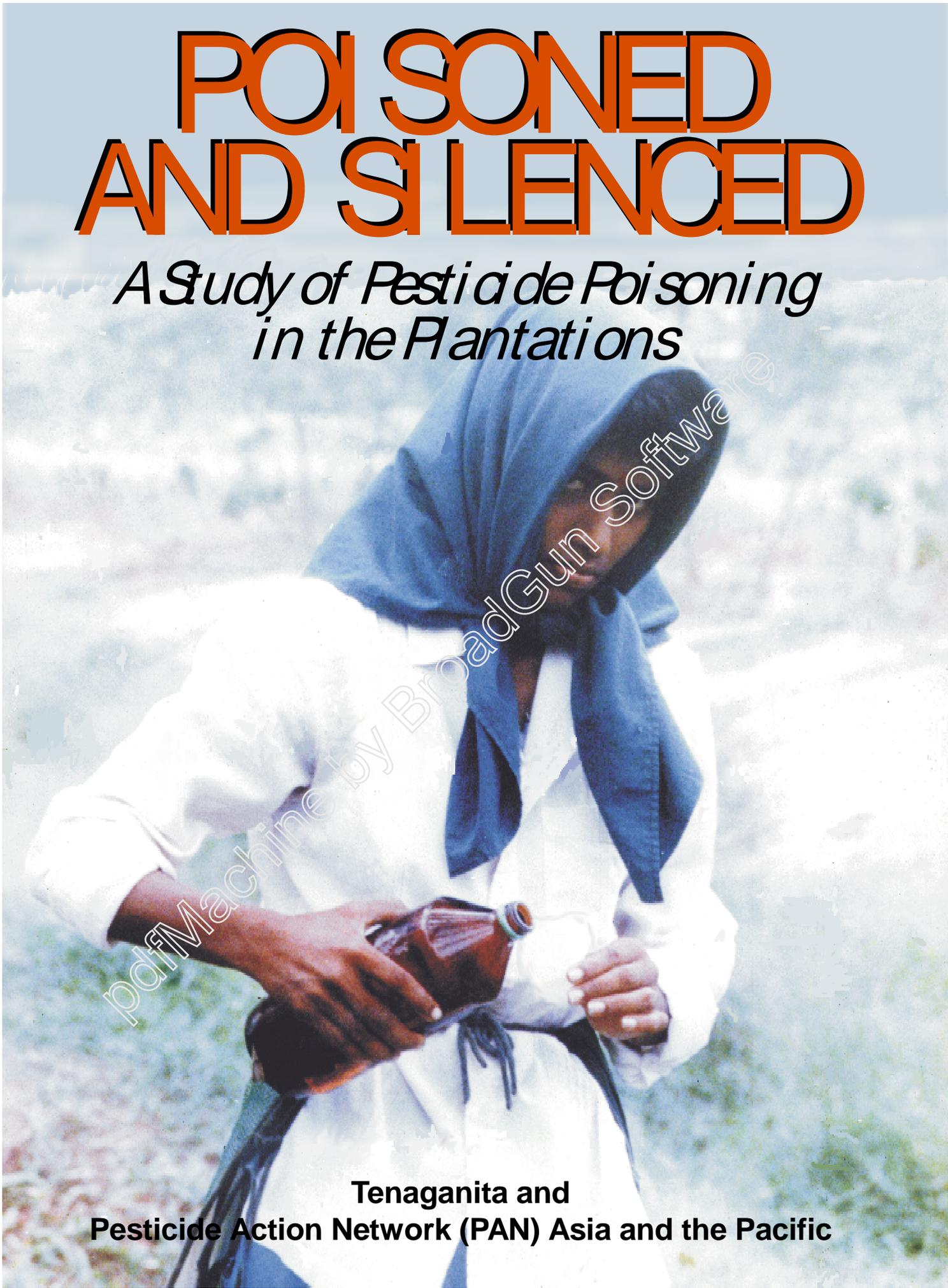


POISONED AND SILENCED

*A Study of Pesticide Poisoning
in the Plantations*

**Tenaganita and
Pesticide Action Network (PAN) Asia and the Pacific**



Tenaganita (Women's Force) is a women and migrant rights organization. It was born out of the struggles of women workers in the plantations and factories in 1991. Today it is the voice of women and migrant workers in Malaysia and regionally.

The organization's focus is the promotion and protection of rights of workers especially reproductive rights and empowerment of the women and migrants so that they can achieve their full potential in society.

Towards this end, Tenaganita has outreach services, training and education programs, legal support for women and migrants to assert their rights, participatory action research program, advocacy and the development of support through networking at all levels.

Currently, the organization gives emphasis to: i). Asserting Migrant Rights. ii). Mobility and HIV/AIDS. iii). Women, Chemicals and Cancer. iv) Trafficking in Women and Children.

Pesticide Action Network (PAN) Asia and the Pacific is one of the regional centers for PAN International – a global coalition of citizen's groups and individuals who are working to promote sustainable agriculture, and oppose the use of pesticides. PAN Asia and the Pacific is dedicated to ensuring the empowerment of people, especially women, agricultural workers, peasant and indigenous farmers. We are specially committed to protect the safety and health of people, and the environment, from pesticides use and genetic engineering in food and agriculture.

PAN AP prescribes to the following development principals; a participatory holistic approach; a commitment to gender equity and genuine partnership; the need to confront social injustice and global inequities; the value of biodiversity, appropriate traditional and indigenous knowledge system; and the recognition that our earth is one interdependent living system.



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Poisoned and Silenced

*A Study of Pesticide Poisoning
in the Plantations*

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Pesticide Action Network (PAN) Asia and the Pacific**

This Resource Book has been specially produced in order to facilitate information sharing and exchange with our Asia Pacific network partners, the media, and the public at large. It is hoped that the information shared, will stimulate debates and discussions as well as encourage networking, involvement and participation in the issues tackled within.

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Worker preparing herself for spraying duties. Photo: Tenaganita, 2002.

Executive Summary

The pesticides industry is widely accepted as a growing market in Malaysia. The area under oil palm plantations has been increasing sharply over the years, with a consequent rise in consumption of agrochemical products and herbicides contributing as much as 75 per cent of the RM 326 market for pesticides in 1997. The agrochemical industry is controlled by a handful of transnational corporations, which reap the benefits but are not accountable for its effects on humans and the environment.

Despite these rapid market developments, the legislative framework for monitoring and reduction in the use of pesticides (Pesticides Act 1974 and the Occupational Safety and Health Act (OSHA) 1994) is not entirely successful in dealing with the issue.

Women are the major workforce on plantations and undertake activities such as mixing, handling and spraying pesticides in their work environment. They are exposed to pesticides daily, along with their families who reside on the plantations. It is widely accepted that the harmful effects of chemicals affect women more than men due to their physiological make up. The estate management is oblivious to the problems faced by the women workers. Caught up in a vicious circle of poverty and disease, the women are voiceless, oppressed and do not oppose the management.

A study on women workers from selected plantations in the country revealed certain critical issues that need urgent attention. The study comprised a questionnaire survey, blood sampling for plasma pseudo cholinesterase enzyme and self-health monitoring cards on which respondents recorded their daily symptoms of pesticide exposure. This ensured the participation of women in the monitoring exercise and served as a tool for creating awareness about the hazards of pesticides on human health.

The study revealed that a majority of workers on plantations were Indian women, paid an average of RM14.6 per month. Herbicides were the most commonly used chemicals. Workers were not aware of the chemicals they sprayed, but were able to identify them by other criteria such as the common name, the colour and appearance of the product. Sprayers reported the mixing of "pesticide cocktails", a practice which is prohibited by law. The most common spraying equipment was the Hand Pump. Workers complained of poor maintenance and leaks in the sprays, and of the poor medical care and first aid facilities on the estate. Some plantations provided sprayers with protective equipment; others did not bother to do so. Even when it was provided, workers did not use protective gear, as it was uncomfortable in the hot and humid conditions. Sprayers did not practice common hygiene such as washing their hands before meals, or washing their clothes after spraying.

The common symptoms of fatigue, back pain, giddiness, difficulty in breathing, skin problems, nausea, eye irritation, headache, tight feeling in the chest and swelling are indicative of exposure to organophosphate and carbamate type of pesticides. Blood samples revealed a depression in the acetyl cholinesterase enzyme activity, which is confirmation of pesticide poisoning. After a one-month break in spraying, enzyme levels of selected sprayers were elevated, reconfirming that they were poisoned by organophosphate when the readings were taken a month earlier.

The reduction or prevention of toxicity related to pesticide usage in the country would entail that the use of hazardous compounds such as pesticides is banned and/or severely restricted; information is easily available on the subject; workers at risk are made aware and empowered of their rights; adequate medical care is available where it is most needed; existing legislations are reviewed to be more effective in handling the pesticides issue; effective monitoring is in place to ensure that legal regulations are followed; pesticide users are trained in the appropriate application of pesticides; alternatives to chemical pest control are promoted in the country; policy level advocacy to reduce pesticide usage is undertaken; the widespread dissemination of information in the mass media; and the integration of the gender perspective in the analysis of the occupational hazards of pesticides.

The current study, though not entirely conclusive is a pioneering attempt to document the health related problems of women sprayers on plantations in Malaysia. The findings raise critical issues regarding the safety and health of workers on plantations that need further in-depth scrutiny and exploration.



A cornucopia of pesticide containers and spraying equipment photographed near the sink area in a worker's home. Photo: Tenaganita, 2002.

Chapter 1

Pesticide Use in Malaysia and its Health Implications

Agrochemicals are widely used in Malaysia especially in the plantations. Mainly dominated by herbicides, these are most commonly used in the approximately 4 million hectares of plantation crops—palm oil, rubber and cocoa. In 1993, the agrochemical market in Malaysia was worth RM262 million, with herbicides accounting for 76.3 per cent of the share. In 1997, the figure rose to the level of RM326 million, with herbicides still accounting for three-quarters of the share at 75.1 per cent. The herbicide market itself was estimated at RM200 million in 1993 and at RM245 million in 1997. (Figure 1 and 2)

FIGURE 1: Trends in the Agrochemical Market in Malaysia

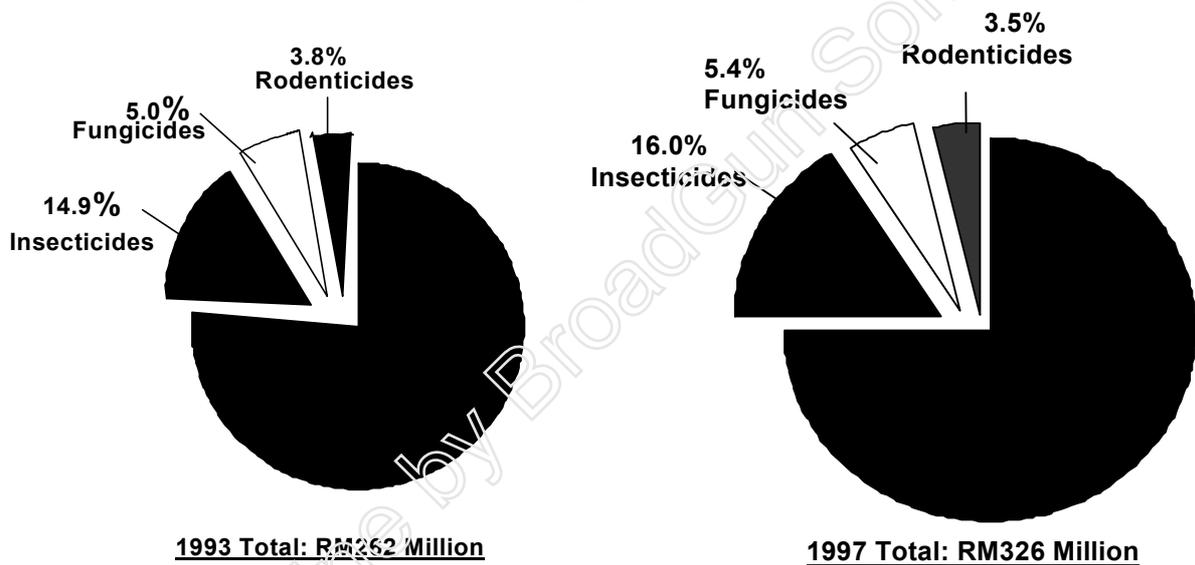
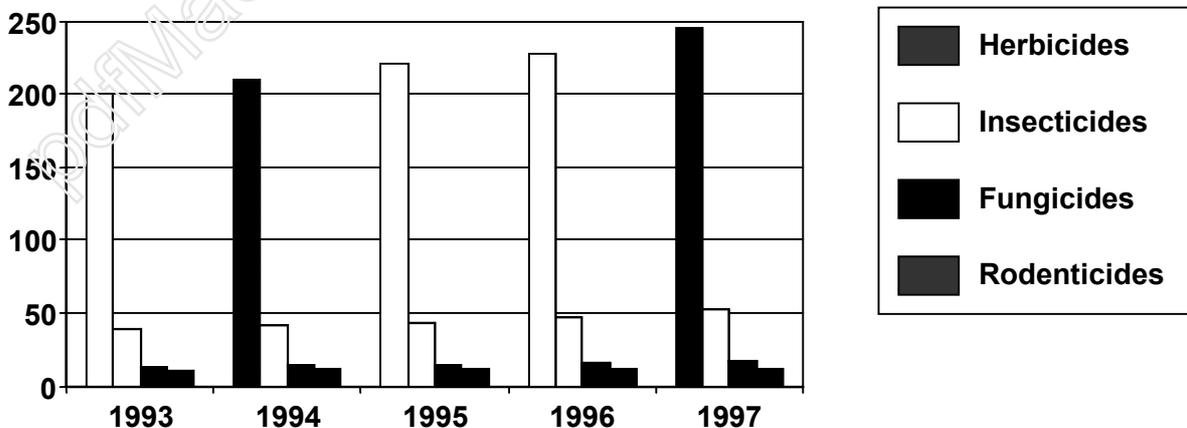


FIGURE 2: Consumption of Agrochemicals in Malaysia (RM million)* 1993 – 1997



Source: Malaysian Agricultural Directory & Index, 1999/2000

The Third National Agricultural Policy (1998-2010) for Malaysia states that the rapid growth of the oil palm industry in the country will be sustained, with future expansion into Sabah and Sarawak and through reverse investment in neighbouring countries. Oil palm and rubber are viewed as important exports and significant revenue earners for the country.

With limited land availability, the plantation area has remained constant over the years. However, large areas of land under cocoa and rubber crops have been replanted with the more lucrative oil palm, which is expected to further expand agrochemical usage in the country. The area of oil palms in Malaysia is expected to rise from 2.7 million ha (in 1998) to 4.3 million ha in 2020, with a subsequent rise in the utilisation of agrochemicals such as herbicides, rodenticides, insecticides and fungicides as indicated in *Table 1* (AGROW, 1998).

Table 1: Agrochemical usage on Oil Palms in Malaysia (1998-2020)

Year	1998	2000	2005	2010	2020
Oil palm area (000 ha)	2742	2874	3192	3518	4251
Herbicides (million litres)					
Glyphosate	7.7	8	8.9	9.9	11.9
Paraquat	4.8	5.0	5.6	6.1	7.4
2,4-D amine	1.0	1.0	1.1	1.2	1.5
Spray adjuvants	0.5	5.2	5.7	6.3	7.7
Rodenticides (tonnes)					
Warfarin	2.8	2.9	3.3	3.6	4.3
Bromadiolone	0.5	0.5	0.6	0.7	0.8
Insecticides					
Cypermethrin (000 litres)	1974	2069	2298	2533	3061
Carbofuran (000 kg)	1398	1466	1628	1794	2168
Sime RB Pheromone (000 sachets)	129	135	150	165	200
Fungicides (kg)					
Thiram	4524	4742	5267	5805	7014
Benomyl	2550	2673	2968	3272	3953

Herbicides (Glyphosate and Paraquat) and rodenticides are the major pesticides used in oil palm plantations. The state and sector-wide distribution of oil palm area is indicated in *Table 2*.

In Malaysia, over 3,000 retail outlets are involved in the manufacture, formulation and packaging of pesticides (Lum et al. 1990). There are presently 1,600 pesticide products registered in the country, comprising about 250 active ingredients (Ong, 1996).

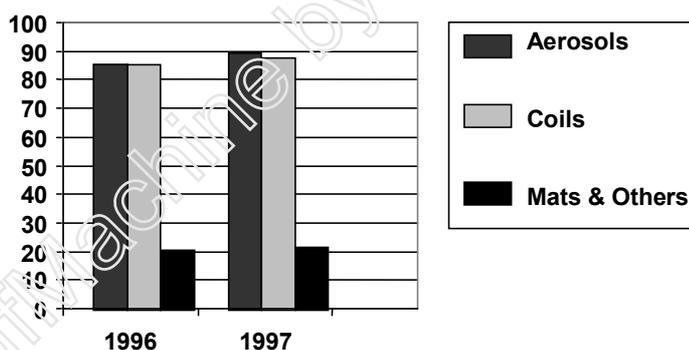
Although not strictly referred to as agrochemicals, household chemicals contain pesticides as active ingredients, and are a source of exposure to households especially to young children. These are largely insecticides packaged differently for household needs. The use of aerosols and mats is increasing at a steady rate of 5-6 per cent annually, much higher than the conventional coil usage, expanding only at 1-2 per cent annually (*Figure 3*). Though coils are the cheapest product in the market, consumers object to the stench and sticky residue left behind by smoke, and hence prefer the more expensive aerosols and mats.

Table 2: Distribution of Oil Palm Planted Area by State and Sector (hectares), 1997

State	Small-holders licensed	FELDA	FELCRA	RISDA	State schemes/Govt Agencies	Private Estate	Total
Johor	108,450	129,382	19,656	3,901	17,578	308,025	586,992
Kedah	8,095	300	1,016	481	0	31,737	41,629
Kelantan	1,052	39,119	6,168	420	8,948	17,121	72,828
Malacca	3,182	1,191	1,215	763	0	29,237	35,588
N. Sembilan	10,444	24,675	5,986	1,770	0	62,404	105,279
Pahang	11,591	285,632	25,507	9,719	50,220	157,433	540,102
Penang	7,035	0	484	56	0	7,297	14,872
Perak	43,291	23,542	29,526	3,259	6,629	169,701	275,948
Selangor	35,553	8,929	3,872	269	9,880	81,183	139,686
Terengganu	3,011	42,272	19,410	16,425	14,633	47,898	143,649
<i>P. Malaysia</i>	<i>231,704</i>	<i>555,042</i>	<i>112,840</i>	<i>37,063</i>	<i>107,886</i>	<i>912,036</i>	<i>1,956,573</i>
Sabah	26,178	118,057	1,348	0	58,591	511,562	715,736
Sarawak	2,158	8,383	3,547	0	58,036	74,883	147,007
<i>Sabah / Sarawak</i>	<i>28,336</i>	<i>126,440</i>	<i>4,895</i>	<i>0</i>	<i>116,627</i>	<i>586,445</i>	<i>862,743</i>
MALAYSIA	260,040	681,482	117,735	37,063	224,515	1,408,481	2,819,316

Source: Malaysian Agricultural Directory & Index, 1999/2000

FIGURE 3: Consumption of Household Products in Malaysia, 1996 – 1997



Source: Malaysian Agricultural Directory & Index, 1999/2000

In Malaysia, the aerial application of pesticides is still permitted by the Pesticides Board in collaboration with the Department of Civil Aviation, though retaining the option only as a last resort. The seeming lack of urgency in reducing the amount of pesticides used in the plantations is a cause for concern especially with regards to the safety and well being of women workers, particularly those employed as pesticide sprayers and applicators.

Several local companies in Malaysia are diversifying into agri businesses. The country is also becoming a focal point for pesticide exports in the region, with active ingredients being sent for formulation into new products and re-export to neighbouring countries. At the global level, the European and North American markets are reaching

their limits in pesticide sales, and the industry is aggressively promoting its products to farmers, plantations and governments in the South.

The agrochemical industry is largely controlled by a handful of transnational corporations that reap enormous benefits but are subjected to little accountability. Despite having mechanisms such as pesticide legislation and stringent testing protocols for registration, the onus of proving product safety does not lie with the manufacturer. It is usually up to the governments to ban specific pesticide products if found hazardous to health.

Currently, over 120 tests have to be carried out prior to issuing a permit to register a pesticide in the U.S. Despite this, and given the hundreds of new chemicals introduced globally every year, it is no surprise that systematic health and environmental poisoning are believed to be common. Pesticide companies routinely sell products banned in their home countries to the developing world, where regulatory and legal enforcement capacities are lacking.

The Global Industry

As stated above, with the European and North American markets reaching their limits in terms of pesticide sales, the Pesticides industry is now heavily promoting its products to the South. A point of much concern is the often aggressive marketing tactics that take place to push sales. Many of their product promotion tactics even go against the codes of conduct that they have voluntarily accepted. Some of these tactics are based on untrue information and other tactics that could be considered dangerous.

For example in 1993, Malaysian NGOs and the general public heavily criticised an advertisement taken out by ICI, which appeared in the local newspapers, claiming that Paraquat is "environmentally friendly". (Rengam, 1994). In 1993, ICI spun-off its "new science" industries (pharmaceuticals, agrochemicals, seeds and specialty chemicals) into a separate company called Zeneca. Zeneca then merged with the Swedish pharmaceutical company to form AstraZeneca. In 1999, AstraZeneca merged its agrochemical divisions with Novartis to form a company presently called Syngenta, which continues to market Paraquat in Malaysia.

In another case, in an interview with a reporter from the Bangkok Post, dated June 9th 1999, the manager of Monsanto Thailand boasted that Roundup (trade name for glyphosate) was safer than coffee or table salt. He also maintained, "In another study on rabbits, Roundup has been found to cause less irritation than baby shampoo". (Chinvarakorn, 1999). Such statements clearly violate the Food and Agriculture Organisation's (FAO) International Code on the Distribution and Use of Pesticides, which the company is known to voluntarily honour.

Since the early trends in the 1970s, the pesticides industry has gone through a period of consolidation. After a flurry of mergers and acquisitions in the last few years, corporate domination of the food system has reached a peak. As reported by AGROW Crop protection News in 1999, the top five agrochemical companies, Syngenta (merger of Novartis and Astra-Zeneca, as mentioned above), Aventis (Rhone-Poulanc and AgrEvo), Monsanto (Pharmacia¹), BASF and Du Pont, building up strategic monopolies incorporating dominant positions in the seed, agrochemicals, pharmaceuticals and related markets. As reported by the Canada-based ETC Group (Action Group on Erosion, Technology and Concentration), in 2000 the top two companies-Syngenta and Pharmacia-control 34 per cent of the global agrochemical market, valued at US\$29,880 million.

Pesticides and Human Health

Pesticide Exposure and Toxicity in Humans

Pesticides are classified into four categories depending on their toxicity (by U.S. Environmental Protection Agency EPA and World Health Organisation WHO). The most dangerous pesticides are in EPA Category 1, and WHO Category 1A and 1B.

There are four ways pesticides can enter the human body – by breathing, by swallowing, through skin contact and through the eyes in cases of splashes or spills. The most common route of pesticide absorption is through the skin.

Table 3: Top 10 Agrochemical Companies

Company	Agchem Sales in US\$ millions	% share of world market
1. Syngenta (Novartis + AstraZeneca)	\$6,100	20%
2. Pharmacia (Monsanto)	\$4,100	14%
3. Aventis (AgrEvo +Rhône Poulenc)	\$3,400	11%
4. BASF (+ Cyanamid)	\$3,400	11%
5. DuPont	\$2,500	8%
6. Bayer	\$2,100	7%
7. Dow AgroSciences	\$2,100	7%
8. Makhteshim-Agan	\$675	2%
9. Sumitomo	\$625	2%
10. FMC	\$575	2%

Source: ETC Group, based on data provided by Allan Woodburn Associates cited in Agrow. July/August, 2001

Some parts of the skin, such as the genital area, the face and neck followed by the back of the hands, armpits and forearm absorb pesticides more easily than others. If the skin is damp or wet, or if there is a cut or rash, pesticides will go through the skin faster and in larger amounts. Children absorb more pesticides than adults at the same level of exposure, due to a large skin surface for their size, and because of rapid breathing rate.

Pesticides affect human health in three major ways:

- *Immediate / acute effects:* reactions to pesticides that occur due to direct contact with pesticides and manifest within a very short time. The most common effects are irritation of the eyes, nose and throat such as tearing, stinging, burning and coughs, skin irritation and rashes. Almost 76 per cent of all acute poisonings in Asian countries are caused by organophosphates (Jeyaratnam et al, 1987).
- *Delayed / Chronic effects:* reactions that occur due to low levels of exposure over a long period of time, which may take months or years to manifest as cancers, neurological damage or reproductive system disorders.
- *Effects on existing conditions:* aggravation of existing medical conditions such as asthma and allergies, heart and immune system disorders.

Of late, there has been growing concern over the use of chemicals that can disrupt the endocrine system, which controls key developmental, reproductive, behavioral and immunological functions. Of all the endocrine disrupting effects of pesticides, the most serious ones arise from changes that occur during foetal development in the womb, as these changes are irreversible. For example, changes in the developing brain can alter neural pathways leading to alterations in behavior and endocrine function. Changes to the thymus and bone marrow cells can lead to immune suppression. Changes to the developing testes or ovaries can affect sperm or egg quality and quantity (PAN AP, 1999).

Chemical pesticides known to disrupt the endocrine system among others include DDT and its degradation products such as DDD and DDE, Alachlor, Aldicarb, Aldrin, Atrazine, Carbaryl, Carbofuran, Dimethoate, Dinoseb, Endosulfan (thiodan), Endrin, Fenitrothion, Fipronil, Lindane, Malathion, Maneb, Methoxychlor, Parathion, 2,4,5-T, 2,4-D, Toxaphene, di (2-ethylhexyl) phthalate, dicofol, hexachlorobenzene and synthetic pyrethroids, Chlorpyrifos and Deltamethrin.

There is also a significant association of congenital limb defects in children whose mothers have been exposed to pesticides in close proximity (Krickler et al, 1986).

Factors Affecting Toxicity in Humans (WHO/UNEP 1990)

The severity of any adverse effect from exposure to pesticides depends on the dose, the route of exposure, how easily the pesticide is absorbed, the types of effects of the pesticide and its metabolites, and its accumulation and persistence in the body.

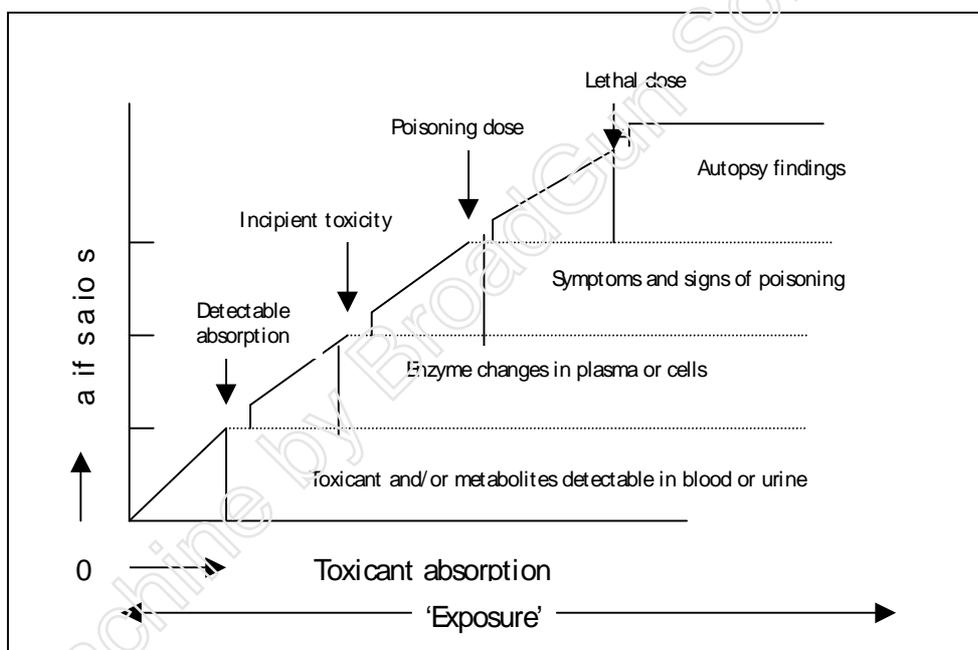
Further, the toxic manifestations depend on the health status of the individual. Malnutrition and dehydration are likely to increase sensitivity to pesticides. Sores and skin abrasions may facilitate uptake of pesticides through the skin, which is of particular importance when adequate protective clothing is not available or not worn.

Nutritional deficiencies such as Protein Energy Malnutrition may aggravate pesticide toxicity. Water deprivation may make people more susceptible to the effects of anticholinesterase pesticides. Hence field workers suffering from dehydration are more susceptible to poisoning by organophosphorous and carbamate pesticides. A rise in ambient temperature often makes the toxic effects of pesticides worse.

In the body, the pesticide may be metabolised or it may be stored in fat, or excreted unchanged. In times of poor nutrition, the body's fat deposits are mobilised, releasing the stored pesticides into the bloodstream, with the possibility of toxic effects if the concentration reaches high levels.

When two or more pesticides are used simultaneously, they may interact and become either more toxic (synergism or potentiation, as with lindane and heptachlor) or less toxic (antagonism). Effects that result from pesticide interactions although hard to identify and quantify, are probably of more importance than generally recognised.

Figure 4: Manifestations of Toxicant Absorption (Morgan 1980)



Occupational Exposure to Pesticides

WHO estimates the total cases of pesticide poisoning worldwide at between 2 and 5 million workers each year of which 40,000 are fatal. Of these, 70 per cent of the cases are in the developing world. Copplestone (1985) states that about 60-70 per cent of all cases of unintentional acute pesticide poisoning cases are due to occupational exposure. Workers in agriculture are said to face at least twice the risk of dying on the job than other sectors. Those in developing countries such as Malaysia are especially at high risk due to inadequate education, training and safety systems.

Table 4: Factors Affecting Skin Absorption of Pesticides

Skin characteristics	<ul style="list-style-type: none">- sores and abrasions- wetness of skin- location on the body (absorption occurs readily through the eyes and lips)- vascularization
Environmental factors	<ul style="list-style-type: none">- temperature- humidity
Pesticide characteristics	<ul style="list-style-type: none">- acidity (pH)- vehicle- physical state (solid, liquid or gas)- concentration of active ingredient

The following list shows some of the occupations at potential risk from exposure to pesticides:

- pesticide manufacturers (production workers)
- formulators
- vendors
- transporters
- mixers
- loaders
- operators of application equipment (farmers / sprayers / workers)
- growers and pickers
- rescue and clean up parties

Long-term exposure is likely to occur in the occupational groups listed above. Very few reports of such effects are available, and further studies are needed to document occupational exposure to pesticides.

Data collected from the Social Security Organisation, Malaysia, 1991 suggests that the accident rate per 1,000 workers is as high as 25 per cent in the country. In 1991, as many as 35,224 workers in the agricultural sector were affected by accidents, an increase of 8 per cent over a period of three years (ILO, 2000).

A report by the Malaysian Factories and Machinery Department, the agency that enforces the Occupational Safety and Health Act, revealed that the accident rate for improper handling of pesticides is four times higher than that of other industries, and is as high as 93 per 1000 workers as compared with the national average of 23 per 1000 workers (Rengam, 1991).

Women are at High Risk

Due to the multiple roles they play in society, women workers have special needs concerning nutrition, lifestyle and reproductive health. Women have a dual reproductive and economic role as unpaid workers at home, and as paid workers in the fields. On an average a woman works 1-3 hours per day longer than a man in the same society.

The physiological differences in women's bodies (more fatty tissue, thinner skin and lower kidney functions) make them more vulnerable to pesticide exposure than men. During pregnancy, pesticides can cross the placenta and affect the developing foetus (PAN AP, 1999). It is therefore crucial that female sprayers in plantations are monitored constantly for exposure to pesticides.

An early study in Malaysia revealed that 88 of the 100 cases of confirmed organophosphate poisonings were women of Indian origin. The study attributed this to the easy availability of pesticides on rubber plantations, which employ many Indian women (Delilkan et al, 1984).

In general, the health hazards of women workers have been traditionally under-estimated because occupational safety and health standards, and exposure limits to hazardous substances are based on male populations and laboratory tests.

Signs and Symptoms of Organophosphate Poisoning

Acute organophosphate poisoning accounts for 53.6 per cent of total poisonings in Malaysia (He, 1999). Symptoms of acute organophosphate poisoning develop during or after exposure within minutes to hours, depending on the method of contact. Exposure by inhalation results in the fastest appearance of toxic symptoms, followed by the gastrointestinal route and finally the dermal route.

Some of the most commonly reported early symptoms include headache, nausea, dizziness and hyper secretion, the latter of which is manifested by sweating, salivation, lacrimation and rhinorrhea. Muscle twitching, weakness, tremor, incoordination, vomiting, abdominal cramps, and diarrhoea signal a worsening of the poisoned state. Meiosis is a helpful diagnostic sign and the patient may report blurred or dark vision. Anxiety and restlessness are prominent, as are a few reports of choreiform movements. Psychiatric symptoms include depression, memory loss, and confusion. Toxic psychosis manifested as confusion or bizarre behaviour has been misdiagnosed as alcohol intoxication. Children often present with slightly different clinical picture than adults. Seizures and mental changes such as lethargy and coma are common (U.S. EPA, 1999).

A study by Yusof et al (1995) revealed that in comparison to a non-exposed control population, 12.4 per cent of the agricultural workers in Ranau, Sabah suffered from nail abnormalities, and almost 50 per cent suffered from reproductive disorders and miscarriages attributable to pesticide exposure.

Confirmation of Poisoning

It is commonly advised that if pesticide poisoning is probable or suspected, it should be treated immediately, without waiting for laboratory confirmation.

For clinical confirmation, blood samples should be drawn to measure the plasma cholinesterase or red blood cell AchE (Acetyl cholinesterase enzyme) levels. A depression of plasma pseudo-cholinesterase and /or RBC acetyl cholinesterase levels is a good indicator of excessive organophosphate absorption. A significant number of organophosphates must be absorbed to depress blood cholinesterase activity, but enzyme activities especially

Table 5: Common symptoms of Acute Organophosphate Poisoning (PAN/ CTA 1995)

Mild to moderately severe poisoning	Severe poisoning (in addition to those seen in mild poisoning)	Very severe poisoning (in addition to those seen in mild and severe poisoning)
<ul style="list-style-type: none"> - nausea, vomiting - headache - increased salivation - extreme weakness, fatigue - dizziness - flu like symptoms - increased perspiration - blurred vision - inarticulate speech 	<ul style="list-style-type: none"> - difficulties in walking - abdominal cramps and diarrhoea - excessive perspiration with salivation - twitching of the eyelids, tongue and gradually of other skeletal muscles - pin sized pupils, but pupils may also be dilated - uncontrollable urine excretion and bowel movements 	<ul style="list-style-type: none"> - generalized convulsions (resembling epileptic seizures) - unconsciousness - acute breathing problems - drop in blood pressure - death due to respiratory failure, heart failure, and pulmonary oedema

plasma pseudo cholinesterase may be lowered by dosages considerably lesser than are required to cause symptomatic poisoning. Depression of the plasma levels usually persists for several days to a few weeks. The approximate lower limits of normal plasma and RBC cholinesterase measured by the BMC Reagent Set (Ellman Boehringer method) are 1875 and 3000 mU/mL/min.

In certain conditions, the activities of plasma and RBC cholinesterase are depressed in the absence of chemical inhibition. About 3 per cent of individuals have genetically determined low level of plasma pseudocholinesterase. Patients with hepatitis, cirrhosis, malnutrition, chronic alcoholism and dermatomyositis exhibit low levels. A number of toxicants including nicotine, state of early pregnancy, birth control pills may also cause depression of levels.

It is generally accepted that everyone has his or her own personal level of cholinesterase. This personal level called a 'baseline' can be lower or higher in some people than others. To confirm organophosphate poisoning, a reduction from this baseline level needs to be established. Unfortunately, in most cases, baseline levels (levels before exposure) are not available and hence two or more repeat testing are suggested to confirm poisoning (Moses, 1996).

Pesticide Poisoning Cases in Malaysia

Recording of pesticide poisoning cases in Malaysia has been limited to in-patient data, laboratory reports from government hospitals and records from the Chemistry Department of the Ministry of Science, Technology and Environment. From 1970 to 1982 there were 100 cases of organophosphate poisoning admitted to the Intensive Care Unit, University Hospital in Kuala Lumpur (Delilkan et al, 1984). Data from the Ministry suggest that most cases of poisonings from 1979 to 1986 were related to pesticides, mainly the herbicide Paraquat, and of the causes, 49.1 per cent were intentional and 37.8 per cent accidental. Hospital records from 1994 revealed that 740 poisonings related to pesticides occurred at work (Rajendra, 1996). However, data on accidental pesticide poisoning is often confused by the incidence of pesticide poisonings related to suicides.

Geographical areas with a concentration of plantations are likely to record high levels of mortality due to pesticide poisoning. Data clearly suggests that farm and plantation workers constitute 45 per cent of the reported pesticide deaths (Sinnaia, 1989). Another survey revealed that 13.3 per cent of all agricultural workers in Malaysia were poisoned, with an average of 6.7 per cent of agricultural workers poisoned per year (Jeyaretnam et al, 1987). Studies have also shown that 12.2 per cent of a total of 264 poisoning cases treated in a teaching hospital were attributable to pesticides (Awang et al, 1991).

A more recent study (Zain, 1998) reports that in the year 1995, a total of 972 cases of pesticide poisonings were admitted to Malaysian hospitals. Of these, 133 were caused by accidents, 247 by other causes, 520 were attributed as suicides, while causes were unknown for 72 cases. The same study reports that Johor and Perak had the highest number of deaths due to pesticide poisoning (33 cases) with Kedah reporting only one case; Perak reported the highest number of hospitalisations (137) and Kedah (29); Negeri Sembilan reported the highest number of suicide attempts using pesticides (125), Perak (71) and Kedah (4).

A study by the Consumer Association of Penang (CAP, 1996) revealed that as many as 90 per cent of the farmers surveyed did not observe safety measures while handling pesticides. Used pesticide containers were disposed off in water areas, and none of the farms displayed the notice "Danger: Pesticide Sprayed Area, No Entry to Unauthorized Persons", as stipulated by regulations.

A 1998 survey of pesticide use and associated incidences of poisoning in Peninsular Malaysia, reported that estate workers formed the majority of all pesticide poisonings reported. The study also revealed that organophosphorous insecticides and rodenticides were used widely in oil palm plantations, though the estate workers did not understand or were unaware of the colour coding of chemicals, and the potential hazards from pesticides (Ramasamy et al, 1988).

Poisoning cases most commonly occur during spraying, mixing, and diluting the pesticides. A study conducted in Malaysia revealed the following information on the activities associated with high incidence of pesticide poisoning (Jeyaretnam, 1982):

Some of the specific factors contributing to acute pesticide poisoning are (Jeyaretnam, 1985):

- Lack of protective clothing suitable for tropical climates,
- Poor knowledge and understanding of safe practices in pesticide use,
- Use of pesticides (by farmers) in concentrations in excess of requirements,
- Poor maintenance facilities for spray equipment, giving rise to hazardous contamination, and
- Use of pesticide mixtures.

Studies on the occupational exposure of sprayers have been limited in Malaysia. Swan (1969) carried out two fields trials on Malaysian rubber plantations to study the exposure of operators applying Paraquat with hand operated knapsack sprayers. Howard et al (1981) studied the health of Malaysian plantation workers using Paraquat sprayers. Chester and Woollen (1981) reported on occupational exposure to Paraquat. Lee and Chung (1985) carried out an extensive study on the potential contamination of various parts of a spray operator's body. Tan et al (1988) studied the potential dermal exposure of spray operators.

Table 6: Poisoning Incidents in Malaysia by type of Activity

	Incidents	Percent poisoned
Spraying	181	5.7
Mixing or diluting	107	3.4
Other (including equipment repair)	2	0.2

A study by Whitaker (1989) covering 400 Malaysian rubber and oil palm small holders in Johor, Perak, Kelantan and Pahang reports a satisfactory awareness regarding the hazards from pesticides, safety and hygiene. The study however adds that standards in storage of pesticide containers and disposal of empty containers need to be improved, and emphasises continued education and training programmes regarding the use of pesticides.

Very few studies have been undertaken to study the problem of acute pesticide poisoning among agricultural workers, and more so women workers. The inadequacy among health professionals to recognise and treat pesticide poisoning victims is also generally recognised.

End note:

¹ When *Pharmacia* acquired *Monsanto* in November 1999 it quickly spun off the ag biotech company as a detached agribusiness unit. However, *Pharmacia* retains 86% control of the new, independent entity.

Chapter 3

Women Plantation Workers

Poisoned and Silenced – How Long More?

Yes! This is the reality of the lives of women workers in the plantations in Malaysia. Women are not only caught in a web of exploitation at their workplace but are continuously silenced and subjugated by cultural, social and patriarchal norms that have become institutionalised.

Currently more than half of the workforce in plantations are women. The women continue to be employed as unskilled, temporary contract workers doing the most menial and underpaid jobs. Yet, as more and more Malaysian workers leave the plantations to work in the towns, the women stay back so that they can at least guarantee a roof over the heads of their children. Urbanisation and industrialisation has pushed men and the young to work in the new industrial zones. The women decide to stay on and continue to take on any job so that they can have a house and basic amenities, which are expensive and beyond the reach of plantation workers.

Historically, women were recruited into the plantations only after 1928 when the Indian Emigration Act was amended and enforced to change the sex ration rule of recruitment. The new rule required and allowed women to immigrate to Malaya. For every 3 males, 2 females should be assisted to emigrate. The key objective was to develop family units so that male workers would become permanent workers. This would then ensure a steady and permanent workforce that would be more productive. Consequently women played the dual role of providing cheap labour and social stability.

Hence, women became a source of cheap labour. They were recruited as field workers and later as tappers with unequal wages to that of the men. Since the families were in constant debt-bondage, the women were not in a position to demand better wages and conditions. The women were viewed as dependents of the male rubber tappers, and as such their wages were considered as supplementary to that of the men.

At the time women's work was irregular and temporary. Their wages were not only low but inconsistent with the men. The majority were field workers whose wages were much lower than the casual tappers. A primary reason for employing women as dependants of male tappers was vividly stated in a circular (NO. 12, 1931) by the Plantation Association of Malaya that read:

"The tappers' wages were not adequate to cover his dependants' cost of living. Either the tapper had to be paid enough to support his dependants or his dependants had to be employed. The latter of course was cheaper."

Geographically, the women together with the men and their children were isolated from the rest of Malaysian society. They lived in what is popularly called the 'green ghettos'. Today, the plantations are still our 'green ghettos' but the women are in a worse-off situation. These days, women often live in broken homes, many have separated from their husbands, and struggle on alone to manage the family. In all aspects, economically, political or socially, the women are isolated, remain subservient and exploited.

However, as Malaysia aggressively pushed on with its new economic strategies and policies, the lives of women in the plantations changed as well. In the early sixties, when synthetic rubber consumption rose to more than 60 per cent globally, rubber prices dropped sharply in the country. With the developed countries controlling synthetic rubber, Malaysian plantations saw that they could not compete even though they tried for higher yields using stimulants. This also saw the tapper being pressured to tap up to between 600 to 700 trees as averse to 350 trees per day. The plantation sector was under pressure to diversify and introduced oil palm as the alternative crop. This brought about a major restructuring of the workforce.

The switch to oil palm cultivation required more 'intensive care' from pests, and women were recruited as sprayers of pesticides and fertilizers. Photo: Tenaganita, 2002.



Consequently, the male workforce increased since it was only men who were employed as harvesters of oil palm fruits. Women who had been tappers, and recognised as skilled workers, lost their jobs. However, the oil palm crops required more intensive 'care' from pests. The use of pesticides became a major requirement, with frequent spraying becoming the norm. Women were recruited as sprayers of pesticides and fertilisers. Once again women lost their skills and were relegated to the status of 'unskilled workers', and used for maintenance of trees and soils, and collected loose fruits from the ground after harvest. As a result women worked in the most menial and hazardous jobs in the plantation. And today it is estimated that there are about 30,000 women pesticide sprayers in the country!

After more than 180 years, has the situation changed for women in the plantations? Unfortunately, in the experience of Tenaganita, the situation has become even worse. Tenaganita has been working with plantation workers since its inception in 1991. In the last 11 years Tenaganita has been conducting regular health workshops, interviews, surveys, counselling sessions, seminars, focused group discussions, leadership training and awareness campaigns with women plantation workers. This work and collaboration with women plantation workers has made it possible for Tenaganita to compile information about the work and life of plantation workers, and compile case studies of their exploitation as women, and as workers. The information in this chapter is based on 10 years worth of experience, work and sharing by women plantation workers.

In those early days, women who were working in the plantations did face hazards of snake bites, mosquitoes, and the impacts of carrying heavy buckets of latex to the collecting centre. But today the hazards are even worse. Women are poisoned slowly by chemicals they use each day in their workplace. Women's health has suffered from chronic poisoning, accidents, and violence and sexual abuse.

Women face multiple forms of violence. Many of the sprayers interviewed had been beaten, either by their fathers or husbands. Many had been raped during marriage, especially when they refused sex out of fear of bearing another child. Nalini in her interview stated; *"My husband would take all my overtime wages, go the alcohol shop, come home drunk, accuse me of having sex with others and then beat me up. I became a young widow when my husband, after too much of drinks, fell unconscious onto a railway track and was crushed by an oncoming train."* (Please see the case studies included, *'Putting a face to the Statistics'*)

Some of the women also faced violence and sexual harassment at work. One woman even stated how she was sexually harassed by the 'mandor' or supervisor. This form of abuse has created fear among the women. The women who have spoken up were given spraying jobs deep in the interior of the estates.

Women have little recourse to treatment, cure or even basic first aid. Due to the absence of medical monitoring and a total lack of understanding of how women are affected by these chemicals, the extent of the impact of pesticides and chemicals on women, on their reproductive health and on their unborn children, is unknown.

Women are biologically different from men, although this makes very little difference in measures of performance. These biological differences have an impact on the way that women are affected by chemical poisons, particularly pesticides. The skin is the body's largest organ and 90 per cent of exposure to pesticides occurs through the skin. Women have thinner skin than men and may absorb more under similar levels of exposure. This predisposes women to higher absorption of chemicals into the body. In addition, certain persistent pesticides (such as DDT) are stored in fatty tissue and can stay in the body for many years. Since women have a higher percentage of body fat than men, they store more pesticides in their body. Most of the pesticides in use today do not stay in the body for more than two or three days. They are eliminated from the body through the urine. This is why it is very important for workers exposed to pesticide to drink lots of water. Women especially must drink lots of water since their renal function, compared to men, is slightly less efficient, especially during pregnancy (Moses, 1999).

Very few women know that the highest absorption point is the genital area especially through the vagina. For women who are brought up to feel ashamed of themselves, who refuse to look at their own vagina, they do not know the risks they are taking as pesticide sprayers. In fact, the patriarchal and cultural norms and practices that subordinate women and suppresses her sexuality, makes women ignorant and vulnerable to pesticide poisoning. As this study reveals, women experience severe vaginal burning sensations after spraying but suffer in silence. Since hospital assistants (HA) are usually male, women are shy and ashamed to state this problem to the men, and the problem goes unchecked. This underlines the dilemma and lack of gender sensitivity prevalent in plantations, and in medical facilities.

The developing foetus is protected by the placenta. While the placenta does an admirable job of keeping bacteria out, it does however allow certain toxic chemicals including toxic pesticides to cross the placenta. Women, let it be farmers or workers, continue to spray even when they are pregnant. This brings not only high risks to the pregnancy itself, but also to the child who faces the risk of chronic poisoning, and being born with abnormalities or deformities. Several pesticides can disrupt the body's endocrine or hormonal system. These endocrine disruptors can mimic and alter the normal functions of hormones, tamper with hormonal balances in the body and thus affect reproductive systems. These chemicals can also bring about certain types of genital birth defects and cancers. The developing child in the womb of a woman is vulnerable to pesticide poisons. For women, the risk of developing breast cancer is also very high and probable.

Confronted with these risks to women's health, reproductive health and possible negative impacts of chemicals on our children, it is crucial that women become aware and intervene. However, this process for change will be challenged as Malaysia is now undergoing its eighth development plan, with moves to develop the agriculture sector with the objective of strengthening the agribusiness industry. With this goal, we can foresee an increase in the use of chemicals. During the economic crisis that took a toll on our country, the key saving product was palm oil. The commodity price went up and the demand grew in the international market. Today palm oil is seen as a stable crop and produce. Thus we can expect the plantations to remain and production to increase in the coming years. This would indeed further aggravate the situation of pesticide poisoning among the plantation workers.

Women's health is definitely at risk and at what cost? Before our future is stolen, and women continue to be exploited, abused and poisoned we need to act with a strong gender perspective.

Putting a Face to the Statistics - 2 Case Histories

Case History 1- *Parames*

Parames (not her real name) dropped out of school after five years of education in a Tamil school situated in the plantation where her parents worked. She stayed back at home to help her siblings and her parents. At the age of 14, she fell in love with a boy who came to work in the same estate where she resided. Parames' parents vehemently opposed the relationship. So Parames and her boyfriend, Karu, eloped to get married. She stayed with him for a year and then when Parames got the blessings from her parents, she officially married Karu. She was 19 years old.

"The five years of love and courtship turned into nightmare on the third day of my marriage when Karu started beating me up. This violence and nightmare went on throughout the marriage. I have three children, two boys and a girl. All of them are grown up and working with independent lives. I aborted my fourth pregnancy as I was afraid to have any children since the marriage was unstable. My husband constantly accused me of having extra marital affairs. I feared that another pregnancy would mean more beatings and sexual abuse.

I remember how one day Karu beat me up badly and locked me up in a room. My four year old boy, opened the door and begged me to leave the house. I then decided to leave. Together with my three children, we walked over 15 kilometers to my parents home. Concerned over the sanctity of marriage, of their reputation and of my work in the plantation, my parents sent me back with my brother-in-law, requesting him to take care of me and the children. My husband hardly supported the family. I managed to run the house with my wages and contributions from my brothers and sisters. Brought up to be a faithful wife, I gave in whenever Karu demanded sex from me. Sometimes he has even called me a prostitute. Many times I reflected that a prostitute at least got money when she gave her body for sex. I received nothing except abuse and beatings.

I not only faced abuse and problems in my family life, but also at work. I started work under the contract system at the age of 15. Under the Employment Act, a person can only be employed when she is 16 years old. My work and responsibilities were weeding, applying some kind of powder to the oil palm fruit bunch so that it will grow bigger. I also added a kind of

white powder to the pollen and mixed both male and female flowers for better fruiting.

When I turned 16, I became a permanent worker where I applied rat poison, manure and chemicals on to rubber trees for increase in latex production. When I began work, initially, two workers used a bag of manure weighing 50pounds for 450 trees in a day. Later this was increased to 12 bags, then 15 and now 20 bags per day. This demand for high productivity has had a tremendous impact on my body. I experienced severe pains on my back, arms and legs but there was no experience of higher wages.

After my third child, I opted to become a sprayer as I could earn 50 cents more each day and I could come home by 2.00 p.m., as compared to others who came home after 3.00p.m. I started applying pesticides to grass, 'lallang' (weeds), on the oil palm trees, and onto creepers on the ground. I sprayed strong chemicals to unwanted trees. I never knew the names of these chemicals nor their impact on me. I even used my bare hands to apply an oil based chemical on to the 'lallang' to kill them. I have used gramaxone / paraquat, commonly known as 'kopi-O'. I was a very good worker. I sprayed 22-24 tanks of pesticides each day. Each tank contained 4 gallons of pesticides. The management constantly praised me for my high ability. I was proud that I could protect the trees from pests, and keep the estate clean of weeds.

At the beginning, when I started handling the pesticides, I experienced headaches. During the hot season, when I used gramaxone in particular, my nose bled. I used to get severe pains on the left side of my stomach. When I raised these medical problems with the estate paramedic, called the 'hospital assistant' or 'HA', he gave some tablets, which I took. I believe they were painkillers. I did not take medical leave as I prided myself in being a good worker and did not want to lose out on the incentive benefits.

Since the estate was large, the sprayers were taken on tractors with their tanks and the chemicals for the task ahead for the day. One day there was an accident, and tractor turned over. I suffered from injuries but was not compensated. Being ignorant of the law, I did not make any demands. The Union too was silent about it as we did receive medical treatment.

My concern was to do my job well. Since I did not get any skin problems except bleeding of the nose, I did not mind my job and found it safe.

However after 8 years of spraying and being a hardworking woman, I began to have stomach pains regularly. One day the pain became very severe, and I could not bear it. I went to a private clinic where the doctor gave me an injection. He told me I had ulcers in my stomach. A fulltime worker with an environment group, Friends of the Earth, contacted me. He took me to see another doctor who did an X-ray and a kind of scan. He told me I had ulcers in my throat and my stomach. He advised me not to spray pesticides and not to carry the heavy bunches of oil palm fruits. But the supervisor of the estate insisted that I continue spraying pesticides. With an irresponsible husband, and my children depended solely on me. I had no choice except to continue spraying.

A few days later while I was coming home after work, I collapsed in the tractor that was bringing me back with the others. I was taken to the Elmina estate group hospital and then transferred to the government hospital. Nothing was discovered. All I knew was that my whole body was feeling more and more pain. I began to go for regular check ups at the government General Hospital in Kuala Lumpur. At this hospital, the specialist told me that something was wrong with my nerves. I also began to lose weight and became very thin. Later the doctor told me that my nerves had been affected probably by pesticide poisoning. I had to take medicines daily.

My health worsened. I began to have severe headaches. My menses was no more regular. I got my menses twice a month and it lasted for 3-4 days. I had prolapsed womb as well. Finally, the doctor gave me a letter for the Management, requesting that I be given light jobs in the estate. This request was turned down and I was told that there were no light jobs.

During this period, I came in contact with Tenaganita. I participated in their training programs and became more courageous. I went to the Labor department and lodged a complaint since the Union too had failed to support my request. It was after this action that I got the sweeping job. In spite of the light job, I continued to have the severe headaches and chest pains. In fact, during one of my visits to a Gynaecologist arranged by Tenaganita, I found out I had excessive white discharge as well. I continued to go for leadership programs and later stood for elections as a Union committee member. I won and began to be active in the Union.

If I had known of the dangers of pesticides, especially on women, I would have not taken the job as a sprayer. I would have campaigned more aggressively so that other women too will not be affected. Tenaganita tried to help me to be medically boarded out under the Social security scheme. I refused. I had heard that the estate would be sold and there would be an offer of houses as compensation for the workers. If I stopped work, I would lose the house. And so I continue to work, in spite of my poor health, with the hope of a house, a roof over my head, soon."

Case History 2 - Nandini

Nandini comes from Perak, a state north of Kuala Lumpur. At the time of the interview, Nandini was 32 years old. She is a pesticide sprayer and a permanent worker in the estate. Nandini is a widow with four children, the eldest being 8 years and the youngest, only three. Her education in school ended in Primary school. She refused to continue her schooling as she could not stand the teasing she got from boys on a daily basis. When she came of age and got her first menses, her mother told her nothing about growing up or what changes will take place in

her body. All that her mother did was warn her not to mix with or play with boys anymore. She never knew the reason except that she was considered to be a grown up girl. And about her work, marriage, health and fears, this is what Nandini has to say.

"In 1982, I started helping my mother to tap rubber trees in the rubber plantation we lived in. I did this for six years with no wages at all. The number of trees my mother had to tap per day went up from 250, to 450 and then to 600 trees per day. Without help

from children like me, rubber tappers would not be able to complete their task for the day. When I became 20 years old, I began to work in the same estate as a permanent worker. I do weeding, pesticide spraying and pruning. I worked both in the rubber plantation and the oil palm plantation. My basic salary is only RM15.00 per day. I am paid daily. On rainy days, when I cannot work, I do not get any wages. My actual take home pay is less than RM300 per month, in spite of the hard work we do each day.

I fell in love with Ram when I met him at my sister's house. Ram, like me, had just broken a relationship. I was surprised when my mother accepted him and requested that his parents come over to ask for my hand in marriage. He took me over to his aunt's house and I spent the night with him. I was so afraid to tell my mother the truth. I ran away with him to his hometown in Baling. My sister got us married in a temple. It was only after the first child was born that we legally registered our marriage. He was good to me at the beginning. But later, he began to take 'samsu' (alcohol) with his friends. Whenever I questioned him, he would shout, scold and beat me up. I was constantly accused of having 'affairs' with other men. In spite of knowing karate, I could not hit him back because he was my husband. I had to respect the 'tali' round my neck, which he tied on our wedding day.

I was afraid that I would go through the same fate as my mother's sister. She could not stand my uncle's abuses and violence. My aunt committed suicide by burning herself with kerosene. In fact, her husband was not the only batterer and drunkard, but all my uncles, husbands to my mother's sisters, were drunkards and abusers.

However, my fate took a different twist. In 1998, my husband was drunk and had fallen asleep or unconscious on a railway track. He was run over by an oncoming train. My life became terrible and I was very lonely. There were times when I even contemplated suicide. But the thought of my four children kept me going. My mother became a pillar of strength, while my relatives were only interested in the money I would get both from the Employer's Provident Fund (EPF) and the social security scheme arising from my husband's death.

My health too began to take a downturn. As a pesticide sprayer, I used to spray Roundup, Paraquat,

Amin, Tamarin and Ally. I used to spray more than 10 tanks of pesticides. After spraying, I had very bad headaches, felt nausea, giddiness, tightness of the chest as well as chest pains. I used to find cracks on my chest but did not take it seriously. I believed that all these pains and symptoms were part of the result of hard work. It was all normal. However, I noticed that the cracks became hard, and my breasts became very painful. There is pus in my breasts and they are swollen.

I went to the paramedic, the hospital assistant employed by the estate. He was a male paramedic. I was too shy and afraid to tell him about the swelling in my breasts. How could I ever show my breasts to a man who is not my husband? So, I just told him that I had chest pains. He gave me some tablets to take. But the pain became severe after I had taken the pills. I confided with a friend about my problem. She scolded me and took me to see a medical officer at the General Hospital. I was told that nothing was wrong with me. The doctor gave me some panadol to take.

Two days later the pain became unbearable. I began to vomit and ran a fever. My breasts were swollen. I found out that there was a doctor who was active in an NGO and he was very sympathetic. So, I went to see him. He checked my breasts and found lumps in my breast. He referred me to another hospital to do an X-ray and a biopsy. A specialist checked me again and said he suspected that I could have breast cancer. But when the results came back after the biopsy, it was negative. I was really happy.

I continue to take medication and rub cream over my breasts. All these seem to be very temporary. The swelling, the pus and the pain seem to reoccur. Now, there are lumps under my armpit as well. I really don't know what is my health problem. In fact, I have become weaker. I have more headaches and the left nostril of my nose has become very painful. My whole body is in a wreck. I have had excessive white discharge for two weeks continuously. I have been given tablets and supportise to insert into my vagina. My lower back gets painful. I also suffer from constipation regularly. My constant prayer is that God will take away my illness. I am really tired of going from clinic to clinic and hospital to hospital. I need to work to support my children. I can only try to bear the pains and continue to work as a pesticide sprayer."

Accountability

In looking at the conditions of the workers in the plantations and more critically on the lives of the women pesticide sprayers, we need to assess the different players and stakeholders who have created conditions that are adversely affecting women workers health and well being, and therefore have a role and responsibility towards the women plantation workers.

1. The Plantation Industry

The owners and the management of the plantations make the decisions on the tasks, the method of spraying, the type of pesticides used, the health care services and the actions taken when a complaint is lodged.

Reports from plantation workers indicate that the plantation industry has failed to set up safety committees and adhere to the Occupational and Safety Act. Worse, it has not given the workers appropriate information on the poisons they would have to handle and use. The industry is fully aware of the dangers that these poisons pose, as there have been various advocacy initiatives carried out to highlight these issues since 1984. It still continues to use very highly toxic pesticides. However, it has developed strategies so that it will not be made accountable.

The industry has structured the task of spraying into the 'sub-contractual work' category. As such, the workers come directly under the supervision of the sub contractor. Many remain as temporary workers, and in this way the industry has abdicated its responsibility. Its concern is only profits and not the lives of the workers who have brought in the wealth to the industry.

In addition workers are for the most part ignorant of what they are using, reports from the workers show that they are not told about the pesticides they are using, they do not have access to the pesticide labels and often have no indication of what they spraying. The Highly Toxic Pesticide Regulation 1996 requires that workers spraying paraquat, monocrotophos or calcium cyanide have to be monitored for the impact of the pesticide on their health.

According to the guidelines under the Act the employer must maintain a record of the use of these highly toxic pesticides, the sprayers involved, and the total number of work hours and the amount of pesticides received and used. This raises some major questions: If the workers are ignorant of the pesticides they are spraying, they would have no idea if they are using the list of pesticides under the Highly Toxic Pesticide Regulation; in which case, the plantation management could be hiding behind this "ignorance" and not adhere to the regulations as required under the Act.

The guidelines of the Act also require every employer to institute a programme of Medical Examination. But in reality workers can only have access to medical care via the hospital assistant (HA). Again the reports from workers indicate that the paramedic has strict instructions to ensure that the workers continue to work even if they are ill. Feedback from workers reflect that the HAs only provide very basic and minimum treatment for the acute poisoning, and ensures that the worker returns to work. Many do not make proper referrals. The worker therefore is unable to obtain effective treatment or recognize the symptoms as poisoning. The paramedics are neither given training on monitoring, nor on the OSHA Act.

2. The Pesticide Industry

The Pesticide Industry works closely with the plantation industry. It does not come directly in contact with the applicators. This distance makes the industry invisible in its role of promoting the use of chemicals in the plantation sector. The pesticide industry is responsible to ensure that the pesticides it manufactures and distributes do not poison workers, the public and the environment. But looking at the instances of reported poisoning, the industry has not, or has been very slow, in taking action to address these issues, and has often been more vocal in denying that poisoning has taken place. The Pesticide Act is itself weak in ensuring the accountability of the pesticide industry that continues to sell poisons.

3. The Government of the day – The Enforcement Agencies

Two major enforcement agencies, the Pesticide Board and the Department of Occupational Safety and Health (DOSH) are responsible to ensure protection and safety of the workers from poisons. Overall, there is a lack of monitoring of the sale, use and impact of the poisons in the plantations.

The weak implementation of the regulations in the plantation sector has led to women workers being poisoned daily. Besides this, health or medical personnel have not been trained effectively to deal with pesticide poisoning and health. Thus the government is equally accountable for the current health crisis of plantation women sprayers.

4. The Trade Union

The plantation workers had been organised since before the independence of the country. The trade union called 'The National Union of Plantation Workers' (NUPW) emerged as the largest and richest union in the country. But in less than 15 years, its membership of about 140,000 has dwindled to less than 35,000. Today the union members contribute the highest union subscription in the country. And in spite of the high union fees, the plantation workers remain amongst the poorest and most marginalised workers. Today, 60 per cent of the Union membership is women.

It is evident that the Union has failed miserably to protect the workers from being poisoned. The leadership has become indifferent to the issue of pesticide poisoning. Instead it has bargained for slightly higher wages for sprayers, as compared to a general worker, as it has termed pesticide spraying a 'high-risk' job. The sprayer now gets 50 sen (approximately 12 U.S. cents) extra each day. The Union has also compromised women's health and the health of our future generation for this negligible increase in wages. The leadership lacks gender perspective. This is reflected in the absence of programs for women and lack of women leaders in the Union itself. There is a lack of education programs to create awareness on hazards, on the regulations and the need for effective safety committees. In short the Union has failed to address the frightening reality of women workers and their daily exposure to poisons.

The silence of the Union together with the ineffectiveness of the enforcement agencies has only allowed the two major industries, i.e. the Plantation and the Pesticide industries, to continue the practices that poison women daily. With the absence of proper monitoring mechanisms and support systems, women pesticide sprayer continues to be poisoned, silenced and isolated.

New Emerging Issue

The phenomenon of hiring migrant workers is a growing one, with majority employed as contract labour. Hence, activities are often sub-contracted to businesses or agents who supply these contract workers to undertake various jobs on the plantation. When a migrant worker is documented he has a work permit valid for one year, with levy and visa payments made to the Immigration department. The work permit is issued under the name of the specific enterprise or industry he is employed. However, a large majority of the migrant labor in the plantations is sub-contracted labor, and the migrant worker—who for example is a pesticide sprayer—works in different plantations. As such, migrant labourers are not considered employees of the plantation industry. This being the case, we can see that there is a conflict between the terms for a valid work permit, and that of a sub-contracted work system. In this scenario of employment, the contractor who employs the migrant labor does not obtain a work permit for his workers as they do not work in one particular plantation industry but in many others as well. Consequently, large numbers of migrant workers under the sub-contract system of employment remain undocumented. They are unprotected by all the labor regulations, are highly mobile and face the high risk of being arrested, detained and deported. Thus these workers are also highly vulnerable and face acute risks to their health with no access to medical care or treatment.

Chapter 4

Pesticide Exposure Study among Women Pesticide Sprayers Undertaken in Collaboration with the National Poison Centre, USM, Malaysia

Rationale of the Study

Tenaganita (a women's organisation based in Kuala Lumpur) has been studying women in plantations since 1991. A review of literature available on pesticide poisoning reveals lack of information on plantation workers in Malaysia. Limited studies conducted in Malaysian plantations provide little information on the women workforce, their living and working conditions and the extent of poisoning from exposure to pesticides.

Tenaganita conducted a preliminary study in 1991 through interviews with 50 women workers in six estates of Selangor state. Research staff lived within the community under study and participated in the community life, taking detailed notes on the work-related and social environment in the plantations. The study was part of a PAN AP regional initiative covering seven countries (India, Indonesia, Korea, Malaysia, the Philippines, Sri Lanka and Thailand) to study the impact of pesticides on women plantation workers.

'Victims without Voice' (Arumugam, 1992), an initial report from the Malaysian study revealed that women sprayers in plantations were visibly weak, worn down and often unable to continue working past the age of forty. Workers were generally aware of hazards associated with pesticide use, but did not associate specific health symptoms to pesticide poisoning. A majority of the pesticide sprayers were illiterate and could not read labels on pesticide containers. The survey also exposed several shortcomings in the training and education programmes for plantation workers, safety precautions in place and the provision of protective clothing and gear for workers in the plantations.

There was a need to educate women in plantations about the harmful effects of pesticides used daily in their surroundings and to empower them to stand up for their right to information on the pesticides they handled and symptoms of toxicity. There was a need to build their self-esteem, to recognise and understand their own bodies, reproductive rights and health issues related to pesticide usage. At the same time it was essential to involve women workers to participate in the monitoring of poisoning cases and help in the documentation of their problems, giving a strong, united voice to the concerns of women workers in plantations.

The current study is a follow up to the previous research conducted by PAN AP and Tenaganita, and is aimed at substantiating data on the poisoning of women workers and sprayers in plantations. Beyond data collection, information gathering and analysis, the study was envisaged to serve as a medium of awareness building and empowerment amongst sprayers, enabling them to make more informed decisions regarding their working environment and health problems associated with it. This joint PAN Asia Pacific, Tenaganita and Pusat Racun Negara (National Poison Centre) project was formulated and implemented in order to counter the impacts of chemicals on the women plantation workers, on their families and the developments in the agrochemical industry and products. The specific objectives were as follows:

- to build awareness of the health dangers of pesticide spraying among women plantation workers (and their families);
- to strengthen the capacities of women plantation workers to participate in the making of decisions affecting their wellbeing, in particular within their local workers' union;
- to document the adverse health effects from exposure to pesticides through a blood testing / sampling programme; and
- to launch a programme of pesticide education and advocacy, targeting plantation workers, policy makers and the general public.

Methodology

The study was conducted over a two-year period from May 1997 to 1999. The study methodology is detailed in *Figure 5*.

In Phase I (see *Appendix 2*), 72 women workers from 17 rubber and sample oil palm plantations in Kedah, Penang and Perak were selected. (see *Appendices* for sample distribution). Initial visits to the plantations were conducted for establishing contact and rapport building. A descriptive questionnaire was administered (n = 72) to gather general demographic information and specific data on pesticide usage patterns and related health problems. (A copy of the standard format is given in *Appendix 1*). A component of the questionnaire would generate information on the frequencies of signs and symptoms arising out of the spraying activities. These effects were normally obtained within the same day of spraying to ensure that the responses could be reliably assessed when these side effects appeared. A questionnaire listing of 19 side effects was developed to assist the volunteers to identify possible effects from the spraying activities. In getting an appropriate response from the interviewees, two interviewers were recruited based on their previous experience and understanding of the estate system as well as ability to communicate with volunteers. The interviewers were required to document the replies from the volunteers immediately into the questionnaire.

Firstly, the process was a build-up of activities: the awareness building process engendered an informed participation of the women in the blood sampling and testing initiative. This then led to the more in-depth process of monitoring and information gathering. As a concrete step to deal with the outcome of such research and monitoring, a referral mechanism was also established to help deal with the direct health impacts.

Secondly, the process involved continuous interaction with the sprayers via training workshops, health camps, and discussion groups. These interactive processes were all part of a process of empowerment of the women—specifically sensitising women to the relevant issues; creating awareness among the women of their own bodies; and thus helping to build self-esteem and confidence for the women to decide for themselves, *and to take action as well as to take control of matters effecting their bodies*.

Follow up visits were conducted to explain the objectives of the research and to seek the support of women sprayers in the sampling programme. Some women were wary of the visitors and did not want to participate due to fear of losing their jobs on the plantations; others were restrained by their husbands or other family members. Only 39 women agreed to participate in the blood sampling programme and were tested for plasma pseudo-cholinesterase levels to validate acute poisoning from organophosphate and carbamate group of insecticides. Specimen collection was carried out in accordance with the requirement as normally stipulated by the Ethics Committee on Human Study.

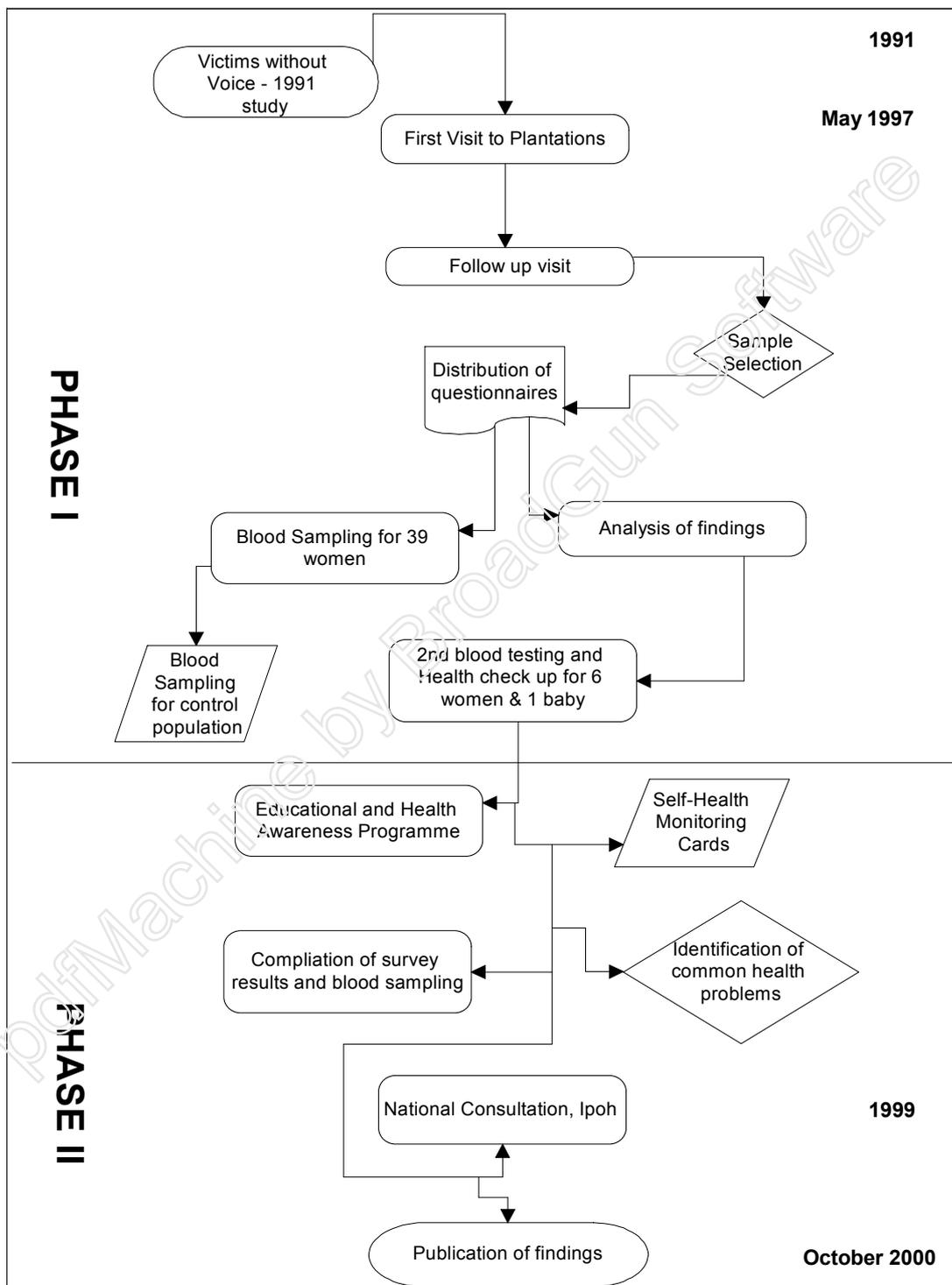
There was no substantive data available on the identity of pesticides used in the plantations, but the common complaints and side effects reported seemed to be attributable to exposure to organophosphates and carbamate. Based on the indirect correlation for organophosphate or carbamate poisoning, the plasma test was carried out on the assumption that if the spraying involved the above-mentioned chemicals, then the toxic effects would be mediated through the inhibition of activity in the enzyme, acetyl cholinesterase. It was not considered relevant to compare cholinesterase levels amongst sprayers and non sprayers as even the non sprayers were exposed to pesticides daily during mixing or weeding activities.

Women with abnormally low levels of the cholinesterase were taken for a re-sampling to confirm the readings (six women and one baby). These cases were followed up by a detailed medical examination by qualified medical professionals at the National Poison Centre. An intervention programme of non-exposure to pesticides (for one month) was undertaken to observe the elevation in plasma pseudo-cholinesterase levels, if any.

Blood testing was also conducted for a selected sample from plantations in Perak. However, due to inappropriate handling of the sample by the laboratory, the results were inconclusive and had to be discarded.

In Phase II, a self-health monitoring programme was implemented in selected estates over a three-month period (see *Appendix 2*). A sample of 67 women participated in this programme, which involved the daily recording of health problems faced by the women workers on Monitoring Cards distributed earlier (see *Appendix 3*). These signs and symptoms were presented onto simple cards via graphics or drawings, with sections where dates and indications of the symptoms experienced were to be filled in by the woman sprayer. A field researcher would then collect the cards, either weekly or twice a month and sit with the women to analyse the common symptoms.

Figure 5: Study Methodology



Education and health awareness programmes were conducted using the Community Pesticide Activity Kits (CPAK). Specialists from the National Poison Centre, medical professionals and staff from the plantation workers trade union, Tenaganita and Pesticide Action Network Asia and the Pacific participated in these programmes. The workshops were conducted in the Perak plantations. The results of the Phase I study were shared with participants to discuss further the adverse health effects of pesticides and precautions to be taken while handling pesticides. The sessions were aimed at empowering women workers to take charge of the risks to their bodies and assert their basic rights in the plantations.

Testing for Plasma Pseudo-cholinesterase

Testing of specific pesticides in the blood is expensive that involves technically complicated procedures. However, organophosphate and carbamate pesticide exposure can be measured by tests using levels of plasma and red blood cell (RBC) cholinesterase activity as biomarkers, methods that are relatively inexpensive and easy to perform. A preliminary evaluation of the plasma cholinesterase activity was carried out to determine the effect of exposure to pesticides.

For the purpose of this study, pseudo-cholinesterase levels in plasma were tested using the Ellman method (see *Appendix 4*), a simple, inexpensive and easily automated procedure conducted at the National Poison Centre. Blood specimens were collected under medical supervision in accordance with the requirements stipulated by the Ethics Committee on Human Study. Samples were collected immediately after spraying activities had been conducted. The sample sprayers were fully aware of the purpose of the study and had consented in writing to participate in the study. Plasma levels were selected as the biochemical parameter for this study because the enzyme depression in plasma is usually apparent within a few minutes to hours of significant absorption and thus is a good indicator of acute symptoms of organophosphate poisoning.

It is recommended that while interpreting the plasma pseudo-cholinesterase levels, comparisons should be made with baseline levels. Every individual has characteristic levels of baseline (before organophosphate exposure) plasma cholinesterase and hence depressed levels for one person may not be interpreted as low levels for another individual in a similar environment. As there were no records of pre-employment baseline levels available for women workers in the plantations and hence surrogate levels of a control, healthy unexposed population were used as an alternative (control n=108). In addition, for the six cases selected for follow-up, a second testing was done to reconfirm the readings, an intervention programme with a period of no spraying and exposure was observed, and testing conducted a third time to compare these levels with those obtained immediately after spraying. An elevation would then be attributable to a non-exposure to pesticides.

Findings

General Observations

The estate provided workers with housing on the plantation and free water supply. Workers had to pay for the electricity consumption separately. The quality of housing varied within estates, some homes were large three-room establishments with modern bathrooms and toilets. Others were not so comfortable.

In general, most workers were uneducated. Without a formal education to speak of and any alternative skills, they were forced to work at the plantations in order to survive and support their families. Women remained subordinate to both the management as well to their husbands. They played the multiple roles of the bread winner, the child bearer and rearer and homemaker. A majority of husbands living on the estates drank and gambled in the evenings. In some homes, the husband lived off the wife's income. Wife beating, polygamy and single mothers were a common feature on the plantations. Where couples worked as a team, both contributing towards the running of the household, the family seemed happier and better off financially. The younger generation was more aware of their rights and dreamed of a life outside the plantations.

There was a general lack of priority on health and nutrition. Families spent more on consumer goods such as TV, furniture etc. than healthy food, medicine or education. Rice and dhal (lentils) was the most common meal. Children of plantation workers did not perform very well in schools and school dropouts were common due to financial constraints.

Young children and families of the sprayers were exposed to pesticides daily due to the proximity of their homes to the fields. Men regularly complained of ill health and symptoms associated with pesticide exposure. Children playing on a playground near the production fields were commonly seen to be coughing, suffering from asthma, rashes and anaemia.

The estate management kept a close watch over the workers, who were discouraged to speak out and divulge information regarding the conditions on the plantations to outsiders. Workers were frisked upon entry and departure from the plantation to ensure that nothing was carried in and out of the estate. The researchers had to spend much time building a rapport and winning the confidence of the workers. In some plantations, workers were warned that they would lose their jobs if they participated in the current study. A 23-year old pregnant worker had her employment terminated for 6 months on this ground. After delivering her baby, she returned to work on the plantations, using the influence and recommendation of the local church authorities.

The estate did not provide toilets near the fields and women workers urinated in the fields itself. Clean water for either washing or drinking was not made available by the estate. As a result, workers either did not wash hands before eating or used any source of water available nearby. For drinking purposes, they carried their own water into the fields. They did not wash, bathe or change clothing after spraying.

TABLE 7: Personal Details of Sprayers

ITEMS		FREQUENCY (%)	AVERAGE
SEX:	MALE	0	
	FEMALE	72 (100)	
AGE (years):			36.4
RACE:	MALAY	25 (34.7)	
	CHINESE	0	
	INDIAN	47 (65.3)	
MARITAL STATUS:	MARRIED	67 (93.1)	
	NOT MARRIED	5 (6.9)	
	DIVORCED or SEPARATED	0	
NO. OF CHILDREN:			4.4
LENGTH OF SERVICE (months):			86.6
SALARY/DAY:			14.6
TYPE OF WORKER:	PERMANENT	72 (100)	
	CONTRACT	0	
	MIGRANT	0	
WORKING HOURS/ DAY:			7.0
PREGNANT/BREASTFEEDING:	YES	6 (8.3)	
	NO	66	

Demographic Characteristics

The questionnaires administered during phase I of the study revealed that of the 72 respondents, 47 were Indians (65 per cent), and the rest were Malays. The average age of the women workers was 36.4 years. Most were in the range of 15-50 years. Two teenaged girls aged 15 and 17 were identified. Ninety-three per cent were married with an average of four children in the family. Three women were pregnant when the survey was conducted. Two had recently delivered babies and two more had stopped spraying during their pregnancies. Six of the women were breastfeeding their children.

Workers were hired on a permanent basis, the average length of service was 87 months, with an average daily income of 14.6 Malaysian Ringgit (US\$1 = RM3.8). The estates in Kedah paid more than those in Perak. The women reported that they spend about seven hours everyday working on the plantations, with a half hour break for lunch. The workers were assigned to carry out different activities in the estates, such as mixing, spraying and carrying the pesticide solution to the sprayers. All the 72 respondents were handling pesticides on a daily basis; 47 were sprayers and 7 were mixing the pesticides before application. Weather permitting, full time sprayers were expected to spray for 28 days of the month. Workers undertaking spraying activities were paid an additional 0.50 Malaysian Ringgit per day and were allowed to finish work half an hour earlier than other estate workers.

Overall, as noted in Phases I and II, women constitute almost half of the workforce in plantations, many employed as temporary contract workers doing unskilled work, like fruit pickers or weeders. The very nature of contract work implies instability of employment for the workers, and abdication of responsibility of the industry and management of the workers. The contracts can vary from between six months to even a few years, but it also implies lower wages, lack of security in their jobs, possibly no access what-so-ever to healthcare facilities and vulnerable to any accompanying risk.

Estates preferred to employ women as they were careful in the daily handling of the pumps. Some estates employed men who were migrant workers as sprayers, but it was difficult to interview them as they did not reside within the plantations. Spouses of some respondents were employed as manual labourers on the same plantation, others were jobless or did odd jobs in the estates.

Pesticide Usage

It was found that weedicides or herbicides were the most frequently used pesticides, followed by insecticides. None of the sprayers acknowledged the use of fungicides on the plantations. Most sprayers were able to identify the brand names of the chemicals applied.

The responses received for identifying the pesticides took four forms (see *Table 8*):

actual product name e.g. Gramaxone or Ally;

partial product name e.g. Amin which refers to 2-4 dichlorophenoxyacetic acid or 2,4-D);

'common name' e.g. Paraquat; and

based on the appearance of the product e.g. colour of product being like 'Kopi-O', which indicates the black colour of Paraquat, or 'soap water' indicating that the identity of the product is difficult to trace.

On the basis of the above information, the actual names of products were extrapolated to obtain a fair idea of the distribution of pesticides used in the plantations, as indicated in *Table 9*.

This listing re-confirms that herbicides were the most widely used pesticides in the plantations under study. In the plantations, it was a common practice not to disclose the names of the pesticides to sprayers. On some occasions the labels from containers were removed before they reached the sprayers. The most commonly used herbicides used as identified by the sprayers were Paraquat, Metsulfuron, Glyphosate, 2,4-D and Glufosinate ammonium.

Nine sprayers (12.5 per cent) reported mixing of pesticides to produce a 'cocktail' before spraying. This practice involved the mixing of several pesticides in full strength in a container, usually a bottle from which aliquots were diluted into the spraying tank. Although this practice is prohibited by law, it was commonly carried out to reduce the frequency of spraying, saving time and costs.

Table 8: List of Pesticides Applied on Plantations (as identified by respondents)

ITEMS	FREQUENCY (n)	ITEMS	FREQUENCY (n)
Paraquat	27	Soap water/Air sabun	10
Roundup	48	Wallop	3
Ally	58	Centery	1
Kopi O	46	Angsa	1
Amin	34	Afflo	1
Dada	1	RS	2
Gallon	2	Dust up	4
Tiram	1	Weeda win	1
Dairon	2	Biovet	4
Apollo	2	Highflow	9
Sterling	2	Ken up	1
Gramaxone	11	Basta 15	27
		Attack	1

**Table 9: Pesticides Used in the Plantations
(Based on extrapolation of information obtained from respondents)**

Exact names	Chemical entities	Classes of pesticides	Frequency (n)
Paraquat	Paraquat	Herbicide	85
Roundup	Glyphosate	Herbicide	49
Ally	Metsulfuron methyl	Herbicide	58
Kopi o	Paraquat	Herbicide	see paraquat
Amin	2,4-D dimethylamine	Herbicide	35
Dada	Unidentified	-	1
Gallon	Unidentified	-	2
Tiram	Thiram	Fungicide	1
Dairon	Diuron	Herbicide	2
Apollo	Clofentezine	Insecticide	2
Sterling	Unidentified	-	2
Gramaxone	Paraquat	Herbicide	see paraquat
Soap water/Air sabun	Unidentified	-	10
Wallop	Dicamba+Glyphosate	Herbicide	3
Centery	Unidentified	-	1
Angsa	MSMA	Herbicide	1
Afflo	Unidentified	-	1
RS	Unidentified	-	2
Dust up	Unidentified	-	4
Weeda win	Paraquat	Herbicide	see paraquat
Biovet	Unidentified	-	4
Highflow	Diuron+Paraquat	Herbicide	9
Ken up	Glyphosate	Herbicide	see glyphosate
Basta 15	Glufosinate	Herbicide	27
Attack	2,4-D Butyl ester	Herbicide	see 2,4-D

Frequency of Spraying

The sprayers averaged 262 spraying days/year. As many as 64 women said that they sprayed throughout the year. Twenty seven sprayers reported that they were given a break of about 2.8 months from spraying. Some reported that they were assigned to another task for 3.8 months.

On an average, workers carried a four-gallon load of pesticide on their back. This was refilled at least eight times a day. Due to this heavy load, many workers complained of persistent back aches, abdominal pains and prolapse wombs.

Mixing of Pesticides

Table 10: Mixing of Pesticides

ITEMS	FREQUENCY (%)
MIX PESTICIDES:	
YES	7 (9.7)
NO	62 (86.1)
MIX WITH OTHER PESTICIDE:	
YES	9 (12.5)
NO	4 (5.6)

Only 9.7 per cent of the interviewed sprayers were also involved in the mixing of the pesticides before application (*Table 10*). This dual function was an exception rather than a norm in most estates. It was surprising to note that 9 sprayers reported mixing of pesticides to produce a cocktail before spraying. This practice involves the mixing of several pesticides at full strength in a container, usually a bottle from which aliquots are then diluted into the spraying tank. Although this practice is often prohibited by the plantation management as part of the 'safe use of pesticides' training, it is commonly carried out in order to reduce the frequency of spraying, saving time and labour costs.

Spraying Equipment

Most of the sprayers (80 per cent) used the Hand Pump for spraying (see *Figure 6*). Almost 11 women sprayers (15.2 per cent) reported problems with the spraying equipment provided. As many as 65 workers (90.2 per cent) stored the equipment in the estate storage area, others (2) took the spray set home for storage. Only 40 workers (55.6 per cent) had been provided training and information on how to use the spraying equipment.

Protective Clothing / Gear

Only 48 sprayers (66.7 per cent) were supplied with protective gear, of which eight (11 per cent) received overalls, 32 (44.4 per cent) were supplied with gloves, 11 (15.3 per cent) were provided covering for the eyes and face, only one (1.4 per cent) was provided an apron, 17 (23.6 per cent) were given boots, and 44 (61.1 per cent) were supplied with respiratory equipment (see *Figure 7*).

Figure 6: Type of Spraying Equipment Used by Sprayers

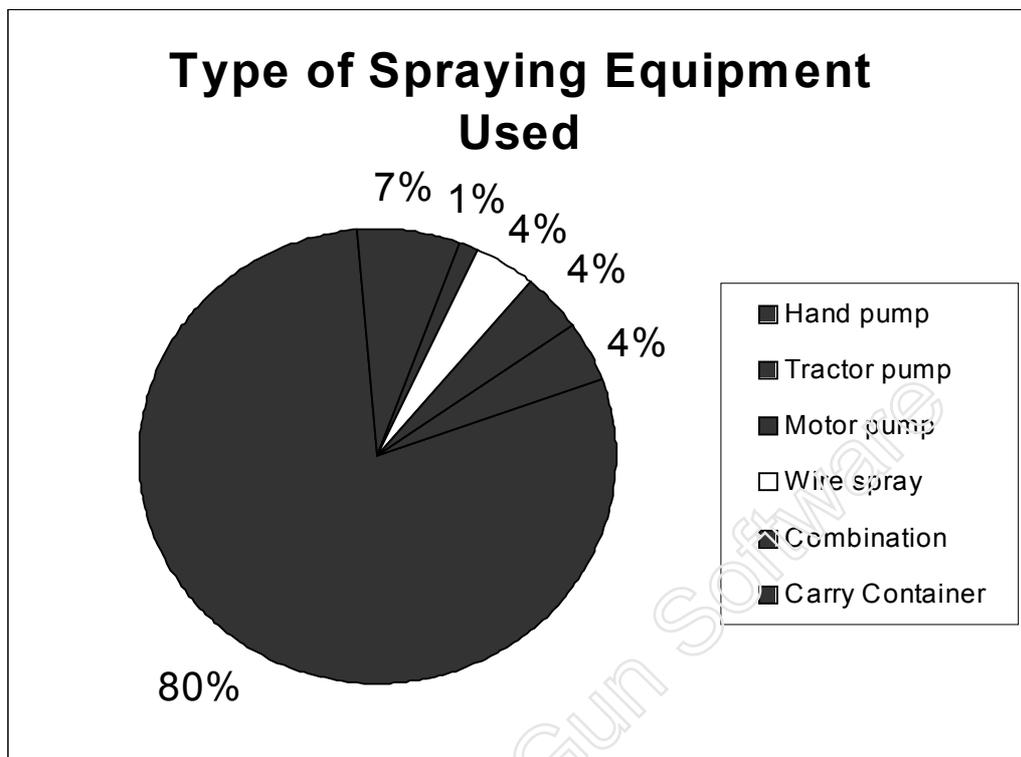
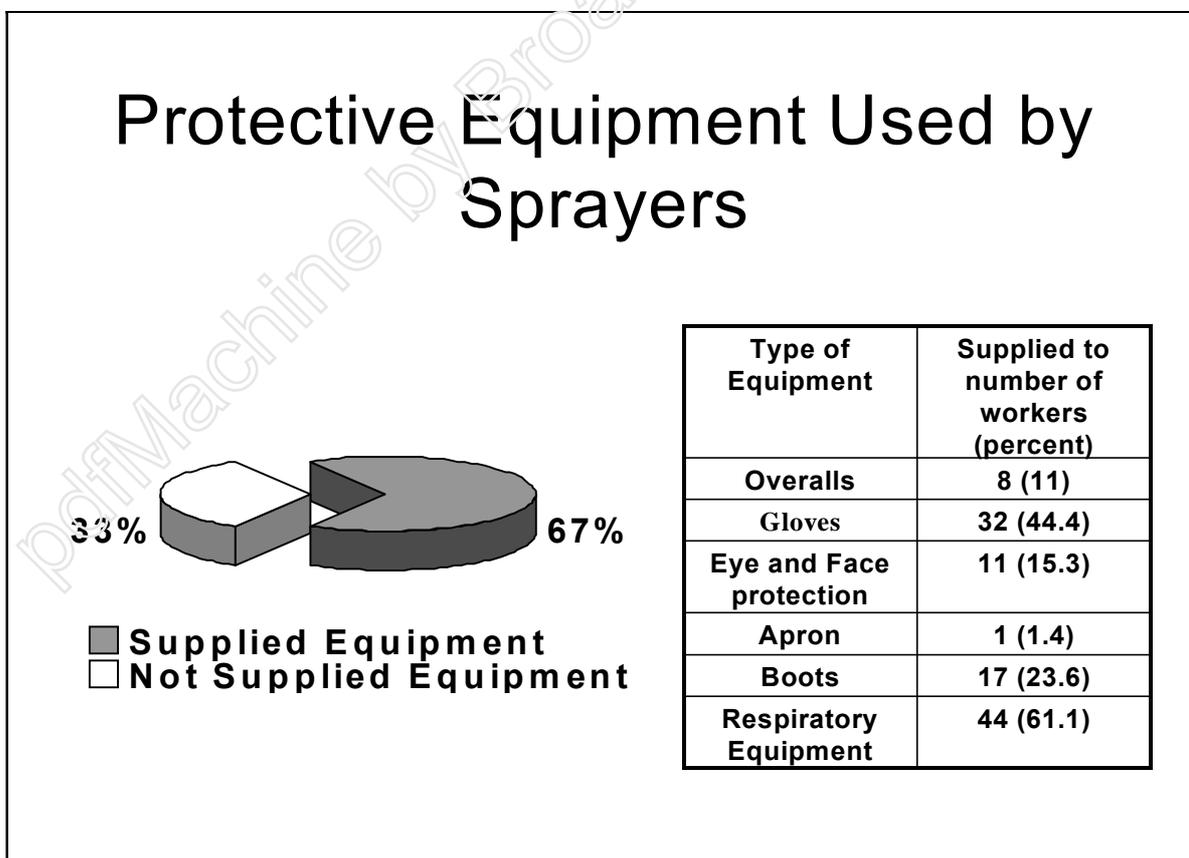


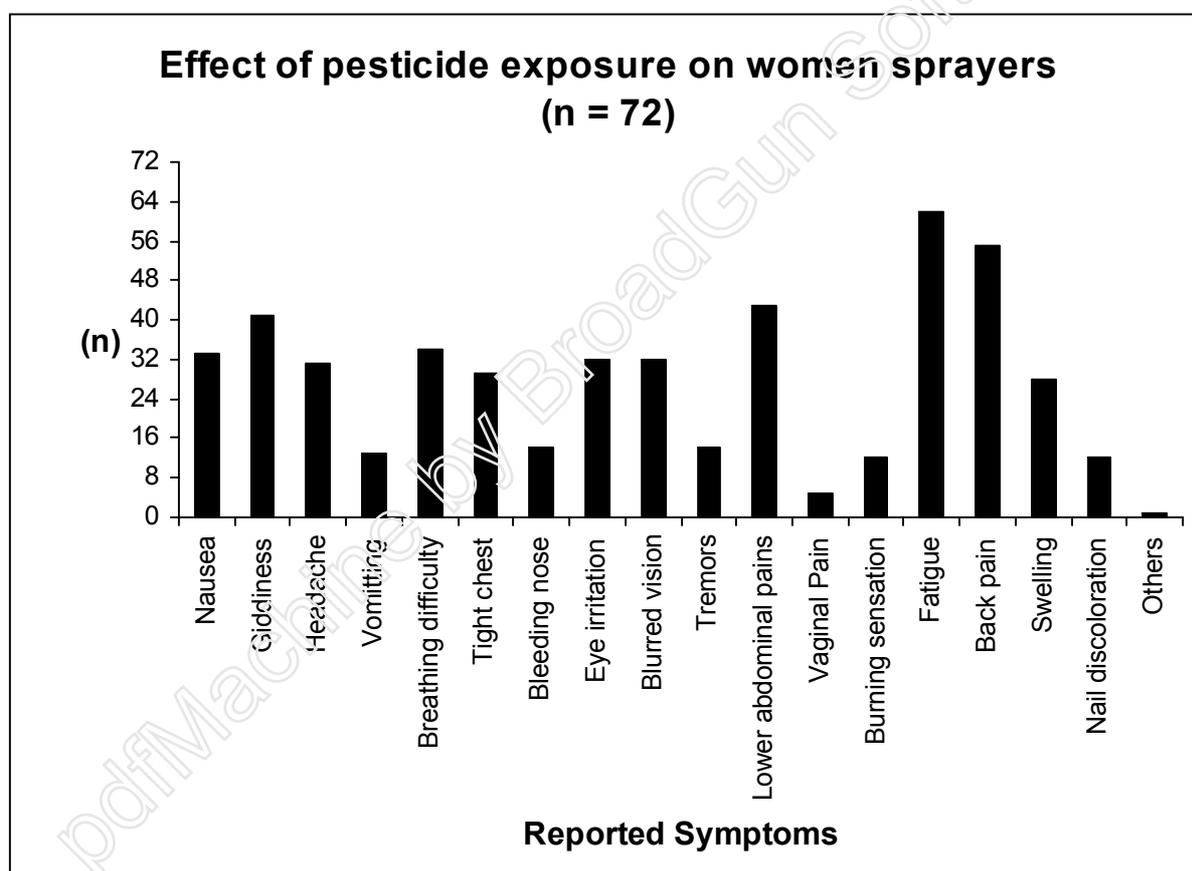
Figure 7: Protective Equipment Used by Sprayers



Most workers did not use the protective gear provided as it was uncomfortable in the hot weather. In the interviews conducted and the sessions held with the women, the sprayers themselves expressed that they did not consider a coverall or apron as adequate protection and only a few were reported wearing these while spraying. As one woman sprayer said; *“The apparel and the mask are made of plastic. Each time I wear the mask, the heat creates vapour and my vision gets blurred and I become uncomfortable. So, I remove the mask. It is the same with the apron which is plastic. I prefer to use two layers of clothes than this kind of protective wear.”* Another sprayer expressed: *“They give us Washington boots. But when we spray the pesticides, it goes into our feet and we experience a burning sensation. Sometimes this leads to sores in our feet. It becomes more dangerous for us”.*

Some reported wearing their everyday cotton clothing for spraying, often not even washing these before the next application. Others said that the eye/face protector did not offer much protection as it got blanketed by the mists from the spray. Most workers wore long pants, long sleeve shirts and boots to work, placing a handkerchief over the face while spraying pesticides. At some estates workers had to buy their own gloves. Most reported that the protective clothing was washed regularly (73.6 per cent). Some workers revealed that they were provided gloves only when officers from the Labour Department visited the plantation.

Figure 8: Effects of Pesticide Exposure on Women Sprayers (n = 72)



Effects of Pesticide Exposure

The most common symptoms of pesticide exposure reported by the sprayers were fatigue, back pain, giddiness, difficulty in breathing, skin problems, nausea, eye irritation, headache, tight feeling in the chest and swelling (see Figure 8). Workers also complained of a burning sensation in the vagina and heavy white discharge. Two workers were sent for a detailed check up including PAP smear; results were negative but follow up and regular check ups were recommended. Those complaining of breast lumps were also checked thoroughly and recommended regular follow up.

Kishi et al (1995) identified a list of signs and symptoms commonly seen from exposure to organophosphate and carbamate exposure. A majority of symptoms reported in this study coincide with that list.

During phase II, the information obtained from self health monitoring cards revealed similar information on the effects of pesticide exposure, i.e across the four locations studied, the commonly experienced symptoms were fatigue, back pain, headache, skin irritation, dizziness, lower abdominal pain and eye irritation (see *Table 11* for details)

Women sprayers mentioned that some side effects such as epistaxis (bleeding nose) occurred initially upon spraying pesticides, but gradually subsided. Many sprayers who complained of knee pain, eye irritation and abdominal pain assumed that these were attributable to ageing or strenuous workload, but never thought the problems to be pesticide related.

Table 11: Effects of Pesticide Exposure among Women Sprayers in Four Locations (Phase II)

Signs and Symptoms	Prevalence (per cent) in			
	Sungai Petani	Teluk Intan	Taiping	Sungai Siput
Fatigue	13.8	13.9	13.5	12.4
Back Pain	13.1	12.8	13.4	12.2
Headache	11.9	15.2	12.3	11.9
Skin Irritation	9.5	9.4	5.8	9.5
Dizziness	9.4	6.3	8.5	9.5
Pain In The Lower Abdomen	12.5	4.6	4.9	10.3
Eye Irritation	6.5	7.9	8.0	7.2
Blurred Vision	4.8	4.5	6.1	4.5
Muscle Stiffness	1.8	2.7	6.4	4.6
Tightness Of The Chest	2.6	4.2	3.5	4.4
Knee Swelling	0.5	4.2	6.3	3.0
Nausea	4.6	1.0	2.1	1.9
Difficulty In Breathing	2.2	2.9	1.9	1.8
Tremor	2.6	1.3	1.6	1.0
Vaginal Pains	0.5	2.7	1.3	1.7
Nail Discolouration	1.2	2.7	0.5	0.7
Burning Sensation During Urination	0.3	0.9	1.3	1.2
Vomiting	1.2	0.3	0.7	1.3
Swelling Of The Finger	0	2.2	0.6	0.1
Epistaxis	0.8	0.1	1.2	0.4
Dropping Of The Nail	0.1	0.2	0.2	0.5

Health Care Facilities

Workers voiced concerns about the inadequacy or the complete lack of first aid in the plantations. Most sprayers sought medical advice from the estate clinic, where a Hospital Assistant (HA) attended to them, while some accessed the services of the government hospital. Many women admitted that they were shy to disclose intimate health problems to the HA, who was always a male. The cultural subordination of women invariably increases her vulnerability to being poisoned. As Nalini, a sprayer who had infected breasts due to spraying but did not disclose this to the paramedic in the estate, stated in an interview: *“When I got my first menstruation at the age of 15, my mother told me that I was an adult and that I must not speak to boys. I never knew why. I was therefore shy and afraid to tell about the pain in my breasts to the paramedic”*.

Workers were not allowed to go to the government hospital without the approval of the estate HA. As a result, they went to the private hospital where they were forced to spend more money from their savings. Medical leave was not granted to the workers.

Almost a fourth (25 per cent) of the workforce said that they were sent back without any medication or treatment. The most common medications received were oral preparations (tablets 62.5 per cent and liquid 22.2 per cent), and external preparations such as creams (48.6 per cent). As many as 59 sprayers testified that they had never undergone a medical examination during their employment with the plantation. Another 53 informed that the estate management did not have a medical policy for its employees.

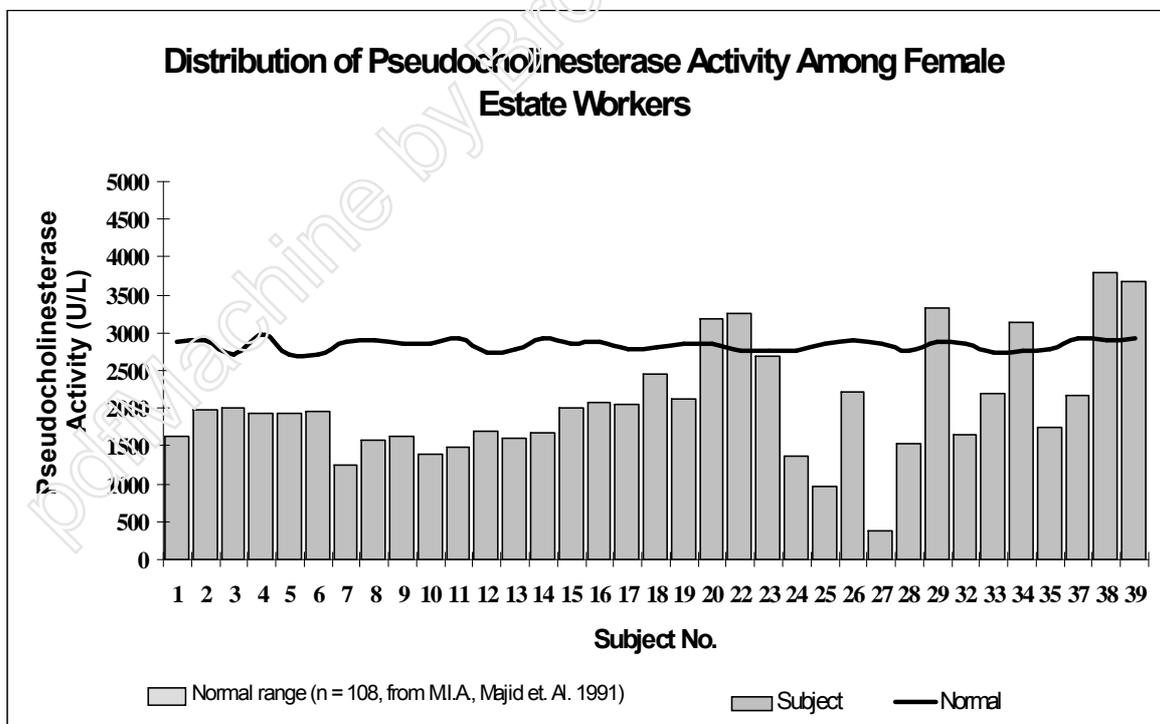
There was no source of clean water available to wash eyes if pesticides were accidentally spilt on their eyes. Faced with such an emergency situation, women sprayers said they would use water from any source such as a nearby stream, which was probably also contaminated with pesticides.

It is also important to note that in the majority of cases, the paramedic has not had any training on the effects of chemical poisoning, nor has there been training to interpret symptoms or relate them to the chemicals used. As well, management has the policy whereby if a worker goes to a hospital to see a doctor and misses a day's work, she would be deemed 'absent from work', and as such, she would lose her privileges to a bonus and incentive wages for the month. Thus even if a woman is ill, she does not go to a doctor. Instead, she suffers in pain.

Blood Sampling for Plasma Pseudo-cholinesterase

Of a total sample of 39 sprayers who agreed to blood sampling, 27 (69 per cent) had plasma pseudo-cholinesterase levels below normal (see figure 9). One subject was found to have markedly low levels (373 IU/l).

Figure 9: Plasma Pseudo-cholinesterase Levels of Sample (n = 39)

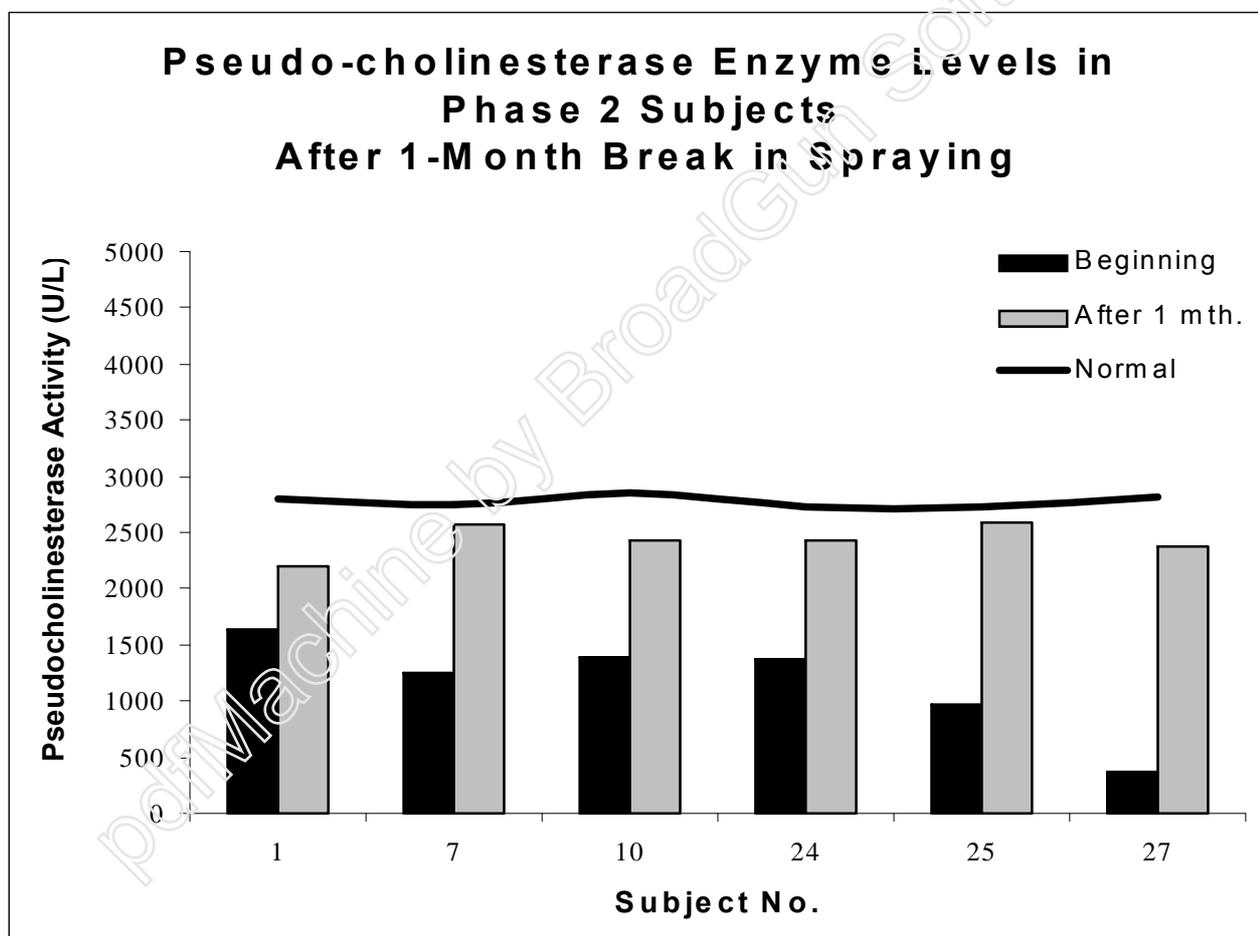


Six subjects with low plasma enzyme levels identified for follow up were interviewed, sent for thorough medical check up and a re-sampling for plasma pseudo-cholinesterase levels.

A repeat blood sampling was carried out when subjects had abstained from spraying for a month due to bad weather. This time around, the plasma enzyme levels were elevated significantly. An increase in the range of 38 to 500 per cent in the values was observed (see figure 10).

Moses (1995) clearly states that if an increase of 15 per cent or more is observed on a repeat testing, then the subject was poisoned by an organophosphate and carbamate type of pesticide. The six samples followed up in this study, display more than a 15 per cent rise in enzyme levels after a break from spraying, thereby confirming that at the time of the first testing, the sprayers were poisoned by organophosphate and carbamate pesticides.

Figure 10: Elevation of Plasma Pseudo-cholinesterase Levels in Workers after One Month Break in Spraying



Case Studies for Medical Examination

From the observations, six sprayers with low levels of enzyme activity were further interviewed and brought to the National Poison Centre for a medical examination. The full profiles of these volunteers are given in the following case studies.

Case Study no.1

Name : MG

Age : 29 years old

Race : Indian

Gravida/Para : G7 P6

Date of examination : 8.12.1997

History of Present Illnesses.

- Was brought to Pusat Racun Negara due to noted low level of Cholinesterase from previous survey and for detailed medical history and examination.
- Currently complain of:
 - ⇒ occasional chest pain and difficulty in breathing
 - ⇒ backache
 - ⇒ headache
 - ⇒ itchiness over temporal region bilaterally and over dorsum aspect of legs
- Chest pain and difficulty in breathing were associated with working environment when patient accidentally inhaled the pesticides/herbicides that was sprayed. Pain and SOB were relieved spontaneously.
- Backache and headache are on and off and aching were more associated with her work. The aches were relieved by taking pain killer medication.
- Itchiness over the temporal region and dorsum aspect of legs. She has history of spilling pesticide over her legs and splashing over face while spraying and mixing the pesticide. Cream was given to relieve the symptoms but to no avail.
- Patient also gave history of epistaxis 2 months ago after inhaling the pesticide while mixing it. The amount of blood was minimal and treatment was given by the Hospital Assistant there.

Occupational History

- Started working as a pesticide mixer and sprayer at Pelam Estate for the past one and a half years. Duration of exposure to pesticides was about six hours daily for six days per week.
- Nature of her work was to mix the pesticides (type of pesticides were not disclosed by employer) and then carry the tank to the site for spraying. "Samurai-pump" was used for spraying. Sometimes spillage of pesticides occurred while mixing it, while carrying the tank and while spraying. Most common mode of exposure was contact with skin and inhalation when spraying.
- The estate did not provide any protective clothings to the employees. Patient was given a mask while working only after she developed an episode of epistaxis.
- Type of pesticides that patient used for spraying were usually ROUNDUP, ALLY and PARAQUAT.
- At present, patient has been transferred from spraying of pesticides to painting of rubber tree with a chemical to increase latex production. However, no protective clothing was given for this job.

Past Medical/Surgical history:

- Nil of note.

Family and Social History:

- Married with six children aged between two to 10 years old and four of them are school-going.
- Husband is working as a sprayer of pesticides too in another company.
- There are no medical, surgical or similar problems in the family members.

Obstetrics and Menstrual History:

- Menstruation is regular, light flow of three days per 30 day's cycle.
- Obstetrics history:

LMP : 4.8.97

EDD : 11.5.98

POA : 16/52

Had attended ante-natal check-up. Complained of minimal foetal movement and was informed by examining doctor to come back for follow-up in 2 weeks' time. Noted to be pale but patient is not taking any haematinics.

CLINICAL EXAMINATION:

Thinly built lady

Comfortable and afebrile

Vital Signs:

Weight : 49kg

BP : 103/61mmHg

Pulse : 72/minute

Anaemic

No jaundice

Skin:

Eczema-like lesion seen over temporal region with periorbital hypopigmentation. 2 lesions on left temporal side, each measuring 2 cm and 4 cm in diameter and one on right side measuring 3 cm in diameter.

Dry, excoriating eczema-like lesions seen with scratch marks over dorsum aspect of both legs.

No bleeding seen.

Mouth :

Poor oral hygiene with caries but no mucosal lesions.

Eyes :

Pupils reacted to light, normal eye movements

Ear, nose and throat :

Grossly normal

Cardiovascular system :

Dual heart rhythm, no murmur

Respiratory system :

Air entry equal both sides, clear.

Abdominal exam :

Scaphoid, soft, non-tender with striae-gravidarum seen.

No palpable mass felt.

Liver, spleen and kidney not palpable.

Uterus is 16 weeks size, globular in shape. No foetal parts felt.

Central Nervous System :

Cranial nerves grossly intact.
Normal power, 5/5 and normal tone.
No proximal muscle weakness.
No muscle twitching or fasciculations.
Deep and superficial reflexes are intact.
Sensations are normal.

SUMMARY:

29 year old Indian lady, G7P6 at 16 weeks was noted to have low levels of cholinesterase on a survey. Gave history of exposure to pesticides and herbicides and developed occasional chest pain, backache, headache, itchiness of legs and temporal region and an episode of epistaxis. On examination, generally all systems are intact except for a few dermal lesions over bitemporal region and dorsum on both legs which are dry and excoriating.

DIAGNOSIS:

1. Gravida 6 Para at 16 weeks gestation
2. Anaemia in pregnancy
3. Contact dermatitis ? Due to pesticide

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Case Study no. 2

Name : TS
Age 22 years
Race : Indian
Sex : Female

Para: 2
Date of examination : 8.12.1997

Complained of:

- I Giddiness on and off)
- I Abdominal cramps on and off)
- I Back pain on and off) past six months
- I Itchiness of the skin)
- I Chest tightness and breathing difficulty on and off)

History of Present Illnesses

A 22 year old lady, who has been working in the rubber and palm oil estate for the past year as a pesticide sprayer. She was brought to Pusat Racun Negara by the social worker for further history taking, physical examination and repeat cholinesterase level. A survey done for cholinesterase activity conducted by Pusat Racun Negara in conjunction with Pesticide Action Network reveals that her cholinesterase level to be low (1500 U/L) but increased to 2300 U/L after stopping spraying for one month.

At the moment, she suffers from the above complaints and attributed it to the history of cutaneous and inhalational exposure to pesticides. She was pregnant at three months and work in this recent estate for one month. On few occasions, she fell down from a steep hill during spraying and accidentally, the pesticides got splashed

all over her body. As a result, she suffers from itchiness of the skin over the affected area. She also had giddiness, abdominal cramps, back pain, chest tightness and breathing difficulty during spraying.

She had few episodes of epistaxis after spraying pesticides recently which subside spontaneously.

She is experiencing right shoulder pain (claimed to be kicked by her husband the night before during his drinking episode).

Past Obstetrics and Gynaecological History

- Just delivered a small for gestational age baby girl (1.6 kg) by lower segment Caesarean section (LSCS) 30 days ago.
- Reason for LSCS: Poor progress of labour with cephalopelvic disproportion
- Not breastfeeding her child

Past Medical and Surgical History

- No history of other illnesses.

Social and Marital History

- Married with 2 children (age ranging from one month to one and a half years)
- Poor spacing
- Husband is also a pesticide sprayer but sometimes did not go to work
- Husband consume alcohol and usually physically abused her during his drinking episodes

Occupational History

- Worked as a pesticide sprayer in other estate before.
- Just worked in this recent estate for one month before being permanently terminated from work due to poor performance.
- No compensation was given as she was only on probation at that time.
- Worked for seven hours per day.
- Not spraying pesticides only on rainy days.
- Used engine-pump spray which was leaking.
- Was not given any protective attire by the management.
- Had history of exposure to pesticides by inhalation and cutaneous contact.
- Commonly used pesticides are Ally, Paracol, Kopi "O" which was mixed by herself.

Nutritional History

- Poor
- Does not take enough food due to no well balanced food supply

PHYSICAL EXAMINATION:

General status

Poor hygiene - dirty nails
smelly and dirty clothing
dental caries

Medium built lady - 55 kilograms

Pallor - at conjunctiva, no jaundice
- Buccal mucosa.

Vital Signs:

Stable, afebrile
Blood Pressure : 105/69mm Hg
Pulse rate : 64/minute regular, good volume

Skin/nail

Impetigo marks over exposed area of the body,
Both upper limbs and lower limbs.
Measuring about 0.5 cm to 1 cm.
Dermatitis lesion and scaliness over both medial aspects of legs.
Hyperkeratotic area over dorsal aspect of both feet.

Eyes

PEARL (Pupil equal and reactive to light)
Eye movement : normal
Visual acuity } not done as Snellen Chart and ophthalmoscope not available.
Funduscopy }

Thyroid/Ear/Nose/Throat

Normal.

Lungs

Equal chest movement.
Normal vocal fremitus and vocal resonance.
Clear.

Cardiovascular system

Apex beat at 5th intercostal spacem midclavicular line.
Dual rhythm no murmur.

Abdomen

Obese, striae with caesarean section scar measuring
Soft, non tender.
Uterus : not palpable.
No liver, spleen or mass palpable.
Kidneys not ballotable.
Bowel sound reactive.

Central nervous system

Cranial nerves : Grossly intact.
No fasciculations or abnormal movement noted.
Normal gait.
Tone : Normal.
Power : All of 5/5.
Reflexes:
Deep } Normal
Superficial } Normal

Right forearm : Tenderness over the area on deep palpation
No limitation of movement/swelling or bruises

SUMMARY

A 22 year old Para 2 Indian lady, postpartum 30 days with symptoms of anaemia and contact dermatitis due to cutaneous exposure to pesticides.

DIAGNOSIS

1. NUTRITIONAL ANAEMIA
2. CONTACT DERMATITIS - pesticides induced
3. MUSCULAR PAIN RIGHT FOREARM

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Case Study no. 3

Name : JI
Age 37 years
Race : Malay
Sex : Female

Para: 5
Date of examination : 10.12.1997

Complained of

- Giddiness on and off. }
- Numbness over both hands on and off. }
- Knee and back pain. } for the past three years
- Chest tightness. }
- Epistaxis - few episodes recently. }

History of Present Illnesses

A 37 year old lady, who has been working in the rubber and palm oil estate for the past five years as a pesticide sprayer. She was brought to Pusat Racun Negara by the social worker for further history taking and physical examination. A survey done for cholinesterase activity conducted by Pusat Racun Negara in conjunction with Pesticide Action Network revealed that her cholinesterase level to be low i.e. 1377 U/L.

On further questioning, she claimed to suffer from the above complaints on and off for the past three years.

Giddiness and headache are usually felt during spraying pesticides and occasionally in the morning. It usually subsides by itself once she stop spraying due to raining days. For the past three years, she also had breathing difficulty and chest tightness during spraying pesticides at work. No loss of vision, nausea, vomiting or fall down during this episodes. Headache is more of boring in nature rather than throbbing.

Numbness over both hands, knee and back pain occur when she was doing spraying in the field.

She had few episodes of epistaxis after spraying pesticides recently which subsided spontaneously. No other complains.

Obstetrics and Gynaecological History

Her last child birth was eight years ago. She took oral contraception pills for family planning after her last childbirth. All children were born by spontaneous vaginal deliveries with no complications.

Had history of VDRL positive during last pregnancy. Completed Benzathine Penicillin injection, Husband tested negative for VDRL.

Medical and Surgical History

- No history of other illnesses.

Social and Marital History

- Married with five children (age ranging from 8-19 years)
- Husband works as labourer in Matang.

Occupational History

- Working as pesticide sprayer for the past five years at the same estate for seven hours per day (312 days/year).
- No spraying pesticides only on rainy days.
- Used hand-pump spray with good condition but no training provided.
- Used-self protection by means of face mask provided by the management as well as own working attires which were washed after use.
- Had history of exposure to pesticides only by inhalation.
- Commonly used pesticides are Ally, Amin, Apollo, Sterling, Kopi "O" which has been mixed by other workers.
- Pesticides used recently are unknown.

Nutritional History

- Took adequate well balanced diet.

PHYSICAL EXAMINATION:

General status

Comfortable, afebrile.

Medium built lady - 85 kilograms.

Pink, no jaundice.

Good hygiene.

Vital Signs:

Stable

Blood Pressure : 126/79mm Hg.

Pulse rate : 64/minute regular, good volume.

Skin/nail

- Normal nails and skin.

Eyes

PEARL (Pupil equal and reactive to light)

Pterygium noted binasally.

Eye movement : normal.

Visual acuity } not done as Snellen Chart and ophthalmoscope not available.

Funduscopy }

Thyroid/Ear/Nose/Throat

- Normal.

Lungs

Equal chest movement.

Normal vocal fremitus and vocal resonance.

Clear.

Cardiovascular system

Apex beat at 5th intercostal space midclavicular line.

Dual rhythm no murmur.

Abdomen

Obese, striae.

Soft, non tender.

No liver, spleen or mass palpable.

Kidneys not ballotable.

Bowel sound reactive.

Central nervous system

Cranial nerves : Grossly intact.

No fasciculations or abnormal movement noted.

Normal gait.

Tone : Normal.

Power : All of 5/5.

Reflexes:

Deep } Normal

Superficial } Normal

Reduced sensation over first and second finger bilaterally

(C6 and C7 distribution)

No muscle wasting noted

SUMMARY

A 37 year old Para 5 Malay lady with history of exposure to pesticides over five years. Examination reveals sensory neuropathy over both first and second finger. C6 and C7 distribution.

DIAGNOSIS

1. Sensory neuropathy Over C6 and C7 distribution of both hands:

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Case Study No. 4

Name : LM
Age 43 years
Race : Indian
Sex : Female

Para: 5
Date of examination : 10.12.1997

Complained of

- Giddiness on and off.
- Numbness over both hands on and off.

History of Present Illnesses

A 43 year old lady, who has been working in the rubber and palm oil estate for the past 12 years as a pesticide sprayer. She was brought to Pusat Racun Negara by the social worker for further history taking and physical examination. A survey done for cholinesterase activity conducted by Pusat Racun Negara in conjunction with Pesticide Action Network revealed that her cholinesterase level to be very low i.e. 373 U/L.

On further questioning, she claimed to suffer from:

Giddiness }
Headache } on and off
Syncopal attack past three months
Numbness over both hands especially right side on and off

Giddiness and headache were usually felt during spraying pesticides and occasionally in the morning. It usually subsided by itself once she stopped spraying on rainy days. For the past 3 months, she also had syncopal attack and experienced sudden blackouts when she woke up from her bed in the morning. No loss of vision, nausea, vomiting or fall down during this episodes. Headache was more of boring in nature rather than throbbing.

Numbness over both hands occurred whenever she was doing spraying in the field. She claimed this to be due to excessive supination and pronation movement that she had to do during spraying. Sometimes, she could not feel any sensation at all during spraying.

No other complaints.

Obstetrics and Gynaecological History

Her last child birth was 16 years ago. She had completed her family by bilateral tubal ligation after her last childbirth. All children were born by spontaneous vaginal deliveries with no complications. First menarchy attained at 15 years with normal 30-32 days cycle lasting for two to seven days. She is still menstruating.

Medical and Surgical History

- No history of other illnesses.
- Had history of right eye conjunctivitis due to accidentally splashed insecticides during working. Eye irrigation done in dispensary estate by medical assistant and SOCSO compensation was given for six days.

Social and Marital History

- Married with five children (age ranging from 24-26 years)
- Husband works as a palm fruit picker in the same estate.
- Schooling till standard six.
- Claimed to be happily married with a very supportive husband and good children.

Occupational History

- Working as pesticide sprayer for the past 12 years at the same estate for seven hours per day (312 days/year).
- Not spraying pesticides only on rainy days.
- Use hand-pump spray with good condition but no training provided.
- Used self protection by means of face mask provided by the management as well as own working attires and fabric gloves.
- Had history of exposure to pesticides used by inhalation, cutaneous and eye routes.
- Took immediate measures to reduce effects by taking shower every time she had cutaneous exposure and seek treatment from estate dispensary.
- Commonly used pesticides are Ally, Amin, Apollo, Gramoxone, RS which have been mixed by other workers.
- Pesticides used recently are unknown.

Nutritional History

- Took adequate well balanced diet

PHYSICAL EXAMINATION:

General status

Comfortable, afebrile.

Thin medium built lady - 42 kilograms.

Pink.

Good hygiene.

Vital Signs:

Stable.

Blood Pressure : 114/71mm Hg.

Pulse rate : 84/minute, regular, good volume.

Skin/nail

- Normal nails.
- Has blackish discoloration over right upper chest measuring about 1 cm in diameter (claimed to be due to accidentally sprayed insecticides to that area)
- Bluish strap-like mark over both shoulder about 5 cm in length (claimed to be due to carrying insecticide tank)

Eyes

PEARL (Pupil equal and reactive to light)

Pterygium noted binasally.

Eye movement: normal.

Visual acuity } not done as Snellen Chart and ophthalmoscope not available.

Funduscopy }

Thyroid/Ear/Nose/Throat

- Normal.

Lungs

Equal chest movement.
Normal vocal fremitus and vocal resonance.
Clear.

Cardiovascular system

Apex beat at 5th intercostal space, midclavicular line.
Dual rhythm no murmur.

Abdomen

Acaphoid.
Atriae albicans and surgical mark seen.
Soft, non tender.
No liver, spleen or mass palpable.
Kidneys not ballotable.
Bowel sound reactive.

Central nervous system

Cranial nerves: Grossly intact.
No fasciculations or abnormal movement noted.
Normal gait.
Tone : Normal.
Power : All of 5/5.
Reflexes:
Deep } Normal
Superficial } Normal

Reduced sensation over first and second finger bilaterally.
(median nerve distribution)
No muscle wasting noted.

SUMMARY

A 43 year old Para 5 Indian lady, with history of exposure to pesticides over 12 years. Examination reveals sensory neuropathy over both first and second finger. C6 and C7 distribution.

DIAGNOSIS

a) Sensory neuropathy Over C6 and C7 distribution of both hands

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Case Study no. 5

Name : SY

Age 31 years

Race : Malay

Gravida/Para : 2

Date of examination : 10.12.1997

History of Present Illnesses:

- Was brought to Pusat Racun Negara due to noted low level of Cholinesterase from previous survey and for detailed medical history and examination
- Patient have no complaints associated with the exposure to the poisons such as skin irritation, difficulty in breathing or eye itchiness.

Occupational History:

- Patient have been working at Aman Jaya Estate as a rubber tapper for many years.
- For the past two years, she started doing "over-time" work spraying pesticides and herbicides. The commonly used pesticides/herbicides were ROUNDUP and ALLY. Nature of her over-time work is to carry the pre-mixed pesticides/herbicides tank and spraying done using the hand-pump or the "Samurai pump". The estate provides protective clothing of masks and boots only, no gloves were provided. Duration of her work of exposure to the poisons are about four hours daily, every day for six days.
- Patient had occasional exposures to pesticides/herbicides via inhalation and skin contact.
- No history of ingestion or spillage on the eyes.

Past Medical/Surgical History

Nil of note.

Family and Social History:

- Married with two school-going children, aged 8 and 14. Husband is a fish-monger.
- There are no surgical or medical problems in the family and no similar problems in the family.

Menstrual History:

Normal flow, regular with six days/30 days cycle.

CLINICAL EXAMINATION

Thinly built lady.

Comfortable and afebrile.

Vital Signs:

Weight : 52 kg

Blood Pressure : 120/80mm Hg.

Pulserate : 66/minute.

No anaemia, no jaundice.

Skin : No dermal lesions seen.

Mouth : Good oral hygiene and no mucosal lesions.

Eyes : Pupils reacted to light, normal eye movements.

Ear, nose and throat : Grossly normal.

Cardiovascular system : Dual heart rhythm, no murmur.

Respiratory system : Air entry equal both sides, clear.

Abdominal exam : Scaphoid, soft, non-tender.

Central Nervous System:

No palpable mass felt.
Liver, spleen and kidney not palpable.
Cranial nerves grossly intact.
Normal power, 5/5 and normal tone.
No muscle twitching or fasciculation.
Deep and superficial reflexes are intact.
Sensations are normal.

SUMMARY

31 year old lady, noted to have low levels of cholinesterase on a survey. Gave history of exposure to pesticides and herbicides but no complaints and no physical signs noted.

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Case Study no. 6

Name : PV

Age: 41 years

Race : Indian

Date of examination : 10.12.1997

Was brought to Pusat Racun Negara due to noted low level of Cholinesterase from previous survey and for detailed medical history and examination.

- Currently complained of :
 - ⇒ nausea and vomiting on and off;
 - ⇒ epistaxis occasionally;
 - ⇒ itchiness over left wrist for two weeks' duration

History of Present Illnesses

- Nausea and vomiting occurred while mixing pesticide occasionally. Not associated with abdominal pain and symptoms relieved spontaneously without any medication.
- Epistaxis occurred on and off especially so in the morning. Amount of bleeding was minimal and symptoms relieved spontaneously or with medication given by Medical Assistant.
- Had history of spillage of pesticides over left wrist two weeks ago. Patient washed the pesticides after contact and sought medical advice. Was given cream for the lesion but itchiness over the area still persists.
- Patients also gave history of splashing pesticides into eyes one month ago. Patient developed redness of eyes and itchiness. Irrigation of eyes done and SOCSO compensation was given.

Occupational History

- Started working as a pesticide sprayer at TRP Trong Estate for the past eight years. Duration of exposure to pesticide is about eight hours daily for six days per week.
- Nature of her work is to spray the premixed pesticides but occasionally she had to mix the pesticides herself. Patient then carried the tank to site of spraying and hand-pump was used for spraying. Most common mode of exposure were contact with skin, nails or eyes and inhalation when spraying.

- The estate provided protective clothing to the employees such as gloves, mask and boots.
- Type of pesticides that patient used for spraying are usually KOPI - "O", ALLY, AMINE, ROUNDUP and PARAQUAT.

Past Medical/Surgical History

Patient gave a history of accident at the working place 10 years ago while working at a rubber plantation. At that time, patient was processing the rubber latex to make "getah keping" when her hair accidentally got stuck into the roller machine. Part of her left arm and both her legs was also trapped in the machine in the process of releasing her hair. She was warded for seven months where toilet and suturing were done. Patient did not remember other procedures done to her. She lost her previous job and no compensation was given.

Family and Social History

- Single lady, staying with her mother and two nephews.
- The nephews are both working and supporting themselves.
- Mother is old and bed-ridden and patient had to look after her after working.

Menstrual History

- Regular flow, minimal in amount, three to seven days over 30 days cycle.

CLINICAL EXAMINATION

Thinly built lady, short stature.
Comfortable and afebrile.

Vital Signs

Weight : 51.5 kg.
BP : 115/74 mmHg.
Pulse : 80/minute.
No anaemia, no jaundice.

General Examination

Walks with an abnormal gait due to contractures over legs.
Scars seen as in diagram.

Surgical scar seen over occipital area ~6cm long. Non tender. No hair growth over the area.

Scar ~20 cm long over posterior aspect of arm.

Dry, exfoliating lesions over anterior and posterior aspect of left wrist. Scratch marks visible. No weeping or bleeding.

Contractures with scarring over dorsum of both legs.

Reduced sensation over L4 and L5 (over contracture site)

Skin : Dry, eczema-like lesion which are scaly and cracks seen over anterior and posterior aspect of left wrist. Scratch marks also seen.

Mouth : Good oral hygiene, no mucosal lesions.

Eyes : Pupils reacted to light, normal eye movements.

Ear, nose and throat : Grossly normal.

Cardiovascular system : Dual heart rhythm, no murmur.

Respiratory system : Air entry equal both sides, clear.

Abdominal exam : Scaphoid, soft, non-tender . No palpable mass felt.

Liver, spleen and kidney not palpable.

Central Nervous System : Cranial nerves grossly intact.
Normal power, 5/5 and normal tone.
No proximal muscle weakness.
No muscles twitching or fasciculations.
Deep and superficial reflexes are intact.
Sensations are reduced over dermatomes of L4 and L5 (over contracture).

SUMMARY

41 year old Indian lady, was noted to have low levels of cholinesterase in a survey. Gave history of exposure to pesticides and herbicides and developed occasional nausea and vomiting, epistaxis, itchiness of left wrist and history of splashing pesticides into eyes. On examination, generally all systems are intact except scars from previous accidents seen and eczema-like lesions over left wrist. Reduced sensation over L4 and L5 dermatomes over dorsum aspect of leg.

DIAGNOSIS

? contact dermatitis over left wrist ? due to pesticide.

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Case Study no.7 (Baby of Tamilselvi)

Name : NM
Age : One month
Race : Indian
Sex : Female
Date of examination : 3.12.1997

Complained of

- None

History of Present Illnesses

- Brought for routine medical examination

Birth History

- Born full term by Lower segment Caesarean Section (LSCS) due to poor progress of labour with ? maternal cephalopelvic disproportion on 7th of November 1997.
- Birth weight 1.6 kg (Term Small For Gestational Age Baby).

Immunisation History

- Had 2nd dose of Hepatitis B injection on 7th of December 1997.
- No complication.

Feeding History

- Given formula feeding on demand.
- Sucking well.

PHYSICAL EXAMINATION

General Status

- Comfortable and active.
- Pink, no jaundice.

Central nervous system

- Cranial nerves grossly intact.
- Moro's Reflex present.
- Babinski's downgoing.

Cardiovascular system

- Apex beat 5th intercostal space midclavicular line
- Heart dual rhythm, no murmur

Lungs

- Equal chest movement.
- Normal vasicular breath sounds.

Abdomen

- Soft, non tender.
- No organomegaly.

DIAGNOSIS

- Normal small for one-month baby.

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Conclusions

Occupational safety and health are major concerns in agriculture, ranked among the top three most hazardous occupations. Agrochemicals such as pesticides present a particular challenge as hazards attributable to the use of chemicals are difficult to diagnose.

The two major problems in this area remain a certain unwillingness to recognise occupational poisonings and the failure to report them when recognised. Occupational health is an area of continuous struggle between workers fighting for protection or compensation and their employers seeking to deny or reduce their liability for work related diseases. The conflict has greatly influenced statistical reporting, and the burden of disease due to occupational exposure is usually underestimated.

It is quite clear from the current study that the women spraying pesticides in oil palm plantations in Malaysia are poor and live in unsafe and unsanitary conditions. As part of their occupational duties of handling and spraying pesticides they are at risk from pesticide poisonings, which can severely damage their own health, of their families and that of future children born to them. Institutionally powerless, their complaints and voices are overlooked by the estate management.

It has been proven that women are at higher risk to exposure from chemicals such as pesticides than men. Whether pregnant or not, exposure to pesticides affects the reproductive system and may potentially damage the foetus in the womb. However, the key question remains whether any person, be it a man or woman should be exposed to such hazards at all. The solution lies not only in removing women away from such hazardous occupations, but also in ensuring that other marginalised groups such as migrant workers do not replace them on plantations.

Since most workers stay in homes located in the estates, their families and children are also at risk from exposure to pesticides. In Taiping, it was reported that a children's nursery was located adjacent to the fields sprayed, exposing the children to pesticides everyday. The number of poisoning cases reported from estates is thus grossly under-estimated, as it does not take into account the entire population residing in the plantation.

Women workers exposed to pesticides commonly complain of reproductive problems, especially a burning sensation in the vagina. During the education and health camps conducted by Tenaganita, they shared that it was painful to have sex. Where men dominated sexual decisions, women were sometimes forced to have sex against their wishes.

The other common health complaints were backaches, abdominal pains and prolapse wombs. These were brought about because women sprayers carried a heavy load of the spray tank on their backs almost throughout the day.

The HA at the estate medical centre is a male, and women workers find it embarrassing to discuss reproductive complaints with him. As a result, these complaints were ignored, not treated and further aggravated, causing much discomfort to women workers.

Women working in the plantations were illiterate and could not read labels on the pesticide containers. It was commonly seen that pesticides were used in concentrations in excess of requirements; in 'cocktails' whose ingredients were not known; and often the estate management chose not to divulge the names of pesticides used, to the sprayers. This is in violation of the basic right to information on potential hazards from an occupation such as pesticide spraying. Also, as the spraying equipment was sometimes leaking, it posed additional dangers of spillage and toxicity to the sprayers.

The health and nutritional status of the workers and their families was generally poor, which made them vulnerable to toxicity. Women workers reported that they were forced to reduce their water intake during the day because they could not find a urinal in the fields and had to hold back the urge to urinate until the end of the shift. In the hot and humid conditions on the plantations, this is not a healthy practice, and dehydration may have further aggravated the toxic effects of pesticides.

Mixing the pesticide with bare hands. Photo: Tenaganita, 2002.



The estate management did not provide training on safety precautions and procedures to be followed while handling pesticides. There were no training materials available in local languages for workers and medical professionals. The protective gear provided, if any, was inappropriate to the local hot and humid conditions and is thus not used by most sprayers. These factors aggravated the risk factor for working in plantations.

An incentive of 50 cents per day was offered to workers who undertook spraying activities. Only for the additional income of RM15 per month (US\$4) women sprayers placed themselves under serious health risks. Workers need to be educated and made aware of these realities.

Medical professionals were not adequately trained to recognise symptoms of pesticide exposure and often disregarded these as minor complaints of cough, headaches etc. This further underestimated the real picture regarding poisoning attributable to pesticide exposure.

In addition, where awareness raising and the empowerment process has successfully enabled the women to cease having to spray pesticides due to health concerns, management has responded by shifting the work to contracted labour—most of whom are migrant workers.

In such conditions of use in the plantations, - where pesticides are sprayed daily by workers for seven hours, with very little knowledge of the dangers of the pesticides they are using, without any or with very little protective clothing, using spray equipment that is often leaking, where medical personnel neither have any training on identifying of symptoms of poisoning nor treatment of poisoning, and worse workers are not told about the identity of the chemicals that they are being exposed to, and where profits are given more importance than human health – in such situations the use of Class 1 pesticides becomes even more problematic. Yet such Class 1 pesticides are used in the plantations including monocrotophos and methamidophos, often by workers without any knowledge of their hazards and exposing them and their families to these poisons. Although the study did not identify the WHO Class 1 pesticides (classified as extremely and highly hazardous), it is common knowledge that they are used and so it is urgent that all Class 1 pesticides be banned from use in the plantations. Although the study does not cover the use of pesticides in farming communities in Malaysia, such conditions exist in the farming sector and so it would be desirable in the interest of protecting the health of agricultural workers and farmers to ban the use of WHO Class 1 pesticides in Malaysia.

Another major pesticide in use in Malaysia is Paraquat. Poisoning due to Paraquat is clearly demonstrated in the surveys and interviews with workers and indicated in the medical examinations. Paraquat use is rampant in the plantation sector although the next choice of herbicide use in the plantations is Glyphosate. Because of its effects to workers and users of Paraquat, Malaysia has restricted its use and classified it as Class 1 pesticide. However, more needs to be undertaken, given the extent of poisoning identified by the workers in this study and in numerous other studies, it is urgently required that Malaysia bans Paraquat.

On the national level, the market for herbicides is increasing steadily, with sales reaching RM 245 million in 1998. In comparison, the implementation and monitoring of OSHA in the country is far behind. This is a glaring disparity that needs attention of the government's regulatory authorities.

The legal framework in place includes the Pesticides Act and the Occupational Safety and Hazards Act (OSHA). However, the compliance with regulations under these legislations is doubtful and a mechanism for monitoring compliance and OSHA does not exist. It is essential to monitor the adherence of the legislations, as they affect a large population of agricultural workers, farmers and horticultural workers in the country.

The hazards of pesticide use in developing countries is not in dispute and governments and NGOs are working towards reducing pesticide use. In 1998, governments agreed upon the Rotterdam Convention, which aimed at increasing the awareness and action against banned and severely restricted pesticides and introduced the concept of Prior Informed Consent (PIC) to help countries prohibit imports of certain hazardous pesticides. The FAO International Code of Conduct on the Distribution and Use of Pesticides is now being revised in the light of 15 years of experience in monitoring pesticide usage in countries. It calls for stricter vigilance in recording and preventing pesticide poisoning and pollution.

Data on the toxic effects of pesticides are limited and difficult to ascertain because of the use of pesticide cocktails. However, as long as there is an indication of possible health hazards from pesticides, their use should be limited and assessed further.

Recent research has shown that synergistic effects among chemicals used in different combinations are much more dramatic than was previously thought. Yet, chemicals are tested for their possible carcinogenic and mutagenic potential in isolation from each other. To determine their real effect, we need to test chemicals in all possible combinations, which is both financially and logistically impossible. However, the fact that there are no definitive answers with respect to the pesticide mixture problem, is not an excuse for doing anything about it (Howard, 1997).

It is also necessary to seek alternative methods of pest control which are safe to human health and the environment. This requires a shift towards non chemical methods of pest control, such as integrated pest management using biological control, cultural control and host resistance, and towards organic agriculture where fertilisers and synthetic pesticides are not used at all.

In 1991, Law Hieng Deng, Malaysian Minister for Science, Technology and the Environment called for a review of the rising trend of chemical pesticide usage and pointed to the successes of biological controls, for example against oil palm bag worms and rhinoceros beetles in coconut trees and rearing sheep in rubber plantations to reduce the need for weed-killing chemicals (New Straits Times(A), 1991).

The Malaysian Agricultural Research and Development Institute (MARDI) has been running a successful project to promote integrated pest management to vegetable growers in the highland areas for two years (New Straits Times(B), 1991).

NGOs play an important role in documenting what are happening on the ground, working with poor communities to improve pest control practices and in contributing to improved monitoring and regulation. It is vital to strengthen their capacities to continue carrying out monitoring activities and share experiences to build collaboration between other groups working on the issue.

The current study is indicative of the fact that women sprayers working in plantations in Malaysia are poisoned by

the pesticides they spray daily. It also reaffirms that the living conditions in plantations are poor, medical care is inadequate and that estate management is oblivious and often unsympathetic towards the social and health problems faced by workers. The study also confirms that the sample population was spraying organophosphate-type pesticides, indicated by a lowering of the acetyl cholinesterase levels in plasma and blood.

The study is a pioneering attempt to study in depth, the women sprayers on plantations in Malaysia. It is recognised that further, more structured studies are required to substantiate data from this study and to overcome the limitations faced in this study, some of which are explained below.

Tests for the effects of other commonly used pesticides, such as Paraquat were not carried out due to high costs involved in testing. Blood testing for plasma cholinesterase carried out in Perak, had to be discarded due to handling errors and could not be used in the conclusions of this study.

There was no substantive information gathered on other types of pesticides used in the plantations, because workers were unable to identify either the pesticides they used or their quantities in isolation or in cocktails.

Baseline levels of cholinesterase for the sample population were not available. In the absence of these, average levels of a control (unexposed) population sample were used for comparison. There was no scope for confirming the blood testing results, as it was only possible to conduct a one-time testing of cholinesterase levels for most of the sample. A second confirmatory test was conducted only for six workers with unusually low levels of the enzyme.

There are debates underway in the scientific community regarding the validity of the plasma cholinesterase levels over RBC levels as an indicator of organophosphate poisoning. The US EPA continues to use the plasma pseudo-cholinesterase levels for its studies, which were thus deemed as suitable for an exploratory study of this nature. Further studies could be substantiated by using RBC levels (used by Canada and WHO) or brain tissue levels (used by Californian regulatory authorities). Also, plasma levels are lowered by dosages considerably lesser than are required to cause symptomatic poisoning and hence are good indicators of early acute organophosphate poisoning.

Studies show that cholinesterase levels in RBC are a better indicator of organophosphate toxicity than those in plasma. The U.S. EPA uses the plasma butyrylcholinesterase levels as an indicator, which has been questioned on the issue. The Californian regulatory authority uses the acetylcholinesterase in brain tissue as an indicator. The plasma levels were used as an indicator for this study, as the testing procedure is comparatively easy and inexpensive. Other indicators such as RBC, brain tissue and urine if measured may have provided more insight into the extent of poisoning.

Ideally, a comparison between the cholinesterase levels of sprayers, non sprayers and non plantation workers would have been useful in ascertaining a cause-effect relationship of the symptoms and pesticide use. In the plantation situation, this type of distinction was not feasible, as non sprayers (undertaking mixing or weeding types of activities) were also exposed to the pesticide sprays.



The clothes, equipment and pesticides are kept at worker's home. Photo: Tenaganita, 2002.

Chapter 5

Recommendations

The results of the research study raises critical issues regarding the safety and health of women sprayers on plantations that need further scrutiny and exploration.

The current study is an attempt to throw some light into the pathetic conditions of women workers in plantations and is a step closer in identifying the need for future research, training and policy level interventions.

The reduction or prevention of toxicity related to pesticide usage in the country would entail:

- support and implementation of a systematic pesticide use reduction policy with the aim of replacing them with long-term, safe and ecological solutions to pest management.
- Banning the use of WHO Class 1 pesticides in Malaysia
- Banning Paraquat
- A systematic review, evaluation and screening of all pesticides both for their acute and chronic toxicity in the conditions of use in Malaysia. These pesticides need to be screened for their reproductive and endocrine-disruptive effects with bans and severe restrictions being imposed on these chemicals. Since in reality it is impossible to catch up with all the screening that has to be undertaken, the precautionary principle needs to be adopted, when dealing with pesticides where toxicological hazards have been established and risks not fully understood, or where there are toxicological gaps in knowledge either on the precise effects of the pesticides or on the mechanisms for toxicity.

At the same time, it is necessary to ensure that there is in place legislation to control the use of pesticides and an infrastructure to enforce the violation of legislation. Sound pest management techniques must be practised to control pests and avoid their becoming resistant. Training and information activities concerning pesticide safety must be established for educating pesticide distributors and users in addition to sprayers. Simultaneously, there is need for continued research to seek safe and ecological solutions for agriculture and public health use.

Recommendations for future action and intervention include:

- **Information Sharing and Dissemination**

Need for information that are clear and easy to understand on pesticide usage and precautions to be followed. Pesticide companies should be responsible for placing instructions and signs of caution on containers. The manufacturers' Material Safety Data Sheet (MSDS) is a good source of information for estate management and employers.

Estate management to provide complete information to sprayers on the types of pesticides used, and possible health hazards thereof. Trade union leaders to be made aware of the potential hazards from pesticides, so that the issue is tackled at trade union discussions and negotiations with estate management.

- **Education**

Plantation workers need to be educated on the precautionary measures to be followed while handling pesticides; common symptoms of pesticide poisoning; their legal rights as workers and the legal framework supporting their cause. The National Union of Plantation Workers (NUPW) should set up a Health and Safety Committee that provides information, conducts training and capacity building for its members. A standard training protocol for plantation workers should include the following:

- a) Understanding of health hazards
- b) Adoption of proper work practises
- c) Use of protective equipment
- d) Practice of good personal hygiene
- e) Recognition of early symptoms
- f) Quick first aid
- g) Safe transport and storage of pesticides, safety labels and datasheets
- h) Proper disposal of empty containers

With education and awareness, workers will be empowered to resist injustice and violation of rights in plantations.

- **Medical care**

Establishment of a fully equipped clinic available on the plantation capable of identifying and treating pesticide related emergencies such as burns, skin problems, breathing disorders, nausea and vomiting etc. The clinic staff should preferably be a woman, so that sprayers can discuss health problems comfortably.

In addition, it is essential that medical professionals in plantation clinics, government and private hospitals be trained to identify and treat symptoms and clinical data for pesticide toxicity. A training protocol for medical care specifically related to pesticides should be developed and included as part of the curriculum in medical schools.

Furthermore, it is suggested that hospitals document and routinely monitor cases of pesticide related poisoning and also conduct detailed research with clinical data on the effects of pesticide toxicity.

- **Compliance**

There is an urgent need to monitor and ensure that pesticide companies adhere to the established regulations regarding distribution of banned pesticides. Plantation workers can play a key role in the monitoring and collection of information on pesticides used on the plantations.

- **Legislation**

There is need to review existing regulations governing occupational safety and hazards, and their compliance in the country – especially with regard to the formation of Safety and Health Committee, and planning a research agenda on the pesticides issue. Ban WHO Class I pesticides and Paraquat and stop the use of pesticides known or suspected to be carcinogenic (cancer causing effects), endocrine-disrupters (causing reproductive and fertility problems) and immune-system suppressants.

- **Strengthening OSHA**

There should be a formation of the Safety and Health Committee to monitor the health effects experienced by plantation workers, especially the sprayers. Addressing the weaknesses in OSHA as identified earlier in the report.

Training of Social Security Review Board on the effects and hazards of chemicals on people's health in order to ensure proper compensation to workers affected by chemicals.

- **Promotion of Alternatives**

Farmers, agricultural workers and horticulturists should be encouraged to experiment with and practise non-chemical methods of pest control and develop a conscious strategy to reduce the use of pesticides in plantations.

- **Advocacy**

Widespread dissemination of information on pesticide related hazards in print and other media, and an urgent need for policy intervention and regulation of pesticide use in Malaysia.

- **Integration of Gender Perspective**

To integrate the gender perspective in occupational safety and health legislation, it is imperative to take into account the three roles of women - housewife, mother and worker, and the need for special protection of women in hazardous conditions. There should be equal employment opportunities for both women and men. This requires that due regard is paid to family needs, while working to enable all to develop their potential, child care services, flexible working time arrangements, non penalising career breaks and leave sanctions. Access to training also needs special attention.

Targetting the enterprises (plantations), preventive programmes should be planned to control the occupational hazards, deal with psycho-social and organisational factors, and revise work practices to reduce hazards and job designs of women workers.

At the individual level, workers should participate in protective programmes, ensure that they have the option of work modification, reassignment and rehabilitation, if necessary, especially during pregnancy and child bearing times. Ergonomic considerations regarding the manual handling and load carrying should be ensured to meet standards.

There is also a need to plan for human variability, avoiding generalisations about women's physical capacities and vulnerabilities, and taking into account individual capability of workers based on age and sex. Research to examine existing information or bias and avoid erroneous judgement on the issue is essential. National occupational health and safety statistics, with specific focus on women need to be substantiated. Women need to be better represented in decision making bodies concerning occupational health and safety, with adequate access to training, information and freedom to organise themselves into formal and informal groupings.

- **Future needs for research**

In terms of research needs to substantiate the harmful effects of specific pesticides to health symptoms, more studies are required to identify the effects of pesticides other than organophosphates. In light of emerging discussions on Endocrine Disruptors, there is an urgent need to collect data on the health impacts of pesticides on children, such as hyperactivity, poor performance in schools, aggression, asthma and respiratory problems to name a few. It may also be useful to document and compare the health status of children of sprayers and non-sprayers in plantations.

Without concrete quantitative information on the pesticides used, it is difficult to ascertain the level of toxicity amongst workers. Future studies should address this information gap on the specific types and quantities of pesticides used on plantations. As an important part of obtaining information, there is the prerequisite that both government agencies and the industry's right to know and freedom of information. It is only through an environment that promotes transparency and sharing of information, that we can effectively address strategies for intervention to protect health and lives of women sprayers and the estate community.

Research is also required on documenting the long term effects of pesticide exposure, especially on women who have been spraying pesticides for many years.

In the product developmental stage, research is required to develop lesser toxic molecules and adopt safer formulations, provide safer techniques of application and ensure complete toxicological testing of a product before it is marketed, to develop suitable methods for exposure measurements on users and on the environment. More specifically, evaluation of potential risks to workers must be evaluated in terms of regulation and post-registration surveillance.

Post-product development and marketing, pesticide manufacturing companies in collaboration with plantations should promote the safe use of pesticides, workers' participation in the management of health risk at the workplace (plantations), hazard identification, assessment of exposure and health surveillance. These include pre-employment medical examination, periodic assessment of health status of workers and biological monitoring.

In general, all users should be educated to avoid the use of unnecessary pesticides, adoption of safe practices and pesticide application and crop defense.

In the area of empowerment of women workers, more studies are needed to document the factors undermining the reproductive rights and sexuality of women in plantations. Further education and awareness campaigns should target these issues.

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Appendix 1

The Survey Questionnaire

WOMEN CONFRONTING THE CYCLE OF POISON

Questionnaire On Pesticide Spraying In Plantations

Name:

Location:

Personal Particulars:

Sex:

Age:

Race:

Marital Status:

Occupation of Spouse:

No. of children:

Nature of work/Occupation:

Length of Service:

Salary:

Are you a: Permanent worker contract worker migrant

Working hours (no of hours of work): per day per week per month

Are you pregnant or breastfeeding.

Pesticide Use

Are you a pesticide sprayer Yes No

1. What class of pesticide used in the field:

Weedicide Insecticide Fungicides Others

2. What pesticide do you use?

Common Name: _____ Name: _____

What is it used for? _____

How often in a year do you apply this? _____

Do you spray throughout the year? Yes _____ No

Is there a break given? Yes _____ No

If there is a break, for how long? _____

What type of task are you assigned? _____

How long after spraying are you assigned to another task? _____

Frequency in a month _____

Number of hours per spray _____

3. Equipment:

Method of spray (equipment used) _____

What was the condition of the equipment? _____

How is it stored? _____

Was training provided on use? _____

4. Protective clothing:

Was protective clothing/equipment supplied? Yes No

If yes, what were they? coveralls gloves eye and face protective
aprons and coats protective boots respiratory equipment

Is protective clothing washed after it is used? Yes No

5. Mixing of Pesticides

Do you mix the pesticides before spraying? Yes No

If not, who mixes? _____

What is the pesticide mixed with? _____

What are the quantities? _____

Do you mix it with other pesticides? Yes No

If yes what are they? _____

What are the quantities? _____

6. Effects of the Pesticide

After spraying do you suffer from:-

- Nausea
- Giddiness
- Headache
- Vomiting
- Difficulty in breathing
- Tight feeling of chest
- Itchiness / skin irritation / white patches on skin / red spots
(Where on the body?)
- Bleeding through the nose
- Blurred vision
- Tremors
- Lower abdominal pains

- Vaginal pains
- Burning sensation during urination
- Fatigue / tiredness
- Back pains
- Swelling of the knee joint
- Discolouration of nails / inflammation and irregular nails / nails dropping off
- Others

7. Have you been exposed to pesticides / come in contact with pesticides

- | | | |
|--------------------------|------------------------------|-----------------------------|
| Through Inhalation | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| On the skin | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| Accidentally consumed it | Yes <input type="checkbox"/> | No <input type="checkbox"/> |

MEDICAL

1. Who do you go to when you have any of the effects of poisoning?

2. What treatment is given?
 Medicines: type: cream drug / tablets for consumption liquid form
3. Do you go for regular medical check-up?

4. Where do you go for the check-up?

5. Who conducts the medical examination?

6. Is there a policy in the plantation on sending sprayers for regular check-up?

Phase I: Sample Selection and Distribution within Estates

Estate No.	Place	State	No. of Subjects (n)
1.	Serdang	Kedah	8
2.	Serdang	Kedah	3
3.	Bukit Lembu	Kedah	3
4.	Batu Lintang	Kedah	4
5.	Bukit Selambau	Kedah	3
6.	Kulim	Kedah	2
7.	Kuala Ketil	Kedah	3
8.	Sungai Petani	Kedah	3
9.	Kulim	Kedah	4
10.	Kulim	Kedah	5
11.	Kulim	Kedah	6
12.	Mahang	Kedah	1
13.	Mahang	Kedah	1
14.	Trong, Taiping	Perak	15
15.	Nibong Tebal	Penang	3
16.	Taiping	Perak	3
17.	Nibong Tebal	Penang	5
TOTAL:			N = 72

Phase II:

Estates involved in the Self-Health Monitoring Cards Programme

Estate No.	Place	State	No. of subjects (n)
1	Sungai Petani	Kedah	17
2	Sungai Siput	Perak	2
3	Sungai Siput	Perak	15
4	Trong	Perak	22
5	Teluk Intan	Perak	11
TOTAL:			N = 67

Appendix 3

சுகாதார குறிப்பு / REKOD KESIHATAN

பெயர் :
 Nama: _____
 வயது :
 Umur: _____

அடையாளக் காட்டு எண்:
 No Kad Pengenalan: _____
 தோட்டம்:
 Tempat: _____

எண் No	நோய் அறிகுறிகள் Tanda - Tanda Penyakit	திகதி / Tarikh					
1	 குமட்டல் Rasa Mual						
2	 வாந்தி Muntah						
3	 மயக்கம் Pening Kepala						
4	 தலைவலி Sakit Kepala						
5	 மூக்கில் ரத்தம் Hidung Berdarah						
6	 மூச்சை விடாமல் Susah Bernafas						
7	 நெஞ்சு இறுக்கம் Dada Ketat						
8	 முதுகு வலி Sakit Belakang						
9	 நடுக்கம் Menggigil						
10	 முட்டிக்கால் வீக்கம் Bengkak Lutut						

எண் No	நோய் அறிகுறிகள் Tanda - Tanda Penyakit	திகதி / Tarikh					
11	 சோர்வு / களைப்பு Penat						
12	 அடிவயிற்று வலி Kesakitan Bawah Perut						
13	 பெண் குறியில் வலி Sakit Faraj						
14	 சிறுநீர் கழிக்கையில் எரிச்சல் Pedih semasa kencing						
15	 கண் அரிப்பு Gatal Mata						
16	 யங்கலான பார்வை Kelihatan Kurang Terang						
17	 நகம் நிறமாறுதல் Ubahan Warna Kuku						
18	 விரல்கள் வீங்குதல் Bengkak Jari						
19	 நகம் விழுதல் Kuku Tanggal						
20	 சொறி / அரிப்பு Kudis / Gatal						
21	 உடல் மூட்டு வலி Sakit Sendi Badan						

Appendix 4

Ellman Method for Measurement of Serum Cholinesterase Enzyme Activity

The specimens collected were kept cool until transfer to the laboratory, where they were stored at -10°C . Blood analysis was carried out immediately and the results were communicated to the subject. The chemical reaction involved in the cholinesterase assay is as follows:



Thiocholine + 5,5'



Cholinesterase hydrolyzes butyrylthiocholine (BTC) to yield thiocholine which reacts with 5,5'-dithiobis-2-nitrobenzoic acid (DTNB) to form the yellow 5-thio-2-nitrobenzoate with an absorbance maximum at 405 nm. Therefore, the rate of change absorbance at 405 nm is directly proportional to the cholinesterase activity.

Reagents:

Butyrylthiocholine iodide	5 mmol/L
DTNB	0.25 mmol/L
Buffer	pH 7.2 ± 0.1
Non-reactive stabilizers and fillers	

Chemicals and equipment:

1. Cholinesterase (BTC) reagent obtained from Sigma Chemical Company (USA)
2. A spectrophotometer with a temperature controlled cuvette compartment and capable of measuring absorbance at 405 nm
3. Cuvettes
4. Pipetting device

Testing Procedure:

The temperature of the reaction mixture was maintained at 30°C .

1. Cholinesterase (BTC) reagent was prepared according to the instructions stated from the manufacturer.
2. The spectrophotometer wavelength was adjusted to 405 nm and the absorbance reading to zero with water as reference.
3. The reagent was incubated to the assay temperature.
4. To a cuvette labeled TEST, 1.0 mL of the Cholinesterase reagent was added to it. The cuvette was placed into the temperature controlled cuvette compartment.
5. 10 μl of sample was added to the cuvette and the solution was mixed immediately by inversion. The solution was then incubated at 30°C for 15 seconds.
6. The absorbance (A) of TEST was measured at 405 nm versus water as reference. This is identified as INITIAL A.
7. The incubation was continued further for 30 seconds following the initial absorbance reading. The absorbance reading after 30 seconds was identified as FINAL A.
8. The difference in the absorbance during the said period, ΔA per 30 seconds was obtained by subtracting INITIAL A from FINAL A. ΔA per minute was obtained by doubling the value of the difference in the absorbance during 30 seconds.
9. The cholinesterase activity (U/L) of the sample with the following equation:

$$\text{Cholinesterase activity} = \Delta A \text{ per min} \times 7426$$

WHO Class I Pesticides in Malaysia

No.	Name	Class		
1.	Buto Carboxim	1b	Insecticide/Nematicide	
2.	Cadusafos	1b		
3.	Carbofuran	1b		
4.	Dichlorvos	1b		
5.	Fenamiphos	1a		
6.	Furathiocarb	1b		
7.	Isazofos	1b		
8.	Methamidophos	1b		
9.	Methidathion	1b		
10.	Monochrotophos	1b		
11.	Thiometon	1b		
12.	Triazophos	1b		
13.	Captafol	1a		Fungicide Household/Veterinary/ Public Health
14.	Coumaphos	1a		
15.	Brodifacoum	1a	Rodenticide	
16.	Bromadiolone	1a		
17.	Chlorophacinone	1a		
18.	Coumatetralyl	1b		
19.	Difethialone	1a		
20.	Diphacinone	1a		
21.	Flocoumafen	1a		
22.	Warfarin	1b		