight lost (one eye). Hospitalised
16	Farmer Applicator	Metacid	Excessive saliva, vomiting. Hospitalised
17	Farmer Applicator	Hinosan	Convulsion, sleeplessness, dizziness
18	Farmer Applicator	Hinosan	Headache, dizziness, convulsion, excessive
19	Farmer Applicator	Does not remember	saliva, vomiting, sleeplessness. Hospitalised Dizziness, headache, excessive sweating,
20	Farmer Applicator	Paramour, dimecron, metacid	hand tremor, excessive saliva, vomiting, sleeplessness, nausea, difficult breathing. Hospitalised Mouth dryness, staggering. Hospitalised
21	Farmer Applicator	Hinosan + Metacid	

Table 3.13: Hai Van commune, Hai Hau district, Nam Dinh Province, Vietnam

Sl #	Age/ sex	Name of the Pesticide	Comments	Nature of illness	Treatment
1	45 y/o woman	Bassa	Backpack spraying in rice field to treat brown plant hopper (wearing gloves and face-mask) over 3-4 days	Headache, "tired, sick"	"Take the medicine [for] headache, go to Health Station and go to private clinic to take radiograph"
2	37 y/o man	Bassa, Trebon	Backpack spraying to treat brown plant hopper, no protective clothing worn ("feel uncomfortable; don't have it")	Dizziness, excessive sweating, staggering and vomiting	None: only "drink water with sugar"
3	52 y/o man	Bat Dang, Regent, and "other things"	Backpack spraying in rice field, no protective clothing worn ("the protective clothing is not ready. I quite hesitate to use it, it's uncomfortable"), very hot conditions	Dizziness, headache, "itching of back and swelling of shoulder"	"Go back home and wash then treat by myself by using water morning glory…"
4	44 y/o woman	Bassa, Confai (imidacloprid), Valivithaco (validamycin), additives (gibberellic acid)	Backpack spraying in rice field: "the pesticide gushes in the face. It was in the face, eyes, soak into the face mask to touch the mouth, nose, shoulder".	Dizziness, headache, blurred vision, hand tremor, staggering, "rash, pain of shoulder and scruff of the neck"	"Only use clothes to absorb and gargle with water"
5	56 y/o woman	Fastac, Valivithaco	During weeding. No protective clothing worn during this activity "do not concern".	Dizziness, headache, blurred vision, staggering. "I'm …weeding and suddenly I feel dizzy. And the neighbour is spraying the field very close to me. I sniff at the pesticide. I feel dizzy, vomit and I turn back to house to lie. I'm tired."	Go to doctor at the Health Station "to check pressure and heart and inject. I use vinphastu, Vitamin. After 1 night, I feel better."

Sl #	Age/ sex	Name of the Pesticide	Comments	Nature of illness	Treatment
6	32 y/o woman	Mixing Bassa and Rigent (6 kinds), and validamycin	Spraying in field for 3-4 hours over 2-3 days. Wearing face mask and gloves, but no raincoat.	Dizziness, headache, excessive sweating, staggering.	Treated: "go to the health station to buy the medicines but do not feel better. And then I bring the label of pesticide to the doctor. He only g[ave] me drugs… I stay in the hospital 2 days."
7	75y/o man	Don't know/ don't remember	Application in field for plant hopper. No protective clothing worn ("subjective").	Swelling of ankle	Unknown
8	25 y/o woman	Mixing Rigent and Fastac	Backpack application in rice field, over 1.5 hours	Dizziness, headache, nausea/ vomiting, "cholera"	Go to health station… "Go to Health Station to inject and transmitted 6 bottles of liquid into the body. Stay there 1 day and 23 days after feel normal.
9	44 y/o woman	Mising Bassa (fenobucarb), Con fai (imidacloprid), kho van[7], bat dang, vimogreen (gibarellic acid),	Application in field. Wearing only facemask. "during spraying, the tap of spray backpack… failed. I tried it but it do not run but suddenly, the spray backpack runs- the pesticide gushed on my face. And then I removed my clothes to wipe the face and I can open the eyes."	Dizziness, headache, blurred vision, hand tremor, staggering, and "pain of the scruff of the neck, itching"	None: "I just used the clothes to absorb the pesticide in the face and rinse the mouth and then go back home to take a bath."

Trade name	Active ingredient
Bassa	Fenobucarb
Conphai	Imidacloprid
Fastac	Alpha - cypermethrin
Rigent	Fipronil
Vimogreen	Gibberellic acid
Valivithaco	Validamycin

7 *"Kho van" – (*Rhizoctonia solani *Kuhn): is not the name of a pesticide. Farmers call the pesticide following the disease of the rice. There are many kinds of the pesticides for "*Rhizoctonia solani *Kuhn"*

Table 3.14: Padmapur

Sl #	Age/ sex	Name of the Pesticide	Comments	Nature of illness	Treatment
1	25 y/o wo-man[8]	Endosalfan (25% EC) and Novacron (36% SL)	Incident occurred in 2004, during application in the field. No protective clothing.	Excessive sweating, excessive salivation, nausea/ vomiting, death.	Dead before treatment
2	Female re-spond-ent (adoles-cent)[9]	Endosulfan (35% EC)	Application in field. Not wearing protective clothing. Items worn: boots/ shoes, long-sleeve shirt, 'frock'.	Dizziness, convulsion, staggering, narrow pupils, excessive salivation, death.	Dead before treatment.
3	35 y/o man	Endosalfan (25% EC) and Novacron (36% SL)	Incident occurred in 2005 during application in the field. Protective clothing not worn during application.	Dizziness, hand tremor, convulsion, excessive salivation, nausea/ vomiting.	No treatment or hospitalisation.

Table 3.15: Sri Lanka

Sl #	Age/ sex	Name of the Pesticide	Comments	Nature of illness	Treatment
1	52 y/o man	Sindak (bensulfuron-methyl, metsulfuron-methyl); Nominee Nomini (bispyribac sodium)	Application in field, mixing loading. No protective clothing worn (too expensive, not available) to treat weeds	Dizziness, headache, blurred vision, hand tremor, staggering, And "fever, stomach, eye redness, vomiting, eye tearing".	Treated and hospitalised. Was "given first aid and after saline with medicine".
2	40 y/o man	Sindak (bensulfuron-methyl, metsulfuron-methyl); Nominee (bispyribac sodium)	Application in field, mixing loading. No protective clothing worn (too expensive, not available) to treat weeds	Dizziness, headache, blurred vision, hand tremor, convulsion, staggering, narrow pupils/ miosis, nausea/ vomiting	"He has given first aid [paracetamol] and affter [was] given saline."
3	36 y/o woman	Thiacloprid	Mixing and loading backpack sprayer to treat rice thrips	Dizziness, headache, blurred vision, staggering	Treated, hospitalised "Doctor gave first aid"

8 *Incident reported by relative (brother)*

9 *Incident reported by relative (brother)*

Sl #	Age/ sex	Name of the Pesticide	Comments	Nature of illness	Treatment
4	54 y/o man	Carbofuran	Application in field. Not wearing PPE (uncomfortable and expensive). Using bucket and brush, hand.	Dizziness, headache, convulsion, excessive salivation, nausea/ vomiting	"He was given first aid at home and immediately taken to the hospital."
5	55 y/o man	Maneb	Application in field/ mixing loading for onion, blossom blight.	Dizziness, headache, blurred vision, staggering	Treated and hospitalised. Immediately [gave first aid]
6	43 y/o woman	Speed (mancozeb)	Application in field using backpack spray, no protective clothing ("it is not considered a necessity")	Dizziness, headache, blurred vision, excessive sweating, staggering	Treated and hospitalised: "was given first aid and prescribed medication"
7	42 y/o woman	Carbofuran	Mixing and loading. Wearing gloves, long-sleeved shirt. To treat cut worms in cabbage.	Dizziness, headache, staggering	Treated and hospitalised: Was given medicine after being hospitalised.
8	35 y/o woman	Speed (mancozeb)	Application in field, mixing/loading. Not wearing protective clothing ("considers wearing protective clothing as useless") to treat onion, purple blotch	Dizziness, headache, blurred vision, staggering	"First aid was given by a doctor after being [hospitalised]"
9	45 y/o woman	Pyriban 40 (chlorpyrifos 400 g/L)	Mixing/loading pesticide. Wearing long-sleeved shirt. Using pesticide to treat bean-pod borer	Dizziness, headache, blurred vision, staggering	Treated and hospitalised: "Was given medicine after being hospitalised."
10	24 y/o woman	Maneb	Mixing/loading pesticide to treat chili blossom blight. No protective clothing worn (too expensive and not available)	Dizziness, headache, hand tremor, staggering	"Was given medicine after being hospitalised."
11	52 y/o woman	Carbofuran	Application in field, mixing/loading. No protective clothing worn (too expensive, not available). Used to treat alternaria blight in cabbage	Dizziness, headache, excessive sweating, staggering	Treated and hospitalised: "After being hospitalised, the patient was treated by a doctor."

Sl #	Age/ sex	Name of the Pesticide	Comments	Nature of illness	Treatment
12	42 y/o woman	Curatter (carbofuran)	Application in field to treat brown plant hopper. No protective clothing worn	Dizziness, headache, nausea/ vomiting	Treated and hospitalised
13	60 y/o man	Speed (mancozeb 80%)	Application in field, mixing/loading. Wearing protective clothing (gloves, face mask, boots/shoes, long-sleeve shirt, long pants).	Dizziness, headache, blurred vision	Treated and hospitalised: "Was given medicine after been hospitalised."
14	36 y/o woman	Propineb	Application in field, mixing/loading. No protective clothing worn (not available, too expensive). To treat carrot thrips	Dizziness, headache, blurred vision	Treated and hospitalised: Immediately was given the medicine.
15	35 y/o woman	Propineb	Mixing/loading, re-entry to field. To treat carrot thrips.	Skin rash	Treated and hospitalised: Was given medicine after being hospitlalized.
16	24 y/o woman	Speed (mancozeb)	Application in field. Not wearing protective clothing (considers wearing protective clothing as useless). To treat potato.	Dizziness, nausea/ vomiting, skin rashes.	Treated and hospitalised: First aid was given by a doctor after being [hospitalised]
17	47 y/o man	Polyram M (maneb)	Application in field, mixing/loading. No protective clothing worn (not available).	Dizziness, headache.	Treated and hospitalised: "Immediately gave first aid."
18	25 y/o man	Calypso (thiacloprid)	To treat downy mildew on bean Application in field to treat rice thrips.	Dizziness, headache, blurred vision, staggering.	Treated and hospitalised: "Immediately was given the medicine."
19	53 y/o man	DADAS 400 (chlorpyrifos)	Application in field (backpack spray) to treat potato root eating and white grubs	Dizziness, headache	Treated and hospitalised: he was given first aid: (paracetamol) and after has given saline.
20	26 y/o man	Nominee (bispyribac-sodium)	Application in field, mixing/loading.	Dizziness, headache, nausea/ vomiting, fever	He was given first aid and after has given saline.

Sl #	Age/ sex	Name of the Pesticide	Comments	Nature of illness	Treatment
21	43 y/o man	Sindak- (bensulfuron-methyl / metsulfuron-Methyl) –nominee bispyibac-sodium	Application in field, mixing/loading. No protective clothing worn (too expensive, not available) to treat broad leaved weed and sedges	Dizziness, headache, nausea/ vomiting.	Treated and hospitalised.
22	63 y/o man	Speed (mancozeb)	Application in field (backpack spray) to treat alternaria blight. No protective clothing worn ("too expensive")	Dizziness, headache, nausea/ vomiting.	Treated and hospitalised: He was given first aid and after saline with medical.

Table 3.16: Wonosobo

Sl #	Age/ sex	Name of the Pesticide	Comments	Nature of illness	Treatment
1	31 y/o man	1. Curzate (cymoxanil 8.36%) 2. Dithane (mancozeb 80%) 3. Provikur (propornokar-bhidroklori-da[10] 722 g/L) 4. Matador (Lambda-cy-halothrin 1%) 5. Spontan (dimelipo 400 g/L)	Application in field, mixing/loading, re-entry to treated field. "He [was] ordered to hold pipeline and squirting mixed pesticides to the field of potato toward harvest time. Three days later, he feels dizzy, queasy, blurry vision, hand trembled and vomiting."	Dizziness, headache, blurred vision, hand tremor and nausea/ vomiting.	Treatment given: "Rest himself, took medicine for headache that from small shop near home."
2	23 y/o woman	1. Curzate (cymoxanil 6.36%) 2. Trineb (mancozeb 66.64%) 3. Acrobat 50 WP (dimetho-morph 50%); 4. Pilaram 80 WP (maneb 80%); 5. Curacron 500 EC (pro-	Application in field, re-entry to treated field. Wearing long-sleeved shirt, long pants, hat. Additional information: • Pesticides dosages used approximate, there was no appropriate measurement. • Hand sprayer with diesel resulting high pressure spraying.	2 incidents: a) miscarriage year 2004 b) unconscious after spraying pesticides: year 2007	Treatment: "Drinking in young coconut water, milk and then take a break/rest."

10 *Indonesian spelling*

Sl #	Age/ sex	Name of the Pesticide	Comments	Nature of illness	Treatment
		fenafos 500 g/L)	• Not using complete PPE, only use long-sleeve shirt, long pant, and hat.		
3	Man (>19 y/o)	1. Curzate (cymoxanil 8.36%) 2. Trineb (mancozeb 66.64%) 3. Daconil (chlorothalonil 75%) 4. Matador (lambda-cyha-lothrin 1%)	"Mixing four pesticides brands together in the house, took to the field and spraying his potato cultivation. He used pail, drum, and wood stick as mixer stuff." No PPE worn "never used protective cloths/ equipment before, feels uncomfortable and sultry when use". "He usually mixed pesticides in field. Because it [was] rain[ing], he mixed at home. He thought that when he goes to field, he can straight [away] spray by using [a] diesel pump. After two hours from mixing pesticides, he felt dizzy, [had] headache, blurred vision, queasy and vomiting."	Dizziness, headache, blurred vision, nausea/ vomiting, tottering.	Treated and hospitalised: "Went to paramedic, told to rest at least for three days, got injection and medicines."
4	26 y/o man	Gramoxone (paraquat dichloride 276 g/L)	Application in field, mixing/loading. No PPE worn (only hat) "feels uncomfortable and sultry when use". "After spraying weeds in fields, sprayer tank opened, containing Gramoxone solution. When tank cap opened, waste solution in tank spraying out, and straight [in] to his face."	"Scorched face, felt burnt". "The face was scorched for about a month." "After [being] struck by waste pesticide that sprays out from tank, he [felt burnt] in his face and face skin scorched"	No treatment or hospitalization: "Take a rest/ break"… "He didn't go to the doctor, just self-cure at home."

Sl #	Age/ sex	Name of the Pesticide	Comments	Nature of illness	Treatment
5	30 y/o man	Matador (lambda-cyhalothrin 25 g/L)	Application in field, mixing loading, re-entry. Wearing boots/shoes, long-sleeved shirt, long pants. Spraying pesticides. "Pesticide (Matador brand) added by water and mixed [in] a pail, then put on backpack sprayer tank. Backpack sprayer tank usually used for two weeks of potato cultivation. He used protective clothes, such as long-sleeves shirt, long pant, boot and hat. He didn't use… face mask or gloves. After spraying pesticide he felt dizzy, queasy, blurred vision, and vomited."	Headache, blurred vision, nausea/ vomiting, unconscious	Treatment given: yes. "Rest"
6	30 y/o woman	1. Curacron 500 EC (profenafos 500 g/l), 2. Dithane M-45 80WP (mancozeb 80%), 3. Agrimec 18 EC (abamectin 18.4 g/l), 3. Mesurol 50 WP (methiocarb or (mercaptodimethur 50%)	Application in field, re-entry to treated field. Wearing gloves, long-sleeved shirt, long pants, face mask. "Spraying with tank sprayer using diesel pump. She [was] helping to arrange the sprayer pipeline." Additional details: • Pesticides dosages used approximately, there was no appropriate measurement. • Hand sprayer with diesel used for high pressure spraying. • Not using complete PPE, only use long-sleeve shirt, long pant and face mask.	• miscarriage, abnormal/ unsuitable menstruation. • dizziness, headache, blurred vision, nausea/ vomiting, unconscious, pain on muscle and low heart impulse.	Treatment given: yes. "Drinking … young coconut water, milk and then take a break/rest."

Table 3.17: Chittoor, Andhra Pradesh

Sl #	Age/ sex	Name of the Pesticide	Comments	Nature of illness	Treatment
1	35 y/o man	REEVA-5 (synthetic pyrethroid)	Vector control application. No protective clothing, only long sleeved shirt and long pants. Application by hand (without gloves). "Fall down while spraying in a mango tree due to giddiness".	Dizziness, headache, blurred vision	Not hospitalised. Met the Government doctor at Pilerm. Medicines were purchased for 23000 Rs.
2	80 y/o man	molazine, palameoil, endosulfan	Application in field (equipment: hand, bucket, backpack). "No information was given".	Headache, blurred vision	Treatment given.
3	19 y/o man	Endosulfan, chlorpyrifos, monocroto-phos	Application in field, vector control. "With hand". More than one pesticide formulation was used: "followed shop-keepers instructions and with our experience".	Headache, blurred vision, excessive sweating	Hospitalised. "Due to that upset, met local doctor in the beginning, later went to hospital at Tiurpati. But no certificate was given."
4	45 y/o man	Pyarisulfan (endosulfan)	Application in field, during spraying. No protective clothing was worn ("not available"), only long-sleeved shirt.	Blurred vision, nausea/ vomiting, small wound on the body	Treated and Hospitalised.
5	20 y/0 man (report-ed by family mem-ber)	Super sulf, phosphamidon	Application in field, re-entry to treated field. No protective clothing worn "nobody told me". Application method: hand, backpack, tractor mounted.	Dizziness, blurred vision, death. Adverse effects occurred after 6 months.	Treated and hospitalized.
6	35 y/o	REEVA-5 (synthetic pyrethroid)	Mixing/loading, vector control application "due to moving and spraying". No protective clothing worn ("land owner did not supply"), only long-sleeved shirt.	Dizziness, headache, nausea/ vomiting	Treatment given but not hospitalised.

Sl #	Age/ sex	Name of the Pesticide	Comments	Nature of illness	Treatment
7	-	Endosulfan, mithen, Ba-rispie, Daizen	Application in field, vector control, re-entry to treated field. No protective clothing was worn "don't know about it".	Headache, blurred vision, excessive sweating, nausea/ vomiting	Treatment given and hospitalised: "first met local doctor and then went to Chittoor"

RETAIL STORE SURVEY

There were some limitations in conducting and analysing the retail store surveys.

However, the results show some of the general conditions of the stores. For example:

- Level of training varied, from some (Sarawak) to none (in Orissa). Salespersons were not able to give reliable advice in all locations.
- Conditions in stores included haphazard storage of pesticides, for example in Wonosobo.
- Stores were sometimes located in farmers' homes and within market-places, sometimes located in close proximity to food stores.
- Some labels were not in local languages (e.g. in Prey Veng, Cambodia).
- PPE availability varied. In Sarawak, 5 of the 6 stores stocked PPE, while in Thrissur, where only 2 out of 9 stocked PPE and the salespersons did not advise on how to use it. In Orrissa, no stores stocked PPE. In Yunnan, PPE was available, but not from pesticide stores.

In Wonosobo, it was found that shops are becoming the center for information for farmers on dosage, brands, and how to use chemicals. The information on chemicals is obtained from training and meeting held by chemical companies (Bayer, Du Pont, and Monsanto), and shops provide prizes (hats, T-shirts, wall clocks, jackets etc) to farmers who buy a certain amount of the products they stock. There is no protective clothing worn in the process of selling. Merchants also map the chemical needs of farmers and provide credit to farmers after harvest. It is recommended that further in-depth research of the conditions of stores be undertaken. ◆

4. Discussion of Results

DEMOGRAPHICS

In total, 1,304 respondents were interviewed and more than 118 retail stores surveyed, with 55 human health incident reports gathered. These included 399 (31%) women and 903 (69%) men. Communities were from varied sectors ranging from small-scale rice farmers to agricultural workers on large palm oil estates. The total groups covered were:

- Vegetable farmers (Cambodia, Sri Lanka, China, Philippines, Vietnam, Indonesia)
- Paddy farmers (India and Vietnam)
- Cotton farmers (Orissa, India)
- Agricultural workers (varied farm crops), Andhra Pradesh, India
- Agricultural workers in palm oil plantations (Perak and Bintulu, Malaysia)

The interviews covered a wide range of nationalities and ethnic groups within the countries.

GENDER

In some sites, women are taking a greater role in pesticide application than previously. Field observations from the study site in Hai Hau, North Vietnam noted that men were migrating to the cities, with many women involved in agricultural work. This was also found in the Yunnan sites where more women than men are in the fields, although this was not reflected in the numbers of respondents. In Prey Veng, Cambodia, the monitoring team noted that, as a result of the deteriorating health of male farmers (attributed to spraying pesticides), women are often replacing men in farming tasks. Women are exposed to pesticides through spraying, and other farming tasks including transplanting, weeding and harvesting. Unfortunately, these tasks commonly occur after pesticides have been sprayed on a crop, resulting in their exposure to the pesticides. In Wonosobo, Java, Indonesia, focus group discussion revealed that while men decide what pesticides to use, women often help in spraying them, impacting on their health.

HAZARDS

The toxicity analysis of the reported pesticides shows that 66% of the pesticide active ingredients have highly hazardous characteristics, according to PAN International criteria, presenting unacceptably high levels of risk to communities, and especially to sensitive sub-populations such as women, children, the malnourished or those suffering from diseases. Many of the pesticides recorded can cause endocrine disruption at extremely low levels of exposure, especially at most vulnerable stages of development such as the unborn foetus and the very early stages of childhood. Newborn children can be 65 to 164 times more vulnerable than adults to the organophosphates chlorpyrifos and diazinon (Furlong et al., 2006). Women are also particularly vulnerable to the oestrogen-mimicking effect of pesticides such as endosulfan, cypermethrin, chlorpyrifos and monocrotophos, all of which can cause breast cancer cells to proliferate (Watts, 2007). Additionally many people were being exposed to mixtures of pesticides; mixtures can increase the hazardous properties of pesticides through synergistic effects (e.g. Mariana et al., 2009).

Some HHPs that were frequently reported are discussed here:

Paraquat

Paraquat is an acutely toxic herbicide that has no antidote. The greatest risk to workers of fatal and serious accidents is during the mixing of the pesticide and loading of spray equipment, where contact with the chemical concentrate occurs. Conditions of use in developing countries make it difficult to follow label instructions and recommendations, and paraquat has been recorded as a causal agent in many poisonings (see Section 1. Women are the major workforce on plantations in Malaysia with 30,000 women workers. As reported by Tenaganita, women worker's regular exposure to herbicides (mainly paraquat) has resulted in a myriad of serious acute and chronic health effects (Fernandez & Bhattacharjee 2006). Paraquat has been banned or restricted in several countries. In the United States, PPE requirements for applicators and other handlers (other than mixers and loaders) include "a long-sleeved shirt and long pants, chemical-resistant gloves and shoes plus socks" (US EPA, 1997). Paraquat was the most popular herbicide found in the Sarawak and Yunnan study sites. In these sites, protective clothing was lacking with only 19% of applicators wearing PPE in Sarawak, and then consisting only of some items. In Yunnan, none of the farmers interviewed wore adequate PPE. Paraquat was also used in Perak where PPE was more consistently worn. The lack of PPE used in such communities exposes double standards in the conditions of use of paraquat in developed, compared to developing countries. Given that a higher proportion of paraquat use in Asia compared with other regions (45% in 2002) (Dinham, 2002), and a new Syngenta production site in China, this problem may be extensive. Safer alternatives to paraquat exist as it has been successfully phased out in several countries (Berne Declaration & IUF 2009). A combination of integrated weed management methods and approaches is more appropriate for small holders in developing countries (PAN Germany 2008). Integrated weed management methods can also replace paraquat use in large plantations and other large-scale cropping systems.

Endosulfan

Endosulfan, reported primarily in the Indian study sites, is an acutely toxic, persistent and endocrine disrupting insecticide banned in at least 62 countries. It has caused well-documented severe acute and chronic health effects, including deaths and birth defects, as a result of the aerial spraying of endosulfan on cashew plantations in the Kasargod district of Kerala over 20 years (Watts 2009). Endosulfan has now been officially determined by the Stockholm Convention's POPs Review Committee to be a Persistent Organic Pollutant (POP), and the Committee decided that "endosulfan is likely, as a result of its long-range environmental transport, to lead to significant adverse effects such that global action is warranted" (POP RC 2009). Alternatives to endosulfan are also available (PAN Germany 2008, Nair SK 2009).

Monocrotophos

Monocrotophos is a WHO Class 1b ("highly hazardous") organophosphate insecticide. It is readily available in India, and is often associated with intentional and accidental poisonings (WHO, 2009; Abhilash & Singh, 2009). According to these monitoring results, it is the most popular pesticide used in the cotton farming community in Padmapur, Orissa. And, although it is banned in Cambodia, it is still purchased and used according to the results of this monitoring.

Chlorpyriphos

Children and the unborn are particularly sensitive to the effects of chlorpyrifos. A US study found that children exposed, in utero, to chlorpyrifos in household use in the USA were likely to have lower birth weight and length, and to have reduced mental and motor development at 3 years of age. They were also more likely to manifest symptoms of attentional disorder, attention deficit hyperactivity disorder, and pervasive personality disorder, all of which can lead to learning difficulties (Gulson 2008).

Despite using highly hazardous pesticides, many farmers were not aware of the specific hazards and identity of the pesticides they use. Some respondents in faced difficulty in identifying the product names and/or active ingredients of the pesticides they use. In some sites, access to labels and information was limited, and they were not always written in the local language.

The Code of Conduct (Article 5.2.3) states that industry should *halt sale and recall products when handling or use pose an unacceptable risk under any use directions or restrictions.* Further, in November 2006, the United Nations Food and Agriculture Organization discussed and endorsed SAICM – the Strategic Approach to International Chemical Safety. One of the key recommendations of the FAO Council was "risk reduction, including the progressive ban on highly hazardous pesticides" (FAO 2006).

EXPOSURE

The highly hazardous nature of the majority of the pesticides being used is compounded by the high level of exposure experienced by many as a result of:

- Lack of protective clothing, partial or inadequate protective clothing
- Spillages
- Non-observance of the wind direction
- Poor storage practices - such as storing in the home
- Poor disposal practices – including discarding in open field

High exposure is experienced through practices

- Partial, inadequate, or complete lack of PPE
- Spillages
- Non-observance of the wind direction

Consequently, respondents reported having experienced a range of symptoms that are consistent with pesticide poisoning during pesticide use or exposure, ranging from a low of 5% reported in Yunnan to a high of 91% reported in Sri Lanka. A number of detailed incidents were also reported in several communities. Given the high incidence of self-reported symptoms in this study, and that underreporting rate based on hospital registries is a known concern in developing countries, this highlights the need for improved health surveillance. This would also be consistent with the recommendation in the Code of Conduct (article 5.1.3) to *carry out health surveillance programmes of those who are occupationally exposed to pesticides and investigate, as well as document, poisoning cases.*

Further exposure is experienced through contaminated water. A concern expressed was that the available water-bodies nearby fields are used for multiple purposes including washing of equipment causing pollution of the water, for example, in Kerala and Orissa. Run-off of chemicals from fields also enters the water, which is in some cases used for bathing and drinking. For example in Sri Lanka, "polluted water is used by all residences for all purposes" particularly for the community at Monaragala which receives runoff from upstream use at Nuwara Eliya and Badulla.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

The Code of Conduct recommends users to wear PPE, defined as *any clothes, materials or devices that provide protection from pesticide exposure during handling or application... it includes both specifically designed protective equipment and clothing reserved for pesticide application and handling* (FAO 1990). For manual spraying, the most essential items are boots or covered shoes, a long-sleeved upper garment and garment that covers the legs, and a hat (if spraying high crops). Gloves and eye protection must be worn when pouring, mixing or loading pesticides, and there may be additional items required in certain circumstances. For many highly hazardous pesticides, far more stringent requirements are necessary to protect the user. For example, for methyl parathion (a WHO Class 1b pesticide), in the United States strict engineering controls must be followed. Mixers and loaders must use a closed system, and applicators must be in a closed cab. They must also wear PPE: "mixers, loaders, and applicators using engineering controls must wear: long-sleeved shirt and long pants, shoes plus socks in addition, mixers and loaders must wear chemical-resistant gloves and a chemical resistant apron" (US EPA 2006).

According to the Code of Conduct:

Pesticides whose handling and application require the use of personal protective equipment that is uncomfortable, expensive or not readily available should be avoided, especially in the case of small-scale users in tropical climates. Preference should be given to pesticides that require inexpensive personal protective and application equipment and to procedures under which pesticides are to be handled and used (Article 3.5).

Government and industry should promote the use of proper and affordable PPE. (Article 5.3.1).

The Code of Conduct recommends that services be implemented to collect and safely dispose of used containers and left-over pesticides.

Reuse of containers for domestic purposes is risky as the containers can be contaminated and cause exposure. The Code recommends as a risk reduction measure the *use of containers that are not attractive for subsequent reuse and promoting programmes to discourage their reuse, where effective container collection systems are not in place* (5.2.3.5).

The findings reveal that a huge effort needs to be made to implement International Codes and Conventions on pesticides in order to meet the Johannesburg Plan of

Implementation goal: "by 2020, chemicals are used and produced in ways that lead to the minimization of significant adverse effects on human health and the environment" (UNEP 2006).

Sustainable and safe alternatives to pesticides are available and must be adopted. Integrated Pest Management is an approach that involves the careful consideration of available pest control techniques and measures to discourage pests and to minimise health and environmental risks, and the Code states that *concerted efforts should be made by governments to develop and promote the use of IPM* (FAO, 2003). Further, Biodiversity Based Ecological Agriculture provides a framework for agriculture 'in harmony with the environment and community', which involves the 'protection of traditional varieties and ecosystems where biodiversity is protected, the quality of the soil is ensured and agricultural methods are ecologically sound and safe', based on farmer-led initiatives (www.ricewisdom.org). Adoption of approaches are in line with the recommendation of the recent International Assessment of Agricultural Science and Technology for Development that sustainable agricultural strategies should be prioritised, including Integrated Pest Management (IPM), agroecological approaches, organic farming, and farmer field schools (IAASTD 2008).

RECOMMENDATIONS

PAN AP recommends the following actions are taken in order to alleviate the worst pesticide problems in developing countries particularly in Asia:

- Develop a global partnership to rapidly reduce and eliminate highly hazardous pesticides;
- Governments should phase out highly hazardous pesticides and progressively phase-in non-chemical pest management approaches including supporting the investigation, education, and promotion of agro-ecological practices, Biodiversity Based Ecological Agriculture and Integrated Pest Management.
- Governments and industry ensure that pesticides that require PPE are not registered, sold or used in developing countries in which the conditions of use are such that these pesticides cannot be used safely, in particular because of a lack of, or inadequacy in, or inability to purchase PPE;
- Governments ensure systematic health monitoring of those exposed to pesticides;
- Governments ensure that all retailers of pesticides are trained, licensed and able to advise on how to use them; and that there is systematic compliance monitoring of all pesticide retailers;
- Governments ensure that health workers are trained in diagnosing and treating pesticide poisoning;
- Sufficient funding is made available to achieve the above recommendations in developing countries and those with economies in transition. ◆

5. RESULTS FOR: Prek Krabrau Commune, Peam Chor District, Prey Veng, Cambodia

STUDY SITE AND METHODOLOGY

The Cambodian Center for Study and Development in Agriculture (CEDAC) is a Cambodian NGO set up in 1997 working on sustainable agriculture and rural development. According CEDAC's experiences on pesticides, Cambodian farmers are using pesticides on rice, bean, vegetable, tobacco, and other agricultural and industrial production. Based on discussion and existing experiences, CEDAC decided to select for the study area the monoculture mung bean cultivation at Prek Krabau commune, Peam Chor district of Prey Veng province.

Prek Krabrau is one of ten communes of Peam Chor district. It is located along the lower Mekong River, 30 km from the Cambodia-Vietnam border and around 70 km Southeast of Phnom Penh. The commune consists of three villages (Oddong, Oddom and Prek Krabau) with 905 households and a total population of 5,336 including 2,694 women.

Scope and sample

100 respondents and three shop retailers (one located in the community and two located in the district town) were selected for the survey. The interviews were conducted in October 2008 by a community monitoring team. The team consisted of 7 data collectors and 1 team leader. The team had organized a meeting before collecting data and information from the field to ensure a clear understanding of objectives, methodology and process of the study.

RESULTS – PESTICIDE USE AND EFFECTS

Demographic profile of study participants

In total, 100 study participants were interviewed. Of these, 84 were male and 16 female. The characteristics of sex, age, level of education and household income are provided in Table 5.1.

Overview of agriculture in the commune

Being an agricultural commune, 99% of those surveyed indicated they were in the farm sector. The main general income of the commune depends on agricultural activities especially production of bean, rice and corn. According to the discussion with community, mung bean production is first main income, followed by corn. Generally, the communities grow rice for home consumption and few households can produce a small surplus of rice for selling. The commune has 1,021 hectares of agricultural land. The area is flooded by the Mekong River for 3 months from August to October. In average, one family has 1.12 ha of land. Every year they grow crops two times after flood water recedes. They grow mung-

Table 5.1: summary of socio-demographic characteristics

Characteristic	Percentage (n=100)
Sex	
Male	84%
Female	16%
Age group	
20-29	20%
30-39	20%
40-49	37%
50-59	17%
60-69	6%
Level of education	
Grade school	87%
High school	13%
Income (Riel/season)	
1,000,000 – 1,900,000	2%
2,000,000 – 2,900,000	18%
3,000,000 - 3,900,000	16%
4,000,000 – 4,900,000	18%
5,000,000 – 5,900,000	10%
6,000,000 – 6,900,000	18%
7,000,000 – 7,900,000	3%
8,000,000 – 8,900,000	10%
9,000,000 – 9,900,00	1%
10,000,000 and above	3%
No response	1%
Household size	Average: 6 persons (range 2-11)

bean and dry season rice from November to March, and then corn and sesame crops from April to July.

The household income is provided in Cambodian Riel per season, with the season calculated as running from November-February, and with an average household size of 6 persons. The average income per season is 4,935,354 Riel/season (equivalent to USD 1,184 http://coinmill.com/KHR_calculator.html, 13 November 2009).

Pesticide use

Pesticide use in Prek Krabau

The commune has experienced using pesticides for many years, since the early 1980s. The results of the survey show that, on average farmers in this commune have been using pesticides for 12 years (range 2 to 28 years). Prior to 30 years ago, during the Khmer rouge regime (1975-1979), there was no use of pesticides in the area.

95% of the respondents indicated that they are a *pesticide applicator*. 2% were not, and 3% did not respond to this question. According to discussions with the local community, all the farmers buy chemical pesticides and fertilizers from the local market and from neighbouring Vietnam, with the intent to kill pests and increase crop yields. The survey showed that 8% of households buy pesticides directly from Vietnam.

Pesticide use and exposure

The respondents were asked to comment on what activities they did that involved pesticides on the farm, and other exposure factors.

Aside from pesticide application, as indicated above by 95% of the respondents, the 5 most common pesticide-related activities were *mixing/loading* (95%), *washing equipment that has been used when spraying or mixing pesticides* (86%), *washing clothes that have been used for spraying or mixing pesticides* (85%), *re-entry to treated fields* (70%), and *working in fields where pesticides are being used or have been used* (67%).

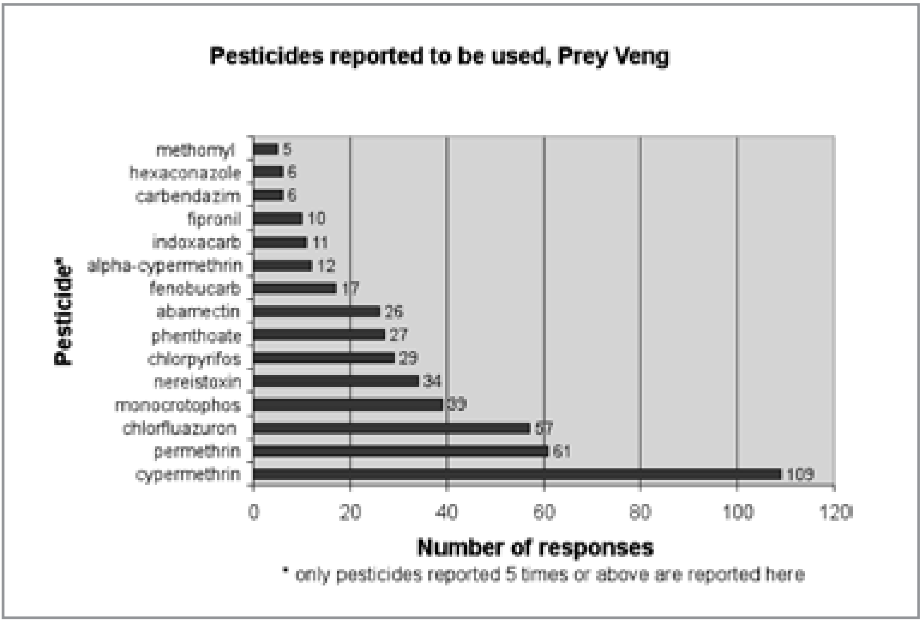
When asked how they are exposed to pesticides, the five most common forms of exposure were as a result of pesticides being *applied by ground methods* (99%), *neighbour use of pesticides* (66%), *eating food after spraying* (48%), and *eating food that has been sprayed with pesticides* (24%).

Pesticide identity

Respondents were asked to identify pesticides they use or are exposed to through these activities. A total of 463 pesticides were reported to be used, and the active ingredient was identified for all of these, using the procedures described in Section 3. All pesticides reported 5 times or more are identified in Figure 5.1, and a full list is provided in Annex 2. The active ingredients of the most commonly reported pesticides are **cypermethrin (109 reports), permethrin (61), chlorfluazuron (57), monocrotophos (39), nereistoxin (34), and chlorpyrifos (29).**

Monocrotophos has been banned in Cambodia since 2003.

Figure 5.1



Conditions of use

When asked *how soon they enter the area after spraying*, the average answer (re-entry period observed) was 1.3 days, ranging from less than a day to 4 days.

Farmer spraying pesticides on mung bean crop, Prey Veng

Personal Protective Equipment (PPE)

64 (67%) of pesticide applicators reported they *wear protective clothing when applying pesticides.* 31 (33%) of applicators indicated that they did not wear protective clothing. The items worn by the 64 applicators who said they wear PPE are indicated in the below table, with the main items being long-sleeved shirt, long pants and face mask. Nobody indicated the use of *overalls* or a *respirator.*

Table 5.2: Items of PPE worn by applicators

Item worn	% who wore item
Gloves	70%
Overalls	0%
Eyeglasses	5%
Respirator	0%
Face mask	92%
Boots/shoes	38%
Long sleeve shirt	97%
Long pants	94%
Others	0%

33% of applicators indicated that they did not wear protective clothing. 19% of applicators gave the reason they did not wear PPE as uncomfortable, and 11% *not available*. 1% did not respond.

Washing facilities

Of the applicators, 44% indicated that they have access to *washing facilities for hands and body* where they apply the pesticides, 52% said they did not. The remainder (4%) did not respond.

Spillages

A large number of respondents had experienced having pesticide spilled on them, either while *spraying* (79%), *mixing* (60%) and/or *loading* (17%). When asked the reasons for the spill, answers related mostly to 'wind direction', 'bucket management', 'cover of backpack', and 'using hands to mix pesticides'. When asked what they did afterwards, 92% answered that they had cleaned, washed or bathed, and 2% 'did nothing' (6% did not respond).

Wind direction

While 80% of applicators reported they spray *along the wind direction,* a large number, 42%, reported they spray pesticides *against the wind direction,* with some indicating that they spray both against and along the wind. 3% answered *unknown* about the wind direction while spraying. Wind direction was also stated as a reason for pesticide spillages by 7 respondents, as reported above.

Pesticides storage, disposal and cleaning practices

Disposal

Burying the container was the most common form of disposal, followed by *throw in open field, burnt,* and/or *other.* Other methods (20%) included 'sell to buyer' (6%), 'thrown in the river' (6%), 'put in the old well' (3%), amongst others.

Table 5.3: Container disposal methods

Disposal method	Percentage
Returned to company	3%
Bury	79%
Thrown in open field	27%
Burnt	21%
Other	20%

When asked if they *reuse the containers for other purposes afterwards,* 83% said that they did not and 15% did (2% did not respond). However the 15% of respondents did not describe what the containers were used for.

In describing how they dispose of leftover pesticides, 54% responded that they disposed of them in the field or river; 39% bury; 6% put in the old well; 3% sell to the buyer; and 2% did not respond.

Cleaning and rinsing of containers and equipment

When asked where they clean the equipment, places described were: in the river (28%); in the field (27%); 'no washing' (25%); at home (8%); in the well (3%) or lake (3%).

Storage

Over half (56%) of respondents indicated they stored their pesticides at *home*. 15% stored them in a *shed*, 15% *garden*, 4% in the *field*, and 10% *other*, which included 8% that described storing pesticides hung 'on a tree'.

74% indicated that they stored the pesticides *locked up and away from children*. However, 25% did not (1% did not respond).

93% indicated that they stored the pesticides *separated from other items*. However 6% did not (1% did not respond).

Training, access to information, and awareness of hazards

Training

When asked if they received *training for the pesticides they use*, 75% of applicators indicated that they had not, and 21% had. The remaining 4% did not respond.

Access to label/Safety Data Sheets

60% responded positively that they had access to labels, 31% access to *safety data sheets.*

Table 5.4: Access to Label/SDS

Access to	% positive response
Label	60%
Safety data	31%

89% reported they *know the hazards of the pesticides* that they use. 9% said they did not (2% did not respond). Those who said that they knew the hazards were asked to mention some: 83% said 'health hazard'. 3 also mentioned pesticides were 'hazardous to health and the environment', and 1 mentioned 'environmental impact'.

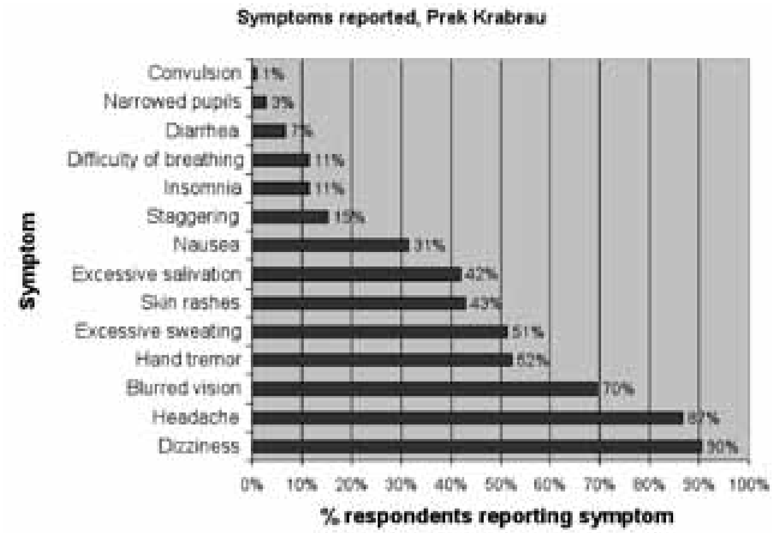
Pests and alternatives

In describing the pests the pesticide are used for, 96% said 'worm', 10% 'rice bug' or 'bug', 4% said 'aphids'. 2% did not respond. When asked if they knew another way to control this pest without pesticide, 62% said they did not. Only 3% did, giving answers like 'botanical pesticides' and 'use net'.

Description of symptoms

Symptoms reported by the respondents that they had ever experienced when using pesticides or being exposed to them are displayed in Figure 5.2. The most common symptoms experienced were *dizziness* (90%), *headache* (87%), *blurred vision* (70%), *hand tremor* (52%), and *excessive sweating* (51%).

Figure 5.2



When asked who they would call if someone was poisoned, 49% said *hospital,* 38% said *doctor,* 28% said *friend*, and 1% *company.*

Reporting issues - community interviews

Table 5.5: reporting issues

Section	Issue
Ethnic group	Interpreted differently
Activities	Application in field tickbox missing
Re-entry period	No response (15% of records)

RESULTS – RETAIL STORE SURVEY

Pesticide Retailer Store, Prey Veng

Store profile

A total of 2 stores were surveyed, which were located in the market in Prey Veng.

Salesperson training and advice given

One of the salespersons had indicated they had received training from the government, and one had by the company. Only one of the two stores had a license issued by the Government. The stores stocked some items of PPE, such as gloves and face masks. In both stores, the pesticides were stored alongside other consumer products including food and clothing. In both cases, the pesticides were not signed as hazardous and were also not physically segregated from the other products.

Products in stores

The monitoring team gathered data about 95 of the pesticide products in the stores. Aspects of the labeling and packaging are displayed in the tables below.

Table 5.6: product labelling

Product labeling		
Aspect	**Yes**	**No/no response**
Has label	90	5
Clear and concise	91	4
Carries product name	93	2
Carries active ingredient	92	3
Carries active concentration	93	2
Carries manufacturer	89	6
Instructions in local language	0	95
Carries warning symbols	92	3

Table 5.7: product packaging

Product packaging		
Aspect	**Yes**	**No/no response**
State of container	95 – 100% intact	
Child proof	0	95

6. RESULTS FOR: Yunnan, China

STUDY SITE AND METHODOLOGY

The monitoring was done in two sites in Yunnan, by the Pesticides Eco-Alternatives Centre (PEAC), a Yunnan-based NGO with the mission to reduce the use of harmful pesticides in China and to promote alternative ecological forms of pest control. Questionnaires were translated into Chinese before the survey. In order to ensure the quality and efficiency of data collection, PEAC did a pre-survey in a Kunming rural village. Then, all facilitators involved in the survey discussed and adjusted the strategy to make it applicable to the conditions of rural villages and to make sure all facilitators have the same standard and understanding of data collection. Such meetings were organized 3 times before, and during the implementation.

According to the project plan, 2 villages, with 20 natural villages (groupings of farmer households together, separated by farm fields), that plant vegetables and use pesticides were chosen to implement the survey in Yunnan Province.

Scope and sample

More than 150 people were interviewed between August and December 2008, selected randomly during the daytime. In these villages, 121 questionnaires were collected and analysed, 60 from one village and 61 from the second village[11]. Among the interviewees, a female farmer's detailed poisoning case (by spraying mixed pesticides) was recorded. Additionally, 10 pesticide dealers were interviewed randomly in 4 regions, including city and rural villages.

Based on the survey and in order to improve farmers' pesticide risk awareness, posters, pamphlets and training handouts were shared with local farmers, female delegates, farmer leaders and with local agro technicians while implementing, and after, the survey.

Study limitations

Because of the limitation of low education in rural areas, the survey was implemented by asking most of the questions face to face, which was time consuming. Sometimes, farmers refused to answer some questions that, they believe, are a personal secret, or even refused the whole questionnaire. Therefore, PEAC trained facilitators who helped to implement the survey, and consulted with officials of relevant government agencies, who provided certain coordination facilitation. Women are the main labour force in agriculture in rural areas. PEAC planned to collect 50% respondents from female respondents. But, unfortunately,

[11] *29 farmers did not complete the survey*

because of the limited time and cultural barrier (usually a male is the 'leader' or 'speaking delegate' of a family), there was less than 50% female participation in the survey.

RESULTS – PESTICIDE USE AND EFFECTS

Demographic profile of study participants

The demographic profile of study participants is summarised in Table 6.1.

The education level is considered generally low in both villages, with over half of respondents having reached a primary school level of education. 5 had not attended school and were illiterate.

Women farmers in vegetable farms, Yunnan

Occupation and income

Compared with other rural communities, the economic condition of the surveyed villages is generally good. Because of difficulty with farmers' understanding of "annual income" (net/overall), statistic data was gathered by facilitation of a rural agro technician. In 2007, the average annual net income per person of the villages are RMB 3,618 (USD 530) and RMB 3,155 (USD 462) respectively. Most of their income comes from agriculture and livestock breeding. The average household size is 4 persons.

Gender

It was found that because men moved out of villages for jobs, women are the main labour force in agricultural production. More women than men are working in the field. However, this trend is not reflected in the ratio of men and women respondents.

Table 6.1: Socio-demographic characteristics

Characteristic	% (n=121)
Sex	
Male	58%
Female	42%
Age group	
20-29	2%
30-39	36%
40-49	42%
50-59	17%
60-69	2%
70-79	1%
Ethnic group	
Hui	51%
Han	49%
Education	
Primary School	52%
Secondary School	44%
No schooling	4%
Income	Average annual net income per person is 3,618RMB and 3,155RMB
Household size	Average: 4 persons (range 2-7)

Employment

All farms of both the villages are small scale and farmers plant vegetables in 0.43-3mu (1mu=666m2) farm fields. Geographical differences between the villages mean that the farmers plant different vegetables, using different methods:

a. *Village 1: Plant vegetables in vinyl tunnel* (greenhouse). *Tomato and cabbage are the main vegetables grown in this season*
b. *Village 2: Rotate crops of rice, lotus, pea or other vegetables.*

Pesticide use

Pesticide use: general findings

96% of respondents indicated that they are a pesticide applicator.

When asked about their activities involving pesticides, the most common were *application in the field* (99%), *mixing/loading* (84%), *washing clothes that have been used when spraying pesticides* (66%), *washing spouses clothes* (60%), and/or *purchasing pesticides* (53%). Some also indicated *re-entry to treated fields* (21%). A small percentage also indicated that they were involved in *household application* (3%) and/or *vector control* (3%).

When asked further about their exposure to pesticides, aside from application in the fields, 77% were also exposed through spraying for *public health purposes.* Some were also exposed through *neighbours' use of pesticides* (19%).

Pesticide identity

Data was collected on pesticide products that farmers were using or had used in recent activities, by interview and by observing containers that were collected by farmers. With the help of the label contents and web-based pesticide registration database, hosted by the Chinese Ministry of Agriculture, the active ingredient, formulation, toxicity, recommended usage frequency and volume per load (or using volume) of each kind of pesticide in the villages were analysed. These pesticides are identified in Annex 3.

The pests and diseases which the respondents reported to use the pesticides against included diamondback moth, plant hoppers, worm, caterpillar, and fungal diseases such as blight, powdery mildew, leafspot, and botrytis. Herbicides were used for weed control.

The monitoring team found that there were different pesticides used in the two villages. In the first village the commonly used insecticides were terbufos, acetamiprid, acephate, buprofezin and metolcarb and the fungicide mancozeb; whereas in the second village the most popular insecticides were cyromazine, abamectin & imidacloprid (mixture), abamectin & indoxacarb, and the fungicides fenaminosulf, sulfur & mancozeb, mancozeb, mancozeb & carbendazim, pyrimethanil & propiconazol, carbendazim & Isoprocarb & mancozeb.

Paraquat was noted as the most popular herbicide in both of the villages.

Conditions of use

Personal Protective Equipment (PPE)

86 applicators (74%) indicated they wore protective clothing when applying pesticides.

26% of pesticide applicators indicated they did not wear it (3%), or did not respond (23%).

For the 86 pesticide applicators who did wear protective clothing, items worn are indicated below:

Table 6.2: Items of PPE worn by applicators

Item worn	% who wore item
Gloves	3%
Overalls	5%
Eyeglasses	0%
Respirator	2%
Face mask	2%
Boots/shoes	7%
Long sleeve shirt	90%
Long pants	88%
Others	8%

3% of pesticide applicators indicated they did not wear PPE because it was *uncomfortable.*

Pesticide application, Yunnan

However, none of the 121 farmers surveyed chose proper personal protective equipment when purchasing and using pesticides. It was observed that all of those wearing gloves were women: to avoid leakage from sprayer. 12 Farmers also used a plastic sheet to avoid body exposure to leaking sprayers. The farmers who wore masks did so to avoid exposure when spraying high crops and spraying upwards. The other observation was that the boots worn were not all water-proof and could not prevent exposure. Most farmers usually wear long-sleeved shirt and pants. However there were 10 (8%) farmers who wore a T-shirt to work.

Several possible reasons were given by the monitoring team for the lack of PPE:

1) Lack of risk awareness. Farmers don't realize the direct or potential hazards of pesticides; therefore, nearly all of them see PPE as a burden while working.
2) There are regulations requiring PPE for pesticide users, but no monitoring mechanism to enforce them. Plant protection station (PPS) have trained or even provided certain protection equipment to local communities. However, farmers usually do not like to use PPE when using pesticides.
3) PPE is sold, but not specifically for protecting pesticide users. No specific PPE store were available in these communities. Farmers have to buy PPE in different stores, e.g. pharmacy, hardware store, supermarket, etc.

Washing facilities

88% of applicators indicated that they had *access to washing facilities (for hands and body) where they apply the pesticides.* 5% said they did not (7% did not respond).

Spillages

The majority of farmers (92%) had experienced having pesticide spilled on them during spraying. Of the 44 respondents who described reasons for this, the main reasons were ‘leak out’ of the sprayer (68%), or exposure to pesticides ‘in the air’ (21%) or that ‘the crops are too high’ (3%), amongst other reasons (8%). In response to the spillage, 86% of farmers described cleaning or taking a bath after a spillage.

Wind direction

When asked about the wind direction during spraying, 92% of applicators indicated that they sprayed pesticides *along the wind direction.* 1% indicated that they sprayed *against the wind direction,* and 7% did not respond.

Pesticides storage, disposal and cleaning practices

Disposal

Methods of disposal of containers indicated by all respondents are described in the table below. *Put in the trash* (42%) and *thrown in open field* (26%) were the most common methods. Other methods were indicated by 35% of respondents, of which 17% indicated ‘randomly thrown’ and 1% indicated ’thrown into gunny bags’ and 1% ‘thrown into drainage’ (the remainder did not specify what method they used). A government agency holds Integrated Pest Management Farmer Field Schools (FFS) in the first village, and it was observed that farmer members of the FFS have a higher awareness about containers than farmers in the second village. In the first village they collected containers and sent them to a government agency for disposal, and did not throw them in the field or ditches Some respondents indicated more than one disposal method.

Table 6.3

Disposal method	Percentage
Thrown in open field	26%
Put in trash	42%
Bury	1%
Burnt	1%
Other	35%

95% of farmers indicated that they *did not use the containers for other purposes afterwards.* However, 3% did, with some mentioning that they ‘recycle’ (1%) or ‘reuse’ (1%) the container. 2% did not respond.

When asked how they dispose of leftover pesticides, most (92%) indicated that they would ‘spray again’ or that there was ‘no leftover’. 8% gave other answers.

Cleaning and rinsing of containers and equipment

In describing the locations where they clean the equipment, the main answers were ‘at home’ (68%), or ‘in the drain’ (12%). However 12% responded that they ‘never clean’ the equipment while 8% did not respond.

Storage

The main place where pesticides are stored is in a *shed* (79%). However respondents also indicated storing pesticides in the *garden* (12%), at *home* (4%), in the *field* (3%), and 3% *other location* (including the 'greenhouse'), with some respondents indicating more than one location to store pesticides.

Most (98%) responded that the pesticides were stored *locked up and away from children, and also separated from other items* (97%). The remaining respondents did not do so.

Training, access to information, and awareness of hazards

Training

At both villages the government provides a series of technique trainings to farmers every year. However, when asked whether they had received training, 22% of applicators indicated they had received training, and 76% had not (3% did not respond).

Usually the pesticide dealers' suggestion or information sharing will greatly influence consumers' choice of pesticide. Because sharing information as well as new knowledge between neighbours is a common way of communication among local residents, farmers in the same village appeared comparatively familiar with the habit of using and choosing pesticide. Most farmers in the first village, with IPM FFS, have comparatively better attitude toward choosing and using pesticides as well as container disposal.

Access to label/safety data sheets

All (100%) of farmers interviewed responded positively that they had access to a label; however only 19% had access to safety data sheets. Sources of information on the hazards of pesticides were given as *label* (76%), *told* (65%), through *training* (20%), and/or obtained the information from the *safety data sheet* (13%).

Description of symptoms

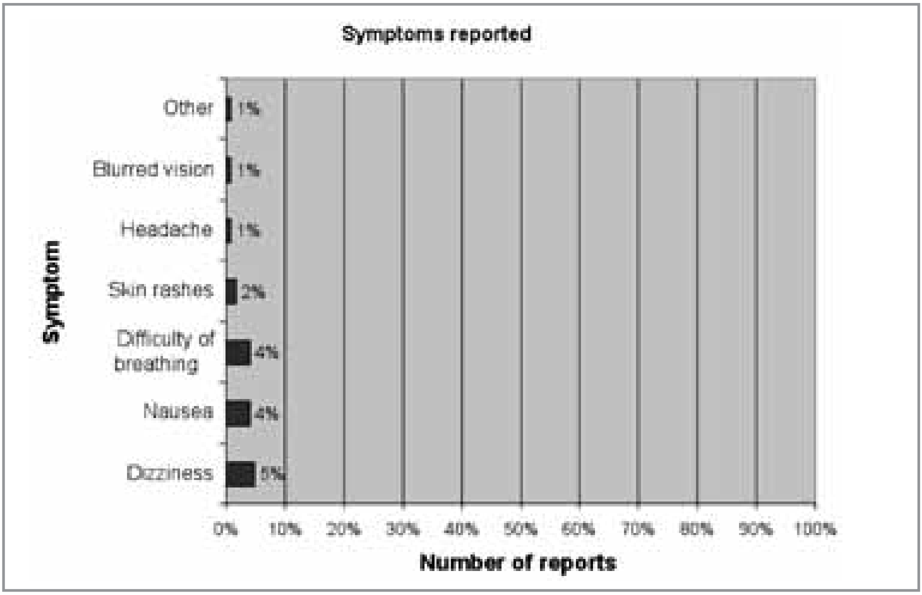
Nearly all farmers believed they didn't experience poisoning when using pesticides. However some poisoning symptoms were noticed while interviewing 12 female farmers, who shared that they had experienced symptoms including dizziness, weakness, nausea, difficulty in breathing, and loss of appetite. But most of them couldn't recall the detail of poisonings. One 41-year-old female farmer shared her story:

One day in September of 2007, she mixed Methamidophos EC and Triadimefon WP together and sprayed peas in the field. She wore a long-sleeved shirt and long pants while working, but after around 2 hours working in the farm field, she felt dizziness and nausea. Instead of going to the hospital to seek help from a doctor, she turned back to home and went to bed without eating any food.

Response to poisoning

When asked who they would call if they thought someone was poisoned, the majority would call the hospital (96%) or doctor (1%). However 2% said they would just 'drink sweet water' or 'take rest at home' (1% did not respond).

Figure 6.1



Reporting issues - Conditions of Use

Table 6.4: Reporting issues

Section	Issue
Washing of equipment	8% did not respond.
Knowledge of hazards	Due to limitations in the questions and responses, there was a low response rate to this question.

RESULTS – RETAIL STORE SURVEY

Background

The survey was carried out in Chenggong County, Haikou Town and in Luo Yang Town in Kunming. 10 pesticide dealers were randomly selected in rural villages and in an agricultural materials market. The survey specifically focused on paraquat products. Of the 10 stores, 3 of them were selling Gramoxone and the others were selling domestic paraquat products produced by 7 different manufactures in Guangdong, Guangxi, Shandong and Sichuan provinces.

Target consumer

Pesticide store, Yunnan

All these products are sold to farmers who plant vegetables and flowers around the market. But, most of dealers said, because of the non-selective nature of paraquat, it is also harmful to non-target plants, for example their vegetables.

Training and PPE

All the surveyed stores have registered with the local government and have certification to sell pesticides. They learnt general knowledge about PPE, storage, relevant regulations, etc. from a government routine training course, but did not get product related training from the manufacture. The label is usually the channel for them to learn and, accordingly, to give suggestions to consumers.

Because they are specific stores for pesticide, no PPE was found there. When asking where to buy PPE, they identified the relevant stores as the street-pharmacy, hardware store, commodity stores, etc.

General condition

The storage and packaging condition of the surveyed products was good. In these stores, we observed the condition of the pesticide label, container and storage. The observed packages are made of plastics and labelled and sealed according to the relevant regulations in China. ◆

7. RESULTS FOR: Chittoor District, Andhra Pradesh, India

STUDY SITE AND METHODOLOGY

Sahanivasa is a social action group primarily promoting and strengthening the rights of Dalits, Adivasis (indigenous people), rural workers and the marginal farmers in Andhra Pradesh. Sahanivasa has collaborated with an agricultural workers union in Chittoor district to survey agricultural workers involved in pesticide application. 150 people were selected for the survey. The participants were selected at random, based on convenience of access to the Union. Participants were informed of the objectives of the study and it was initiated only after their acceptance. The respondents work in fruit gardens, paddy, sugar cane and vegetable cultivation. Chittoor District is a dry area where crops are dependent on seasonal rains or tube-wells. Pesticide users interviewed were mainly involved in cash-crops owned by medium or large-scale farmers.

RESULTS – PESTICIDE USE AND EFFECTS

Demographic profile of study participants

Gender of respondents

A total of 150 people were interviewed, comprising 77 women (51%) and 73 (49%) men. 3 of the women interviewed indicated they were breastfeeding at the time of the interview.

Employment

Respondents indicated their sector of employment as *farm* (71%), *orchard* (37%), and/or *other* (54%) including 'agricultural fields' and 'agricultural lands'. Similarly, the most common occupation described was agricultural work or labour including spraying. The monitoring team described the respondents' place of employment as being in fruit, paddy, sugar and vegetable fields, with the majority being landless labourers working for others, who do spraying tasks amongst other agricultural labour. With married couples, both husband and wife participate in pesticide spraying. As well as carrying out agricultural labour including spraying, women also attend domestic activities such as cooking and caring for children.

Table 7.1. Summary of socio-demographic characteristics

Characteristic	% (n=121)
Sex	
Male	49%
Female	51%
Age group	
20-29	11%
30-39	33%
40-49	41%
50-59	11%
60-69	1%
No response	2%
Level of education	
Grade school	19%
High school	16%
College	3%
Vocational course	6%
Other	1%
No response	55%
Household size	Average: 4.1 persons (range 1-10)
Average household income	Estimate: Rs18000/year general average income of agricultural workers (Sahanivasa)

Pesticide use

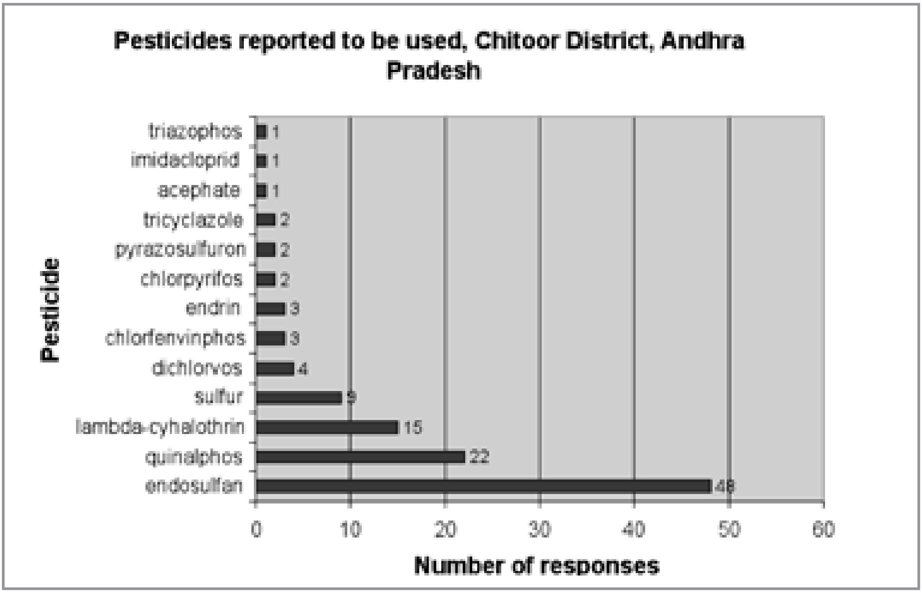
95% indicated that they are a *pesticide applicator,* and of these, the majority (109 respondents) are *worker applicators*. The remainder were not applicators (2%) or did not respond (3%).

The respondents were asked to comment on their pesticide-related activities, and other exposure factors. The most common activities indicated were *re-entry to treated fields* (91%), *washing equipment* (83%), *washing clothes* (74%), *working in the fields* (69%) and *application in the fields* (50%).

When asked how they are exposed to pesticides, the most common route indicated was *neighbour's spraying* (81%), followed by *applied by ground-based methods* (77%). Some also indicated they are *eating food that has been sprayed with pesticides* (63%) or *exposed through water contamination* (45%). While some respondents indicated that they were exposed through application by air and spraying for public health purposes, these practices are not known by the monitoring team to take place in the area.

Respondents were asked to identify pesticides they use or are exposed to through these activities. Of 176 pesticides reported to be used, the active ingredient was identified for 114. The methods for determining the active ingredient are explained in Section 3. These are identified in Figure 7.1. For 62 reports, the active ingredient could not be established. The most common active ingredients identified were **endosulfan (48 reports), quinalphos (22) and lambda-cyhalothrin (15).** The organophosphate group of pesticides comprised a total of 33 reports (monocrotophos, dichlorvos, quinalphos, chlorfenvinphos, triazophos). Small numbers of other pesticides were found including sulfur (9), endrin (3), pyrazosulfuron (2), tricyclazole (2) and imidacloprid (1).

Figure 7.1



Conditions of use

Personal protective equipment (PPE)

Spraying pesticides without PPE

Woman sprays pesticide into mango tree, without PPE

Only 1% of applicators indicated that they wear protective clothing when applying pesticides. 99% did not indicate the use of protective clothing. However, some items of clothing were indicated to be worn while spraying such as *long-sleeved shirts* (71%), *pants* (7%), which may not have been thought to be protective clothing. Very small numbers, less than 3%, indicated the use of *gloves, overalls, eyeglasses, respirator, mask or boots.* Of those that that did not use protective clothing, reasons were given such as *expensive* (42%), *not available* (31%) or *uncomfortable* (3%), with some not stating the reason. These findings were confirmed by the monitoring team's observations that 'no special protectors were being used', noting that either the land owner or the person involved in the activity is not taking any care or precaution, and people working as daily workers have "no capacity to purchase [protective equipment] even though some of them are aware of the problems." Some respondents also described using the same clothes for two or three days in a row.

Washing facilities

45% of applicators indicated that they did have *access to washing facilities* for hands and body where they apply the pesticides. 27% did not.

Spillages

A number of respondents reported having experienced spillages either while spraying (57%), while mixing (31%), and/or while loading (12%). When asked on what body part the spillage occurred, common responses were 'hand' (45%) followed by 'face' (15%), 'leg' (11%) or 'eyes' (7.%). When asked what they did in response, 55% indicated that they 'washed' or 'cleaned'; 16% 'visited the doctor' or 'hospital', although some 'did nothing' (8%), and the remainder did not respond.

Wind direction

48% of applicators indicated that they spray *against the wind direction.* 31% reported spraying *along the wind direction*, while 16% indicated the wind direction while spraying was unknown. Some respondents did not answer this question. Spraying against the wind direction was confirmed by the monitoring team through discussions.

Spraying pesticide against the wind direction

Pesticides storage, disposal and cleaning practices

Disposal of containers, cleaning and rinsing of equipment

The most common method of disposal of pesticide containers indicated was *thrown in open field* (79%), while some *bury, burn or put in the trash* and/or *use other methods.* Other methods, described by 10% include re-use e.g. to store kerosene (see also reuse of containers below). Some respondents used more than one disposal method.

Table 7.2

Container disposal method	Percentage
Returned to company	1%
Thrown in open field	79%
Bury	17%
Burnt	19%
Put in trash	17%
Other	10%

When asked if they *use the containers for other purposes afterwards,* 54% responded that they did not. 44% responded that they did, and when asked to describe the purpose, 9% of respondents gave answers including for 'storing kerosene' (7%), for lamps (<1%), or to keep domestic things (<1%), or 'don't know' (<1%). The remaining 2% respondents did not respond to this question. In describing their disposal methods in an earlier question, 1 respondent indicated they used it to 'keep chili powder'.

When asked how they dispose of leftover pesticide, 78% indicated that they disposed of it '[on] the land'. Some indicated they disposed of it in the 'canal' or 'waterbody' (2%), or brought it back home (1%). The remainder (19%) did not respond. For washing of equipment, 54% indicated that they washed the equipment in a canal or water-body, 30% in the field, garden or open space, and 3% did not wash. The remainder did not respond.

Storage

When asked where they store the pesticides, respondents most frequently indicated *home* (71%), followed by *field* (23%), *garden* (11%) and/or *shed* (9%), or *other* (1%). 69% reported storing pesticides *locked up and away from children,* although 30% did not (1% did not respond). 63% *separated pesticides from other items*, although 35% did not (2% did not respond).

Pesticide storage inside the home

Training, access to information, and awareness of hazards

Training

When asked whether they had received *any training for the pesticides they use,* 90% of applicators responded that they had not. 10% did not respond. Zero respondents indicated that they had received any training on pesticides.

Choosing pesticides

When asked about ways that they choose pesticides, common ways were via *salespersons' suggestion* (75%); also some chose based on a *recommendation* (39%), *own experience* (34%) and/or via *labels* (12%). Of those that chose based on a recommendation, the pesticides were recommended by relatives (11%), agricultural department staff (6%), co-farmers or friends (5%), shop dealers (5%), landowners (1%) or others.

Access to information

When asked about their access to written information on pesticides, 47% indicated they had *access to a label*, and 11% access to *Safety Data Sheets.* The remainder did not have access or did respond to this question.

Table 7.3: Access to Label/SDS

Access to	% positive response
Label	47%
Safety data	11%

Awareness of hazards

When asked if they knew the hazards of the pesticides they use, only 20% said they did. These 20% were able to mention symptoms like 'headache', 'vomiting', 'eye burning', or hazards like its 'not consumable', 'dangerous' or 'poisonous'.

Knowledge of alternatives

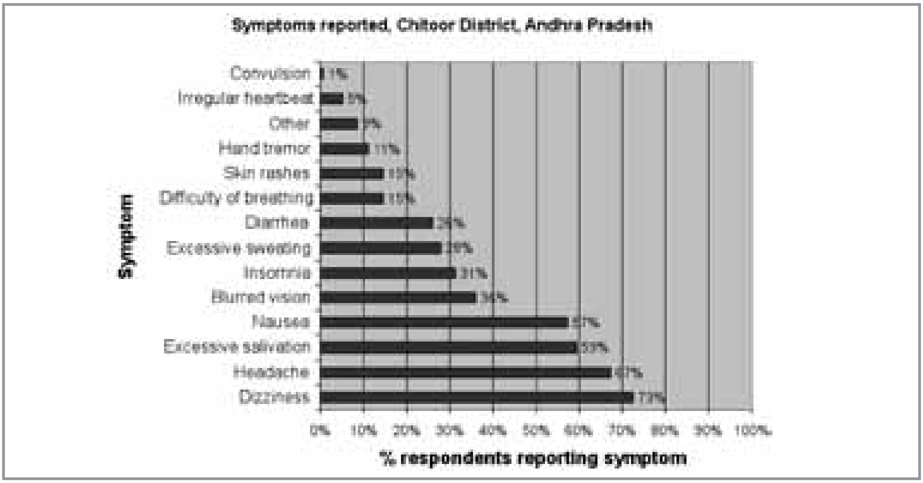
Pests reported were not described in depth. Few farmers (7.3%) knew other ways to control pests without pesticides. They mentioned some techniques such as *cow urine* and *neem leaf/oil.*

Symptoms

When asked if they had ever experienced symptoms when using pesticides or being exposed to them, the most common responses were *dizziness* (73% reported this) *headache* (67%), *excessive salivation* (59%), and *nausea* (57%). The full list of symptoms reported is displayed in Figure 7.2. Other symptoms (9%) reported included 'body pain', 'cough', 'itching', 'eye problems', 'stomach pain' and 'weakness'.

A Farmer involved in pesticide usage for past 16 years is now affected by chronic illness

Figure 7.2



When asked who they would call if they thought someone was poisoned the most common answers were *doctor* (76%), *hospital* (45%) and/or *friend* (11%).

Reporting issues - Community interviews

Table 7.4: Reporting issues

Section	Issue
Re-entry period	Low response rate
Education	Low response rate
Washing facilities	27% did not respond to this question.
Reasons for spill	Not enough qualitative reports to determine the reasons.

INCIDENTS

Respondents described 7 cases of poisoning, including the pesticide used, symptoms experienced and treatment received. Refer to Table 3.17 for details of these. ◆

8. RESULTS FOR: Thrissur, Kerala

STUDY SITE AND METHODOLOGY

The study for 'Community Monitoring for International Advocacy' was undertaken over a period of one month in the Kole lands of Thrissur by Thanal. Kole farming is a distinctive feature found in the areas of Thrissur and Malappuram districts of Kerala state. These are wetland areas that remain submerged from June to November. The waters are then pumped dry using motors and paddy cultivation is begun. The word, 'Kole', in Malayalam means *bumper yields.*

The study area covered 5 padasekharams that are spread over 4 Panchayats. The survey covered the areas of Mulloor and Parappur which are parts of the Tholur Grama panchayat, Kodannur; part of the Paralam panchayat, Manallur; of the Manallur Grama Panchayat and Oorakam; part of Cherpu Grama Panchayath. The survey was conducted among 115 farmers from the above Panchayaths and also included 9 pesticide stores from Thrissur town and above panchayaths.

Kole fields, Thrissur

Data collection

In all the places that the survey was conducted the Agricultural Officer of the respective Krishi Bhavans was informed and then the farmers were contacted. The Kole lands have been divided into 'Padasekharams.' As mentioned earlier Kole farming requires the use of pump sets to flush the waters out and every small farmer does not have these equipments. Farming, thus is looked after on a community basis. According to the area that the small pieces of farmland lie in, they are divided under 'padasekharams' which literally mean a collection of farms.

All padasekharams have a committee that elects its President, Vice President and the other members of the committee. In all the places the members and the conveners of the padasekharams were contacted, who had with them a complete list of all the farmers in their respective padasekharams. It was a list of the farmers under whose names the lands were registered and a total of 115 farmers were selected.

The survey began in Thrissur, in the second week of October 2008 and continued up to the second week of November. The fields were in different phases of cultivation. While in some areas cultivation had begun a month ago, in some areas the fields were only being pumped dry which gave the monitoring team an opportunity to observe the pesticide use during different stages of cultivation.

RESULTS – PESTICIDE USE AND EFFECTS

Demographic profile of study participants

Table 8.1: Summary of socio-demographic characteristics

Characteristic	% (n=115)
Sex	
Male	98%
Female	2%
Age group	
20-29	2%
30-39	10%
40-49	27%
50-59	23%
60-69	35%
No response	3%
Level of education	
Grade school	54%
High school	31%
College	12%
Vocational	3%
Postgraduate	1%
Household size	average 5 persons

Pesticide use

Application and activities

Table 8.2

Pesticide Applicators	**Worker applicators**	**33**
	Farmer applicators	**65**
Applied by others	**17**	

Applicators can be divided into 3 categories[12]. The first category comprises of the owners of comparatively larger land holdings and farmers who can afford to hire pesticide applicators for their lands. Out of the 115 people interviewed, 17 of them belonged to this category. They are not exposed to direct contact with pesticides but they oversee the spraying work and also re-enter the fields for weeding activities. They are indirectly exposed to pesticides in this way.

Applicators spray along the wind direction, but pesticides drift on to them when the wind direction changes

The second category is of farmer applicators, who apply pesticides on their own fields which is because of the size of their land holdings, which is small and it is not feasible to hire applicators due to high cost of production. Such farmers are also exposed to pesticides.

The last category is the worker applicators, for whom application is a means of livelihood. They apply

[12] *Analysis of the the pesticide applicators was done by THANAL.*

pesticides on large patches of land and find work through out the cultivation period. In many cases they do not own any land and in the remaining parts of the year, they are mostly employed on lands that they have taken on lease. They are also directly exposed to pesticides.

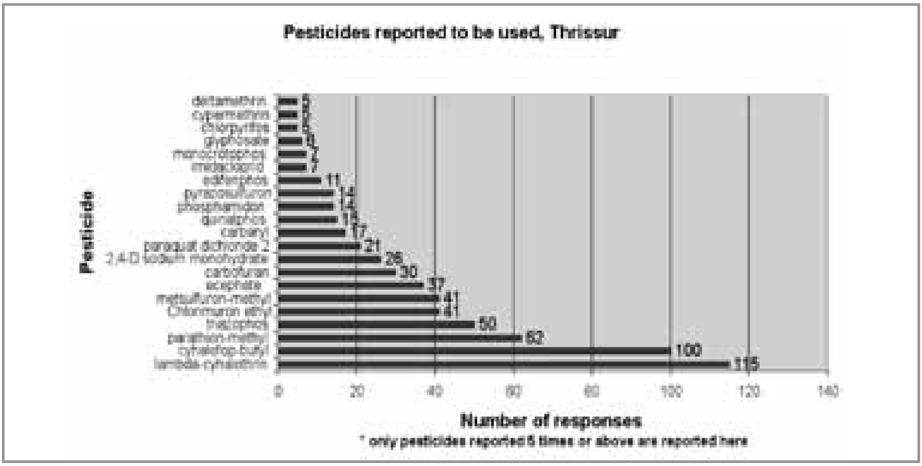
Aside from pesticide application, other common activities included *re-entry to treated fields* (93%), *purchasing pesticides* (86%), *working in fields where pesticides are being used or have been used* (78%) and *mixing* (77%).

When asked about how they are exposed to pesticides, the most common form was *application by ground methods* (93%), *water contamination* (64%). Smaller numbers were aware of being exposed through *eating food sprayed with pesticides* (10%), or *eating food after spraying without washing hands first* (7%). 5% were also involved in spraying for public health purposes.

Pesticide identity

Respondents were asked to identify pesticides they use or are exposed to through these activities. Of 671 pesticides reported to be used, the active ingredient was identified for 650, using the procedures described in Section 3. These are identified in Figure 8.1. For 21 reports, the active ingredient could not be established. The most commonly reported pesticides are lambda-cyhalothrin (115 reports), cyhalofop-butyl (100), methyl-parathion (62), and triazophos (50). The most commonly used insecticides belong to the extremely or highly hazardous pesticide category as classified by WHO, such as triazophos(Ib) and methyl parathion(Ia). A full list of pesticides and their status as Highly Hazardous Pesticides is provided in Annex 2.

Figure 8.1



Conditions of use

The time of spraying on an average is 4-5 hours, and the usual time begins at 6 to 10 in the morning and from 4 to 6 in the evening. This time is more in the case of applicators who sometimes spray well past afternoon and also late into the evening. The equipments used are not demarcated for herbicides and pesticides and the same equipments are used for both purposes. Also the spray nozzles used are same for all pesticides, herbicides as well as insecticides.

PPE is often not worn. Sprayers have to roll up their pants (with bare feet) to apply pesticides in the paddy fields

Personal Protective Equipment (PPE)

58% of total respondents indicated that they wore protective clothing when applying pesticides. However, none of the farmers use the conventionally recommended protective clothing. 26% of pesticide applicators did not wear any PPE with 12% of those indicating they did not because it was *uncomfortable.*

From the respondents who did wear PPE, items worn were as follows:

Table 8.3: Items of PPE worn by applicators

Item worn	% who wore item
Gloves	9%
Overalls	1%
Eyglasses	3%
Respirator	1%
Face Mask	18%
Boots/Shoes	8%
Long Sleeve Shirt	48%
Long Pants	50%
Others	14%

While 50% of all pesticide applicators use long pants, the applicators have to roll up the long pants to their knees, as the Kole lands are slushy, and their feet sink knee deep into the soil. It can be conclusively said that the figure of applicators using PPE is extremely misleading, as the PPE used are not effective in providing protection to the applicators.

Washing facilities are the canals – which are also used for washing equipment

Washing facilities

89% of respondents indicated that washing facilities are available to them near the fields. They are water canals that flow through the paddy fields, where the applicators wash their equipment as well as themselves. Though the data indicates that washing facilities are available, it actually results in the toxic chemicals being exposed to more number of people, including the respondents, who are at higher risk.

Spillages and wind direction

65% of the respondents indicated that pesticides had been spilled on them, while mixing (30%), loading (21%) and/or spraying (56%). Some of the applicators mixed the pesticides with their bare hands. While mixing if the pesticide spilled or got sprinkled on their hands they did not wash immediately but did so, only after the spraying was over.

All the applicators spray *along the wind direction.* But while spraying, since the open fields are windy, a change in the direction of wind or when the applicator turns the direction of spray causes the pesticides to get blown on the body of the applicator. In some cases, where the spillage occurred while mixing or loading, the respondents told that this was because of the leakage in the containers.

Pesticides storage, disposal and cleaning practices

Disposal

Methods of disposal of containers indicated by the respondents is shown in Table 8.4.

Table 8.4

Container disposal method	Percentage
Thrown in open field	70%
Resold to waste collectors	33%
Burnt	3%
Buried	10%
Thrown in Rubbish	1%
Others	4 %

The farmers who throw the empty pesticide containers in the field do not know that this leads to contamination of water. None of them have received any training on the safe disposal of empty containers and pesticide store owners or the pesticide representatives also do not give them any advice on disposal.

Cleaning and rinsing of containers and equipment

Of those who responded, the most common location indicated for washing of equipment is the *canal* (78.8%).

Storage

When asked on where the pesticides are stored, the most common location was in a *shed* (47%). Some stored the pesticides at *home* (23%) in the *field* (23%) or *garden* (2%). 14% stored the pesticides in *other* locations.

91% reported that the pesticides were *locked up and away from children*, although 4 indicated they were not. (5% did not respond). 94% indicated that they were *separated from other items* and 6% did not respond.

Although 95% of the respondents do not use the pesticide containers for any other purposes, 5% did, such as 2% for 'bathing'.

Training, access to information, and awareness of hazards

Training

23% of the respondents claim that they have received training on pesticide use, out of which only 2 claim to have received training from companies. The rest of the users have attended a few hours of classes, from Agricultural Department or the Agricultural University. Most of these classes are concerned with pest management in general and does not include the precautions or the equipment to be used while spraying pesticides. The data can be misleading as the farmers refer to any kind of training on pest control to be the training on pesticides.

More than 60% of the respondents rely on the pesticide store keeper's advice while purchasing pesticides. The results of the store survey shows that most of the store keepers do not advice their customers as to what precautions are to be taken when applying pesticides, or the correct method of mixing, loading or application since they do not read the labels. 7 of the stores also do not stock any PPE. The store keepers claim that the demand for the PPE is low, whereas the farmers, on the other hand claim that these equipments are not available for them to buy.

Access to label/SDS:

Labels are found attached to the pesticide bottles and since the applicators purchase pesticides for their use, over 90% of the respondents have access to them. However, this data is misleading as access to labels does not necessarily mean that the farmers read the labels. In this case almost all the labels have data written in English or Hindi, but instruction in the local language (Malayalam) is missing. So, in spite of many respondents having an access to labels most of them cannot read it. The safety data sheet is available with a few pesticide bottles but all the data is in extremely small print which is too difficult to read. The information in the sheets is too small to read and some of the sheets don't have their literature in Malayalam which renders them useless.

Table 8.5: Access to label/SDS

Access to	% positive response
Label	96%
Safety data	35%

Awareness of hazards and alternatives:

Most respondents (92%) responded that they know the hazards of the pesticides they use. When asked to mention some of the hazards, 58% responded, including 26% who mentioned symptoms (such as allergy, dizziness and nausea), diseases (cancer) or disorders, or explained that people could die or be poisoned, with 3% saying 'very dangerous' or 'very poisonous'; a further 10% observed that it kills pests; and 9% did not give clear explanation on what the hazards were.

Pests: the most common pests reported by the respondents are shown in the below table:

Table 8.6: Pests reported

Pest	# Reported
Leaf folder	214
Stem borer	195
Echinocloa colona	99
Bug	58
Aphids	47
Broad leaved weeds	47
Weeds	44
Pseudo stem borer	32
Brown Plant Hopper	13

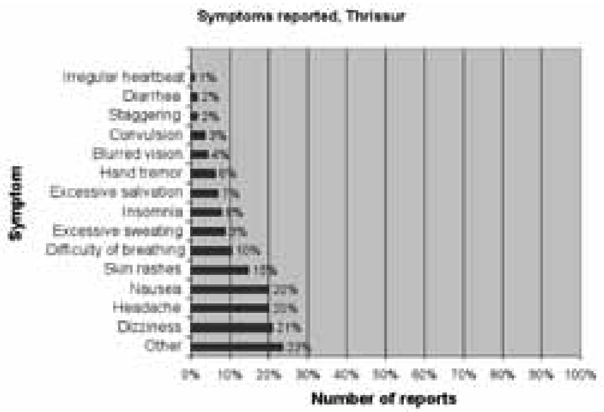
When asked what if they knew another way to control the pest without pesticides, 35% gave an answer. These included:

- Trichocards (15%)
- Neem cake, oil, soap (10%)
- Biofertilizer or biopesticide, organic fertiliser or manure (8%)
- Tobacco decoction (4%)
- Garlic (3%)
- Cow dung (2%)
- Rat traps (1%)

Symptoms

Symptoms reported by the respondents that they had experienced when using pesticides or being exposed to them are displayed Figure 8.2. The most common symptoms experienced were dizziness (21%), headache (20%), nausea (20%), skin rashes (15%). Other symptoms, described by 23% included 'itching' (7), 'stomach ache', 'pain' or 'swelling' (3), 'chest pain', 'allergy', 'shivering', 'teary eye', and 'mouth dryness'.

Figure 8.2



When asked who they would call if someone was poisoned, the most common answer was hospital (97%) and/or doctor (8%).

Reporting issues - Conditions of Use

Table 8.7

Section	Issue
Income	Cannot be established from the data
Disposal of leftover pesticides	Response rate (>5% did not answer)
Knowledge of hazards	Response rate (>5% did not answer)

INCIDENTS

21 respondents had reported incidents to the monitoring team. These are summarised in Table 3.12 in Section 3.

RESULTS – RETAIL STORE SURVEY

Store Survey

The store keepers give advice on which pesticides should be used for controlling specific pests but none to warn about the hazards that pesticides cause. None of them know what risks are posed by specific pesticides, as concluded during the store survey. The store owners do not read labels to understand the precautions and neither do they encourage this habit with their buyers.

Out of the 9 stores, two stocks PPE and they don't advise the farmers to use PPE while spraying. This is an alarming trend that such toxic substances change hands without the buyer or the seller having any knowledge about the hazards that they might pose to health.

Pesticide store located next to a bakery

One of the stores was located right next to a bakery store, whereas another was situated in the middle of a fruit and vegetable market. The pesticides and the food items are sold side by side, and in this way not just the applicators are affected but also consumers.

At one store the store owner was himself co-ordinating the mixing of pesticides by hands by two farmers, which was being overlooked by the representatives of a company.

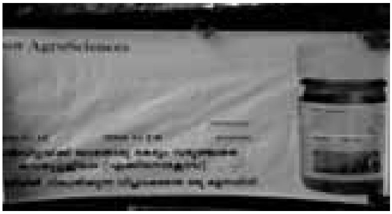
Documenting Advertisements

Certain advertisements were documented:

- 'Clincher', a weedicide, that specifically targets Echinocloa colona, claims to be harmless to paddy.

- The advertisement for' FAX', an insecticide, says that it nourishes the paddy, produces more roots, more ripening and even protects the environment!
- 'Kritap' advertises its product as something that will give a field full of golden grains.

The FAO code states that Statements like "guarantee of higher yields", "more profits", "harmless ", "non toxic" should not be used. The advertisements clearly violate the Code.



Dow AgroSciences – Clincher

A revolutionary weedicide which controls echinocloa without harming the paddy

Instances have been noted where the pesticide companies gave out T-shirts as compliments to farmers and the stores displayed wall clocks from pesticide companies as complimentary gifts. A farmer told the monitoring team that one company was serving free food. ◆

9. RESULTS FOR: Ragadaya District, Orissa, India

STUDY SITE AND METHODOLOGY

In Southern Orissa, the monitoring took place in Padmapur block of Rayagada district. The area covered under the study is a rural area, where crops such as paddy, cotton, pigeon pea, and millets are cultivated. The major crop found here is cotton specifically on the middle and high lands and paddy on the low-lands. The prior consent was obtained from all the farmers interviewed, and purpose of this exercise was shared with them before the interview process began. The interview was conducted with the household head. A systematic sampling procedure was adopted, whereby a fraction of the households was interviewed. 103 people were interviewed. Small sub-groups of 5 households were made. The questions were asked in these groups and were cross checked with the help of other members of the group.

The questionnaires were then sent to the PAN AP regional office located in Penang, Malaysia, where the data was entered into a database. Statistical analysis of the results was done by PAN AP staff and consultants. To determine the active ingredients from the products reported, specific procedures were followed, as described in Section 3. For the other questionnaire data, summary tables were created for each of the variables, and reported as a frequency or percentage of the total.

All the pesticide stores present in the location were interviewed, 7 in total. The surveyors, being locals, talked with salespersons in a discussion mode. Observations were also made in the stores.

Study limitations

Some limitations were noted in the data collecting, encoding and analysis process. In the checking procedure at field level, the questions were asked in these groups and were cross checked with the help of other members of the group. However there could be some cases of errors during the cross-checking process. The respondents did not indicate when was the last time the pesticide was used, so it is possible that some pesticides no longer used could be included.

RESULTS – PESTICIDE USE AND EFFECTS

Demographic profile of study participants

97% of study participants were men, and 3% were women. 95% worked in the farm sector, and 5% in the plantation sector. 95% were pesticide applicators, including the three women interviewed. The other 5% were not.

58% of respondents had completed elementary school, and 36.9% had attained high-school education. 2% had attended college, and 3% did not respond.

Table 9.1: Summary of socio-demographic characteristics

Characteristic	Percentage (n= 103)
Sex	
Male	97%
Female	3%
Age group	
20-29	6%
30-39	39%
40-49	30%
50-59	20%
60-69	4%
No response	1%
Level of education	
Grade school	58%
High school	37%
College	2%
No response	3%
Household size	Average: 4.9 (range: 2-12)

Pesticide use

Of the 103 respondents, 98 (95%) indicated they were pesticide applicators.

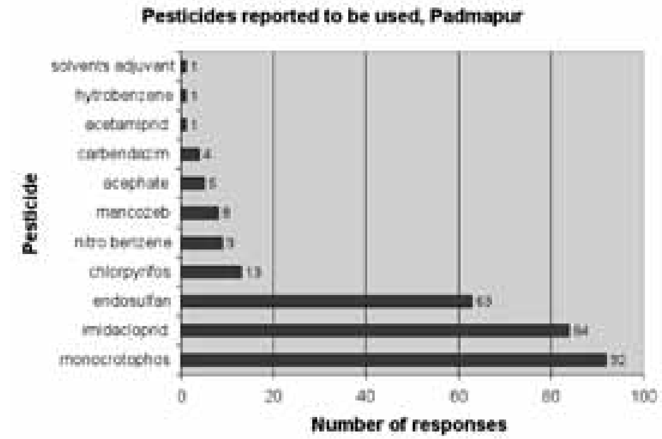
The respondents were asked to comment on what activities they did that involved pesticides on the farm, and other exposure factors. Aside from pesticide application, other common activities indicated by respondents were *washing equipment* (100%) *mixing/loading* (99%), *washing clothes(or spouses clothes) that have been used when mixing or spraying pesticides* (99%).

When asked about their exposure to pesticides, 85% indicated they were exposed to pesticides applied by ground methods (85%). Some respondents also indicated being exposed to pesticides via *food that is sprayed with pesticides* (14%). They also indicated *water contamination* (19%). While the respondents did not describe the source of the water contamination, this indicates that they are aware of their exposure to pesticides via contaminated water.

Pesticides used were reported by respondents. The most commonly reported pesticides were **monocrotophos (92 reports), imidacloprid (84), endosulfan (63), chlorpyrifos (13), nitro benzene (9), and mancozeb (8).** Most of these pesticides are highly hazardous, possessing acute and/or chronic hazards to human health or the environment. Figure 9.1 shows the pesticides found, and the number of reported uses by respondents. There were 40 that gave no answer. In this analysis it is assumed that the product contains the active ingredients indicated by the product label. Some products (in the surveyors' assessment, approximately 20%) are adulterated.

The pests were not described in detail in the results, with 'diseases' being the most common answer.

Figure 9.1



Conditions of use

Personal Protective Equipment (PPE)

Only 6% of applicators reported that they used protective clothing when applying pesticides. The remainder did not (89%) or did not respond (5%). While a majority of all respondents reported they wore long-sleeved shirts (98%) and pants (97%), and some boots (34%), or 'others' (8%), adequate PPE was not used by anybody. Of the 89% of applicators that did not indicate wearing protective clothing, 80% stated the reason as *not available.*

Washing facilities

55% of applicators indicated that they had access to washing facilities (for hands and body) where they apply the pesticides. The remaining respondents did not have access (43%) or did not respond (2%). Through observations and discussions with the community, surveyors ascertained that the washing facilities in these villages are not exclusively for washing after spraying pesticides. They use the existing common facility, which is also used by villagers for bathing; animals drink water from this source too.

Spillages

The majority of respondents had experienced pesticides being spilled on them while handling pesticides, occurring while mixing (97%), spraying (74%) and/or loading (9%). 98% of respondents said they washed after the spillage. As noted above, the washing facilities are common facilities used for multiple purposes.

Wind direction

Not all respondents heed the wind direction when spraying. While 65% of applicators indicated they spray *along the wind direction,* 28% indicated spraying pesticides *against the wind direction.* The remainder did not respond.

Pesticides storage, disposal and cleaning practices

Disposal

Methods of disposal of containers indicated by the respondents included: *thrown in open field* (78%), *bury* (39%), *burnt* (31%) and/or *put in the trash* (11%).

If there are leftover pesticides, 78 % indicated that they disposed of it *at home.* In this context it means that they store the containers with left over pesticides at their homes (generally in places away from their children). 11% indicated there was 'no leftover'. Some respondents indicated they disposed of it in the drain or threw it outside.

Cleaning and rinsing of containers and equipment

Respondents cleaned the equipment in the canal (78%) and/or pond (23%).

Storage

Respondents tended to store the pesticides in the home (97%) (3% did not respond). Most reported that the pesticides were locked up and away from children (95%), although 3% said they were not (2% did not respond). Most also stored the pesticides separately from other items (96%), while 2% did not (2% did not respond). Most respondents (92%) did not use the container for other purposes afterwards, although 2% did (6% did not respond).

Training and awareness of hazards

Training

When asked whether they had received training on the pesticides they use, 88% of applicators said they had not. Only 2% had. The remaining proportion (10%) did not respond. The lack of training was confirmed by the assessment of the local surveyors', based on their observations and discussions with the community. They noted that most of the farmers interviewed had not received any training on the use of pesticides, neither by the government nor by the pesticide sellers. The pesticide sellers do not provide any information on precautionary measures to be taken by the farmers while transporting, handling, mixing, storage and spraying. The farmers primarily follow the practices of farmers from neighbouring Andhra Pradesh who lease land in this area to grow cotton.

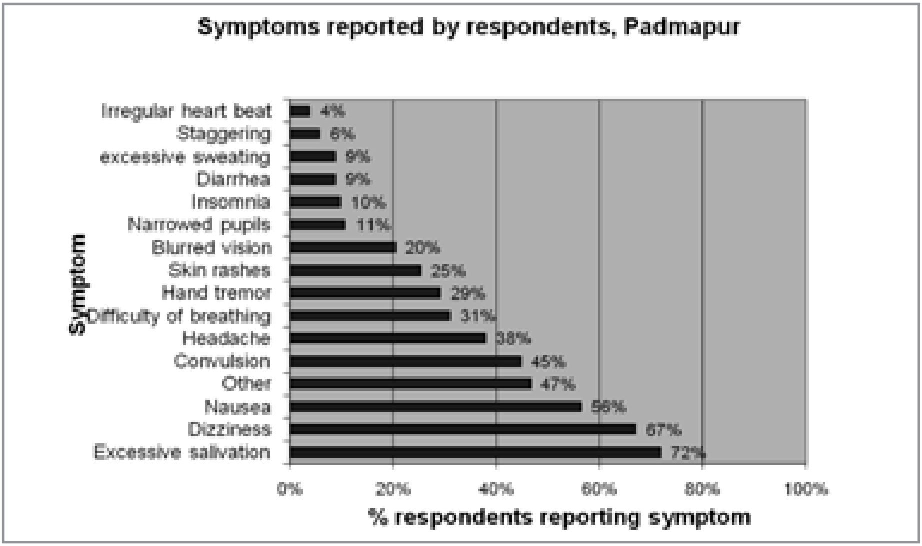
Access to label/Safety Data Sheet

32% responded positively that they had access to a safety data sheet. Only 3% indicated that they had access to the label. The remainder did not have access or did not respond to this question. However, this result may not reflect the real situation. In the assessment of the surveyors, approximately 20% of the pesticides and insecticides being sold in these villages are duplicates and do not come with any labels. The term "duplicates" refers to locally mixed solutions put in emptied containers of branded products. Local traders are known to collect the empty containers, which have been thrown away, and re-fill them with the mixed product. Aside from the approximately 20% adulterated (duplicate) products, all other products have labels, a result that is confirmed through the store survey results (see below).

Symptoms

Symptoms reported by the respondents that they had ever experienced when using or being exposed to pesticides are displayed in Figure 9.2. The figures are shown as a percentage of the respondents who reported the symptom. The most common symptoms experienced were **excessive salivation (72%), dizziness (67%), nausea (56%), 'other' (47%) (especially 'skin itching', reported by 42%), convulsion (45%), and headache (38%).**

Figure 9.2



RESULTS – RETAIL STORE SURVEY

A total of seven stores were surveyed, all located in paddy and cotton growing areas. None of these stores had a government license.

A range of pesticide active ingredients were found in the stores, including acephate, chlorpyrifos, endosulfan, imidacloprid, mancozeb, monocrotophos, and nitrobenzene. These pesticides were also reported by users in the community interviews.

Training, information and advice of salesperson

When asked if they had received information and training from the company who supplied the products or government, all 7 salespersons said no.

The sale of PPE was not observed in any of the stores during the monitoring teams' visits. The surveyor's also asked the question about whether PPE is sold. None of the shops surveyed sold the PPE.

When asked about the hazards of the products surveyed, out of 43 products, for 38 caution was advised by the seller saying it could cause 'death if it goes to the mouth'. It was observed that neither gloves, nor nose-cover are being sold by pesticide sellers in this area, and that farmers generally use their towels to cover their nose.

Conditions in store

Labelling

Of the 43 selected products, 34 had a label. Of the remainder, 5 did not have a label, or there was no indication by the surveyor for 4 products.

Packaging

Responses indicate that packaging and re-packaging of pesticides was not done in-store.

Disposal of used packages

Some of the storekeepers interviewed gave advice to customers on how to dispose of containers, or collected them. Their advice or practice was to bury, burn, or throw away the containers.

Reporting issues - Retail store interviews

Table 9.2: Reporting issues

Section	Issue
Products	Too difficult to quantify numbers from data
Availability of written information	Not quantified
Labeling	Could not report further on the symbols or pictograms and information in local language, due to reporting inconsistencies (number of responses to information on label exceeds number of respondents who indicated there was a readable label).
Storage	Insufficient response

◆

10. RESULTS FOR: Wonosobo, Java, Indonesia

Analysis by Gita Pertiwi

STUDY SITE AND METHODOLOGY

Geography of Wonosobo

Geographically the location of Wonosobo district is on 7˚.11" and 7˚.36' Parallel South, 109˚.43' and 110˚.'04' Longitude East. Wonosobo is about 120 km from Semarang, the provincial city and 520 km from the capital city of Jakarta with a height of about 270 – 2,250 meters above sea level.

When we talk about Wonosobo district, we also are talking about Dieng Plateau as a cultural heritage site with many temples, tourism and fertile agricultural lands with beautiful scenery. Farmers in Dieng Plateau have planted potato since the 1980s and the market boomed in 1985-1995 giving wealth to the inhabitants. In 1996 the area of potato cultivation was 6,188 hectares with production of 135,637 tons.

Hills of up to 40 degrees of slope are exploited as agricultural lands; causing a high danger of erosion, and the high utilization of chemicals make the soil become poor. Massive cutting of trees has taken place, making the hills become barren.

Location

Monitoring in Wonosobo district was done in two sub-districts: first was in Kejajar sub-district with 4 villages (Sembungan, Sikunang, Sigedang and Tambi), a center of potato crop farming; and second in Garung sub-district that is becoming the center of agricultural trading for products, agricultural equipment and production supports (fertilizers, pesticides). The monitoring was done in Kejajar and Garung sub-districts.

Monitoring method

The monitoring was conducted together by a team consisting of farmer's organization (Serikat Petani Wonosobo – Wonosobo farmer's association) and Gita Pertiwi. The team consisted of 13 persons (5 males and 8 females). The method was focus group discussion, in depth interview with farmers, shop keepers, merchants of pesticides and observations.

Interview with farmers, Wonosobo

Time

Monitoring was held from August until October 2008

Farmers, Wonosobo

Respondents

Respondents were:

1. 100 farmers (39% females and 61% males)
2. 6 farmers who had experienced a poisoning incident
3. 10 shops/pesticide merchants
4. Additionally, 10 pesticide advertisements were monitored.

RESULTS – PESTICIDE USE AND EFFECTS

A. Focus group discussion

Monitoring was done in 4 villages, Sembungan (1 063 inhabitants), Sikunang (2 135 inhabitants), Sigedang (2 846 inhabitants) and Tambi (5 124 inhabitants). About 90% of the population in these villages are farmers and peasants.

The annual planting pattern in Sembungan and Sikunang villages are potatoes all the year, while in Sigedang and Tambi villages potato crops are rotated with other vegetable crops in the pattern: potato – carrots/cabbages/loncang - potato(Tambi village has a government owned tea plantation of PTPN Teh Tambi. Dieng Plateau has large Moslem community.)

Agriculture is practiced by men and women farmers. Rich farmers usually rent the farm to other farmers, while peasants are employed as workers (seedling, planting, cleaning weeds, spraying pesticides and harvesting). Female workers bring children under 3 years old to work on the farm and to keep aneye on them. The women peasants work on weeding, maintain seeds, seedling, spraying pesticides and harvesting, while men peasants work on activities that need more physical power, such as hoeing, mixing and spraying pesticides, harvesting and transporting the harvests. There are differences in payment for male and female workers in potato and vegetable cultivation work: a male worker gets Rp. 15 000 – Rp 20 000 (USD 1.60- 2.10) one day plus a pack of cigarettes and lunch, while a female worker gets Rp 10 000 – Rp 15 000 (USD 1.10- 1.60) per day plus one lunch meal.

Men hold the power to make decisions on what crop to plant, the brand of pesticides (including buying), time of harvest and the price of agricultural products. Women's role is to prepare seeds, weeding and to help spraying pesticides by holding long plastic tube for spraying.

Farmers commonly use more than 3 pesticide brands mixed together, the selection is from their experiences, recommendation of neighbors or friends, information from merchants and advertisement on the roads and television.

Steps of potato cultivation

1. **Seedling**, the process of making potato seeds is done by sorting potatoes gathered from their farm, cleaning with water and drying on an open area. Potatoes are sprayed

with pesticide Mypcinta 100 gr/100kgs or Metindo 100 gr/100kgs (active ingredients metomil 25%), or Curacron (profenofos) 30 – 40 ml (1/2 drum = 75 liters) Galicron (profenofos 500 g/l) (30 – 40 ml for 75 liters). They mix the pesticide and water with their bare hands, and dry with winds. They put the potatoes into transparent plastic bags for 4-5 months. After the potatoes bud, they are sorted by size of buds and the rotten potatoes are discarded.

2. **Farm preparation**. Men hoe the farm and leave it for about 10-20 days. If the farm has weeds they spray them with Gramoxone (paraquat) or Goal (oxyfluorfen). They make swathing of 70 – 100 cm wide and this is done by both men and women.
3. **Fertilizing**, compost and chemical fertilizers are used (Ponska, TSP), and insectidices brand of Pollos (lipromil, metomil, pepinasihidrate) of about 4-6 kgs on the swathing and covered with plastic.

Pesticides used in potato production, Wonosobo

4. **Planting**: It takes about 15 persons to plant the crop. Male workers make holes and female workers put seed into the holes.
5. **Maintenance**:
   a. They wipe out grasses with herbicides such as Goal (oxyfluorfen) if the crops are still low.
   b. Watering the crop
6. **Pest and disease control** (70 days, spraying every 4 days)
   a. Pilaram (maneb) (fungicide, 1 kg for 600 liters of water) + Curzate (mancozeb) (1 kg for 1000 liters) + Daconil (chlorothalonil) (1 kg for 1200 liters) + Hamador (maneb) (80 ml for 200 liters) + Glue (pro sticker). They always use a higher dosage than suggested on the label; they believe if they use the dosage mentioned on labels, they will never get the harvest.
   b. Curacron (profenofos) (800 ml for 1600 liters) or Agrimex (abamectin) (50 ml for 200 liters) + Sticker (ingredient) (1 liter for 1200 liters)
   c. Fruit stimulus: Grand super (used after 50 days), dosage 500 gram/400 liters,
7. **Harvest**. The profit for 2,000 meters2 farm is about Rp 1110500 (production cost Rp 7089.500, potato selling Rp 8.200.000, chemical purchased = Rp 2 938500./7089500 = 41.5% of total production cost.

Carrot does not need to have special treatments, they only use chemical and diseases control of Hamador (insecticide) = 1 bottle/200 liters, Super growth/HNO (dosage 1 kg/200 liters), Pilaram (dosage 1 kg/400 liters) and fruit stimulus (KNO or super growth) with dosage of 1 kg/200 liters.

Pesticide utilization (questionnaire 1)

There were 100 respondents consisting of 39 females and 61 males in 4 villages.

The findings are:

Pesticide types: Commonly, farmers use more than 3 chemicals of fungicide, insecticide, pesticide and adhesive. The dosage is not as mentioned on label, because if they use as suggested on label, the pests and diseases will not die. The label is also small and they never read it, just use their intuitions. Spraying is more intensive during rainy season.

Equipment: They spray with machine to save time and energy when the crops already high, but they use backpack sprayer when the crops are still young. The protective clothing worn is very limited, they usually only wear long-sleeved shirt, trousers and a hat.

They seldom wear hand protection, mask, glasses. Spraying is done in the morning and afternoon. Men also smoke cigarettes while spraying, which can also be a form of exposure to pesticides.

Men carrying pesticide spray machine, Wonosobo

Disposal: They throw the chemical container on the farm or near to a water source; sometimes they collect them to bury or burn. The bottles they bring home to play for their children or sell to collectors. Storage: There is no special space to keep chemicals, some of them keep it on the farm or bring it home to hang in kitchen or other rooms.

Spraying pesticides using Machine sprayer, Wonosobo

Roles of men and women: Men's roles are spraying, purchasing chemicals and transporting chemicals from home or pesticide shop to land/farm and harvesting. While women's role is to prepare seeds, mix potato with chemicals, clean up weeds and wash clothes.

Purchasing: Farmers purchase chemicals directly or get credit from the merchants and pay after they harvest.

Symptoms: Commonly, farmers feel the impacts of pesticides such as headache, hot skin irritation, reddish skin and blurred vision. They drink general medicines sold in small shops when they feel the poisoning symptoms becoming stronger.

Incidents: 6 people who had experienced poisoning symptoms from exposure to chemicals were interviewed.

INCIDENT REPORTS

6 persons (2 females and 4 males) reported their experience of an incident out of 00 respondents interviewed. These are detailed in Table 10.1. The outlines of what they feel are:

Two men were poisoned by pesticides of and Matador (lambda cyhalothrin). One farmer was spurt on his face with Gramoxone (paraquat) after he opened the tank sprayer lid. His face was burned, bruised and got peeled. The injury lasted for a month and he only took traditional medicine. Another farmer felt a headache, queasy, and blurred vision after he mixed Matador pesticide at home in a cloudy climate. He took general medicine bought at common shop.

Two men and 2 women were poisoned because of 1 fungicide and 3 insecticides mixed together. They felt the impacts after spraying for 2 hours per day over 3 days. The men felt headache, queasy, tottery walk and trembling. He went to health worker and got an injection, rested for 3 days. The women got menstrual disturbances instead of other symptoms. One of them had a miscarriage. However, the woman who had the miscarriage had no evidence as she did not go to the doctor and only drank young coconut water, milk and took rest.

Most victims do not know the long-term impacts of chemicals.

The incident reports can be found in Table 3.16 in Section 3.

RETAIL QUESTIONNAIRE

11 chemical merchants were interviewed, 4 in Garung sub-district and 7 in Kejajar.

Stacking of agrochemicals, retail store

In Garung, most of chemical shops are near to Garung market. The shops are specialized in selling agricultural equipments (fertilizer, seed and chemicals) but some of them also sell other items, such as clothes. Shops are becoming the center for information for farmers on dosage, brands, and how to use chemicals. Merchants seldom advise farmers to read the label, they only explain and farmers follow it. The information on chemicals is usually received from training and meeting hold by chemical companies (Bayer, Du Pont, and Monsanto), shops provide prizes (hat, T-shirt, wall clock, jacket, etc) to farmers who buy in certain amount. There is no protective clothing worn in the process of selling.

Retail store, Wonosobo

In Kejajar sub-district, shops are in the inhabitants homes, the sell at home by providing glass display containing the pesticides. They do not have a special shop to sell chemicals, because if they sell close to the farmer's houses, it will cut the cost of transportation. There is a system when farmers are able to borrow the chemicals and pay it back after the harvest. Merchants also monitor farms. Farmers may get many chemicals to borrow (to be paid back after harvest) if the crops are growing well. Merchants also hold meetings sponsored by chemical companies to promote new brands and mapping of chemical needs of farmers. Merchants give prizes to farmers who attend the meetings, such as hat, clothes, jacket, snacks and money. The agricultural shops are the biggest distributor of chemicals in Wonosobo district. They also give annual prize if farmers buy more than Rp. 60,000, with prizes including electronic home appliances, motorcycle and even ticket to go Hajj for couple.

PROMOTION/CHEMICAL'S ADVERTISEMENTS

Ten advertisements were monitored, in 5 models, such as patched on trees on street (1 model), brochures (5), banners (2), and tabloid and magazine (1).

The advertisement of chemicals commonly only give description on the name of brand, and words such as "make healthy" and "protect", however, they do not indicate the active ingredients and how to use them. The brochure of PT. Sarana Tani also indicate a lottery offering prizes if buyers follow purchase Rp. 30-50 thousands worth of products.

The brochures commonly promote some chemicals from one manufacturer. The information on the brochure are the brand, name of manufacturer and the advantages of the chemicals, without any information on active and dangerous ingredients.

Advertisement offering prizes if purchasing pesticides

The flyers patched on trees along the roads are most effective advertisement. One tree may have 3 flyers, with information on the brand and advantages.

The advertisements above are against the standards of the Code of Conduct on the Distribution and Use of Pesticides on advertisements as there is no detailed information for consumers. ◆

11. RESULTS FOR: Perak, Malaysia

STUDY SITE AND METHODOLOGY

Location

In West Malaysia, the monitoring was conducted as a collaboration with Tenaganita - an organisation that campaigns to protect and promote the rights of women and migrant workers. The monitoring was undertaken in the state of Perak, one of the 13 states of *Malaysia* and the second largest state in *Peninsular Malaysia*. Perak was chosen because it has the highest number of oil palm plantations compared to other states in Peninsular Malaysia, hence allowed the monitoring team to have access to more sprayers compared to any of the other states.

Member of survey team conducting interview with pesticide sprayers

The monitoring team decided to interview workers from three main plantation companies:

1. Sime Darby Plantations which is the largest plantation company in the world, locally owned with the government having the largest share of the company. Currently it has about 600,000 hectares of plantation land in Malaysia and Indonesia but is aiming to increase it to 1 million hectares by expanding into Africa. Tenaganita, in collaboration with Wild Asia provided consultancy and training to Sime Darby in implementing a gender policy, which was launched on 11th August 2008. Sime Darby registered as a founding member of RSPO (Roundtable on Sustainable Palm Oil).
2. United Plantations, a Danish company, the second largest plantation company in Perak, after Sime Darby. They were the first company worldwide to receive RSPO sustainability certification, in Aug 2008.
3. Workers from the Tun Sambanthan Plantations, a local cooperative owned company.

Besides the permanently employed workers contract workers, who work in various plantations as required, were also interviewed. These workers are attached to the plantations mentioned above and also with other smaller oil palm companies.

The respondents were gathered using two strategies:

i. Making an official request to the employers to arrange for the workers to be interviewed directly or via their unions/Occupational Safety and Health Act (OSHA)/ workers committee.

ii. Organising informal small group gatherings among workers for discussions and interviews thereafter.

If both the strategies failed, the monitoring team would then conduct the interview from house to house.

105 respondents in total were interviewed.

The questionnaires were translated into Bahasa Malaysia. During the face-to-face interviews, it was often necessary for the monitoring team to translate the questions into Tamil.

Prior to interviews, the monitoring team used posters, pamphlets and books to raise the awareness of the workers regarding the harms and dangers of pesticides. Although only a total of 105 respondents were interviewed, the monitoring team had been able to disseminate this information to a far greater number of people (approximately 300 to 400) as they had gathered around the team during the visits. Many questions were posed to the monitoring team on issues related to pesticides, health and personal safety.

Limitations and challenges

Some limitations and challenges were experienced in conducting the monitoring. First, the plantation companies were not entirely co-operative with the monitoring teams, although formal requests had been made to the estates management. Other challenges were that the questionnaire was too lengthy, requiring a minimum of 45 minutes to one hour to complete an interview. Not all of the respondents were able to answer questions on pesticide identity due to several factors: low literacy level, no labels on pesticide containers or respondents were not present when pesticide cocktails are mixed.

RESULTS – PESTICIDE USE AND EFFECTS

Demographic profile of study participants

A total of 105 respondents were interviewed comprising both local and migrant workers. The ethnicity data was interpreted by the monitoring team supervisor based on the person's name, as many participants supplied their religion rather than ethnic group.

Employment

As the respondents were estate workers, the majority indicated their sector of employment as *plantation* (98%). There was also <1% from the *farm* sector (1% did not respond). Occupations described included 'pesticide spraying' (89%), *and/or* 'agriculture' (13%) (general agricultural labour can also include pesticide spraying work), as 93% indicated they are pesticide applicators (see also below, 'Pesticide use'). 4% of respondents were 'foremen'.

Income

The average household size was calculated as 6 persons per household. When asked about their monthly income, 90% of respondents responded with a household income that ranged between MYR 300 and MYR 1200 (USD 88- 352). 11 of the respondents – those who are contract workers – supplied this information as an individual monthly income, which ranged from MYR 500 - MYR 1200 (USD 147- 352).

Table 11.1: Summary of socio-demographic characteristics

Characteristic	Percentage (n=105)
Sex	
Male	21%
Female	79%
Age group	
20-29	15%
30-39	30%
40-49	45%
50-59	10%
60-69	1%
Ethnic group	
Malaysian-Indian	76%
Malaysian-Malay	12%
Indonesian	7%
Bangladeshi	5%
Education	
Primary school (age 7-12)	58%
Secondary school (age 13-17)	12%
Other ('no schooling')	14%
No response	15%
Income	For 89.5% of respondents, income ranged between MYR 300 and MYR 1200. 10.5% (those who are contract workers), supplied the an individual monthly income, ranging from MYR 500 to MYR 1200
Household size	Average: 6 persons (range 1 to 18)

Pesticide use

Use and exposure

The majority (93%) of respondents indicated that they are a pesticide applicator, and 4% were not. 3% did not respond.

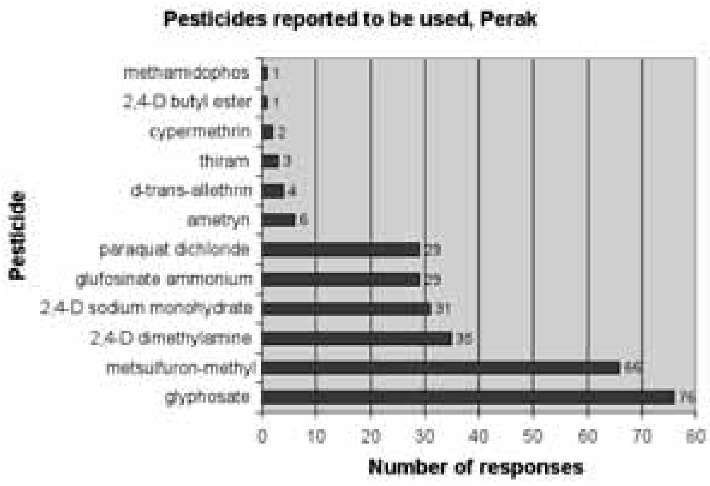
When asked about their pesticide-related activities, in addition to *pesticide application* (indicated by 93%), the 5 most common activities were *washing clothes that have been used for mixing and spraying pesticides* (92%), *washing equipment that has been used for spraying or mixing* (84%), *mixing/loading* (70%), *household application* (62%), and/or *re-entry to treated fields* (53%). 21% also indicated they were involved in *vector control.*

When asked about their exposure to pesticides, the 5 most commonly indicated were: exposure to pesticides applied by *ground methods* (88%), *water contamination* (28%), *spray for public health purposes* (28%), and *neighbour use of pesticides* (17%). "Fogging" of pesticides for the *Aedes* mosquitoes, takes place in the area, as part of a national vector-borne Disease Control Programme, for dengue-control, and this is what *spray for public health purposes* refers to in this context. People also use household pesticides indoors to kill mosquitoes. The pesticide used is most likely pyrethroid-based (Teng & Singh, 2001). Also 5% of respondents indicated they were exposed to pesticides *applied from the air,* however, as aerial spraying is not known to be carried out in the area, respondents may be referring to the fogging operations.

Pesticide identity

Respondents were asked to identify pesticides they use or are exposed to through their activities. Many of the workers interviewed are not present when the pesticides are being mixed, so they do not know the identity of the pesticides they spray. However, the monitoring team was able to establish the identity of the pesticides through asking knowledgeable respondents, and were shown the containers where these were available. Of 352 pesticides reported to be used, the active ingredient was identified for 283, listed in Figure 11.1. For 69 reports, the active ingredient could not be established. The procedure used for establishing the active ingredient is described in Section 3, and a full list of active ingredients is provided in Annex 2. The most commonly reported pesticides were **glyphosate (76 reports), metsulfuron-methyl (66), 2,4-D dimethylamine (36), 2,4-D sodium monohydrate (31), glufosinate ammonium (29) and paraquat dichloride (29).** These are herbicides used in the palm-oil plantations against grasses (157 reports) and weeds (150). However some respondents reported using pesticides against insects, beetles and worms (66 reports).

Figure 11.1



Product mixing

15 of the respondents described mixing a combination of products. Some examples of the combinations include:

a. Sentry (glyphosate isopropylamine) and Ally (metsulfuron-methyl), in combination with two other products;
b. Roundup and Sentry (two glyphosate products);
c. Paraquat, Snap (ametryn), and a third product; and
d. Basta (glufosinate ammonium) and Sentry (glyphosate isopropylamine)

Conditions of use

Personal Protective Equipment (PPE)

94 (96%) of applicators reported they use protective clothing when applying pesticides. 4% did not. From the 94 pesticide applicators who did wear PPE, the following items were indicated:

Table 11.2

Item worn	% who wore item
Gloves	95%
Overalls	94%
Eyeglasses	68%
Respirator	61%
Face mask	33%
Boots/shoes	99%
Long sleeve shirt	99%
Long pants	99%
Others	31%

Of 31% that indicated wearing 'others', 26% indicated wearing a 'cap'.

Of 4% non-wearers, 2% indicated the reason they did not wear it was that it was *not available* (2% did not respond).

Mask/respirator commonly worn during pesticide use

Washing facilities

54% of applicators indicated that they have access to *washing facilities (for hands and body)* where they apply pesticides. 38% indicated that they did not.

Spillages

A number of respondents reported they had experienced spillages, either while *spraying* (71%), *loading* (55%) and/or while *mixing* (23%). The most common parts of the body on which pesticides were spilled were *hand* (51%), *face* (50%), *body* (44%), *leg* (34%) *eyes* (8%) and/or *mouth* (2%). When asked to comment on the reason for the spillage, 74% respondents answered, giving responses like 'wind' or 'wind, spray, while carrying', 'loose cover', or 'mixing'. 74 (70%) of total respondents commented on what they did when they had pesticide spilled on them. Of these 74, 95% said their response was to 'wash' or 'bath'. 3% said they 'spray' or 'continue to spray', and 1% said they walked 3 km for medical care. 1 responded that, wearing a mask, the pesticide 'still get[s] into eyes'.

Wind direction

While 98% of applicators reported they spray *along the wind direction*, 34% reported they spray pesticides *against the wind direction,* with some of the respondents indicating both. 2% answered *unknown* about the wind direction during pesticide spraying.

Pesticides storage, disposal and cleaning practices

Disposal

Varied methods of disposal of containers were indicated by the respondents including: *returned to company, bury, put in trash, burnt, and thrown in open field.* 43% described other methods of disposal, mostly 'store' (22%), 'reuse' (6%), 'sell' (2), amongst various others (13%).

Table 11.3

Container disposal method	Percentage
Returned to company	22%
Bury	13%
Put in trash	8%
Burnt	7%
Thrown in open field	4%
Others	43%

When asked how they disposed of leftover pesticides, the majority tended to reuse the pesticides, for example they 'put it back' in the container/tank (47%); or there was 'no leftover' (11%); or they would bring it back to the store/estate (11%). Some said they would 'spray' in the land/grass (13%), and others said they would 'wash it'.

69% of respondents said they did not *use pesticide containers for other purposes afterwards,* and 8% indicated that they did, including as a 'flower' or 'plant pot', (5%) or for storing/carrying water (3%). The remaining 24% did not respond to this question.

Cleaning and rinsing of containers and equipment

When asked where they wash the equipment, very general answers were given. 70% said they would 'wash it at their workplace',11% at the store, 5% at a canal or waterbody, amongst other locations. In certain locations, some of the workers shared that access to water was limited to 1 hour per day. As use of the water for domestic purposes was prioritised, this was seen as a restriction to washing their clothes.

Storage

When asked where they store the pesticides, the most common locations were *shed* (65%), in the *field* (22%), at *home* (11%) and/or in *other places* (16%).

90% indicated that the pesticides were *locked up and away from children.* 6% said they were not.

91% indicated that the pesticides were *separated from other items,* and 5% that they were not. 5% did not respond.

Store where pesticides are mixed: often sprayers are not present

Training, access to information, and awareness of hazards

Training

67% of applicators said they *had received training on the pesticides they used.* 31% said they had not. 2% did not respond. From discussions with the participants, these training courses were noted to be short trainings done by the plantation company or by their supervisor.

91% indicated that they *know the hazards of the pesticides they use.* Of these, 13 respondents mentioned health effects, such as 'headache', 'heart disease', 'rash', 'nail comes out (black)', 'stomach ache', 'vomit', and 'destroy womb'.

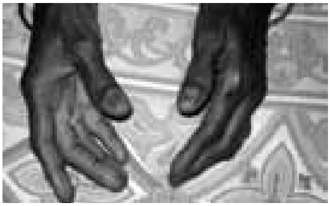
Access to label/Safety Data Sheet

49% responded positively that they had access to label. 13% said they had access to a safety data sheet. From discussions with the workers, it was found that some of the workers do not have access to labels or safety data sheet as they are not present when the pesticide is being mixed.

Table 11.4: Access to label/SDS

Access to	% positive response
Label	49%
Safety data	13%

Knowledge of alternatives: when asked whether they knew other ways to control the pest/weed without pesticides, only 7 respondents gave a positive answer, giving responses like 'manual cutting', 'spraying dust or ash', or 'netting'.

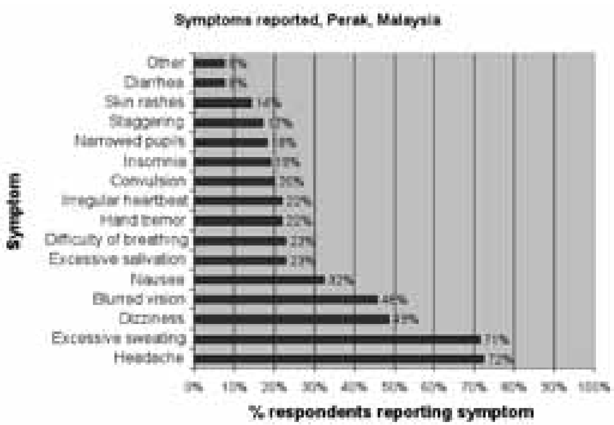


Hands of pesticide sprayer with damaged fingernails

Symptoms

When asked if they had ever experienced symptoms when using pesticides or being exposed to them, the most common responses were *headache* (72%), *excessive sweating* (71%), *dizziness* (49%), *blurred vision* (46%), and *nausea* (32%). The full list of symptoms is provided in Figure 11.2.

Figure 11.2



Response to poisoning

When asked what they would do if they thought someone was poisoned, the most common response was to call the company (67%). This was followed by other (34%), including to call the foreman, clerk or health advisor, and to wash their body. 20% responded that they would call the doctor, and 2% the hospital.

Reporting issues - community interviews

This section identifies aspects on the data such as low-response (>5%), interpretation issues or inconsistencies. Those reported here are only those related to the data used for reporting on the objectives.

Table 11.5: Reporting issues

Section	Issue
Education	No response (15%)
Ethnic group	Some wrote religion rather than ethnic group
Pesticide identity	Many workers could not identify the pesticides as they did not have access to the product labels. However they were identified through knowledgeable respondents and through observation of product labels.
Washing facilities	8% did not respond
Knowledge of hazards	Only 9 persons responded that they knew the hazards, but when asked how they knew, more than 99 responded
Reuse of containers	24% did not respond
Activities in field	Tickbox missing ‘application in field’

RESULTS – RETAIL STORE SURVEY

A total of 7 retailers were interviewed around the Teluk Intan area. However, only 2 respondents were able to answer most of the questionnaire. The rest are not familiar with the products sold.

The retailers adopt haphazard practices such as:

(a) Storing Class 1 pesticides in unlocked cabinets while some even stored them on the shop floor.

(b) PPE not worn to handle pesticides in most cases.

(c) Eating within the surroundings of pesticides.

Generally, no training is provided to buyers. The retailers think that pesticides are not hazardous. This misconception has also been carried over to buyers. ◆

Bintulu and Suai District

12. RESULTS FOR: Bintulu and Suai District, Sarawak, Malaysia

STUDY SITE AND METHODOLOGY

Background information on Sarawak (from report by Peter J. Jaban, SADIA)

Sarawak is the largest state in the Federation of Malaysia. Sarawak is divided into eleven divisions, with Kuching as capital. The other divisions are Sri Aman, Sibu, Miri, Limbag, Sarikei, Kapit, Kota Samarahan, Bintulu, Mukah and Betong. Sarawak has a rich history of diverse people with the indigenous communities living throughout the state. Long before the existence of the British colonial powers – which divided up the island of Borneo – the indigenous communities had existed for generations; each with their respective customs, traditions, cultures, languages and identities. In Sarawak, chemical pesticides and insecticides have been used since the introduction of modern agriculture in the 1960s. Chemical pesticide use started with wet pepper farming and gradually spread to other crops such as vegetables, fruits and oil palm.

Survey team at retail store, Sarawak

Pre-survey briefing and seeking consent of longhouse community in Sarawak

The field survey was carried out in Bintulu and Suai Districts done in co-operation with the local community within those districts. A three day Training of Facilitators was organized jointly by the Sarawak Dayak Iban Association (SADIA) and PAN AP. Facilitators were trained on using the questionnaires in the handbook.

The monitoring was conducted in the Bintulu and Miri divisions, in 5 longhouses which was chosen randomly: Rumah (Rh.) Rajang, Rh Siba, Rh Mamat, Rh Bayang and Rh Ekok. However during the interview at Rh. Rajang, communities from the nearby long houses like Rh. Ngelantar, Rh. Tapu, Rh. Atat, Rh. Sabang and Rh also joined.. As such they were also interviewed.

Every household in the 5 long houses were interviewed unless no-one was available. Some of the houses were locked, as the residents had gone to the city to work in factories and construction sites.

Before the interview was conducted in some of the long houses the monitoring team gave a PowerPoint presentation to raise awareness on the pesticide impact on the health and environment. In other long-houses posters, books or talks were used instead.

The questionnaire was translated into Bahasa Malaysia. During the face-to face interviews, it was sometimes necessary to translate the questions into the local dialect (Iban). The interviewers recorded the answers in English/Bahasa Malaysia.

Study limitations

The questionnaire was too lengthy, requiring a minimum of 45 minutes to one hour to complete an interview. Secondly, not all of the respondents were able to answer the information on the identity of pesticides because of a low literacy level, a lack of labels on the pesticides containers, or the respondent was not present when pesticide cocktails were mixed.

RESULTS – PESTICIDE USE AND EFFECTS

Demographic profile of study participants

Household income

The average household income (of a family grouping, with an average of six persons) is summarised in Figure 12.1. 38% had a monthly household income of under MYR 500 (USD 146), 39% between MYR 500-999 (USD 146-292), and 9% above RM 1000 (USD 293).

Table 12.1: Summary of socio-demographic characteristics

Characteristic	Percentage (n=94)
Sex	
Male	46%
Female	54%
Age group	
20-29	5%
30-39	22%
40-49	32%
50-59	29%
60-69	11%
No response	1%
Ethnic group	
Iban	88%
Dayak-Iban	7%
Bidayu	2%
No response	3%
Level of education	
None	40%
Primary school (age 7-11)	34%
Secondary School (age 13-17)	19%
No response	6%
Household income (MYR/month)	
<500	38%
500 – 999	39%
1000 – 1499	4%
1500 – 1999	2%
2000 and above	3%
No response	13%
Household size	Average: 6 persons (range: 1 to 15)

13% did not respond to the question. Some of the respondents also engage in subsistence agriculture to supplement their livelihoods.

Ethnicity

The majority of respondents were Iban, some Dayak-Iban, and a small number Bidayu.

Educational attainment

Some respondents had attended grade school (36%) or high school (22%). However over a third had not had formal schooling, stating 'not attended school', had 'no schooling' or described themselves as 'uneducated'.

Gender

Of 94 respondents, 43 (46%) were men and 51 (54%) women.

Longhouse, Sarawak

Household information

The study participants live in long-houses, their traditional housing. Within the long-houses, people live in family groupings. The average size of a 'household' (i.e a family grouping of which there are several within each longhouse) is six persons (ranging from 1 to 15 persons).

Work and occupation

According to the survey results, 95% of the respondents described their occupation as 'farming'. 5% were 'housewives'. 1 was a 'security guard'. Some worked in more than one job. Their sector of employment was indicated as (some respondents worked in more than one):

- Farm (65%): growing vegetables, palm oil, fruits and rice
- Plantation (29%): palm oil; and/or
- Orchard (15%): with fruits such as durian, lemon, rambutan, langsat, and jackfruit.

In many cases, the longhouse residents practice small-scale agriculture, producing for their own consumption as well as for markets as a source of livelihoods. However this did not apply to all the longhouses, as some were situated directly amongst oil-palm plantations.

Pesticide use

Pesticide use and exposure

Of the 94 respondents, 77% indicated that they are *pesticide applicators*. 10% were not (the remainder did not respond). The respondents were asked to comment on what activities they did that involved pesticides on the farm, and other exposure factors.

Aside from being a 'pesticide applicator' (as reported above, 77% of respondents), the five most common pesticide-related activities indicated were *washing equipment* (77%), *washing [their own] clothes that have been used for mixing or spraying pesticides* (71%), *washing spouse's clothes that have been used for mixing or spraying pesticides* (62%), *household application* (57%) and/or *mixing* (55%).

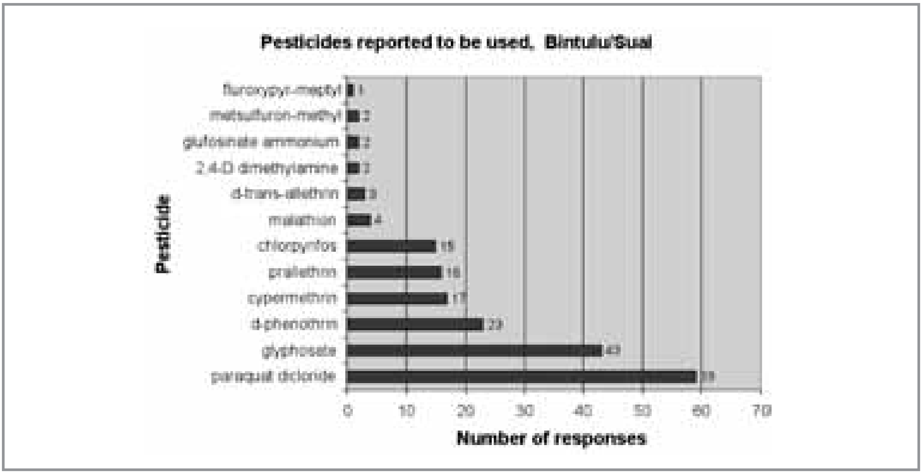
When asked how they are exposed to pesticides, the five most common ways were *neighbour's use of pesticides* (60%), *water contamination* (36%), *spray for public health purposes* (34%), *eating food that has been sprayed with pesticides* (32%), and *pesticides applied by ground methods* (24%). Respondents also indicated that they were exposed by *eating food after spraying without washing [their] hands first* (23%).

Pesticide identity

Respondents were asked to identify pesticides they use or are exposed to through these activities.

Of 218 pesticides reported to be used, the active ingredient was identified for 187. The procedure used to derive the active ingredient is detailed in Section 3. The pesticides for which active ingredients were identified are found in Figure 12.1. For 31 reports, the active ingredient could not be established. The most commonly reported pesticides are **paraquat dichloride (59 reports), glyphosate (43), d-phenothrin (23), cypermethrin (17), pallethrin (16), and chlorpyrifos (15).** The respondents were using herbicides against grasses and weeds (132), and some were also using pesticides against mosquitoes (18) and insects (18) amongst others. The main products used were herbicides (e.g. Roundup and paraquat-based products), and insecticides, such as malathion and cypermethrin. Some also reported using household pesticides for mosquito-control.

Figure 12.1



Conditions of use

Personal Protective Equipment (PPE)

14 (19%) of pesticide applicators wore protective clothing when using pesticides. 81% of pesticide applicators did not wear any PPE (4 indicated they did not wear any PPE, but did state that they wore an item of protective clothing).

Of the 14 pesticide applicators who did wear PPE, the items worn are indicated below:

Table 12.2

Item worn	% who wore item
Gloves	43%
Overalls	21%
Eyeglasses	14%
Respirator	14%
Face mask	29%
Boots/shoes	79%
Long sleeve shirt	71%
Long pants	71%
Others	0%

Reasons for not wearing PPE were explained by pesticide applicators as *uncomfortable* (22%) *not available* (28%) and *expensive* (21%). 32% gave other reasons, like 'don't know' (18%), 'never been told' (4%), 'never seen before' (3%), amongst others.

Washing facilities

49% of applicators indicated that they did have *access to washing facilities (for hands and body)* where they apply the pesticides. 47% said they did not (4% did not respond).

Spillages

When asked if they had ever had pesticides spilled on them, many had, either while *spraying* (47%), *mixing* (29%), or while *loading* (34%). When asked to give the reasons for the spill, 44 gave an answer. Of these, answers included 'overflow' or 'too full' (18%), 'lid not closed'/'loose cover' (9%), 'leakage' (7%), 'damaged backpack/equipment' (4%), accident (including 'slipped' and 'fell') (7%), and others. When asked what they did after the spillage, 44 respondents answered. Of these, 75% said 'wash' or 'bath'. 11% said they did 'nothing' or said 'no actions taken' and 5% said they were 'careful' afterwards, amongst other answers.

Wind direction

When asked about their observance of the wind direction while spraying, 42% of applicators reported they spray pesticides *along the wind direction,* and 24% said they sprayed *against the wind direction.* 50% of applicators answered *unknown* about the wind direction while spraying.

Pesticides storage, disposal and cleaning practices

Disposal

When asked how they disposed of containers, the most common ways were to *put in trash* (62%), followed by, *thrown in open field, burnt,* or 'other' (15%) including 10% in the 'farm', 2% 'river', 'everywhere' (1%), 'anywhere' (1%), or 'abandon' (1%).

Empty pesticide containers discarded in vicinity of longhouse

Table 12.3

Disposal method	Percentage
Returned to company	3%
Bury	2%
Put in trash	62%
Thrown in open field	33%
Burnt	30%
Others	15%

When asked, *are the containers used for other purposes afterwards,* 74% responded that they are not, and 16% that they are (10% did not respond). Of 16% that did use the containers, 13% described the purpose they used it for afterwards. 9% said it was to 'keep water' (e.g. for 'pesticide spraying'), 3% for 'petrol', 'oil' or 'flammable stuff', and 1% to 'keep pesticide'.

When asked how they disposed of leftover pesticides, 57% said they disposed of it in the farm, garden or field; 9% 'everywhere'; 16% said they used it 'until finished' or there was 'no leftover', and 9% said they kept for 'future use' or 'stored'. 6% gave other answers. 12% did not respond to this question.

Storage

When asked where the pesticide is stored, 31% indicated *shed;* 28% *field;* 12% indicated *home*; and 5% *garden.* 29% said *other* including 'store'/'store room' (19%), 'farm' (7%), and others (3%).

70% indicated that the pesticides were *locked up and away from children.* 19% said they were not, and 11% did not respond.

78% indicated that the pesticides were *separated from other items*, 14% said they were not, and 2% did not respond.

Training, access to information, and awareness of hazards

Training

88% of applicators responded that they had not received training on the pesticides they used. The remainder did not respond. Nobody indicated that they had received any training.

Access to label/Safety Data Sheet

67% responded positively that they had access to labels. 25.5% responded positively that they had access to safety data sheets. The remainder did not have access or did not respond to this question.

Table 12.4: Access to label/SDS

Access to	% positive response
Label	67%
Safety data sheet	26%

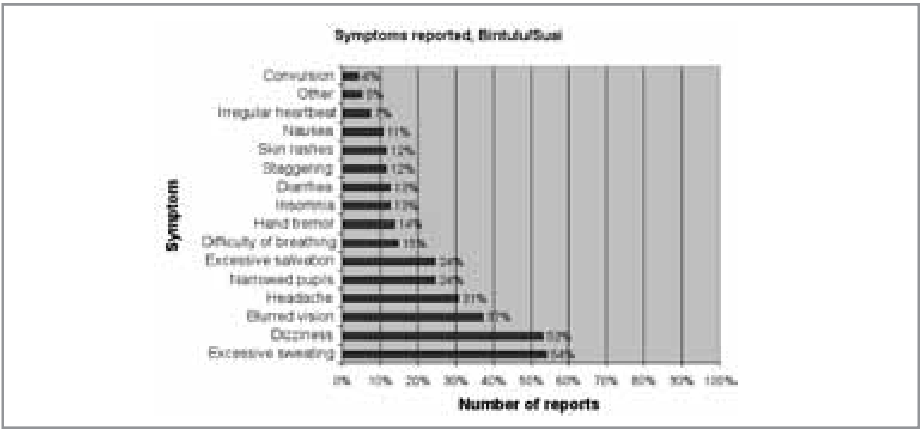
Knowledge of hazards

When asked if they know the hazards of the pesticides they use, 52% indicated they did not know the hazards, and 23% said that they did. When asked to mention some of the hazards, 19% gave answers such as 'health hazard', or mentioned certain symptoms such as 'itchiness', 'skin irritation' and 'headache'.

Description of Symptoms

Symptoms reported by the respondents that they had ever experienced when using pesticides or being exposed to them are displayed Figure 12.2. The most common symptoms experienced were **excessive sweating (reported by 54%), dizziness (53%), blurred vision (37%), headache (31%), narrowed pupils (24%) and excessive salivation (24%).**

Figure 12.2



When asked who they would call if they knew someone was poisoned, 71% said they would call the hospital, 35% would call a friend, and/or 33% a doctor.

During the interviews, aside from pesticides, a range of issues were voiced by some of the participants. For example the oil-palm companies, which also rear cows, have caused pollution to the streams; and toxic waste from the plantations has caused fish-kills in the streams. Another common concern voiced was limited availability of agricultural land and infringements on Native Customary Rights posed by the oil palm plantations. They also raised concerns about the lack of a drinking water supply (stream water being dangerous to consume), scarcity of electricity and lack of medical clinics. In some longhouses, the lack of contact with Government Agencies (such as Agriculture or Health) was mentioned. Some of the residents do not have identity cards. Such concerns – for instance those related to land, the lack of medical facilities and water pollution – are relevant to this study on pesticides, as they affect the health, wellbeing and livelihood of the community (source: P. Jaban).

Some complain there is no proper enforcement from the authorities on pesticide use and safety. At Rh. Ekok, one complaint was that most of the residents cough (dry cough) at night.

Reporting issues - community interviews

This section identifies aspects on the data such as low-response, interpretation issues or inconsistencies. Those reported here are only those related to the data used for reporting on the objectives.

Table 12.5: Reporting issues

Section	Issue
Education	No response (6)
Pesticide applicator	No response (13)
Disposal of leftover pesticides	No response (14)
Storage- locked and away from children	No response (10)
Storage- separated from other items	No response (8)
Container used for other purposes	No response (9)

RESULTS – RETAIL STORE SURVEY

The survey carried out by the 'retail group' covers retail shops within Batu Niah bazaar/ village, shops within Bintulu town, and a shop in between the two areas. In total, 6 pesticide shops were surveyed.

Limitations

There was some difficulty locating stores, but this was resolved. In Batu Niah, the shop-owners were quite reluctant to answer questions, which were thought by the salespersons to be 'sensitive'.

Store profile

There were 4 pesticides retail shops surveyed in Batu Niah bazaar, all located within the bazaar itself. This means the shops are within an area heavily frequented by the general public due to the facilities found in the bazaar, such as a wet market, food stores, groceries and a bank. A primary school and a *tadika* (Kindergarten) are found very near the bazaar. A roadside retail shop was surveyed, located along the Pan-Borneo highway near the junction to Batu Niah bazaar. The roadside shop is near two major food courts. Groceries are also sold at the food courts. Another two retail shops were surveyed in Bintulu town. They are situated in the middle of the town. Nearby the shops the surveyors found foodstalls, food stores, a clinic and a cloth and accessories shop. These pesticides shops are located within an area frequented by the public.

The survey results indicate that 5 out of 6 stores had a license from the government.

Salesperson training and advice given:

When asked if they had received information and training, 5 out of 6 salespersons responded that they had received it from the company who supplied the products, and 5 had received training from the Government. When asked the *mode of training,* 5 indicated that they had attended a course, and 4 mentioned that this was from 2-3 days. 5 respondents that had attended training indicated that the course covered precautions *when mixing, storing, information about alternatives, human health and environmental hazards.*

5 of the 6 stores stocked PPE, including *gloves, overalls, glasses, goggles and masks.* All 6 stores reportedly stocked gloves. Only 3 of the 6 stocked a respirator.

5 salespersons responded that they gave advice to the customer on *disposal of used packages.* The advice given was to 'bury'. When asked if they *collect the used packages,* 5 indicated they did not, and the remainder did not respond.

Condition of products in store

A range of products were selected by the surveyors for closer observation. These were products containing 2,4 D, carbofuran, chlorpyrifos, cuprous oxide, cypermethin, deltamethrin and paraquat dichloride as the active ingredients.

Labelling

All of the selected products had a clear and concise label. 5 labels had the product name and active ingredient. 4 had the concentration, 3 the manufacturer, 4 the instructions in local dialect, 3 precautionary symbols, and 2 had warning symbols.

Packaging

All 6 of the pesticide's packaging was described as *intact.* Half of the products were sold in a *child-proof container,* and the other half were not. 2 products were considered *attractive for reuse,* specifically a jar with a screw-on cap.

Storage

Pesticides were observed to be sold alongside other consumer products, including *food* (5), *clothing* (3) and/or *pharmaceuticals* (1). In cases where they were stored with other products, 4 of them were *physically segregated* from other products. 4 were *signed as hazardous.* ◆

13. RESULTS FOR: Barangay Ruparan, Digos City

STUDY SITE AND METHODOLOGY

Two facilitators were trained in the use of the monitoring tools at the Training of Facilitators (ToF) in Penang, then persons from the grassroots organizations in Davao del Sur were trained to undertake the study. Pesticide Action Network Philippines collaborated with the Community Based Health-Workers Association and Citizens Alliance for Sectoral Empowerment Davao Del Sur (CAUSE DS), consulted with potential communities and the monitoring was done in Barangay Ruparan, Digos City. The community members were trained to undertake the monitoring. In total, 111 farmers were interviewed. 10 retail stores were also surveyed and 10 pesticide advertisements were gathered.

Barangay Ruparan, Digos

RESULTS – PESTICIDE USE AND EFFECTS

Demographic profile of study participants

Of 111 respondents, 90% were male, and 10% female. None of the female respondents indicated that she was pregnant or breastfeeding at the time of interview.

Work and occupation

Describing their occupation, 85% said ‘farmer’, 14% ‘sprayman’, and/or 13% ‘laborer’. Less than 2% described their occupation as ‘tricycle driver’ or ‘rice trader’. Some described doing more than one job. Most of the respondents (96%) worked in the *farm* sector, with the most common crops being rice, eggplant, beans and corn. 5% indicated that they worked in *orchards,* growing fruits such as lemon, mango and pomelo. One of the respondents worked in both farm and orchard.

Educational attainment

When asked about their educational attainment, 65% had completed *grade school,* 32% had completed *high school,* and 3% *college*.

Table 13.1: Summary of socio-demographic characteristics

Characteristic	Percentage (n=111)
Sex	
Male	90%
Female	10%
Age group	
18-19	1%
20-29	12%
30-39	30%
40-49	25%
50-59	21%
60-69	12%
Ethnic group	
Bisaya	85%
Cebuana/Cebuano	7%
Ilocana/Ilocano, Bisaya	4%
Ilongo/Ilocano	4%
No response	1%
Level of education	
Grade school	65%
High school	32%
College	3%
Household size	Average: 4 persons (range: 1-9)

Pesticide use

Use and exposure

97% of respondents indicated that they are *pesticide applicators*, while 1 (<1%) was not, and 2 did not respond.

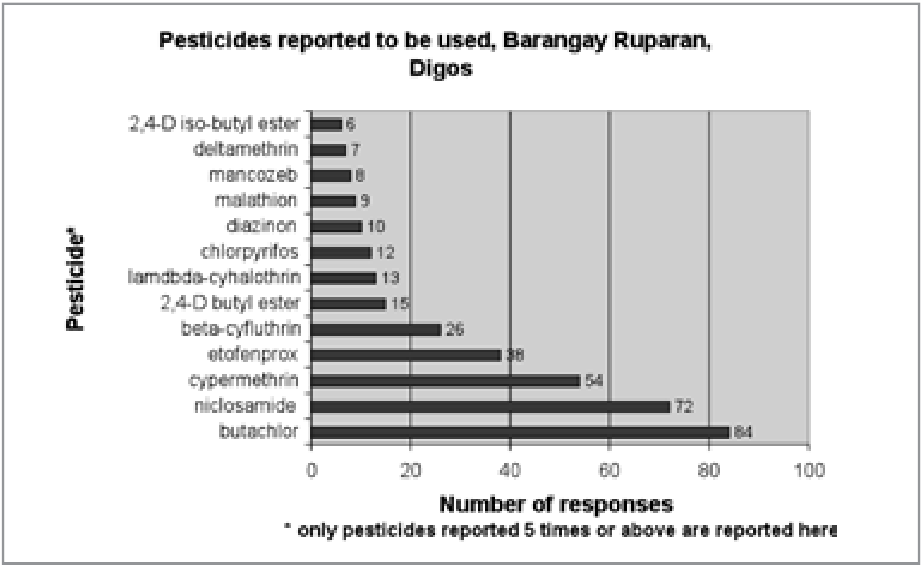
When asked about their activities involving pesticides, participants most commonly indicated in order of frequency: *application in field* (100%); *washing clothes that have been used when spraying or mixing pesticides* (100%); *re-entry to treated fields* (99%); *washing equipment* (89%); *washing spouses clothes* (87%); *mixing pesticides* (70%) *working in fields where pesticides have been used or are being used* (63%); and/or *purchasing pesticides* (60%).

When asked how they are exposed to pesticides, participants most commonly indicated exposure to pesticides applied by *ground methods* (98%), *eating food that is sprayed with pesticides* (96%), and to a lesser extent *water contamination* (4%).

Pesticides reported

Respondents were asked to identify pesticides they use or are exposed to through these activities. A total of 370 pesticide trade names, and their manufacturers, were reported to be used, and the active ingredients were identified for all of these. The active ingredients were identified using the procedure described in Section 3. The most commonly reported pesticides were **butachlor (84 reports), niclosamide (72), cypermethrin (54), etofenprox (38), beta-cyfluthrin (26) and 2,4 D (21, including the butyl and iso-butyl esters).** Figure 1 shows the pesticides found, and the number of times they were reported. The full list of pesticide active ingredients is provided in Annex 2.

Figure 13.1



Conditions of use

Personal Protective Equipment (PPE)

When asked if they *use protective clothing when applying pesticides,* 94% of applicators responded that they did, and 6% did not.

From the 101 pesticide applicators who did wear PPE:

Table 13.2

Item worn	% who wore item
Gloves	5%
Overalls	0%
Eyeglasses	0%
Respirator	0%
Face mask	43%
Boots/shoes	21%
Long sleeve shirt	99%
Long pants	98%
Others	10%

The 6% of respondents who said they did not wear any protective clothing, said it was due to it being *uncomfortable.* 49% of all applicators (including those reporting to wear protective clothing) stated their reason for not wearing protective clothing was due to it being *uncomfortable.*

Washing facilities

93% of applicators indicated that they had washing facilities (for hands and body) where they apply pesticides.

Spillages

Many respondents had experienced spillages, which occurred *while spraying* (71%), *while loading* (5%) and/or *while mixing pesticides* (2%).

Wind direction

A large number of applicators do not heed the wind direction when spraying, with many spraying both with and against the wind: respondents reported they spray *along the wind direction* (94%) and/or *against the wind direction* (79%). 3% responded that the wind direction while spraying was unknown.

Pesticides storage, disposal and cleaning practices

Disposal

When asked how they disposed of containers, the common methods were bury the container. This was followed by *put in trash, burnt* and/or *other,* included 'selling it', 'dumped in a hole', or 'under a mango tree'.

Table 13.3

Container disposal method	Percentage
Bury	56%
Put in trash	30%
Burnt	2%
Other	6%

85% indicated that they did not use the pesticide containers for other purposes afterwards. 14% did, mostly as a container for storing pesticides. One used it as a 'water carrier' for flowers and one for animals.

When asked how leftover pesticides are disposed of, most respondents said there was either 'no leftover' or 'kept for future use' (87%). 4% reported they 'sprayed it on the sideways', 'threw it in the field (3%)' or sprayed on other crops (2%), or decanted into another container (1%).

Cleaning and rinsing of containers and equipment

Equipment is generally washed in an irrigation canal or waterbody (87%). Smaller numbers washed it in a drum or water container (5%), in a field or open space (4%), or faucet (2%).

Storage

Respondents described a number of places to store pesticides, including *home* (32%), *shed* (23%) and/or *field* (4%). Other places (51%) include inside a 'container' or 'box', 'in a sack' or others including 'hung up' or in a store room.

98% indicated that the pesticides were *locked up and away from children*. 1 said they were not, and 1 did not respond.

99% indicated that they were *separated from other items*. 1% said they were not.

Training, access to information, and awareness of hazards

Training

96% applicators said they had received training on the pesticides they use. 1% had not, and the remaining 3% did not respond.

98% respondents indicated that they knew *the hazards of the pesticides they use* (2% did not) and of these, when asked to mention the hazards, most (94%) said it was 'poisonous', 'harmful' or similar. When asked how they knew of the hazards, 94% mentioned the *label*, and others said they were *told* (5%), knew through *training* (3%) and/or a *safety data sheet* (1%).

Access to label/Safety Data Sheets

A total of 97% responded positively that they had access to labels. However, only a small percentage had *access to safety data sheet.*

Table 13.4

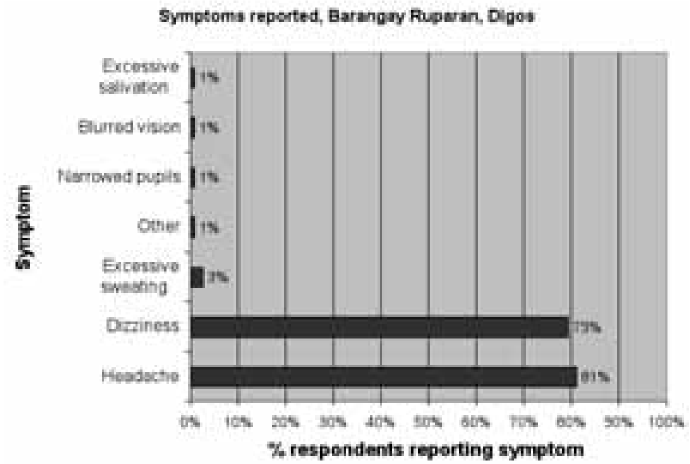
Access to	% positive response
Label	97%
Safety data	3%

Description of symptoms

Respondents were asked if they had *ever experienced symptoms when using pesticides or being exposed to them.* Symptoms reported are displayed Figure 13.2. The most common symptoms experienced were *headache* (81% reported this) and *dizziness* (79%). 3% had experienced *excessive sweating*, 1% or less had experienced *excessive salivation, blurred vision and narrowed pupils,* and 1 'other'.

When asked who they would call if they thought someone was poisoned, most said the *hospital* (91%), 1% said *friend,* 2% said *health care centre,* and 4% other, such as 'drink coconut milk', or 'eat grated coconut and sugar'. 2% did not respond.

Figure 13.2



Reporting issues - Community interviews

Table 13.5

Section	Issue
Income	The income was difficult to quantify due to being calculated per cropping season and varied livelihood sources
Re-entry period	Low response rate
PPE	The number who do not wear any PPE is 8, but reason for not wearing it is 54. A possible explanation is that some people wore some PPE but not all of it.
Washing facilities	7% did not respond to this question

14. RESULTS FOR: Badulla, Nuwara Eliya and Monaragala Districts, Sri Lanka

STUDY SITE AND METHODOLOGY

Paddy and vegetable farming communities in Badulla, Nuwara Eliya and Monaragala districts were selected as the most suitable sites by Vikalpani National Women's Federation in consultation with grassroots organizations in the area. The districts were chosen as they have different climate and geographical variations and high usage of pesticides. Nuwara Eliya and Badulla are geographically situated in an area of higher altitude and rainfall, suitable for growing vegetables such as cabbage, carrot, *knowkhol,* bean, potato and tomato. In lowland Monaragala, a paddy-farming community was selected. A map and description of the climatic and geographical variations can be found in Annex 14.1. Respondents were randomly chosen for interview in the communities selected in Nuwara Eliya and Badulla; however in Monaragala families were selected where pesticides are highly used. The selected farm families were met and notified by the researchers joining with the agriculture research officer of their village. The object and purpose of the survey and questionnaires were explained to the participants who agreed to give details. In total, 103 people were interviewed. 10 retail stores were also surveyed and 10 pesticide advertisements were gathered.

2 people from Vikalpani National Women's Federation were trained at PANAP's Training of Facilitators in Penang, Malaysia. They in turn trained 10 people in Sri Lanka to undertake the study. The questionnaire was translated and administered in Sinhala.

The completed questionnaires were sent to the PAN AP regional office located in Penang where the data was entered into a database. Statistical analysis of the results was done by PAN AP staff and consultants.

In order to determine the active ingredients from the products reported, specific procedures were followed, as described in section 3.

Study limitations

The respondents did not indicate when was the last time the pesticide was used, so it is possible that some pesticides no longer used could be included.

RESULTS – PESTICIDE USE AND EFFECTS

Demographic profile of study participants

Gender

Of 103 respondents interviewed, 56 (54%) were men and 47 (46%) women. One of the women indicated she was breastfeeding.

Table 14.1 Summary of socio-demographic characteristics

Characteristic	Percentage (n=103)
Sex	
Male	54%
Female	46%
Age group	
20-29	13%
30-39	34%
40-49	19%
50-59	24%
60-69	10%
Ethnic group	
Indian Tamil	1%
Muslim	1%
Sinhala	51%
Tamil	47%
Level of education	
Grade school	72%
High school	12%
No response	16%
Household size	Average: 4 persons (range 1-9)
Household income (LKR/month)	
Less than 10000	51%
10000 – 19999	33%
20000 – 29000	13%
30000 – 39999	4%

Ethnicity

51% of respondents described their ethnic group as Sinhala, 47% as Tamil, 1% Indian Tamil and 1% Muslim.

Household income

The average household size is calculated at 4 persons. Just over 50% of household incomes were estimated as falling below LKR 10,000 per month (USD 87 or less), with the highest household income recorded as LKR 350,000 (USD 305).

Educational attainment

When asked their educational attainment, 72% had completed *grade school*, and 12% completed *high school.* The remaining 16% did not respond to this question.

Work and occupation

85% described their occupation as 'farmer' and/or 14% as 'labourer' (some were both farmer and labourer), 3% 'officer' or 'supervisor', 1% 'teacher', 1% 'driver' (1 did not respond). 97% indicated their sector as *farm*, 7% as *plantation*, and/or 2% as *orchard* (some worked in more than one sector). Qualitative descriptions by 73 respondents show that they undertake a wide range of agricultural work, including land preparation, planting, cultivation, fertilizer and pesticide application.

Pesticide use

Pesticide application

97% of respondents indicated that they were *pesticide applicators.*

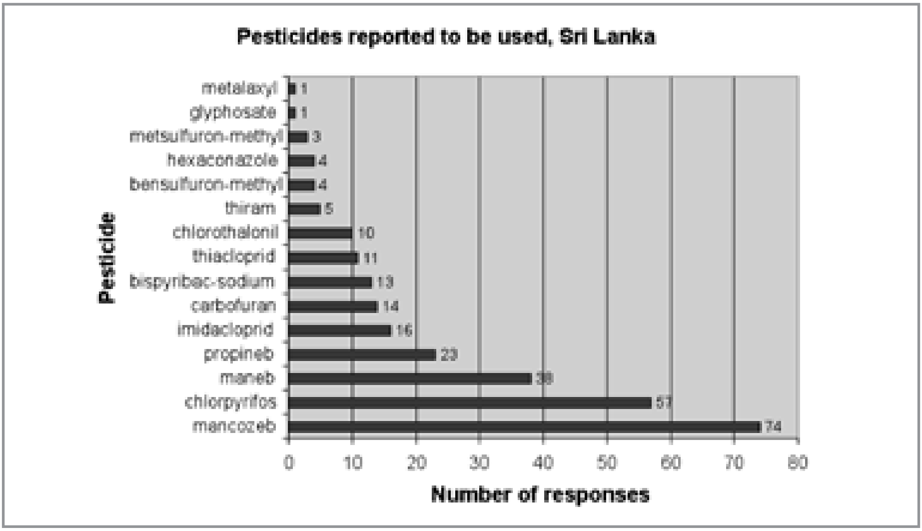
Woman spraying pesticides

Pesticide use and exposure

The respondents were asked what pesticide-related activities they did that involved pesticides on the farm, and other exposure factors. The most common activities indicated were *washing clothes* (98%), *washing equipment* (96%), *mixing* (93%) *re-entry to treated fields* (92%), and *application in field* (81%). Respondents reported forms of exposure, in order of frequency, as *eating food sprayed with pesticides* (89%), exposure to pesticides *applied by ground methods* (77%), *neighbour's use of pesticides* (64%), *water contamination* (52%), or *eating food after spraying without washing hands first* (46%).

Respondents were asked to identify pesticides they use or are exposed to through these activities. Of 284 pesticides reported to be used, the active ingredient was identified for 274. These are identified in Figure 14.1. For 10 reports, the active could not be established. The most commonly reported pesticides are **mancozeb (74 reports), chlorpyrifos (57), maneb (38), propineb (23), imidacloprid (16) and carbofuran (14).**

Figure 14.1



Highly Hazardous Pesticides

Of 274 pesticides for which active ingredients were identified, 232 (85%) appear on the PAN International List of Highly Hazardous Pesticides.

Examples:

- **Probable carcinogen:** chlorthalonil, mancozeb, maneb, thiacloprid accounted for a major proportion (133) of reports.
- **Possible carcinogen:** hexaconazole (4 reports);
- **WHO Class Ib ("highly hazardous"):** carbofuran (14 reports).
- **Endocrine Disruptors (EU):** carbofuran, mancozeb, maneb, thiram
- **High toxicity to bees:** carbofuran, chlorpyrifos, Hexaconazole, imidacloprid.
- **PIC list:** carbofuran, thiram

A full listing of pesticides including their comparison with the PAN International list of HHPs is provided in Annex 2

Conditions of use

Personal protective equipment (PPE)

16% of applicators indicated that they wore protective clothing when applying pesticides, 83% did not, and 1% did not respond.

For the 16 pesticide applicators who did wear PPE, items worn were as follows:

Table 14.2

Item worn	% who wore item
Gloves	69%
Overalls	13%
Eyglasses	0%
Respirator	19%
Face mask	19%
Boots/shoes	13%
Long sleeve shirt	63%
Long pants	63%
Others	6%

For the 83% of applicators who did not wear PPE, the reasons given for not wearing were *uncomfortable* (41%), *expensive* (35%) and/or *not available* (25%). The monitoring team's observations confirmed the lack of protective clothing worn, noting that users were only wearing trousers and t-shirts. These items provide very little protection, as Chandra Hewagallage of Vikalpani explained, "after 5-10 minutes of spraying, especially in heavy wind, the clothing is already wet".

Washing facilities

95% of applicators indicated that they had *access to washing facilities (for hands and body)* where they apply the pesticides. 4% did not, and 1% did not respond to this question.

Spillages

Respondents had experienced spillages while *mixing* (81%), *spraying* (71%) and/or *loading* (37%). 53% of respondents provided reasons for the spill. Of 57% providing a reason for the spillage, the answers were as 'didn't wear protective clothes' (e.g. gloves) (34%) 'carelessness', or 'mistakes' (20%), 'wind' (2%) and/or 'unknown' (1%).

Wind direction

Applicators did not always heed the wind direction when spraying. 20% reported they spray *against the wind direction*, 37% *along the wind direction*, and 42% answered *unknown* about the wind direction while spraying. The remainder did not respond.

Pesticides storage, disposal and cleaning practices

Disposal, cleaning and rinsing of containers and equipment

The main methods of disposal of the containers were to *put in trash* (85%), *burnt* (69%), *thrown in open field* (27%), *returned to company* (1%) or *other* (6%). Some respondents used more than one disposal method.

Table 14.3

Disposal method	Percentage
Returned to company	1%
Put in trash	85%
Burnt	69%
Thrown in open field	27%
Other	6%

77% said they *did not use the container for other purposes afterwards.* 13% did. Of those that did, 10 respondents indicated the purpose they used the containers for including 'flower pots', 'buckets' or 'water cans' (e.g. for toilet purposes) , and to store or carry fuels such as kerosene.

When asked about their disposal methods for leftover pesticides, 52% said they would 'apply again to the field' or 26% would 'keep' or 'store' the pesticides; 7% indicated 'disposal in the field'. A smaller percentage buried (4%) or disposed of it in other places. The equipment was described as washed near the well or canal, or in a body of water.

Woman washes in water that flows off farm fields where pesticides are highly used

Polluted water is used by all residencies for all purposes"

According to the monitoring team, "polluted water is used by residencies for all purposes", and in Monaragala, the water was noted to be polluted by upstream use in Nuwara Eliya and Badulla.

Storage

Common places to store pesticides in order of frequency were the *home* (43%), *field* (32%), *shed* (31%), *garden* (17%) and/or *other locations* (1%).

95% reported that the pesticides were *locked up and away from children*, but 5% did not. 93% reported they store pesticides *separate from other items.* 6% did not, and 1% did not respond.

Training, access to information, and awareness of hazards

Training

77% of applicators indicated that they had not *received any training* on the pesticides they use. 20% responded that they had. 3% did not respond to this question.

Awareness of hazards

89% indicated that they knew the hazards of the pesticides they used, and 30% mentioned some, including 26% who mentioned 'bad effect', 'harmful', 'toxic', or 'hazardous' to 'human health' or the 'environment' . Some mentioned health effects such as cancers (1%), headache (2%), and difficulty in breathing (1%). When asked how they know, they mentioned the *label* (88%), *safety data sheet* (80%), were told (46%), and/or through *training* (15%), including 10% who mentioned Chemical Industries (Colombo) Limited (CIC).

Most common ways to choose pesticides were *own experience* (84%), *suggestion* (81%), *labels* (47%), and/or *recommendation* (26%).

Access to label/safety data sheet

95% indicated that they had access to the label and 71% access to safety data sheet.

Table 14.4

Access to	% positive response
Label	95%
Safety data sheet	71%

Knowledge of alternatives

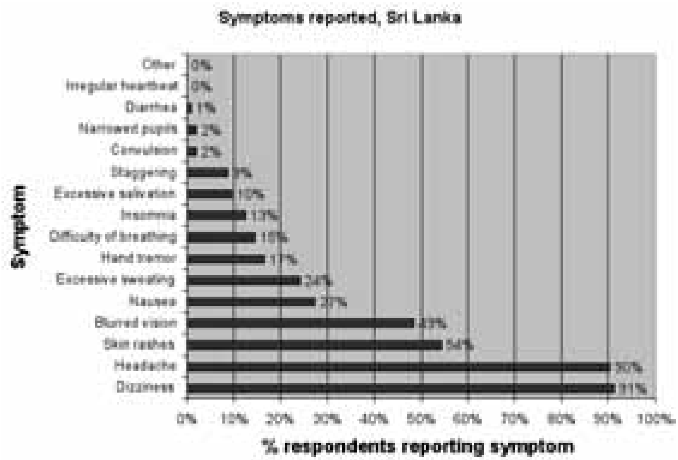
When asked whether they knew another way to control pests without pesticides, 13% said yes. Only three mentioned actual methods such as *compost* (2) or *bioremediation* (1). 85% responded that they did not know other ways. 3% did not respond to this question.

Description of Symptoms

Symptoms reported by the respondents that they had ever experienced when using pesticides or being exposed to them are displayed in Figure 14.2. The most common symptoms experienced were **dizziness (91%), headache (90%), skin rashes, (54%), blurred vision (49%), nausea (27%) and excessive sweating (24%).**

When asked who they would call if someone were poisoned, the majority said they would call a *friend* (98%), and some would also call a *doctor* (50%) and/or the *hospital* (48%), or the *company* (3%).

Figure 14.2

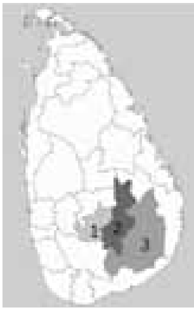


Reporting issues - community interviews

This section identifies problems with data collection such as low-response, interpretation issues or inconsistencies.

Table 14.5

Section	Issue
Education	17% did not respond.
Spillages	No information on what the person's response was to a spillage.
Decant into other containers	No response (94%).



INCIDENTS

Respondents described 7 cases of poisoning, including the pesticide used, symptoms experienced and treatment received. Refer to Section 3.15 for details of these.

ANNEX 14.1: STUDY SITE AND INFORMATION

These districts were chosen as they represent three different climate and geographical variations in Sri Lanka.

1. Nuwara Eliya
MSL: 1,500m
Temperature 13-15C,
Rain fall > 3,000 mm)

2. Badulla district
MSL:1000
Temperature: 14-20C
Rain fall 2,000 mm

3. Monaragala
MSL: near sea level
Rain fall: 1750mm
Temperature 26-30C ◆

15. RESULTS FOR: Vinh Hanh commune, Chau Thanh district, An Giang, Vietnam

STUDY SITE AND METHODOLOGY

The Mekong delta is the biggest cultivated region in Vietnam, accounting for more than 50% annual paddy cultivation (Dung & Dung, 2003). An Giang Province is considered the granary for rice production, contributing nearly 10% of total production of Vietnam in 2007. Vietnamese farmers in the Mekong delta have increased the number of annual crop cycles, with up to seven crops cultivated every two years (An Giang University, 2009). With this increasing intensity, while there has been an "observable increase in yields and production at the farm level", a "corresponding increase in other costs brought about by the greater dependence on chemical inputs, namely pesticides and inorganic fertilizers" has been noted (Dung & Dung, 2003, p.1).

A research team led by the Research Centre for Rural Development, An Giang University was built up, consisting of 7 key people who specialize in agriculture, plant protection, economics and medicine.

The study site selected was Vinh Hanh commune in Chau Thanh district. More than 75% of the population here lives in rural areas. Agricultural production activities focus on rice crops, aquaculture, vegetable cultivation, and livestock (cows and pigs). In Chau Thanh, there are 13 communes and towns and 63 villages. Vinh Hanh is a commune in Chau Thanh district. Rice is the main crop and main source of income for people living in this commune. Farmers have been cultivating 2 crops of rice per year, although recently this has been increased to 3 crops per year.

The questionnaires were translated into Vietnamese to interview the farmers and local Government officials. The team then organized field trips to select research areas and build the relationships between the research team and local governments. A step-by-step process was adopted to select and begin the survey. A map was drawn to show the locations of farmers' households. One research site was selected containing 5 hamlets. 20 households were selected in each hamlet. A total of 100 participants were interviewed. Based on the local culture, many farmers were hesitant to speak directly about their true opinions, and some did not allow the interviewers to record or note the answers. Due to this communicative barrier, systematic and randomized sampling procedure was impossible, and, for this reason, the research team chose to interview those who were available and willing to participate.

Study limitations

Data regarding kinds of pesticides, trademarks, active ingredients, company names and symptoms of farmers were relatively difficult to collect. Also, many farmers could not remember the information on pesticide labels during the interview process. As a result, the interviewers collected data by only recording company logos and taking photographs of pesticide bags and bottles that were found in farmers' fields and around their houses. There were also limitations in gathering the information on the desired numbers of women respondents who had applied pesticides and the effects of pesticide exposure on their health.

RESULTS – PESTICIDE USE AND EFFECTS

Demographic profile of study participants

Vinh Hanh is a rice farming commune, and rice farmers were selected to participate in the study. Accordingly, the majority of respondents (92%) indicated they were working in agriculture, with 99% working in the *farm sector,* mostly undertaking what they described as 'farm work'. Men comprised 93% of those interviewed, and women 7%. Household income was recorded and annual income estimated from their income generating activities.

Half of the study participants had reached grade school level of education. 44% had completed high school and 3% college.

Table 15.1 Summary of socio-demographic characteristics

Characteristic	Percentage (n= 100)
Sex	
Male	93%
Female	7%
Age group (n=100)	
18-19	1%
20-29	5%
30-39	21%
40-49	39%
50-59	19%
60-69	13%
No response	2%
Ethnic group	
Kinh	99%
No response	1%
Household size	Average: 5 persons (range 2-11)
Level of education	
Grade school	50%
High school	44%
College	3%
No response	3%

Pesticide use

Pesticide use and exposure

74% said they were pesticide applicators, 22% said they were not, 4 did not respond to this question, but did indicate that they are 'farmer applicators'. It is taken that 78% of the respondents were pesticide applicators. Many of those that did not apply pesticides hired pesticide applicators to do this work, with 98% indicating that pesticides are used on their farm.

The respondents were asked to comment on what activities they did that involved pesticides on the farm and other exposure factors. The six most common activities were the *re-entry into treated fields* (96%), *purchasing pesticides* (87%), *mixing*[13] *and loading pesticides* (86%), *working in fields where pesticides are being used or have been used* (84%), *application in field* (78%), and *washing clothes that have been used for mixing or applying pesticides* (76%). It was established through the interviews that, depending on the pests in the rice field, the farmers mix multiple types of pesticide for one time spraying, with the intent of saving their time and cost of labor hire, and to control multiple pests and diseases.

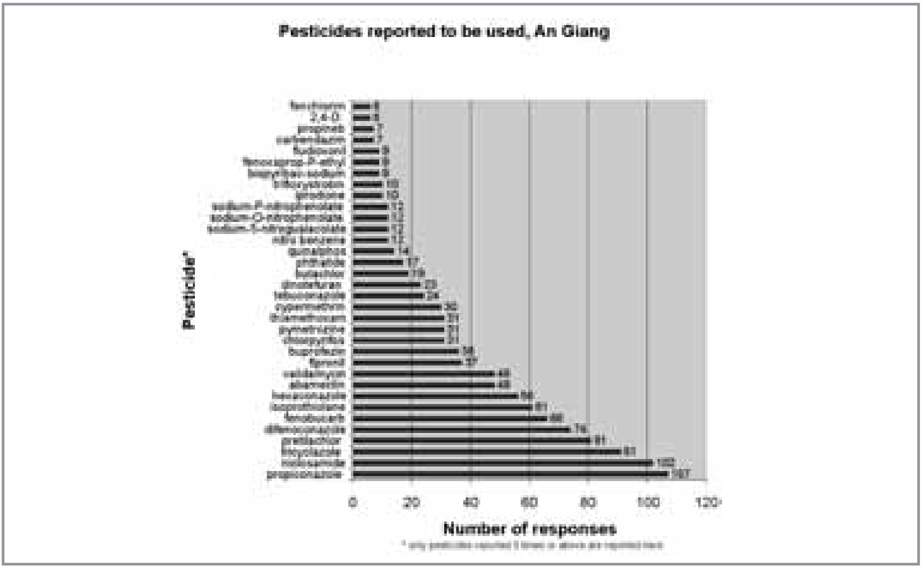
When asked to indicate other factors that expose them to pesticides, the most commonly indicated were exposure to pesticides *applied by ground methods* (78%), *eating food that has been sprayed with pesticides* (73%), *water contamination* (61%) and *neighbour use of pesticides* (53%).

Pesticide identity

As farmers did not know all of the active chemical ingredients in the pesticides they used, interviewers collected this information from pesticide labels and the records in the notebooks of farmers or retailers. In addition, researchers also found information in databases that list company names, and common active chemical ingredients in pesticide products.

An list of the most commonly reported pesticides can be found in Figure 15.1. The most commonly reported pesticides were **propiconazole** (107 reports), **niclosamide** (102), **tricyclazole** (91) **pretilachlor** (81), and **difenoconazole** (74). A list of the pesticides in relation to the highly hazardous pesticide list in Annex 2.

Figure 15.1



[13] *"Mixing pesticides" was interpreted during the field interviews as mixing multiple types of pesticides for spraying.*

The pesticides were most often used for weeds, brown plant hopper, golden snail, and the diseases blast and stackburn amongst others.

Conditions of use

Personal Protective Equipment (PPE)

Of the 78 pesticide applicators, 73 (94%) indicated that they wear protective clothing while applying pesticides. Out of the 73 applicators who indicated they wear PPE, the items are shown below.

Table 15.2

Item worn	% who wore item
Gloves	3%
Overalls	1%
Eyeglasses	22%
Respirator	56%
Face mask	10%
Boots/shoes	1%
Long sleeve shirt	97%
Long pants	95%
Others	1%

5% indicated they did not wear PPE, with 3% of applicators gave a response indicating it was uncomfortable (the remaining % did not give a reason).

Washing facilities

18% of the 78 pesticide applicators indicated that they had *washing facilities where they apply pesticides.* 82% did not.

Spillages

Of all respondents, a large number respondents indicated that they had experienced spillages, either while *spraying* (69%), while *mixing* (57%) and/or while *loading* (4% of applicators). When asked the reason for the spillage, of the 78% respondents that gave an answer, the most common reason given was that the 'wind blew when opening the bottle' or 'while spraying' (46%). Other reasons included that the 'sprayer was too full' (3%).

Wind direction

Not all respondents heeded the wind direction when spraying. While 72% of applicators reported they spray *along the wind direction*, 51% indicated that they spray pesticides *against the wind direction* (with some reporting to spray both along and against the wind direction). 26% answered *unknown* about the wind direction during spraying.

Pesticides storage, disposal and cleaning practices

Disposal

The most common method indicated for disposing of containers are shown in the table below. Some respondents used more than one disposal method.

Table 15.3

Container disposal method	Percentage
Thrown in open field	56%
Burnt	35%
Bury	13%
Put in trash	3%
Others	17% (including 'sell' – 9%)

Reuse of containers

75% said that they did not *use the pesticide containers for other purposes afterwards.* However 17% said they did, although this number may be more as 20% described uses for the containers. The uses described included storing fuels like diesel oil or petrol (15%), making buoys for fishing nets (4%), and for mixing other pesticides (1%). 8% did not respond to this question.

When asked to describe where they *dispose of leftover pesticides,* 55% said that there were 'no leftovers'; 22% said they were disposed 'in the field'; and 17% stored them; 2% kept them in a 'place outside the house' (4% did not respond to the question).

Storage

When asked where they store the pesticides, the most common location was in the *home* (59%), followed by *shed* (21%) and other locations (15%), which included 'corner', 'outside home', 'storehouse', and 'under the bed'. Some also indicated storing the pesticides in the *field* (9%) or *garden* (2%). Some respondents used more than one storage location.

Training, access to information, and awareness of hazards

Training

Of 78 pesticide applicators, 71% indicated that they had *received training* for the pesticides they used. 28% said they had not (1% did not respond).

Access to label/Safety Data Sheet

Most respondents had access to a label and safety data sheet.

Table 15.4

Access to	% positive response
Label	99%
Safety data	91%

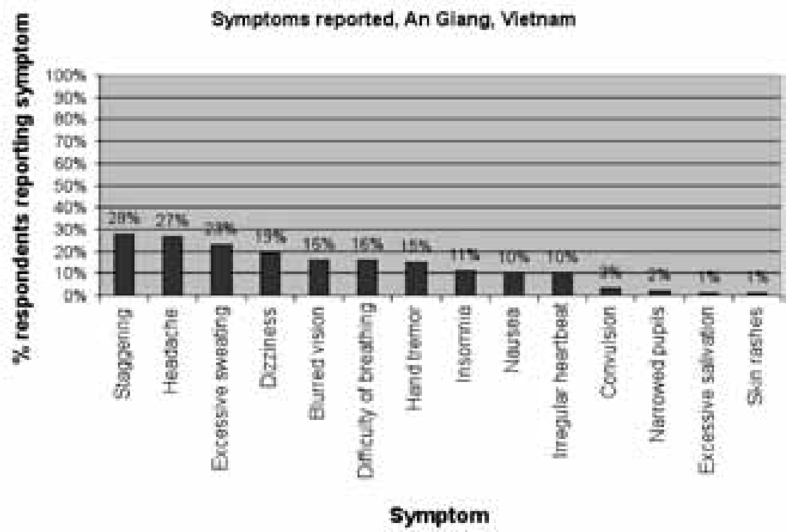
Hazards mentioned

When asked if they knew the hazards of the pesticides they used, 91% said 'yes'. 6% said 'no' (3% did not respond). When asked to mention some of the hazards, 59% gave an answer, such as 'harmful' or 'effect on health' (31%), 'poisoned' (5%), others mentioned diseases and symptoms (8%), although 6% did not know.

Description of symptoms

Symptoms reported by the respondents that they had experienced when using pesticides or being exposed to them are displayed in Figure 15.2. The most common symptoms experienced were *staggering* (28%), *headache* (27%), *excessive sweating* (23%), *dizziness* (19%) and *blurred vision* (16%).

Figure 15.2



When asked who they would call if they thought someone was poisoned, 47% said they would call a *doctor*, 31% a *friend*, 21% *hospital*. 18% described *others*, including go to 'first aid', 'clinic center' or 'infirmary' (8%). 7% said they drink 'lemon juice', 'lemonade, or 'salt water''. Some respondents described more than one approach.

Reporting issues - Community Interviews

Table 15.5

Section	Issue
Income	Not quantified because not clear whether figure is given in month/year
Re-entry period	Insufficient response

Pesticide packaging discarded in rice field

Agricultural products store, An Giang Province

Farmer sprays pesticide in rice field

Other agricultural tasks are undertaken in the field while spraying takes place

16. RESULTS FOR: Hai Van commune, Hai Hau district, Nam Dinh Province, Vietnam

STUDY SITE AND METHODOLOGY

The study was undertaken in Hai Van commune located in the North of Hai Hau district. Hai Van commune has 211 ha of rice paddy areas, and 76 ha of short-term crop areas. It has a total of 2,438 households with 9,074 people (4,534 men and 4,540 women). According to the report of the People's Committee of Hai Van commune, the average income of Hai Van commune is 540 kg of rice/person/year.

The research team, formed by the Research Centre for Gender, Family and Environment in Development (CGFED) including staff/researchers and student volunteers of the Social and Human Sciences University, Vietnam National University, carried out the field work in co-operation with local partner, the Women's Union of Nam Dinh Province.

The field research was planned with the help of the Hai Hau district Women's Union Representatives of the commune Women's Union and Farmers Union assisted researchers to arrange meetings with farmers. The research was done with the close co-operation with local officials. Based on Community Pesticide Action Monitoring (CPAM) tools, the questionnaires were developed and translated into Vietnamese. The data was collected through 102 questionnaires. In addition, the research team collected qualitative data through 11 in-depth-interviews (7 female and 3 male farmers and 1 agriculture extension officer) and 3 group discussions (female and male farmers and leaders).

Study Limitations

A foreseen obstacle occurred, that is, most of the pesticide retailers were reluctant/ uncomfortable to answer the questions of researchers. The researcher had tried their best to gain trust from the retailers, but still the information/data from retailers somehow were unclear, too general or very limited.

It was a very busy time for the farmers during the field work of CGFED teams. The North of Vietnam suffered a terrible flood, so the farmers in Hai Van commune had to harvest paddy urgently as flooding destroyed the farm severely. The researchers were very patient to wait for the informants to be available and flexible in timing to have interview at anytime suitable to the informants.

RESULTS – PESTICIDE USE AND EFFECTS

The demographic profile of respondents is summarised in Table 16.1.

Table 16.1: Summary of socio-demographic characteristics

Characteristic	Percentage (n=102)
Sex	
Male	29%
Female	71%
Age group	
20-29	3%
30-39	16%
40-49	26%
50-59	38%
60 and above	15%
No response	3%
Females (n=72)	
Pregnant	1%
Breastfeeding	1%
Ethnic group	
Kinh	100%
Marital status	
Single	7%
Married	87%
Window/er	4%
No response	2%
Level of education	
Grade school	54%
High school	44%
No response	2%

Employment

The majority (97%) of respondents indicated that they worked in the *farm sector,* with 99% describing their occupation as 'farmer'. Through focus group discussions, it was ascertained that the main occupations in the commune are rice growing, short-term crop cultivation and breeding. Rice grown is mainly used for domestic purposes, and short-term crop products (vegetables) are sold to earn income for people in this area. The research team recognized that the Hai Van commune is a vegetable supplier for other areas of Nam Dinh province and also other provinces in the North of Vietnam, including Hanoi. So pesticide use in vegetable appears higher than for paddy, which is not considered a cash crop.

Pesticide use

Pesticide use and exposure

96% indicated that they are a pesticide applicator and 3% said they were not (1% did not respond).

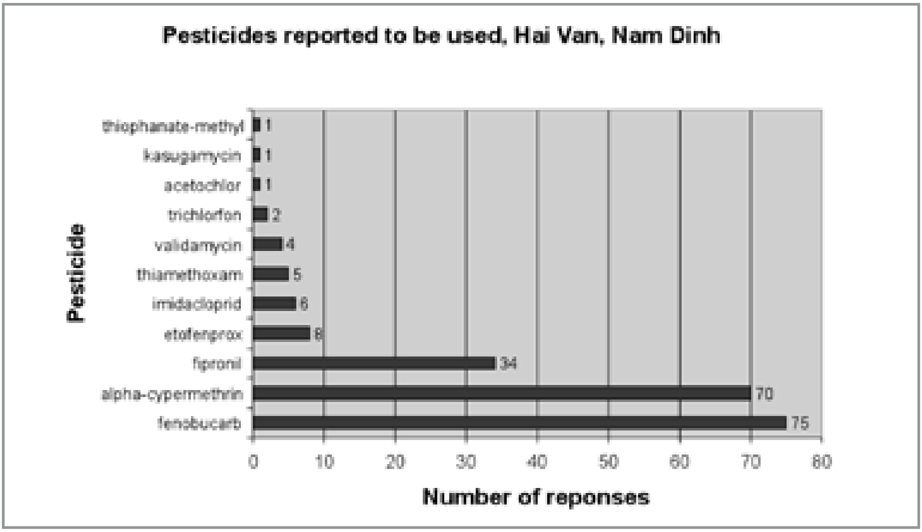
The respondents were asked to comment on what activities they did that involved pesticides on the farm, and other exposure factors. The most commonly reported activities were: *mixing and loading* (96%), *application in field* (94%), *washing clothes* (92%), *washing equipment* (90%) and *working in fields during or after pesticide application* (82%).

When asked how they are exposed to pesticides respondents most commonly indicated exposure to pesticides *applied by ground based methods* (93%) *neighbour use of pesticides* (58%), *eating food sprayed with pesticides* (53%), and *water contamination* (23%).

Pesticide identity

Respondents were asked to identify pesticides they use or are exposed to through these activities. Of 324 pesticides reported to be used, the active ingredient was identified for 207. These are listed in Figure 16.1. For 117 reports, the active ingredient could not be established. The most commonly reported pesticides are: fenobucarb (75 reports), alpha-cypermethrin (70), fipronil (34), etofenprox (8) and imidacloprid (6).

Figure 16.1



Pests

When asked what pest the pesticide is used for, the most common answers were 'caterpillar' and 'insects'. A small number described using the pesticides for diseases. Some of the pests reported are shown in table 16.2

Table 16.2

Pest	# reports
Beetle	32
Leaf folder	29
Brown Plant Hopper	20
Mosquito	14
Fly	12

Conditions of use

Personal Protective Equipment (PPE)

80% (78) of applicators indicated that they wear protective clothing when applying pesticides. 20% said they did not.

Of the 78 pesticide applicators who did wear PPE, the following items were worn:

Table 16.3

Item worn	% who wore item
Gloves	68%
Overalls	58%
Eyeglasses	13%
Respirator	1%
Face mask	97%
Boots/shoes	74%
Long sleeve shirt	76%
Long pants	74%
Others	24%

20 respondents described other items, mostly 'raincoat' (16 responses). Smaller numbers indicated the use of 'hat' (3), and 'helmet' (1). Focus group discussions and in-depth interviews revealed that a local initiative in Hai Van (and elsewhere in Vietnam) that applicators wear a raincoat to prevent skin contact with the pesticides. However they often do not wear this because it is too hot. Further, users who are hired to spray for others are required to wear boots. However they sometimes avoid wearing the boots as they are accustomed to working barefoot.

Woman sprays pesticides in her fields with bare feet

Although the farmers indicated during in-depth interviews that they know the importance of wearing a raincoat, they still found a reason for not wearing it, frequently because it's too hot. Even with the "gauze mask", the most popular protective-equipment, they still found a reason for not wearing it:

"I will wear the gauze mask when it is windy. If there is no wind, I will not wear because the spray faucet is long" (In depth interview No.10)

Backpack spraying in vegetable field, Nam Dinh

Some people decide to not use gloves:

"For me, I only use a long rain coat. That's all! I never use gloves because I already had the spray. So I think wearing gloves is not important" (In depth interview No. 7)

For those (19% who said they did not wear protective clothing, when asked the reason why they did not wear, respondents indicated that it was *uncomfortable* (11%), *not available* (7%), and/or *expensive* (5%).

Washing facilities

When asked if they have access to *washing facilities (for hands and body)* where they apply pesticides, 56% of applicators said they did, and 43% said they did not (1% did not respond).

Spillages

A number of respondents indicated that they had experienced having pesticides spilled on them, either while *spraying* (61%), *mixing* (17%), and/or while *loading* (7%).

Wind direction

While 92% of applicators indicated that they spray *along the wind direction,* 7% said they spray pesticides *against the wind direction* (with some responses showing spraying both against and along the wind). 2% answered *unknown* about the wind direction while spraying.

Pesticides storage, disposal and cleaning practices

Disposal

The most common ways of disposal of containers were indicated as *burnt* (40%), *bury* (20%), *thrown in open field* (15%). 28% indicated other ways of disposal including 'sell it' (14%), 'thrown in the river' (7%), amongst others (7%).

Rinsing of containers into waterway

Table 16.4

Disposal method	%
Burnt	40
Buried	21
Thrown in open field	15
Put in trash	3
Others	28

When asked if they *use the containers for other purposes afterwards,* 95% said they did not. Only 1% did ('to keep seeds'). 4% did not respond to this question.

When asked to describe how they *dispose of leftover pesticides,* a large percentage indicated there was no leftover (81%), while 12% said they threw it into the field or garden, and 3% said they disposed of it in the canal.

Water source is used for multiple purposes

Cleaning and rinsing of containers and equipment

When asked to describe where they *wash the equipment,* 91% said they did this in the 'river', 'canal' or 'ditch' and 12% said they did this in the 'field' or 'garden'.

Storage

When asked about where they store the pesticides, 18% indicated *garden,* 13% *shed* and/or 7% *home.* 67%

Rubbish disposal including pesticide packaging, Nam Dinh described *other* places for storing the pesticides. Descriptive answers show that a higher number stored their pesticides in and around the home than gathered in the data indicated above. More than a quarter (27%) of total respondents described storing their pesticides in the 'kitchen' (including 2 saying 'top of kitchen' or 'kitchen roof'). This was followed by 'toilet', 'toilet wall' or 'bathroom' (12%); followed by animal housing such as 'piggery' or 'rabbit coop' (6%). Some said there was 'no storage', or 'no leftover', or simply 'no' (12%). Various other answers were given.

83% indicated that they stored the pesticides *locked up and away from children.* 4% said they did not (13% did not respond). Similar numbers, 81%, indicated that they *stored the pesticides separated from other items,* 5% did not (14% did not respond). These numbers are also indicative of the result gathered in the in-depth interviews where it said that 'all the users express their high awareness of storing the pesticide in the separate places where people rarely touch, especially out of children's reach', for example, hung in a nylon bag. However, it was noted by the researchers that the potential dangers are still present.

Training, access to information, and awareness of hazards

Training

80% of applicators indicated that they had not *received training for the pesticides they use,* and18% said they had (4% did not respond).

"These type of activities (meeting or a training course) are not popular here. Only the calendar of applying pesticide is informed. There is no course to instruct farmers how to apply or use the pesticide. (In-depth interview No.6)

Not all farmers have opportunities to participate in training courses, with 4-5 representatives chosen per farmers' group to participate in courses with the objective to "apply pesticide properly".

Access to label/Safety Data Sheets

All respondents (100%) responded positively that they had *access to pesticide labels.* 61% responded positively that they had access to *safety data sheet.*

Table 16.5

Access to	% positive response
Label	100%
Safety data	61%

Awareness of hazards

Most (90%) indicated that they *know the hazards of the pesticides they use.* However, this left a remainder of 10% who do not know the dangers of using pesticides. When asked to mention some of the hazards, 84% of respondents gave an answer, including symptoms of pesticide poisoning, such as 'headache', 'itching', 'tired', 'allergy' and 'vomiting'. Some also gave general answers like 'bad for health', 'noxious' or 'very noxious'.

Regarding in-depth-interviews, everybody clearly and strongly affirmed that using pesticide causes harm to their health:

"The pesticide is harmful and very dangerous! I already knew about its danger and pollution. When I use it (spray), we have to breathe; it's very harmful and dangerous to health!" (In-depth-interview No.1)

Based on the fact that using pesticides is very dangerous, people who are weak or cannot spray the pesticide themselves can hire others to do this work for them:

"If I cannot do it myself and hire other people, it will cost much because this work is dangerous. They have to sacrifice to this work for me otherwise rice paddy will be infected by pestilent insect" (In-depth-interview No.6)

In this case, people that know about the dangers of using pesticide also show their gratitude and commiseration to "sacrifice" people who work with dangerous chemical substances.

However, awareness of the danger of using pesticide is still very vague:

"Pesticide is very dangerous, and have direct influence on the health of woman and children. Despite of its danger, we have to do. But I don't know exactly how dangerous and poisonous it is". (Group discussion among female farmers)

Or

"I knew that pesticide is dangerous. Even insect can die, let alone human. But I am still healthy and I know that I still stand doing this work, so I do. And how it is dangerous, frankly, I don't know much (laugh). (In-depth-interview No.9)

In addition to the ambiguous, unspecific knowledge of the danger of using pesticides, the farmers say they "must do", "must eat", "must use":

"After using the pesticide, we talk and then figure out that it is very dangerous. Although we know about its danger, we must use it". (In-depth-interview No. 10)

"Knowing about its danger but must do" is the logical way of farmer thinking. Firstly, it is the basic and essential needs that must be satisfied and solved whereas "the harmfulness appears to be invisible and does not negatively affect ourselves" (Male farmers' discussion). More specifically, the idea raised by male farmers is that its considerably adverse impacts are not seen while their health is still *bearable.*

An impressive and emerging aspect is the farmers execute the "musts" in a limited way. This aspect is ***moral*** issue, which has been adopted as an important life/business principle by the farmers in Hai Van commune.

"We must grow vegetables then sell to others in a moral way. We sell these vegetables we ourselves eat. The pesticide is applied only to young/small vegetables, not to the growing ones" (In-depth-interview No.6)

The moral principle that the farmers adopt is very practical and simple: things they themselves can eat are sellable, otherwise, they are non-sellable.

"When seeing the insects which are newly born on vegetables such as water morning glory or malabar nightshade, we will spray pesticide. After half a month, the top of these vegetables will grow and we will pick their tops to sell. <u>With this period, we can eat, which means we can</u>

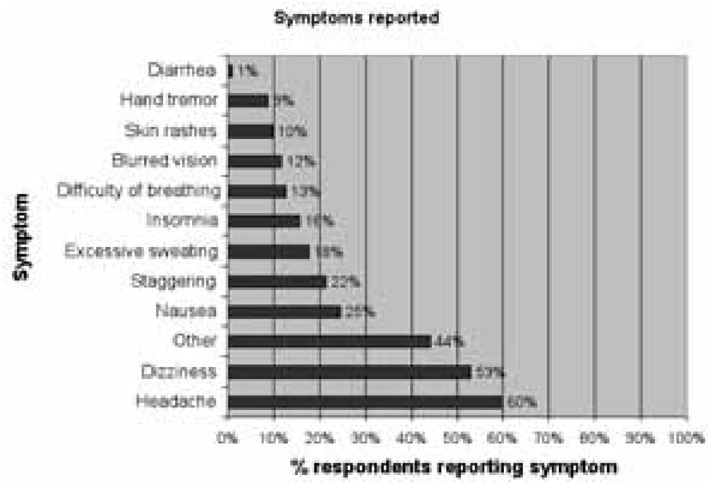
<u>sell to others</u>. We do not sell the vegetables that are applied pesticide in the previous 5-7 days" (In-depth-interview No. 9)

Through the honest sharing of the farmers, such awareness is not always put into practice, with some applying pesticide a short time before sale of pesticides to market.

Description of symptoms

Symptoms reported by the respondents that they had ever experienced when using pesticides or being exposed to them are displayed Figure 16.2. The most common symptoms experienced were *headache* (60%) and *dizziness* (53%). 44% of respondents reported *other* symptoms, mostly 'itching' (including 'whole body itching' with 3 responses) (15%), 'tired', or 'very tired' (15%), 'pain' (including 'body pain', 'chest pain' etc) (6%), 'articulation problem', 'dry mouth', sneezing', 'belly ache', etc. 2 said 'no' or 'no influence'.

Figure 16.2



Reporting issues - community interviews

Table 16.6

Section	Issue
Household income	Not clear whether month/year
Re-entry periods	Inadequate response to analyse
Storage out of reach of children	>10% did not respond
Storage separated from other items	>10% did not respond

INCIDENTS

Respondents described 9 incident cases, including the pesticide used, symptoms experienced and treatment received. Refer to Table 3.13 in Section 3 for details of these. ◆

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Annexes: Annex 1 – List of all reported pesticides

List of all reported pesticides

Pesticide	Number respondents*	Number reported uses*	Number Countries	WHO Ia	WHO Ib	EU R26	Cancer Rating	Muta (EU 1,2)	Repro (EU 1,2)	EU EDC	vB	vP	High Toxicity	POP	PIC	HHP
2,4-d dimethylamine	37	37	1				Possible									Yes
2,4-d ethyl ester	1	1	1				Possible									Yes
2,4-d sodium monohydrate	55	57	2				Possible									Yes
abamectin	83	88	3										Yes			Yes
acephate	44	45	3				Possible			Yes			Yes			Yes
acetochlor	2	2	1				Possible			Yes						Yes
alpha-cypermethrin	85	85	2										Yes			Yes
anilofos	1	1	1													
bensulfuron-methyl	4	4	1													
bispyribac-sodium	22	22	2													
buprofezin	27	36	1				Possible									Yes
camel grease	20	80	1													
carbaryl	20	20	3				Probable			Yes			Yes			Yes
carbendazim	16	17	3				Possible	Y	Y	Yes						Yes
carbofuran	50	50	4		Yes	Yes				Yes			Yes		Yes	Yes
chlorfluazuron	54	57	1													
chlorimuron ethyl	41	41	1													
chlorothalonil	30	31	2			Yes	Probable									Yes
chlorpyrifos	147	165	7										Yes			Yes
cyclosulfamuron	1	1	1													
cyhalofop-butyl	97	103	2													
cypermethrin	179	220	6				Possible						Yes			Yes
deltamethrin	13	13	3							Yes			Yes			Yes
dichlorvos	4	4	1		Yes	Yes	Possible						Yes			Yes
difenoconazole	75	75	2				Possible					Yes				Yes
do not concern about it	5	6	1													
don't remember	19	37	1													
edifenphos	11	11	1		Yes											Yes
emamectin	1	1	1													
emamectin benzoate	6	6	2													
endosulfan	112	112	2			Yes				Yes						Yes
endrin	3	3	1							Yes				Yes		Yes
etofenprox	46	47	2				Possible						Yes			Yes
fenamiphos	1	1	1		Yes								Yes			Yes
fenclorim	6	6	1													
fenitrothion	1	1	1							Yes			Yes			Yes
fenobucarb	149	158	2													
fenoxaprop-p-ethyl	8	8	1													
fipronil	81	83	4				Possible						Yes			Yes
flubendiamide	1	1	1													
[illegible]	1	1	1													
fulvic acid	2	2	1													
glyphosate	11	11	4													
glyphosate isopropylamine	104	116	1													
hexaconazole	47	48	4				Possible					Yes	Yes			Yes
imidacloprid	118	120	5										Yes			Yes
indoxacarb	11	11	1										Yes			Yes
isoprothiolane	59	61	1													
kasugamycin	5	5	2													
lambda-cyhalothrin	152	163	3			Yes				Yes			Yes			Yes
lindane	1	1	1				Possible			Yes			Yes		Yes	Yes
mancozeb	110	141	5				Probable			Yes						Yes
maneb	49	53	2				Probable			Yes						Yes
metalaxyl	5	5	3													
methamidophos	1	1	1		Yes	Yes							Yes		Yes	Yes
methomyl	9	9	3		Yes					Yes			Yes			Yes
metsulfuron-methyl	113	113	4									Yes				Yes
monocrotophos	136	136	2		Yes	Yes							Yes		Yes	Yes

* The number of reported uses is sometimes higher than the number of respondents.
This indicates multiple uses of the same pesticide by respondents

Selected Pesticides: 151
02.02.2010

WHO Ia: Extremely hazardous
WHO Ib: Highly hazardous
R26: Very toxic by inhalation

Mutagenic 1, 2: Mutagenic, Probable Mutagenic
Repro 1, 2: Reproductive toxin, Probable Reproductive toxin
EDC: Endocrine disruptor
vB: Very bioaccumulative, vP: Very persistent

List of all reported pesticides

Pesticide	Number respondents*	Number reported uses*	Number Countries	WHO Ia	WHO Ib	EU R26	Cancer Rating	Muta (EU 1,2)	Repro (EU 1,2)	EU EDC	vB	vP	High bee tox	POP	PIC	HHP
nereistoxin	32	34	1													
niclosamide	103	174	2													
nitrophenolate	1	1	1													
no answer	236	290	5													
paraquat dichloride	97	99	4			Yes										Yes
parathion-methyl	58	63	2	Yes		Yes				Yes					Yes	Yes
permethrin	55	64	2				Probable			Yes			Yes			Yes
phenthoate	26	27	1							Yes			Yes			Yes
phosphamidon	14	14	1	Yes			Possible			Yes			Yes		Yes	Yes
pretilachlor	80	81	1													
propiconazole	87	110	2				Possible					Yes				Yes
propanil	51	52	3													
pymetrozine	33	33	2				Probable									Yes
pyrazosulfuron-ethyl	1	1	1													
quinalphos	51	51	2							Yes			Yes			Yes
tebuconazole	23	24	1				Possible									Yes
thiacloprid	11	11	1				Probable									Yes
thiamethoxam	31	37	2										Yes			Yes
thiophanate-methyl	2	2	1				Probable									Yes
thiram	8	9	2							Yes					Yes	Yes
triazophos	49	51	1		Yes											Yes
trifluralin	3	3	2				Possible			Yes			Yes			Yes
tricyclazole	70	93	2									Yes				Yes
trifloxystrobin	10	10	1													
unknown	30	66	1													
validamycin	51	54	2										Yes			Yes
glufosinate ammonium	21	21	1				Possible		Y							Yes
malathion	15	15	3				Possible			Yes			Yes			Yes
ametryn	8	9	1													

List of all reported pesticides

Pesticide	Number respondents*	Number reported uses*	Number Countries	WHO Ia	WHO Ib	EU R26	Cancer Rating	Muta (EU 1,2)	Repro (EU 1,2)	EU EDC	vB	vP	High bee tox	POP	PIC	HHP
2,4-d	9	9	2				Possible			Yes						Yes
sulfur	11	11	2													
d-phenothrin	19	23	1							Yes						Yes
d-trans allethrin	4	7	1													
fluroxypyr-meptyl	1	1	1													
2,4-d butyl ester	16	16	2				Possible									Yes
prallethrin	19	19	1										Yes			Yes
phorate	1	1	1	Yes									Yes			Yes
azoxystrobin	1	1	1									Yes				Yes
carbosulfan	3	3	1			Yes							Yes			Yes
cymoxanil	19	19	1													
cartap	1	1	1													
[illegible]	5	6	1													
beta-cyfluthrin	10	10	3			Yes							Yes			Yes
dimethomorph	5	5	1													
glyphosate, isopropylamine salt	5	5	1													
isoprocarb	4	4	2													
methiocarb	4	4	1		Yes								Yes			Yes
oxyfluorfen	2	2	1				Possible									Yes
profenofos	26	25	1										Yes			Yes
propamocarb hydrochloride	8	8	1													
spinosad	7	7	1										Yes			Yes
thiosultap-sodium	2	2	1													
transfluthrin	5	5	1													
ziram	2	2	2							Yes						Yes
acetamiprid	2	2	2													
azadirachtin	1	1	1													
benomyl	3	3	1				Possible	Y	Y						Yes	Yes
bismerthiazol	5	5	1													

* The number of reported uses is sometimes higher than the number of respondents.
This indicates multiple uses of the same pesticide by respondents

Selected Pesticides: 151
02.02.2010

WHO Ia: Extremely hazardous
WHO Ib: Highly hazardous
R26: Very toxic by inhalation

Mutagenic 1, 2: Mutagenic, Probable Mutagenic
Repro 1, 2: Reproductive toxin, Probable Reproductive toxin
EDC: Endocrine disruptor
vB: Very bioaccumulative, vP: Very persistent

List of all reported pesticides

Pesticide	Number respondents*	Number reported uses*	Number Countries	WHO Ia	WHO Ib	EU R26	Cancer Rating	Muta (EU 1,2)	Repro (EU 1,2)	EU EDC	vB	vP	High toxic bees	POP	PIC	HHP
butachlor	34	103	2				Probable									Yes
cafen	1	1	1													
chlorfenvinphos	3	3	1		Yes					Yes			Yes			Yes
cyproconazole	1	1	1				Possible					Yes				Yes
diazinon	12	12	2							Yes			Yes			Yes
dimethoate	3	3	1				Possible			Yes			Yes			Yes
dinotefuran	23	23	1										Yes			Yes
ethoxysulfuron	2	2	1													
[illegible]	8	8	1									Yes				Yes
gentamicin sulfate	1	1	1													
hydrobenzene	1	1	1													
iprodione	10	10	1				Probable			Yes						Yes
lychnis viscaria	1	1	1													
metaldehyde	1	1	1				Possible									Yes
micro nutrients	1	1	1													
niclosamide-olamine	2	2	1													
nitro benzene	15	15	2				Possible									Yes
oxytetracycline	1	1	1													
paclobutrazol	1	1	1									Yes	Yes			Yes
phthalide	17	17	1													
propineb	1	1	1				Possible			Yes						Yes
pyrazosulfuron	16	16	1													
quinclorac	4	4	1													
saponin	2	2	1													
simazine	1	1	1				Possible			Yes						Yes
sodium-5-nitroguaiacolate	12	12	1													
sodium-o-nitrophenolate	12	12	1													
sodium-p-nitrophenolate	12	12	1													
solvents adjuvant	1	1	1													

List of all reported pesticides

Pesticide	Number respondents*	Number reported uses*	Number Countries	WHO Ia	WHO Ib	EU R26	Cancer Rating	Muta (EU 1,2)	Repro (EU 1,2)	EU EDC	vB	vP	High toxic bees	POP	PIC	HHP
2,4-d iso-butyl ester	6	6	1				Possible									Yes
zinc phosphide	1	1	1													
xylene	1	1	1													
no pesticide	5	5	1													
chlorantraniliprole	1	1	1													
monosultap	1	1	1													

* The number of reported uses is sometimes higher than the number of respondents.
This indicates multiple uses of the same pesticide by respondents.

Selected Pesticides: 151
02.02.2010

WHO Ia: Extremely hazardous
WHO Ib: Highly hazardous
R26: Very toxic by inhalation

Mutagenic 1, 2: Mutagenic, Probable Mutagenic
Repro 1, 2: Reproductive toxin, Probable Reproductive toxin
EDC: Endocrine disruptor
vB: Very bioaccumulative, vP: Very persistent

Annexes: Annex 2 – List of Pesticides per Site

Statistic by Group/State

	Number of reported uses	WHO Ia	WHO Ib	EU R26	Cancer Rating	Mutagenic (EU 1,2)	Repro (EU 1,2)	EU EDC	High bee tox	Persistence & Bioaccumulation vP	vB	POP	PIC
Andhra Pradesh (India)													
acephate	1				Possible			Yes	Yes				
chlorfenvinphos	3		Yes					Yes	Yes				
chlorpyrifos	2								Yes				
dichlorvos	4		Yes	Yes	Possible				Yes				
endosulfan	46			Yes				Yes					
endrin	3							Yes				Yes	
imidacloprid	1								Yes				
lambda-cyhalothrin	13			Yes				Yes	Yes				
monocrotophos	1		Yes	Yes					Yes				Yes
no answer	62												
pyrazosulfuron	2												
quinalphos	22							Yes	Yes				
sulfur	9												
triazophos	1		Yes										
tricyclazole	2									Yes			

WHO Ia: Extremely hazardous
WHO Ib: Highly hazardous
R26: Very toxic by inhalation
Mutagenic 1, 2: Mutagenic, Probable Mutagenic
Repro 1, 2: Reproductive toxic, Probable Reproductive toxic
EDC: Endocrine disruptor
vB: Very bioaccumulative, vP: Very persistent

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Statistic by Group/State

	Number of reported uses	WHO Ia	WHO Ib	EU R26	Cancer Rating	Mutagenic (EU 1,2)	Repro (EU 1,2)	EU EDC	High bee tox	Persistence & Bioaccumulation vP	vB	POP	PIC
An Giang (Viet Nam)													
2,4-d	6				Possible			Yes					
abamectin	48								Yes				
acephate	1				Possible			Yes	Yes				
acetamiprid	1												
acetochlor	1				Possible			Yes					
alpha-cypermethrin	3								Yes				
azadirachtin	1												
benomyl	2				Possible	Y	Y						Yes
beta-cyfluthrin	2			Yes					Yes				
bismerthiazol	3												
bispyribac-sodium	9												
buprofezin	36				Possible								
butachlor	19				Probable								
cafein	1												
carbaryl	1				Probable			Yes	Yes				
carbendazim	7				Possible	Y	Y	Yes					
chlorpyrifos	31								Yes				
cyhalofop-butyl	3												
cypermethrin	30				Possible				Yes				
cyproconazole	1				Possible					Yes			
deltamethrin	1							Yes	Yes				
diazinon	2							Yes	Yes				
difenoconazole	74				Possible					Yes			
dimethoate	3				Possible			Yes	Yes				
dinotefuran	23								Yes				

WHO Ia: Extremely hazardous
WHO Ib: Highly hazardous
R26: Very toxic by inhalation
Mutagenic 1, 2: Mutagenic, Probable Mutagenic
Repro 1, 2: Reproductive toxic, Probable Reproductive toxic
EDC: Endocrine disruptor
vB: Very bioaccumulative, vP: Very persistent

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Statistic by Group/State

	Number of reported uses	WHO Ia	WHO Ib	EU R26	Cancer Rating	Mutagenic (EU 1,2)	Repro (EU 1,2)	EU EDC	High bee tox	Persistence & Bioaccumulation vP	vB	POP	PIC
emamectin benzoate	2												
ethoxysulfuron	2												
etofenprox	1				Possible				Yes				
fenclorim	6												
fenobucarb	66												
fenoxaprop-p-ethyl	9												
fipronil	37				Possible				Yes				
fludioxonil	9									Yes			
fulvic acid	2												
gentamicin sulfate	1												
glyphosate	1												
hexaconazole	56				Possible				Yes	Yes			
imidacloprid	2								Yes				
iprodione	10				Probable			Yes					
isoprocarb	1												
isoprothiolane	61												
kasugamycin	3												
lychnis viscaria	1												
mancozeb	2				Probable			Yes					
metalaxyl	2												
metaldehyde	1				Possible								
micro nutrients	1												
niclosamide	132												
niclosamide-olamine	2												
nitro benzene	12				Possible								
no answer	1												

WHO Ia: Extremely hazardous
WHO Ib: Highly hazardous
R26: Very toxic by inhalation

Mutagenic 1, 2: Mutagenic, Probable Mutagenic
Repro 1, 2: Reproductive toxin, Probable Reproductive toxin
EDC: Endocrine disruptor
vB: Very bioaccumulative, vP: Very persistent

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Statistic by Group/State

	Number of reported uses	WHO Ia	WHO Ib	EU R26	Cancer Rating	Mutagenic (EU 1,2)	Repro (EU 1,2)	EU EDC	High bee tox	Persistence & Bioaccumulation vP	vB	POP	PIC
oxytetracycline	1												
paclobutrazol	1								Yes	Yes			
paraquat dichloride	1			Yes									
permethrin	1				Probable			Yes	Yes				
phthalide	17												
pretilachlor	81												
propanil	1				Possible			Yes					
propiconazole	137				Possible					Yes			
propineb	7												
pymetrozine	31				Probable								
pyrazosulfuron-ethyl	1												
quinalphos	14							Yes	Yes				
quinclorac	6												
saponin	1												
simazine	1				Possible			Yes					
sodium-5-nitroguaiacolate	12												
sodium-o-nitrophenolate	12												
sodium-p-nitrophenolate	12												
sulfur	2												
tebuconazole	24				Possible								
thiamethoxam	31								Yes				
thiophanate-methyl	1				Probable								
tricyclazole	81									Yes			
trifloxystrobin	10												
validamycin	48								Yes				
zineb	1							Yes					

WHO Ia: Extremely hazardous
WHO Ib: Highly hazardous
R26: Very toxic by inhalation

Mutagenic 1, 2: Mutagenic, Probable Mutagenic
Repro 1, 2: Reproductive toxin, Probable Reproductive toxin
EDC: Endocrine disruptor
vB: Very bioaccumulative, vP: Very persistent

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Statistic by Group/State

Davao del Sur (Philippines)	Number of reported cases	WHO Ia	WHO Ib	EU R26	Cancer Rating	Mutagenic (EU 1,2)	Repro (EU 1,2)	EU EDC	High bee tox	Persistence & Bioaccumulation vP	vB	POP	PIC
2,4-d butyl ester	15				Possible								
2,4-d iso-butyl ester	6				Possible								
beta-cyfluthrin	29			Yes					Yes				
butachlor	84				Probable								
carbaryl	2				Probable			Yes	Yes				
carbofuran	4		Yes	Yes				Yes	Yes				Yes
chlorpyrifos	12								Yes				
cypermethrin	54				Possible				Yes				
deltamethrin	7							Yes	Yes				
diazinon	10							Yes	Yes				
etofenprox	38				Possible				Yes				
imidacloprid	3								Yes				
lambda-cyhalothrin	13			Yes				Yes	Yes				
malathion	6				Possible			Yes	Yes				
mancozeb	8				Probable			Yes					
methomyl	1		Yes					Yes	Yes				
metsulfuron-methyl	1									Yes			
niclosamide	72												
pymetrozine	2				Probable								
thiamethoxam	1								Yes				
xylene	1												
zinc phosphide	1												

WHO Ia: Extremely hazardous
WHO Ib: Highly hazardous
R26: Very toxic by inhalation

Mutagenic 1, 2: Mutagenic, Probable Mutagenic
Repro 1, 2: Reproductive toxin, Probable Reproductive toxin
EDC: Endocrine disruptor
vB: Very bioaccumulative, vP: Very persistent

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Statistic by Group/State

Java (Indonesia)	Number of reported cases	WHO Ia	WHO Ib	EU R26	Cancer Rating	Mutagenic (EU 1,2)	Repro (EU 1,2)	EU EDC	High bee tox	Persistence & Bioaccumulation vP	vB	POP	PIC
abamectin	14								Yes				
azoxystrobin	1									Yes			
beta-cyfluthrin	2			Yes					Yes				
carbofuran	2		Yes	Yes				Yes	Yes				Yes
carbosulfan	3			Yes					Yes				
cartap	1												
chlorantraniliprole	1												
chlorothalonil	21			Yes	Probable								
chlorpyrifos	1								Yes				
cymoxanil	18												
cypermethrin	3				Possible				Yes				
deet	3												
difenoconazole	1				Possible					Yes			
dimethomorph	5												
endosulfan	1			Yes				Yes					
fipronil	1				Possible				Yes				
glyphosate, isopropylamine salt	3												
imidacloprid	1								Yes				
isoprocarb	3												
lambda-cyhalothrin	40			Yes				Yes	Yes				
mancozeb	49				Probable			Yes					
maneb	17				Probable			Yes					
metalaxyl	2												
methiocarb	4		Yes						Yes				
monosultap	1												

WHO Ia: Extremely hazardous
WHO Ib: Highly hazardous
R26: Very toxic by inhalation

Mutagenic 1, 2: Mutagenic, Probable Mutagenic
Repro 1, 2: Reproductive toxin, Probable Reproductive toxin
EDC: Endocrine disruptor
vB: Very bioaccumulative, vP: Very persistent

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Statistic by Group/State

	Number of reported cases	WHO Ia	WHO Ib	EU R26	Cancer Rating	Mutagenic (EU 1,2)	Repro (EU 1,2)	EU EDC	High bee tox	Persistence & Bioaccumulation vP	vB	POP	PIC
no answer	14												
no pesticide	5												
oxyfluorfen	2				Possible								
paraquat dichloride	8			Yes									
permethrin	2				Probable			Yes	Yes				
profenofos	28								Yes				
propamocarb hydrochloride	8												
propineb	22												
spinosad	7								Yes				
thiosultap-sodium	2												
transfluthrin	5												
zineb	1							Yes					

WHO Ia: Extremely hazardous
WHO Ib: Highly hazardous
R26: Very toxic by inhalation

Mutagenic 1, 2: Mutagenic, Probable Mutagenic
Repro 1, 2: Reproductive toxin, Probable Reproductive toxin
EDC: Endocrine disruptor
vB: Very bioaccumulative, vP: Very persistent

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Statistic by Group/State

	Number of reported cases	WHO Ia	WHO Ib	EU R26	Cancer Rating	Mutagenic (EU 1,2)	Repro (EU 1,2)	EU EDC	High bee tox	Persistence & Bioaccumulation vP	vB	POP	PIC
Kerala (India)													
2,4-d	3				Possible			Yes					
2,4-d ethyl ester	1				Possible								
2,4-d sodium monohydrate	25				Possible								
acephate	37				Possible			Yes	Yes				
anilofos	1												
carbaryl	17				Probable			Yes	Yes				
carbofuran	30		Yes	Yes				Yes	Yes				Yes
chlorimuron ethyl	41												
chlorpyrifos	5								Yes				
cyhalofop-butyl	130												
cypermethrin	5				Possible				Yes				
deltamethrin	5							Yes	Yes				
edifenphos	11		Yes										
fipronil	1				Possible				Yes				
flubendiamide	1												
fluoridamid	1												
glyphosate	6												
hexaconazole	2				Possible				Yes	Yes			
imidacloprid	7								Yes				
lambda-cyhalothrin	113			Yes				Yes	Yes				
lindane	1				Possible			Yes	Yes				Yes
malathion	2				Possible			Yes	Yes				
methomyl	3		Yes					Yes	Yes				
metsulfuron-methyl	41									Yes			
monocrotophos	7		Yes	Yes					Yes				Yes

WHO Ia: Extremely hazardous
WHO Ib: Highly hazardous
R26: Very toxic by inhalation

Mutagenic 1, 2: Mutagenic, Probable Mutagenic
Repro 1, 2: Reproductive toxin, Probable Reproductive toxin
EDC: Endocrine disruptor
vB: Very bioaccumulative, vP: Very persistent

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Statistic by Group/State

	Number of reported cases	WHO Ia	WHO Ib	EU R26	Cancer Rating	Mutagenic (EU 1,2)	Repro (EU 1,2)	EU EDC	High bee tox	Persistence & Bioaccumulation vP	Persistence & Bioaccumulation vB	POP	PIC
no answer	21												
paraquat dichloride	2			Yes									
parathion-methyl	62	Yes		Yes				Yes					Yes
phorate	1	Yes							Yes				
phosphamidon	14	Yes			Possible			Yes	Yes				Yes
propiconazole	3				Possible					Yes			
pyrazosulfuron	14												
quinalphos	15							Yes	Yes				
triazophos	50		Yes										

WHO Ia: Extremely hazardous
WHO Ib: Highly hazardous
R26: Very toxic by inhalation

Mutagenic 1, 2: Mutagenic, Probable Mutagenic
Repro 1, 2: Reproductive toxin, Probable Reproductive toxin
EDC: Endocrine disruptor
vB: Very bioaccumulative, vP: Very persistent

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Statistic by Group/State

	Number of reported cases	WHO Ia	WHO Ib	EU R26	Cancer Rating	Mutagenic (EU 1,2)	Repro (EU 1,2)	EU EDC	High bee tox	Persistence & Bioaccumulation vP	Persistence & Bioaccumulation vB	POP	PIC
Sri Lanka (3 districts) (Sri Lanka)													
bensulfuron-methyl	4												
bispyribac-sodium	13												
carbofuran	14		Yes	Yes				Yes	Yes				Yes
chlorothalonil	10			Yes	Probable								
chlorpyrifos	57								Yes				
glyphosate	1												
hexaconazole	4				Possible				Yes	Yes			
imidacloprid	18								Yes				
mancozeb	74				Probable			Yes					
maneb	38				Probable			Yes					
metalaxyl	1												
metsulfuron-methyl	3									Yes			
no answer	10												
propineb	23												
thiacloprid	11				Probable								
thiram	3							Yes					Yes

WHO Ia: Extremely hazardous
WHO Ib: Highly hazardous
R26: Very toxic by inhalation

Mutagenic 1, 2: Mutagenic, Probable Mutagenic
Repro 1, 2: Reproductive toxin, Probable Reproductive toxin
EDC: Endocrine disruptor
vB: Very bioaccumulative, vP: Very persistent

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Statistic by Group/State

	Number of reported cases	WHO Ia	WHO Ib	EU R26	Cancer Rating	Mutagenic (EU 1,2)	Repro (EU 1,2)	EU EDC	High bee tox	Persistence & Bioaccumulation vP	vB	POP	PIC
Nam Dinh (Viet Nam)													
acetochlor	1				Possible			Yes					
alpha-cypermethrin	70								Yes				
cannot answer	60												
do not concern about it	9												
don't remember	37												
etofenprox	8				Possible				Yes				
fenobucarb	75												
fipronil	34				Possible				Yes				
imidacloprid	6								Yes				
kasugamycin	1												
no answer	51												
thiamethoxam	5								Yes				
thiophanate-methyl	1				Probable								
trichlorfon	2				Possible			Yes	Yes				
unknown	66												
validamycin	4								Yes				

WHO Ia: Extremely hazardous
WHO Ib: Highly hazardous
R26: Very toxic by inhalation

Mutagenic 1, 2: Mutagenic, Probable Mutagenic
Repro 1, 2: Reproductive toxin, Probable Reproductive toxin
EDC: Endocrine disruptor
vB: Very bioaccumulative, vP: Very persistent

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Statistic by Group/State

	Number of reported cases	WHO Ia	WHO Ib	EU R26	Cancer Rating	Mutagenic (EU 1,2)	Repro (EU 1,2)	EU EDC	High bee tox	Persistence & Bioaccumulation vP	vB	POP	PIC
Orissa (India)													
acephate	5				Possible			Yes	Yes				
acetamiprid	1												
carbendazim	4				Possible	Y	Y	Yes					
chlorpyrifos	13								Yes				
endosulfan	53			Yes				Yes					
hydrobenzene	1												
imidacloprid	94								Yes				
mancozeb	8				Probable			Yes					
monocrotophos	92		Yes	Yes					Yes				Yes
nitro benzene	6				Possible								
no answer	40												
solvents adjuvant	1												

WHO Ia: Extremely hazardous
WHO Ib: Highly hazardous
R26: Very toxic by inhalation

Mutagenic 1, 2: Mutagenic, Probable Mutagenic
Repro 1, 2: Reproductive toxin, Probable Reproductive toxin
EDC: Endocrine disruptor
vB: Very bioaccumulative, vP: Very persistent

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Statistic by Group/State

	Number of reported cases	WHO Ia	WHO Ib	EU R26	Cancer Rating	Mutagenic (EU 1,2)	Repro (EU 1,2)	EU EDC	High bee tox	vP	vB	POP	PIC
Perak (Malaysia)													
2,4-d butyl ester	1				Possible								
2,4-d dimethylamine	35				Possible								
2,4-d sodium monohydrate	31				Possible								
ametryn	6												
cypermethrin	2				Possible				Yes				
d-trans-allethrin	4												
glufosinate ammonium	25				Possible		?						
glyphosate	3												
glyphosate isopropylamine	73												
methamidophos	1		Yes	Yes					Yes				Yes
metsulfuron-methyl	66									Yes			
no answer	69												
paraquat dichloride	29			Yes									
thiram	3							Yes					Yes

WHO Ia: Extremely hazardous
WHO Ib: Highly hazardous
R26: Very toxic by inhalation

Mutagenic 1, 2: Mutagenic, Probable Mutagenic
Repro 1, 2: Reproductive toxin, Probable Reproductive toxin
EDC: Endocrine disruptor
vB: Very bioaccumulative, vP: Very persistent

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Statistic by Group/State

	Number of reported cases	WHO Ia	WHO Ib	EU R26	Cancer Rating	Mutagenic (EU 1,2)	Repro (EU 1,2)	EU EDC	High bee tox	vP	vB	POP	PIC
Prey Veng (Cambodia)													
abamectin	20								Yes				
acephate	1				Possible			Yes	Yes				
alpha-cypermethrin	12								Yes				
carbendazim	8				Possible	?	?	Yes					
chlorfluazuron	57												
chlorpyrifos	20								Yes				
cyclosulfamuron	1												
cypermethrin	109				Possible				Yes				
emamectin	1												
emamectin benzoate	3												
fenamiphos	1		Yes						Yes				
fenitrothion	1							Yes	Yes				
fenobucarb	17												
fipronil	10				Possible				Yes				
hexaconazole	8				Possible				Yes	Yes			
indoxacarb	11								Yes				
kasugamycin	1												
methomyl	5		Yes					Yes	Yes				
monocrotophos	39		Yes	Yes					Yes				Yes
nereistoxin	34												
nitrophenoxide	1												
parathion-methyl	1	Yes		Yes				Yes					Yes
permethrin	61				Probable			Yes	Yes				
phenthoate	27							Yes	Yes				
trichlorfon	1				Possible			Yes	Yes				
validamycin	2								Yes				

WHO Ia: Extremely hazardous
WHO Ib: Highly hazardous
R26: Very toxic by inhalation

Mutagenic 1, 2: Mutagenic, Probable Mutagenic
Repro 1, 2: Reproductive toxin, Probable Reproductive toxin
EDC: Endocrine disruptor
vB: Very bioaccumulative, vP: Very persistent

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Statistic by Group/State

	Number of reported uses	WHO Ia	WHO Ib	EU R26	Cancer Rating	Mutagenic (EU 1,2)	Repro (EU 1,2)	EU EDC	High bee tox	Persistence & Bioaccumulation vP	vB	POP	PIC
Sarawak (Malaysia)													
2,4-d dimethylamine	2				Possible								
chlorpyrifos	15								Yes				
cypermethrin	17				Possible				Yes				
d-phenothrin	23							Yes					
d-trans-allethrin	3												
fluroxypyr-meptyl	1												
glufosinate ammonium	2				Possible		?						
glyphosate isopropylamine	43												
malathion	4				Possible			Yes	Yes				
metsulfuron-methyl	2									Yes			
no answer	31												
paraquat dichloride	59			Yes									
prallethrin	18								Yes				

WHO Ia: Extremely hazardous
WHO Ib: Highly hazardous
R26: Very toxic by inhalation

Mutagenic 1, 2: Mutagenic, Probable Mutagenic
Repro 1, 2: Reproductive toxin, Probable Reproductive toxin
EDC: Endocrine disruptor
vB: Very bioaccumulative, vP: Very persistent

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Annexes: Annex 3 – Pesticide Identified in Yunnan Study Sites

TABLE 1: PESTICIDE PRODUCTS IN VILLAGE 1

Type	No	Active Ingredient	Formulation		User	Ratio[i]
Insecticide	1	Terbufos	5%	GR	48	80%
	2	Abamectin	2%	EC	27	45%
	3	Abamectin	1%	EC	31	52%
	4	Acetamiprid	5%	EC	38	63%
	5	Phoxim	3%	GR	33	55%
	6	Acephate	40%	EC	41	68%
	7	Imidacloprid	5%	WP	15	25%
	8	Phoxim	3%	EC	8	13%
	9	Imidacloprid	10%	WP	13	22%
	10	Buprofezin & Metolcarb	25%	WP	36	60%
	11	Abamectin & Imidacloprid	10%	EC	23	38%
	12	Abamectin	1.8%	WP	29	48%
	13	Buprofezin & Isoprocarb	25%	WP	12	20%
	14	Folimate	40%	EC	33	55%
Fungicide	1	Triophanate-methyl & Diethofencarb	50%	WP	27	45%
	2	Iprodione	50%	WP	15	25%
	3	Zhongshengmycin	3%	WP	22	37%
	4	Mancozeb	65%	WP	43	72%
	5	Carbendazim	50%	WP	36	60%
	6	Bismerthiazol	20%	WP	27	45%
	7	Cymoxanil & Mancozeb & Dimethomorph	72%	WP	20	33%
	8	Triadimefon	50%	WP	18	30%
	9	Carbendazim & Thiram	60%	WP	14	23%
	10	Difenoconazole	10%	WG	9	15%
	11	Carbendazim & Thiram	60%	WP	7	12%
Herbicide	1	Glyphosate	10%	AS	53	88%
	2	Paraquat	20%	AS	57	95%

[i] Ratio= user amount of this pesticide ÷ total amount of surveyed farmers in this village

TABLE 2: PESTICIDE PRODUCTS IN VILLAGE 2

Type	No	Active Ingredient	Formulation		User	Ratio
Insec-ticide	1	Cartap	98%	SP	6	10%
	2	Abamectin	0.90%	EC	27	44%
	3	Monosultap	90%	SP	22	36%
	4	Acetamiprid	5%	DP	16	26%
	5	Abamectin & Monosultap	3%	EC	34	56%
	6	Abamectin & Imidacloprid	1.80%	EC	41	67%
	7	Cyromazine	70%	WP	9	15%
	8	Abamectin & Monosultap	20%	EC	5	9%
	9	Profenofos	24%	EC	11	18%
	10	Imidacloprid & Beta-cypermethrin	10%	EC	22	36%
	11	Abamectin	2.50%	EC	4	7%
	12	Abamectin	3%	ME	31	50%
	13	Lambda-cyhalothrin	2.50%	EC	19	31%
	14	Cyromazine	50%	WP	23	38%
	15	Abamectin	1%	EC	27	44%
	16	Cyromazine	50%	WP	46	75%
	17	Abamectin	0.50%	WP	9	15%
	18	Abamectin	1.80%	EC	25	41%
	19	Carbosulfan & Imidacloprid	15%	EC	34	56%
	20	Imidacloprid	35%	SE	28	46%
	21	Abamectin & Indoxacarb	4.75%	EC	37	61%
Fun-gicide	1	Fenaminosulf	70%	DP	47	77%
	2	Ningnanmycin	8%	AS	26	43%
	3	Sulfur & Mancozeb	70%	WP	53	87%
	4	Fenaminosulf	50%	DP	23	38%
	5	Mancozeb	50%	WP	48	79%
	6	Mancozeb & Carbendazim	40%	WP	44	72%
	7	Mancozeb	80%	WP	39	64%
	8	Pyrimethanil	20%	WP	37	60%
	9	Carbendazim & Diethofencarb	50%	WP	14	23%
	10	Propiconazol	25%	EC	55	90%
	11	Tebuconazole	25%	EC	38	62%
	12	Flusilazole	10%	EC	33	54%
	13	Propiconazol	25%	EC	51	84%
	14	Carbendazim & Isoprocarb & Mancozeb	75%	WP	39	64%
Her-bicide	1	Glyphosate	10%	AS	53	88%
	2	Paraquat	20%	AS	57	95%

About PAN AP:

Pesticide Action Network (PAN) Asia and the Pacific is one of the five regional centres of PAN, a global network working to eliminate the human and environmental harm caused by pesticides, and to promote biodiversity based ecological agriculture. We are committed to the empowerment of people. We are dedicated to protect the safety and health of people, and the environment from pesticide use and genetic engineering. We believe in a people-centred, pro-women development through food sovereignty, ecological agriculture and sustainable lifestyles.

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