

Did You Take Your Poison Today?



A report by the IPM DANIDA project



The project "Strengthening Farmers' IPM in Pesticide Intensive Areas" (or IPM DANIDA) is a cooperation between the governments of Thailand and Denmark.

The overall objective of the project is to promote good agricultural practices in order to improve the environment and the safety of farmers and to protect consumers from the hazardous uses of pesticides.

More information and PDF versions of this report can be found at www.ipmthailand.org.

Comments on the report or requests for additional copies should be directed to info@ipmthailand.org.

Acknowledgements

This report was written, edited, designed and produced by the **IPM DANIDA project** (Andrew Bartlett, Hein Bijlmakers).

We wish to thank the following persons who assisted in various ways by collecting information, conducting interviews, translating texts, and providing critical reviews of draft texts: Chalerm Sindhusake, Lakchai Meenakanit, Marut Jatiket, Krisanapong Kraithepi, Sakda Sinives, Kevin Kamp, Steffen Johnsen, Boonrawd Thongdongphum, Sirisub Thaoprathom, Sompong Kaewchantuek, Sumittra Gardella, and Natwadee Khattkhuana.

We are also grateful to all persons who were interviewed and gave their valuable opinions on the subject of pesticides in Thailand:

Nong Ampin, Bang-ern Prakhiew, Saweay Termtor, Wittaya Hansuwan, Ploypailin, Wilawan Suwalam, Khlayabsorn Phongpian, Samrit Intaram, Khaelada Jittapanya, Karaket Soraphipat, Santisuk Wisuthisen, Manit Boonkiaw, Witoon Panyakul, Manus Khantithammo, Pakdee Pothisiri, Ampon Kittiampon, Juntip Tumrongsiskul, Sukhum Wong-Ek, and Suppalak Sooksom.

In thanking these individuals, we don't imply that they or their organizations fully endorse the contents of this report.

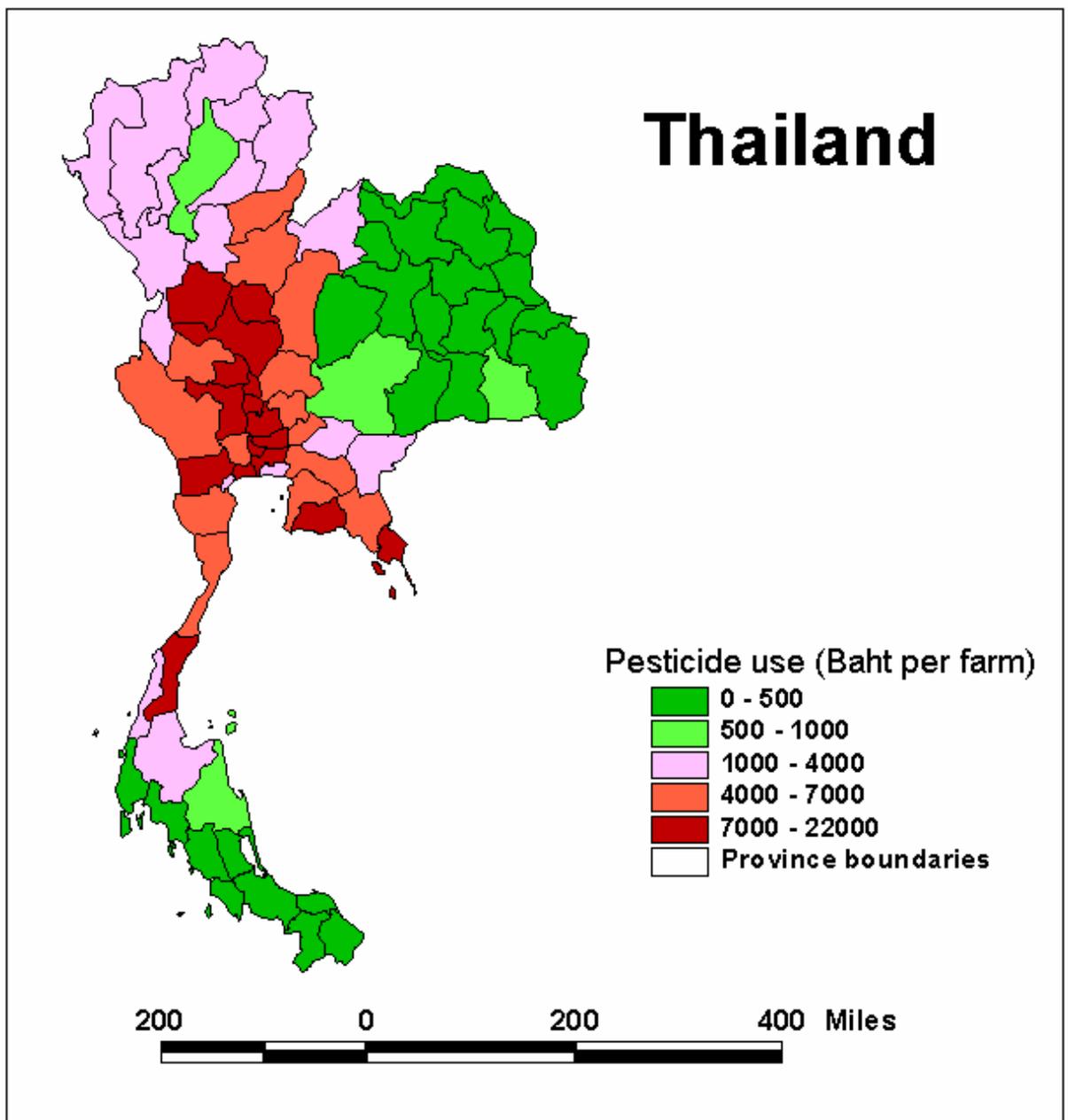
December 2003

Abbreviations and Acronyms used in this report

DANIDA	Danish International Development Assistance
DOA	Department of Agriculture
DOAE	Department of Agricultural Extension
FAO	Food and Agriculture Organization of the United Nations
FFS	Farmer Field School
GTZ	Gesellschaft für Technische Zusammenarbeit
IPM	Integrated Pest Management
MOAC	Ministry of Agriculture and Cooperatives
MOPH	Ministry of Public Health
RPF	Royal Project Foundation
WHO	World Health Organization

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This map gives an idea of the distribution of **Pesticide use in Thailand**. Agricultural statistics for the crop year 2000/2001 show the average amount of money spent per farm to purchase pesticides.

Pesticides on the map

Pesticide use in Thailand is most intensive in the Central plain, the Northern region, and in the East. Areas with relatively lower use of pesticides are the North-Eastern and Southern regions.

Crop farm cash expenses on pesticides per farm (Baht/farm)

Crop year	Region				Average Whole Kingdom
	North-Eastern	Northern	Central plain	Southern	
1998/99	340.40	2951.05	6116.10	982.36	1856.50
2001/02	388.94	3622.48	7094.61	1021.93	2190.31

1. Did you take your poison today?

The answer to this question is probably 'yes'.

There is a good chance that some of the fruit, vegetables or meat that you eat today will contain poisonous chemicals.

We are talking about ordinary food: the things you buy in the market, cook at home, eat in restaurants, and give to your children. You need to know that some of that food isn't safe.

The amount of poison in your food is usually very small, but there is enough to make the Government worried about the effect on your health. That is why the Prime Minister has decided to promote 'Safe Food'. If it were already completely safe he wouldn't have to do that, would he?

Different Government agencies are working together to solve this problem – especially the Ministry of Agriculture and Cooperatives (MOAC) and the Ministry of Public Health (MOPH)– but they cannot succeed without your help. Everybody has a role to play in promoting Safe Food: farmers, retailers, restaurant owners and consumers. Everybody should understand the problem, and know what they can do about it. Young and old, men and women, we need to work together to make Thai food safe to eat.



We love our food. Unfortunately, not all the food we eat is safe.

2. But Thailand is the 'Kitchen of the World', right?

Thailand is certainly a leading food producer. Exports of agricultural and food products from Thailand are worth more than 400 billion Baht (US \$10 billion) per year. We are the world's largest exporter of rice, frozen shrimp and canned pineapple. Other Thai products - such as vegetables, fruit, cassava, sugar, fish, and chicken - can be found in markets all around the world.

Thailand also has the tastiest food in the world. That's what we think, and a lot of foreigners agree with us. There are thousands of Thai restaurants in Europe, America, Australia and other parts of Asia.

But not everybody is happy with what they are buying from Thailand. Complaints from the European Union about chemicals in Thai shrimp and chicken have had a serious effect on the export of these products. The USA and China have complained about chemicals in Thai fruit, the UK has complained about chemicals in Thai rice and Japan has complained about chemicals in Thai vegetables.

The fact that Thai food often includes dangerous chemicals has become the number one reason for trade conflicts. This is another reason why the Thai Government is worried about the quality of our food. If other countries reject our exports, this could hurt the national economy and affect the jobs of thousands of people.



Thai fruits are exported to many countries. But our trading partners have complained about pesticide residues (leftovers from pesticide use on fruits and vegetables).

3. So what type of poison is there in our food?

There are three major sources of concern relating to food safety in Thailand:

- ◆ Chemical contamination. This includes pesticides and antibiotics that are used by farmers to help them reduce crop losses. Some of these chemicals remain in the food when it reaches the consumer.
- ◆ Biological contamination. This includes bacteria (e.g. *Salmonella*), mould and other micro-organisms. These things start to grow on food when it is processed under unhygienic conditions, or it is not stored properly.
- ◆ Illegal preservatives and additives. This includes borax, formalin, and toxic food colouring. These are added by wholesalers and retailers to improve the appearance of the food.

This booklet focuses on the problem of pesticides. These chemicals are dangerous, and they end up on your plate every day. If we want to have Safe Food in the Kitchen of the World, we have got to do something about the way pesticides are used in Thailand.



Pesticides that are used by farmers often leave residues on the crops. Small amounts of these toxic chemicals can be found in the food we eat every day.



Pesticides are sprayed on crops in attempts to control insects, fungi and other pests'

4. What are pesticides?

Pesticides are chemicals that are used to control pests, such as insects, rats, weeds and moulds. In most cases, these chemicals are poisons that kill the pest, but in some cases they act as a repellent (i.e. odors that make the pests stay away), or they stop the pest from growing and reproducing.



Caterpillars can be pests of the crops. Farmers use pesticides to kill these insects.

5. Why should we be worried?

These chemicals are used to control pests, but they can also affect humans who are exposed to pesticides in a number of ways:

- ◆ Skin contact. Farmers often get pesticides on their skin when they are mixing the chemical, during spraying and when cleaning their equipment. This is called 'dermal' exposure, or skin exposure.
- ◆ Breathing. Small drops of chemical easily get into the lungs of farmers when they are spraying pesticides. This is called 'inhalation' exposure.
- ◆ Swallowing. This can happen as an accident, for example when pesticides are stored close to food. It can also happen deliberately, when somebody uses a pesticide to commit suicide. And of course it happens when food contains residues of pesticides that we applied by the farmers. This is called 'oral' exposure.



Dermal exposure: The most common way for farmers to be exposed to pesticides is by skin contact.



Everybody eats fruits and vegetables. The fruits and vegetables we buy in our markets and shops can contain toxic residues of pesticides.

6. Pesticides only affect farmers, right?

Wrong. Everybody should be concerned about pesticides. Although farmers have more contact with these chemicals, and suffer more problems, other people come also into contact with pesticides. This is how:

- ◆ Food that is sold and eaten often contains pesticide residues. The amounts are usually small, but if we eat these residues every day they can make us sick.
- ◆ Pesticides from farms can get into the air, soil and water, creating a risk for everybody.
- ◆ Factories that make pesticides, and shops that sell them, are sometimes located close to residential areas; this increases the possibility that these chemicals will contaminate the environment in which people are living.
- ◆ Pesticides are also used in homes, offices, schools and factories to control cockroaches, mosquitoes, termites and other pests.

7. What types of pesticide are used in Thailand?

More than 300 chemicals are used to control pests in Thailand. These are sold under more than 2,000 brand names.

Different types of pesticide are used to control different types of pest:

- ◆ Insecticides are used to kill flies, beetles, caterpillars, termites and other insects.
- ◆ Herbicides are used to kill grass, shrubs and other weeds.
- ◆ Rodenticides are used to kill rats and mice.
- ◆ Fungicides are used to kill moulds and fungus.

For each type of pesticide, there are many different chemicals on sale. Each chemical has a common name and a brand name. The pesticide label must mention the brand name and the common name. Sometimes the label also includes a complicated scientific name; for example, the scientific name of Paraquat is: "1,1'-dimethyl-4, 4'-bipyridium".

There is usually more than one brand name for each chemical (and some chemicals have hundreds of brand names). For example:

Type	Common name	Brand names
Insecticide	Methyl parathion	Folidol, Paramet, Parathion methyl
	Malathion	Malaphos, Malathion
	Propoxur	Baygon, Raid
	Methamidophos	Monitor, Methamidophos, Tamaron 600 SL
Herbicide	Paraquat	Gramoxone, Paraquat
	Glyphosate	Roundup, Touchdown, Glyphosate 48



Label of an insecticide. The label shows the trade name, the common name (Dicrotophos), the scientific name, and warning signs about the toxicity of the product.



A pesticide shop near Chanthaburi.

8. Where do these chemicals come from?

Most pesticides used in Thailand are imported. They enter the country in a highly concentrated form (called 'active ingredient') and are mixed with other ingredients (a process called 'formulation'). The pesticides are packaged by wholesalers (who have their own brand names), and are sold by retailers.

The pesticide industry in Thailand involves:

- ◆ 169 importers
- ◆ 77 formulation companies
- ◆ 501 wholesalers
- ◆ 4,500 retailers

The use of pesticides has increased enormously in the past twenty years. By 2002, the amount of active ingredient being imported into Thailand was 39,000 tonnes, which was more than 4 times the amount in 1982.

According to the Ministry of Agriculture and Cooperatives, pesticides are "a highly lucrative business" worth 9,116 million Baht (US \$225 million) per year. Foreign companies such as Bayer, Monsanto, Syngenta and Dow hold the largest share of the market. Some of the pesticides that these companies are selling in Thailand are banned in other countries because of the dangers to human health.

In addition to the official figures on pesticide use, many more pesticides are imported and formulated illegally and are sold often by unregistered traders.

9. Are those factories safe?

The owners and managers of factories producing pesticides and fertilisers always say that their activities are safe, but not all of these people are as honest as they claim to be. Here are some examples:

Bangkok Post, 20 Sep 1999

At least 28 people were killed and 20 others still unaccounted for after a powerful explosion destroyed a Taiwanese-owned lamyai processing plant in San Patong district. At least three houses were completely demolished by the impact of the explosion. Rescue workers who combed through the ruins of the factory building found 10 charred bodies and several human limbs. The blast dug up a big hole about three metres deep, five metres wide and 20 metres long. Chiang Mai governor Prawit Srisophon said he suspected the explosion was caused by potassium chlorate illegally stored in the factory. The Taiwanese owner, identified as Lee Font-tien, was in police custody for interrogation, he added. The governor also expressed concern that there were several lamyai fruit processing factories in the province which may be storing the chemical, which is used as fertiliser.

10. So why are farmers using these chemicals?

Insects, weeds and plant diseases can make life very difficult for farmers. By controlling pests, farmers are able to reduce yield losses and sell more attractive produce. For many years, farmers were taught that the best way to control pests was by using chemicals.

Mr. Nong Ampin is 60-year old rice farmer, who lives in Nongkayang village of Nongkachang District, Uthaitхани Province. Khun Ampin grows rice twice each year on 40 rai of land.



"Normally, when the rice is one month old, I use a herbicide to control the weeds. After that, at 6 weeks, I start to use Methamidophos (an insecticide). I usually mix Methamidophos with Cypermethrin (another insecticide). If there are lots of insects, I will use this mixture 4 or 5 times per crop. Each time, it takes 2 days for my family of 3 people to spray 40 rai."

"The chemical pesticides cost about 20,000 Baht per crop, so that is a total of 40,000 Baht per year. Some farmers don't want to spend their money on pesticides. They get a yield of 0.6 or 0.7 tonne per Rai, but I can get 1.0 tonne per rai by using chemicals."

"I have never suffered any sickness or allergy from chemical pesticides because I use a mask to cover my nose and mouth. I wear boots when I walk in the field. Sometimes I wear gloves. But it is dangerous in the rainy season when the rice crop is very tall; that makes it difficult to spray."

"I have heard that farmers in other areas sometimes get sick. I think they might be using very strong chemical. Maybe I will stop using pesticides because I am worried about my health. And the non-chemical farmers still make a profit, especially in the wet season".

Bangkok Post, 01 Feb 2000

Bangkok police yesterday raided an agro-chemical plant in Bang Pu industrial estate accused of making products with banned chemicals. The owners were charged with manufacturing with prohibited hazardous chemicals, producing sub-standard goods, and selling products without permits. Deputy Agriculture Minister Newin Chidchob said the plant used 10 chemicals banned by the Agriculture Department which were considered extremely hazardous to the ecosystem and human health. The firm produced more than 250 brands of agro-chemical products but only had a permit to produce eight kinds, Mr. Newin said. Mr. Newin expressed disbelief that the plant had been able to operate illegally for a long time without the knowledge of authorities. "I couldn't believe the plant had been there for over 12 years," he said. "The building was big and right in the middle of the estate." The firm's customers include large companies such as Thai Central Chemicals Co, Ciba-Geigy Co or Novartis

Bangkok Post, 07 Nov 2002

About a hundred women, children and elderly people were evacuated from a fire-ravaged community at Klong Toey last night as special teams moved in to remove soil left contaminated by spilt chemicals. The evacuation followed fear of a repeat of the 1991 disaster when a fire at a Klong Toey port warehouse sent chemical smoke spewing over the nearby Koh Lao community. Hundreds of people inhaled the toxic smoke and scores died as a result over the next decade. Some of the houses destroyed on Monday were believed to be part of a bootleg insecticide factory. Six chemicals were identified: abamectin, acetamidrid, cypermethrin, acetochlor, metalaxyl and glyphosate. They are used in insecticides and weed killers. Permission is needed from the Department of Agriculture to import, distribute and store them.

In another part of Uthaitхани Province, Mrs. Bang-ern Prakhiew is growing mangoes. She has 800 trees on a plot of about 30 Rais.



"We start spraying after pruning the trees in June. We use Methamidophos (an insecticide) to protect the young leaves from insects, and we use Carbendazim (a fungicide) to protect the young mango from fungus. Usually we mix many things in the spraying tank."

"We have a big spray tank on the back of a tractor which holds 1,000 litres. We use 3 tanks to spray all of our trees. It takes about 2 days, but we only work for half the day, because the work is dangerous: the pesticide is very strong and the trees are very tall."

"We spend more than 20,000 Baht on pesticides each year, but the result is we can produce a lot of fruit. We got about 20 tonnes for the first harvest this year."

11. How dangerous are these chemicals to humans?

Most pesticides are poisonous, but some are more dangerous than others. There are three systems being used in Thailand to classify the risk to human health and warn people of the danger:

- ◆ *The Thai Government* had introduced a colour code for pesticide containers. A red stripe on the label indicates that the chemical is highly poisonous, yellow indicates moderately poisonous and blue indicates slightly poisonous. These colours are used at the bottom of the pesticide label, with pictures to show the type of protective clothing that should be used.
- ◆ *The World Health Organisation (WHO)* has created a 'toxicity classification' with five classes. This system is used in technical documents, including those produced by the Thai Government.
- ◆ *The US Environmental Protection Agency (EPA)* has a 'toxicity ranking' with four categories. The EPA warnings are often used on pesticide labels.



The following table compares the three systems:

WHO		EPA		Thai Government	Example Chemical
Class	Description	Category	Warning	Colour Code	
Ia	Extremely Hazardous	I	'Danger-Poison'	Red label	Methyl Parathion
Ib	Highly Hazardous				Methamidophos
II	Moderately Hazardous	II	'Warning'	Yellow label	Paraquat
III	Slightly Hazardous	III	'Caution'	Blue Label	Malathion
IV	Unlikely to be hazardous	IV	None	Blue Label	Glyphosate

12. How does a person know if they have been poisoned?

These are some of the symptoms a person might experience if you have been exposed to pesticides:

These symptoms can be caused by other illnesses, but if a person suffers a combination of these symptoms after using a pesticide it is likely that they have been poisoned. Farmers do not always realise that they are suffering from pesticide poisoning, and instead they think they have influenza or malaria or some other sickness.

Mild symptoms	Severe Symptoms
dry throat	vomiting
itchy skin	diarrhoea
headache	staggering
red eyes	convulsions
running nose	loss of consciousness



A farmer uses a "body map" to note down signs and symptoms of pesticide poisoning.

Different pesticides will cause different symptoms. Chemicals like methyl parathion can affect the nervous system, causing fatigue, twitching and staggering. Paraquat is more likely to affect the skin and mucous membranes (the inside of the mouth, nose, and eyes), causing redness, itching, and cracking of the skin.

13. Do these pesticides stay in the body?

They certainly can.

Between 1992 and 1998, the Ministry of Public Health carried out more than 2 million blood tests on farmers. More than 18% of the samples contained measurable amounts of pesticides. In some years, the number of blood samples containing pesticides was more than 25%.

In a more recent study carried out by Chiang Mai University, blood tests were carried out on people living in three farming communities. In one community, where fields and orchards surround the houses, more than two-thirds of the people had a risky or unsafe level of pesticides in their blood.

Some of these pesticides stay in the environment for many years, and can accumulate in the tissue of farm animals and humans. These chemicals are called 'Persistent Organic Pollutants', and DDT is a well-known example. Tests in Northern Thailand have shown that traces of DDT can be measured in the blood of villagers more than 10 years after the chemical was last used. This chemical is passed on to babies who are breastfed.



A health officer takes a small blood sample of a farmer's finger. A simple test will show if he is contaminated with pesticides.

14. Are there any long-term effects from pesticides?

Yes. The symptoms listed above (see question 12) are the acute effects of pesticides, which happen within a few hours or days after exposure to the chemicals. Pesticides can also have chronic effects, which happen over months or years. The chronic effects of these chemicals might include:

- ◆ *Infertility and miscarriages*, which means it is difficult for people to have babies;
- ◆ *Birth defects*, which means that babies are born with damage to the brain or body;
- ◆ *Skin problems*, such as dermatitis and eczema (dry and cracked skin);
- ◆ *Damage to the nervous system*, which means people suffer from headaches, poor memory, lack of coordination and sleep problems;
- ◆ *Cancer*, including breast or brain tumours, liver or stomach cancer, skin cancer and leukaemia.

There are many reasons why people could suffer from these problems, including genetic defects, poor diet, smoking, and other kinds of pollution. Nobody knows exactly how many cases are caused by pesticides, but the Ministry of Public Health has estimated that food contamination is causing at least 50,000 cases of cancer in Thailand each year.



"What's your poison?" is a report by the Environmental Justice Foundation. It summarizes health risks associated with pesticide exposure. The report can be downloaded from: www.ejfoundation.org.

15. Can these chemicals actually kill somebody?

Yes. The amount of pesticide required to kill a person depends on a number of factors. The most important factors are: the toxicity and amount of the chemical, the size of the person and the type of exposure.

If an average size man (70 kg) was to accidentally drink a pesticide, these are the amounts that would probably cause him to die:

Toxicity Class	Lethal dose
Ia - Extremely Hazardous	a few drops (less than 1 ml)
Ib - Highly Hazardous	less than a teaspoon (1 to 5 ml)
II - Moderately Hazardous	between one and six teaspoons (5 - 30 ml)
III - Slightly Hazardous	between six teaspoons and 2 cups (30 - 500 ml)
IV - Unlikely to be Hazardous	more than 2 cups (more than 500 ml)

Children are more sensitive and would be killed by even smaller doses of the chemical.



Pesticides can kill. Many pesticides carry the well-know skull as a warning.

16. How many people are poisoned by pesticides in Thailand?



Farmers risk their lives. Pesticides cause many deaths each year.

Thousands of Thai people are poisoned by pesticides every year.

The information that is collected by the Ministry of Public Health shows that the number of reported cases of occupational poisoning was as follows:

These are the figures that are reported by hospitals and clinics. Each of these cases is a result of pesticide exposure at work, and does not include suicide attempts or accidents in the home.

Year	Number of patients	Number of deaths
1990	4,827	39
1992	3,599	31
1994	3,165	39
1996	3,175	32
1998	4,398	15

Senior officials at the Ministry of Public Health admit that the real level of poisoning is much higher than shown by these figures because very few farmers go to hospital when they get sick, and many deaths occur without the cause being recorded (e.g. the doctor's report states 'heart failure' but doesn't mention what caused the heart to fail). A study conducted some years ago showed that only 2.4% of workers who suffer from pesticide poisoning go to a hospital, and that the real number of cases could be nearly 40,000 per year.

In a study carried out by the Department of Agriculture, symptoms of pesticide poisoning were detected in 68% of the vegetable farmers who were observed in Kanchanaburi. Another recent report suggests that over 90% of agricultural workers in Thailand are affected by pesticide and other agrochemicals. What this information shows is that poisoning is a normal occurrence among Thai farmers. They regularly suffer from headaches, dizziness, exhaustion, nausea and itchy skin as a result of pesticide use. These problems lead to sick leave and low quality work and hence decreased

17. Under what kind of circumstances can somebody get killed?

This is the story told by one farmer living in Amphur Paktor, Ratchaburi Province. Saweay Termtor was in his early 40's, and he supported his wife and two children by growing 15 rai of rice.

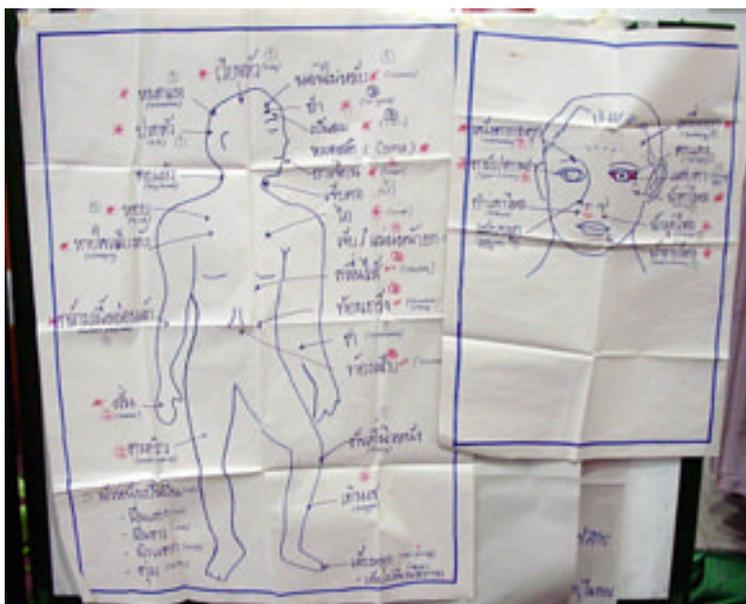
"My rice crop failed because of insufficient rain, so I went looking for work in the South. I was hired to spray herbicides in the rubber plantations. From dawn to dusk I sprayed a mixture of paraquat and glyphosate. The employer didn't provide me with any protective clothing, and my body was regularly soaked with the pesticide."

"Within three months, I had all these blisters on my skin, and I was itching terribly. I also had a bad cough. The employer gave me a few medicines, like cough syrup, but the problems didn't go away. I had to keep working. After another three months I was so sick that I decided to come home. I didn't earn much money, so our children have gone to stay with relatives."

"I have been to the hospital but the doctors just said that I have a common skin disease. They also said that smoking might have damaged my lungs, but I have never smoked in my life. They gave me some medicine, but they also complained that I was being a nuisance. So I stopped going."

"Now look at me: I am going blind, my hair is falling out, and my skin itches so much that it is painful to wear clothes. My wife has to spend all her time taking care of me... feeding me, helping me go to the toilet"

This interview was taken by an official of the Department of Agricultural Extension who easily recognised the symptoms of pesticide poisoning. But it was too late. Three months later, Khun Saweay was dead.



Body maps show the signs and symptoms of pesticide poisoning. These drawings are used in training courses for farmers to help them understand the hazards of pesticide use.

18. Never mind the farmers, what about my food?

Chemicals that are left in the crop after harvesting are called 'residues'. The issue of pesticide residues is very serious in Thailand. Here is some information from three different sources that should make everybody worried about what they are eating:

- ◆ Between 1999 and 2003, the Ministry of Public Health tested 4,000 food samples from various sources. Approximately half of all samples contained pesticide residues, including 45% of Thai vegetables and 50% of Thai fruit. The Ministry also found that 55% of imported fruits contained pesticides. Grapes and tangerines were heavily contaminated by pesticides, but residues were not detected in bananas, mangoes, jackfruits and pineapples.
- ◆ Between March 2002 and March 2003, the Sri Moom Muang wholesale market in Bangkok tested 1,753 samples of vegetables and fruits. More than 85% of all samples contained pesticide residues. On average, more than 3% of the samples contained levels of residues that were higher than the acceptable level. In some months, such as August 2002, the number of samples that exceeded the acceptable level was more than 12%. It should be noted that the staff at Sri Moom Muang can only carry out a basic test, which cannot detect some types of pesticides that are commonly used in Thailand.
- ◆ Between July and November 2002, the Ministry of Agriculture and Cooperatives carried out a detailed study of two popular vegetables. A total of 202 samples of Kale and Morning Glory were examined using the best testing equipment available in the Ministry. Nearly half of the samples (48%) contained residues of pesticides which are classed as 'highly hazardous (WHO Ib) or 'moderately hazardous' (WHO II). What is especially worrying is that nearly a quarter of the samples (23%) contained residues that were higher than the acceptable level. In five samples, a banned pesticide was detected, and in one sample the residue was 21 times the acceptable level!



Testing vegetables for pesticide residues. Many samples contain unacceptably high levels of residues.



Scientists think your food is safe if the level of pesticides is below MRL.

19. What do you mean by "acceptable level"?

Because so much of our food contains small amounts of pesticides, the Government has adopted something called Maximum Residue Level (MRL). These are the officially acceptable limits for chemicals in our food. An MRL is expressed in milligrams of chemical per kilogram of produce.

For example, the MRL for Cypermethrin is 1.0 mg/kg. If 1.0 kg of morning glory contains 0.5 mg of Cypermethrin (i.e. half the MRL), this is considered to be acceptable by the Government. But a sample containing 2.0 mg of Cypermethrin (i.e. twice the MRL) is considered unsuitable for consumption because of the danger to human health.

The MRLs used in Thailand are based on the recommendations of a United Nations organisation called the Codex Alimentarius Commission (usually known as 'Codex'). A recommendation is made by Codex after reviewing all the available scientific information about the short-term and long-term effects a particular chemical might have on human health. Since 1962, Codex has recommended 2,500 MRLs. Thai scientists are conducting their own studies to establish MRLs for local crops that are not included in the Codex recommendations.

The European Union and the USA have their own system of MRLs, but the details are similar to Codex. The MRLs adopted in these countries – like those adopted in Thailand – are the maximum residues that are legally permitted. Food producers and importers

20. Who is testing our food for residues?

Testing of food for contamination by pesticides is carried out by a number of organisations in Thailand, such as the Ministry of Agriculture and Cooperatives (Office of Research and Development on Agricultural Production) and the Ministry of Public Health (Department of Medical Sciences). These institutions have special laboratories to conduct detailed tests. Pesticide residues can also be tested on farms, in restaurants and markets using a simple kit, but these tests do not detect all types of pesticides.

Mr. Wittaya Hansuwan is Deputy Manager of the Sri Moom Muang market. This is the largest wholesale market for fruits and vegetables in Thailand, which supplies many of the smaller markets in Bangkok.

“Our market accepts vegetables from the Northern, North-Eastern, Central and Western Regions. In total there are about 5,000 tons of vegetables passing through Sri Moom Muang each day.”

“We test all kinds of vegetables for Maximum Residue Levels (MRLs). We can detect chemical pesticides and other contaminants such as Borax, Formalin, Sulfates and Bleaching agents.”

“We carry out tests on a random basis and on request. The tests are carried out for farmers, middlemen, buyers and export companies. In cases of serious contamination we report back to the original producer, and if we find contamination in three samples from the same trader we ban them from the Sri Moon Muang market.”

“I think the Government is on the right track to improve food safety, but there is always a danger that people will try to improve their image by talking about policy rather than practicing the real thing.”

“Consumers need to realize that they can influence the production methods of the farmers. If they keep demanding vegetables with a perfect appearance, farmers will continue to use a lot of pesticides to protect their vegetables. Farmers are afraid of losing income by producing vegetables which are not attractive.”

Organophosphates and Carbamates

Organophosphates and Carbamates are two chemical families of pesticides that affect the central nervous system (brain) and peripheral nervous system (nerves found outside of the brain or spinal cord). These chemicals attach themselves to the enzyme (acetylcholinesterase- AChE) that stops nerve transmission in the body. In this way they suppress the functioning of that enzyme which results in continuous electrical nerve transmission. This particularly affects the muscles and glands that make the body organs function



Testing pesticide residues

Residues are often tested using a ‘GT-test’ kit, which was developed by Gobthong Thoopom from the Thai Ministry of Public Health.

The GT-test detects whether or not a sample of food contains chemicals that inhibit an enzyme called ‘acetylcholinesterase’. This enzyme plays an important role in the human body, but it does not function if certain types of pesticides are present in the sample, specifically Organophosphates and Carbamates.

The GT-test can be carried out at any location, for example in the market, and the results are obtained within a few hours. The kits are low cost and simple to use; no expensive equipment or laboratories are necessary.

Unfortunately, this method is not very precise. The GT-test will tell you if a sample contains Organophosphates or Carbamates, but cannot identify the specific chemical or the quantity. Comparing the results with the Maximum Residue Levels is not possible. Also, there are some types of pesticides that are not detected. For example, Pyrethroids cannot be detected by the GT-test kit because these pesticides do not inhibit the acetylcholinesterase enzyme.

21. What can consumers do to avoid pesticide residues?

In Thailand it is impossible to completely avoid eating food that contains pesticides. But there are practical steps you can take to reduce the amount of pesticide residues in your food. Here are seven suggestions:

1. Buy food that is labelled 'organic' or 'safe'. Thailand has an increasing number of stores that specialise in selling healthy food, and some supermarkets have a special section for organic or safe vegetables.
2. Avoid eating fruits and vegetables that are reported to have high levels of residues. This includes introduced fruits like strawberries and grapes, and salad vegetables such as Chinese cabbage and yard-long bean. Read the newspapers and listen to the radio to find out what other foods are found to be contaminated.
3. Avoid buying and eating fruit and vegetables that are produced out of the normal season. Some farmers try to grow crops at an unusual time of the year. They get a high price for these crops, but they often use high levels of pesticides.
4. Rinse fruits and vegetables thoroughly with water before cooking and eating them. If you are not using the vegetables on the same day as buying them, rinse them before putting them in the refrigerator. Some residues are on the surface of the food and you can get rid of most of them by peeling or scrubbing with a brush.
5. Eat cooked vegetables instead of raw items. Cooking usually reduces the level of pesticides in food because the heat destroys some of these chemicals.
6. Look for the "Clean Food, Good Taste" logo when you go out to eat. Restaurants and food stalls with this sign have been tested by the Ministry of Public Health.
7. Take care about using chemicals in your kitchen. Don't keep pesticides (e.g., Baygon, Raid) and food in the same cupboard. Don't use these products near food, or on surfaces where food is prepared.



In addition to these recommendations, some people avoid buying foods that look perfect. They believe that if the vegetables in the market have some signs of insect damage, such as holes in the leaves, this suggests that the crop wasn't sprayed with pesticides just before harvest. There is some truth in this belief. But organic farmers can produce vegetables that look perfect, and chemical farmers can spray pesticides after a crop has been damaged by insects. You cannot depend on the appearance of food as the only indicator of safety. You also need to think about the type of food, where you bought it, and how you prepare it.

22. Is it realistic to expect housewives to take action on this issue?

Mrs. Ploypailin is a 26-year old Secretary working in a Government Office, close to Chatuchak market.

"I am very scared about what I have heard on TV about pesticides in food. It said that pesticide residues could accumulate in the body and cause cancer."

"I try to buy vegetables which have lots of holes in the leaves, which shows that insects have been biting them".



Mrs. Wilawan Suwalam is a working mother, living in a condo in Bangsue, Bangkok.

"I choose brands like Doi Kham and Poo Fah because they are under the Royal Project. I don't know about chemical residues in these foods, but I am sure they have good quality control."

"I know the price is a bit more expensive. But I earn my money so I can look after my family and myself, and that makes me think I should buy safe food. We need to stay healthy so that we can keep working. It would be sad if we worked so hard and rewarded ourselves by eating poisonous food".



Dr. Khlayabsorn Phongpian is a housewife and a professor at Mahidol University.

"I prefer to choose seasonal vegetables. The price is reasonable and I believe there is less chance of pesticide contamination. After buying, I soak my vegetables in water, and then rinse them before cooking or putting in the refrigerator."

"My friends tell me not to eat Chinese cabbage and yard long bean because a lot of pesticide is used in the production. This is a pity because they are my favorite vegetables!"

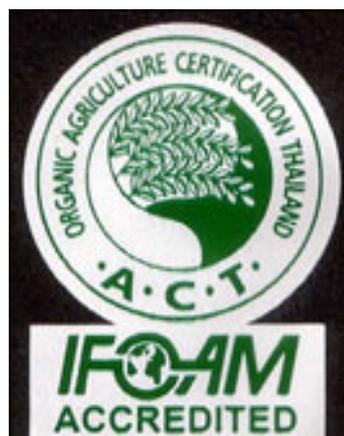


23. What does 'organic' mean?

Organic food is grown without any artificial pesticides or fertilizers. This is the most natural food available, and there are strict standards that organic farmers must follow.

The major certifying organisation in Thailand is 'Organic Agriculture Certification Thailand' (ACT). The leading producer of organic foods is Green Net Cooperatives. Both ACT and Green Net are supported by the Earth Net Foundation, which is playing a leading role in promoting organic farming in our country.

At present there is about 25,000 rai of certified organic production in Thailand. That's not much; it means that for every 5,000 rai of farm land in Thailand, only one rai is organic. Earth Net and the Ministry of Agriculture and Cooperatives want to increase this area over the next few years.



Organic food can be recognized by these "organic" logos. The Organic Thailand logo certifies growers according to Thai standards for organic farming. The ACT logo is accredited by an international organization called IFOAM.

24. How is 'organic' food different from 'safe' food?

'Safe Food' is a new label introduced by the Thai Government. It is based on standards that have been agreed by both The Ministry of Public Health and The Ministry of Agriculture and Cooperatives. The standards for 'safe food' are not as strict as for 'organic food'; farmers are allowed to use chemical fertilizers and pesticides, but tests are carried out to make sure that residues do not exceed the 'maximum residue level' (see question 19). Certificates are issued to the farmers and food suppliers whose products pass these tests.



An organic farmer proudly explains how he grows a healthy crop without using any pesticides.



This well-known "hygienic" logo will soon be replaced by the new Food Safety logo of MOAC.



The new Food Safety logo of the Ministry of Agriculture and Cooperatives.



Hydroponic vegetables are produced without soil. The plants grow in a solution of fertilizer and nutrients.

25. What about all these other labels?

The labelling of food in Thailand is a bit confusing at present. The most reliable labels are 'organic' and 'safe'. If the Government has certified the producer or supplier, the food package will include one of the logos shown in questions 23 and 24.

Here are some of the other labels you might come across.

Hygienic food	This is an old label created by the Department of Agriculture. Approximately 400 farms passed an inspection under the 'Hygienic Fresh Fruit and Vegetable Production Pilot Project'. This label does not mean that the food was grown without pesticides, but the farmers are carefully controlling the use of these chemicals. These farms will probably use the 'Safe Food' logo in the future.
Clean food	This is an old label created by the Ministry of Public Health. The 'Clean Food – Good Taste' project started in 1989 with the aim of improving standards of food hygiene in restaurants and food stalls. This label does not mean that the food was grown without pesticides, but it is probably free from bacteria and other biological contaminants.
Hydroponic food	This is food that is grown without soil; crops are planted in pots or trays that are kept in greenhouses. This does not mean the crop is pesticide free. Chemicals are used in hydroponic crops, but the amount is easier to control than in outdoor crops.
Pesticide-free, Non-toxic, Healthy food	These are labels created by producers, wholesalers or retailers. They want to tell you that these foods are safer than other products, but the standards are not published or officially approved.

26. I'm confused. Are labelled foods safer than other foods?

Certified organic food contains less pesticide residue than other foods. This is the safest choice if you want to reduce the amount of pesticide you are consuming.

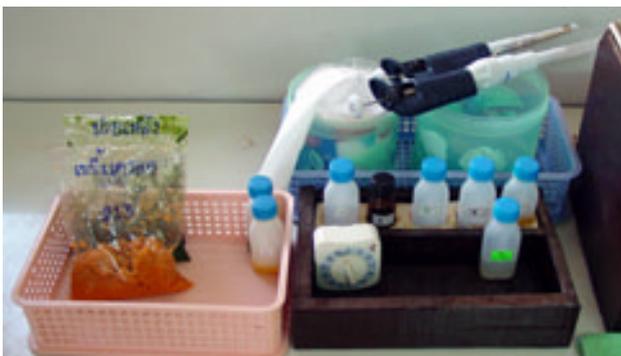
Because some pesticides remain in the soil and water for many years, these chemicals end up in crops that were not sprayed by the farmer. This means that even organic food may contain some residues. This happens in all parts of the world, not just Thailand, but scientists believe that the difference between organic and non-organic food will make a difference to your health.

Food that is labelled "safe" or "hygienic" probably contains more pesticide residues than organic food, but less than non-labelled. In the future these may become relatively safe choices if organic food is not available.

"Tests carried out by the Department of Agriculture showed that 18% of kale and morning glory that was labelled as "safe" contained pesticides residues above the Maximum Residue Level (MRL). In the case of unlabelled samples, there was 29% above the MRL. These tests suggest that labelled foods are slightly safer. But other tests, carried out by the Ministry of Public Health, did not find a significant difference between residues in labelled and unlabelled vegetables. The conclusion is that Thai consumers could not trust these labels in the past. These consumers are now hoping that producers, wholesalers and the Government will make more effort in the future to enforce the standards that are being promoted."



The residue testing of the Department of Agriculture use sensitive equipment and skilled chemists to accurately detect minute quantities of pesticides in food samples.



Simple test kits, such as the GT-test can detect only a limited number of chemicals. While this testing is cheap and fast, the results are not very reliable.

Residue testing

To accurately test residues in food, expensive laboratories and trained laboratory staff are needed. Gas chromatographs and other sensitive equipment are needed. This method of residue testing is slow and expensive, but it gives very accurate and useful results. For each sample the test can say exactly which pesticides were present, and it can also tell how much residue was found. This makes it possible to compare the sample with the Maximum Residue Levels.

The Department of Agriculture has a several laboratories in Bangkok and in the regions, that use this method. these laboratories test samples of farmers who want export and also of farmers who want to be certified with the new "food safety" logo.

While the simple GT-test kit (see page ...) can only give a rough indication about residues belonging to the organophosphates and carbamates, this multi-residue method can detect all known pesticides.

27. If I want healthy food, can the supermarkets provide it?

Samrit Intaram is the Market Specialty Manager for The Mall Group, Thailand's second largest owner and operator of shopping complexes.

"In 1997 we realized that most vegetables and fruits were contaminated with pesticides. It was then that we decided to open a market for non-chemical products. At the beginning, we purchased through middlemen and conducted our own tests to check for chemical contamination. After two years we concluded that this was not an efficient way of ensuring a reliable supply of safe products, so we contacted the Department of Agriculture and learnt how to identify and organise farmer groups who would grow pesticide-free vegetables. The idea was to buy directly from reliable producers instead of depending on middlemen."

"As a pilot project, we started purchasing vegetables produced under the supervision of the Royal projects, using the 'Doi Kham' name. We also helped to organise other producer groups, and sent our own team to supervise quality control and collect samples for laboratory tests. And we organised training for these farmers on how to clean, pack and transport the produce."

"At the beginning, the price of pesticide-free vegetables was about 50% higher than contaminated vegetables, but we can now supply vegetables from the two methods at almost the same price. The aim of the Mall Group is to supply only fruits and vegetables that are produced by non-chemical methods."



Khaelada Jittapanya is Special Product Manager for the Lemon Farm Pattana Cooperatives. Lemon Farm has 8 stores in Bangkok, which have gained a reputation for selling healthy food.

"Lemon Farm is a small organization, so we can develop a close relationship with both suppliers and consumers."

"For organic vegetables there are farmer groups in Pracheenburi, Lopburi, Supanburi and Srakaew. Each group has a network of certified members. They are supervised by the Organic Agriculture Certification Authority of Thailand, which uses internationally recognised standards. We occasionally carry out tests to check for chemical contamination, but this occurs very rarely because our farmers are very serious about organic methods. We have agreements with these groups about the type and quantity of vegetables we will buy. These agreements are based on the interests of our customers."

"Our organisation is designed to operate as a cooperative. Currently we have more than 20,000 members. The education of our members is an important part of the work of Lemon Farm. In every branch we have an exhibition. We also organise training sessions and distribute a monthly newsletter. We want our members to learn about nutrition, herbal medicine, food safety and organic agriculture. As a result they can make better choices. It is important for consumers to know how their food is produced."



28. Are my children at risk?

Yes they are. Children are especially vulnerable to pesticide poisoning for a number of reasons:

- ◆ Children's behaviour means they are easily exposed to pesticides in the environment. They play on the floor, they pick up strange objects, and they put things in their mouth;
- ◆ The small size of children means that a specific amount of pesticide will result in higher dose per kilogram of bodyweight compared to adults;
- ◆ Symptoms of poisoning are often confused with childhood illnesses, so parents don't realise that their child has been poisoned;
- ◆ The body is still immature and therefore the development of organs is at risk from chronic poisoning. Especially the developing nerve system, brain and sexual organs are at risk from pesticides that mimic hormones.



A child playing near spraying equipment and pesticides.

29. What can I do to protect my children?

Here are ten things that you can do to prevent your children from being poisoned by pesticides:

1. Select food for your children which is less likely to contain pesticide residues (see question 21).
2. Make sure your children wash their hands before eating.
3. Prevent children from playing in areas that might have recently been sprayed with pesticides such as orchards and vegetable fields. Do not let them swim in irrigation canals, because the pesticides used on the crops often end up in the canals.
4. If you use an insect repellent to stop mosquitoes from biting, only use chemicals that are labelled for this purpose. Never use bug-spray (e.g. Baygon) or agricultural pesticide on the skin. Don't use repellents near the mouth or eyes, or on the hands of children.
5. Always keep dangerous chemicals such as pesticides in a locked cupboard or on a shelf out of the reach of children. Do not keep agricultural chemicals in the house; some chemicals produce a harmful gas that you cannot smell.
6. Never use empty pesticide containers to store water or food. Never transfer dangerous chemicals to containers that were once used for food or drink, such as soft-drink bottles or biscuit tins. Teach your children not to play with empty containers they find outside.
7. If you use pesticides in your house (for example, to control mosquitoes), do not spray any area where children are sleeping, eating or playing. Keep children out of the room for at least 20 minutes after spraying.
8. Do not place poison baits (used to control cockroaches or rats) in places where young children might find them. Teach older children that these baits are poisonous and should not be touched.
9. Talk to your child's teacher, to find out if the school is taking measures to protect students against the harmful effects of pesticides.
10. Take children to the doctor if they complain of headaches, dizziness or nausea after playing in an area that

30. What can schools do to protect children from pesticides?

There are two ways that schools can protect students against the harmful effects of pesticides:

Firstly, schools can teach students about the dangers of pesticides. The Ministry of Education has been supporting this kind of activity in many provinces. In fact, some Thai teachers and students are world leaders in environmental education, and people from other countries have been visiting Thailand to see what they are doing.

Secondly, schools should have their own Integrated Pest Management (IPM) Programme. This means using non-chemical means to reduce the occurrence of rats, cockroaches, mosquitoes and other pests. When pesticides become necessary, the management of the school should make sure that chemicals are chosen which have low toxicity to humans. Spraying should only be done after



School children visit a Farmer Field School and learn how pesticides can harm our natural environment.

31. What about restaurants; are they using safe food or not?

Mrs. Karaket Soraphipat is the Manager of the Alternative Health Food Restaurant in Trang. She is 50 years old and graduated in Nursing Science from Mahidol University.

"We started this restaurant because we were worried about chemical residues in vegetables and fruits. My husband is a doctor and he says a lot of people get sick because the food is not safe, especially as a result of pesticides and preservatives. We started to do some experiments by growing organic food for our own consumption. We then talked about the situation with our close friends and decided to open a health food restaurant, because we wanted to do something that would help solve the problem for other people."

"The vegetables that we use in the restaurant come from different sources. Some of them we grow ourselves, like Chinese cabbage and lettuce, so we can be sure they are safe. We also use wild vegetables that local people like to eat; these we can buy from villagers in rural areas. And for other vegetables like tomato we buy them from the supermarket in the health food section, usually with a label like Doi Kham."

"The officers from the Department of Medical Sciences (Ministry of Public Health) often come to take samples of our vegetables and test them for chemical contamination. They just show up without making an appointment. As a result, we have got a certificate to prove that our food is safe."

Mr. Santisuk Wisuthisen is the General Manager of the Ladprao Branch of the D'Jitr Pochana Restaurant in Bangkok.

"We normally buy vegetables and fruits from Sri Moom Muang wholesale market or the Sapanmai market. We know there is a problem with chemical contamination because we used a test kit produced by the Ministry of Public Health. The findings showed that all kind of vegetables are highly contaminated, including vegetables like Chinese celery and Chinese Kale that we use a lot in our food."

"After doing the tests, we started using ozonated water to clean the vegetables. We hope the washing will eliminate the pesticide residues. We don't buy so-called 'safe' vegetables from the market because how can you trust the label? We ordered some vegetables from a hydroponic farmer for the salad bar, but even he says that he still uses pesticides when insects attack his crop. And organic vegetables are very high in price compared to those vegetables in the general market. We need to think about the cost of our raw materials and also the price of the finished product."

"To solve this problem the government should educate farmers about the dangers of pesticides: about the health impact on themselves and the consumer. Farmers should also be provided with education about alternative ways of managing their crops, so that they don't use chemical pesticides."



32. Why doesn't the Government just ban these chemicals?

Actually, the Thai Government has already banned a lot of pesticides. Since 1977 a total of 82 pesticides have been banned because they are a danger to human health. The latest chemical to be banned was Methamidophos, in April 2003.

Unfortunately, some of the banned chemicals are still being used, either because old stocks are available, or because the chemicals are illegally imported from neighbouring countries. The use of Monocrotophos, which was banned in May 2000, is still widespread among Thai farmers.

In addition to banning certain chemicals, the Government has created a 'watch list'. The 12 chemicals on this list are known to be harmful to human health, but an official decision to get rid of them has not yet been made. Anybody who is concerned about the dangers of pesticides should avoid buying, selling or using these chemicals.

It is worth noting that some chemicals on the Watch List, such as Aldicarb and Methyl Parathion, are more toxic than some of those that have already been banned, such as Methamidophos and Monocrotophos.

It is also important to realise that having a watch list of twelve very bad pesticides does not mean that other chemicals that are used in our country are safe. For example the herbicide Paraquat, which does not appear on the watch list, has a very bad reputation. But it is still being *recommended* by Thai Government officers to control weeds.

Pesticides on the 'Watch List' in Thailand		
Common name	Chemical family	WHO class
Aldicarb	Carbamates	Ia
Blasticidin-S	-	Ib
Carbofuran	Carbamates	Ib
Dicrotophos	Organophosphates	Ib
Endosulfan	Organochlorines	II
EPN	Organophosphates	Ia
Ethoprophos	Organophosphates	Ia
Formetanate hydrochloride	Carbamates	Not listed
Methidathion	Organophosphates	Ib
Methomyl	Carbamates	Ib
Oxamyl	Carbamates	Ib
Parathion-methyl	Organophosphates	Ia

Endosulfan

"Endosulfan is a highly dangerous, outdated chemical, the safe use of which cannot be guaranteed by many poor countries where it is still used.

Endosulfan is a persistent chemical that has been demonstrated to bioaccumulate in exposed organisms."

(Environmental Justice Foundation)

Paraquat

"Paraquat can not be used safely, particularly not on plantations and small farms, and there is no antidote, which means that poisoning cannot be counteracted with medical treatment. People are dying while others are left seriously ill. The most severe health effects are found in developing countries where workers suffer from damage to lungs, skin, eyes, nose, fingernails and toenails. There are also concerns in the industrialised world and one can not disregard the environmental effects."

Methyl parathion

Methyl parathion is unsafe for children at virtually any dose and must be banned for use immediately on all foods. This insecticide is a relic of an era when highly toxic chemistry was the objective, and when our knowledge of the health risks of pesticides in general, and neurotoxic compounds in particular, was minimal. Now we know that the brains and nervous systems of infants and children are extremely vulnerable to neurotoxic substances.

33. Are any Thai farmers growing crops without pesticides?

Many Thai farmers are reducing the amount of pesticides they use. The Thai Government and other organisations are teaching farmers how to control pests by using Integrated Pest Management or organic methods.

Mr. Manit Boonkiaw is a vegetable farmer living in Banmai village, Bangyai District, Nonthaburi Province. He grows Chinese kale, Cabbage and Hengchai on a plot of 3 Rai.

“Previously I used a lot of pesticides. There were different chemicals for different pests. I used to mix many types of pesticide together. I kept changing the mixture because the worms and insects were becoming resistant, and the chemicals didn’t work. The pesticides used to cost about 10,000 Baht per Rai each season.”

“Spraying was carried out all the year. One day I would spray and the next day the crop would be harvested and sent to market. I knew how dangerous that was. I always had headaches and felt dizzy after spraying pesticides, so I never used to eat those vegetables. I used to have a small plot that I didn’t spray; those were the vegetables for our own consumption.”

“I decided to reduce my pesticides after receiving training in Integrated Pest Management from the Department of Agricultural Extension. That was about three years ago. I didn’t pay much attention at first. But we carried out some experiments that showed how much money we could save.”

“I still use chemicals, but I don’t spray them regularly. First I take a close look at the situation on my farm to see if pesticides are really necessary. If they are, I use the least toxic chemicals, and only in the early stages of the crop. Now I never spray for about 30 days before harvest.”

“I know a lot of vegetable farmers who would like to reduce the amount of pesticides. They know that pesticides cost a lot of money and are bad for their health, but they are worried about the market situation. The middlemen don’t care about pesticides; they never ask what chemicals have been used. And the consumers want cheap vegetables that look good. They should realize that the good-looking vegetables are often contaminated with dangerous pesticides.”

“If consumers would pay a better price for non-chemical vegetables, a lot more farmers would grow them.”



Instead of chemical pesticides, this farmer uses botanical products (Neem) and bio-pesticides (Bt = *Bacillus thuringiensis*) to grow a healthy crop.

Alternative to pesticides

There are a number of ways that farmers can manage without using dangerous chemicals:

- ◆ Ecological Agriculture: by using compost, growing a healthy crop and conserving the beneficial insects that already exist in the field.
- ◆ Biological Control: by introducing beneficial insects into the field, and using ‘bio-pesticides’ that are made of natural viruses and bacteria.
- ◆ Botanical pesticides: by spraying chemicals that are made from plant extracts instead of synthetic chemicals.

Organic farmers, and those who have been trained in Integrated Pest Management, use one or more of these alternatives.

34. What is Integrated Pest Management?

The Thai Government has been training farmers in something called “Integrated Pest Management” or IPM. This training helps farmers to grow their crops with less pesticide.

The first step in IPM is to learn how to grow a healthy crop. Strong plants are less likely to suffer from pests. Farmers can grow a healthy crop by selecting a suitable variety, providing the right fertilizer, making sure the plants get water when it is needed. If a healthy crop is attacked by a few pests, it will recover without any difference to the yield.

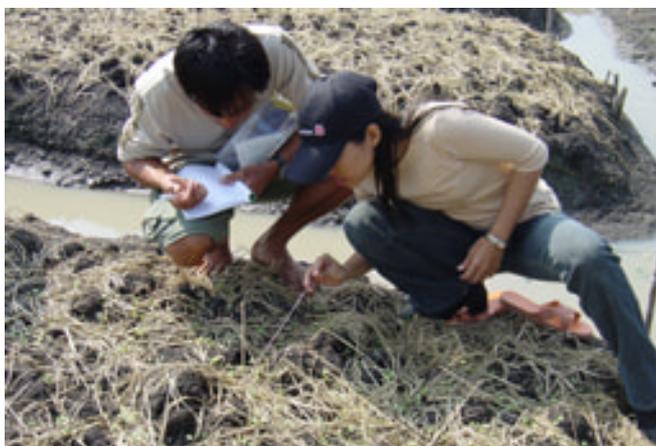
The next step in IPM is to recognise the types of insects that are living in the field. Some insects are harmful to the crop but many of them are useful. One of the things that useful insects do is to kill pests. If farmers can see plenty of useful insects in their field, they don’t need to spray with pesticides. If they did spray, they would kill both types of insect, and in most cases the pests would come back to the field quicker than the useful insects.

Integrated Pest Management is different from organic production. IPM farmers sometimes use pesticides, but they have been trained to carefully decide if chemicals are really needed and to select chemicals that are less harmful to human health and the environment (for example botanical pesticides or bio-pesticides).

Thousands of farmers have completed IPM training in Thailand. The training has been organised by both the Ministry of Agriculture and Cooperatives and the Ministry of Education. Support has been provided by foreign agencies such as the Danish Government (DANIDA), the German Government (GTZ) and the Food and Agriculture Organisation of the United Nations



Ladybird beetles, both the adults and the larvae, are predators of aphids. IPM farmer try to minimize pesticide use in order to conserve these beneficial insects.



The field is the classroom. A farmer and an FFS facilitator observe together the health of seedlings.

Farmer Fields schools

A Farmer Field School (FFS) is an educational process for a group of rural people. The FFS helps farmers learn about ecosystems and has been used in Thailand to teach Integrated Pest Management (IPM).

The FFS involves learning from practical experience. In the FFS, between 20 and 30 farmers meet once each week in their village for a period of 3 or 4 months. During these meetings, the farmers conduct experiments to test and compare different methods of managing their crops. They carefully observe what is happening in the field and record details of the health of the crop, the number and type of insects, the level of water etc. This information is analysed by the group and, as a result, they are able to make better decisions.

35. Is anybody helping organic farmers in Thailand?

Witoon Panyakul is Secretary of the Earth Net Foundation. Earth Net provides organic farmers with production technology, assistance in post harvest management, and pricing and marketing support.

"Farmers know that pesticides are dangerous. They often hire somebody else to spray for them, and they have to pay higher wages to people who do this work. Farmers also do not want to eat the vegetables they are selling, because of the chemicals they have used."

"What farmers need to know is that they can change their system of production. They have a choice to make: they can continue to risk their health and pay a high cost for inputs, or they can stop using pesticides and get a good income. If farmers want to make the change, the Earth Net Foundation and Green Net Cooperatives can help them."

"Farmers who want help from Earth Net have to sign a kind of contract. Those farmers are responsible for managing their farm and paying for their inputs, but they agree to follow certain standards. Farmers can stop using chemical pesticides immediately, but it takes 18 months before they can be certified as an organic producer. Every farm is examined to make sure it reaches the standards."

"The standards used by the office of Organic Agriculture Certification in Thailand (ACT) are internationally recognised. In fact, this is the first certification organisation in Asia to be accepted internationally. Not all farmers can reach these standards and some have to drop out of our project. But the number of organic farmers is growing in Thailand."

"We have implemented the organic scheme for 10 years, and now there are about 1,000 producers in the North East Region. We want to expand to the North, Central and Southern Regions. We are not expecting every farmer in Thailand to turn to organic agriculture, but many poor farmers can benefit from changing their method of production. Small-scale farmers are spending a lot of money on chemicals, but they get a low price for their crop and they are damaging their natural resources. Earth Net and Green Net have shown that there is an alternative for these farmers."



The DOAE bio-center in Pattaya rears these Assassin bugs. These predators kill caterpillars by sucking the juices of their body.

Biological control

Farmer's fields contain many types of insects, bacteria, and viruses. Some of these organisms are pests, but some of them are beneficial because they are the 'natural enemies' of pests. Instead of spraying poisonous chemicals, it is possible for farmers to introduce natural enemies into their fields as a way of controlling pests. We call this 'biological control'. There are three types of biological control in Thailand:

- ◆ Rearing of natural enemies by farmer groups. Some farmers have been trained to collect and breed insects such as earwigs that are released into sugar cane fields to control borers. This is a simple, effective and low-cost alternative to pesticides.
- ◆ Mass rearing of natural enemies by the Department of Agricultural Extension. Throughout the country there are a nine Biological Control Centres managed by DOAE. Large numbers of beneficial insects are produced, such as lacewings, assassin bugs, and ladybird beetles. Farmers can visit these centres to collect natural enemies free of charge.
- ◆ Commercial production of bio-pesticides. Some companies produce viruses (such as 'NPV') and bacteria (such as 'Bt') that are sold in bottles and can be sprayed onto the crop. These organisms make caterpillars sick and cause them to die.

36. Are pesticides doing any harm to the environment?

When farmers use pesticides in their fields, they can end up killing far more creatures than they intended, for example:

- ◆ Pesticides kill many useful insects, including: a) insects that attack and kill pests, b) insects that help to pollinate fruit trees, c) insects that produce honey, d) insects that can be consumed by man.
- ◆ Pesticides kill many kinds of fish that live in ponds, rivers, irrigation canals and paddy fields. It is possible to produce rice and fish in the same field, but only if farmers stop using pesticides.
- ◆ Pesticides kill frogs, lizards, turtles and snakes. These creatures have an important role to play in maintaining the balance of nature.
- ◆ Pesticides kill birds and mammals, either by directly poisoning them or eliminating the smaller creatures that they eat.

Many people have noticed the decline in wildlife in Thailand. There are 48 species of mammals and more than 100 species of birds on the endangered list. These animals could disappear forever if we don't take some action to save them. Pesticides are not the only reason for this problem; the destruction of our forests is also responsible. But by putting thousands of tonnes of poison into the environment we are certainly making the problem worse. Those chemicals are contaminating the soil and the water, and some of them stay in the environment for many years.



Honey bees are beneficial insects. They pollinate our crops and produce honey. Pesticides will kill them.



Fish are very sensitive to pesticides. This farmer did not want to kill the fish. But he did.

Ecosystems

Ecology is the study of relationships between different plants and animals, and between living and non-living components of the natural world. An *ecosystem* is a group of these components that are interacting with each other. An *agricultural ecosystem* includes everything we can find in the field: sunlight, soil, water, plants, worms, insects, frogs, and so on.

When farmers use pesticides, they are not just killing certain insects, they are introducing poisonous chemicals into an ecosystem. These poisons often have a negative effect on processes that help keep the environment strong and healthy. Pesticides kill useful creatures and upset the balance between different species. Some of these chemicals can stay in the environment for many years and get passed from one animal to the next.

37. Is there a Buddhist opinion about pesticides?

The Venerable Prayudh Payutto is one of the most prominent Buddhist thinkers in Thailand. He has written many books and received the UNESCO International Prize for Peace Education. More than ten years ago, he recognised the dangers of chemicals used in food production.

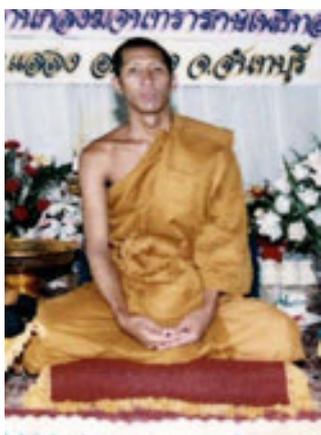
“Within the immediacy of our everyday lives, we are threatened by dangers. We can't be sure whether our food has been soaked in chemicals or not. Sometimes plants and animals, our food supply, are treated with hormones to boost their growth. Pigs are given special additives to make their meat turn a pretty red colour. Poisonous substances are sometimes used in foods as preservatives, flavour enhancers or dyes, not to mention the uncontrolled use of pesticides. Some of the people who sell these foods wouldn't dare eat them themselves!”

The Venerable Payutto has explained that problems like this occur because people have separated technology from ethics. Technology can be used to improve the quality of life and protect the environment, but this doesn't happen if people suffer from greed, hatred and delusion. When people produce or consume more than they need (lobha), and when they do this by trying to conquer nature instead of working with it (dosa), harmful consequences are inevitable. Those consequences are not always recognised, because people are paying more attention to the short-term benefits of their actions than to the longer-term dangers (moha).



38. Is anybody putting these Buddhist ideas into practice?

The Venerable Manus Khantithammo is a monk at Wat Po Thong in Salaeng sub-district of Chantaburi. Since 1996 he has organised 116 community savings groups with 35,000 members.



“Most of the farmers in this area grow fruit. The biggest problem is the use of pesticides in the orchards. These farmers are making a living, but in the meantime they are destroying their health. They use all kinds of chemicals, in large amounts. For example, Durian farmers use pesticides every week, sometimes every 3 days. Not only is this a health problem, it is also an economic problem because farmers have to spend a lot of money on these chemicals. This is why am encouraging these farmers to use organic methods.”

“When I talk to farmers, I use the Buddhist principle of non-violence (ahimsa). I explain that there are millions of lives in a handful of soil. In one square metre of land we can find so many insects, spiders, worms and micro-organisms. And in an orchard, there is an entire ecosystem that includes different kinds of birds, frogs, lizards and other creatures. If farmers use chemical pesticides they are killing these living things, which means they are killing Mother Earth. If Mother Earth dies, then so will everything else: the trees, and eventually human beings. When farmers understand more about nature, they are able to understand more about their own lives.”

“Many groups of fruit farmers in this area have now replaced pesticides with micro-organisms (also called EM, bio-fertilizer etc). Our project helps farmers to produce their own micro-organism from molasses. As a result, farmers are helping nature instead of harming it.”

39. Do we have laws to deal with this problem?

The most important piece of legislation related to food safety in Thailand is The Food Act of 1979 (BE 2522). Sections 25(1) of this law makes it illegal for anybody to “produce, import for sale, or distribute... food which contains anything likely to be dangerous to health“. Section 58 states that “whoever violates 25(1) shall be liable to imprisonment of not more than 2 years and a fine of not more than twenty thousand Baht”.

Since the enactment of this Law more than 20 years ago, the Ministry of Public Health has issued a number of notifications to make it clear what chemicals are considered to be “dangerous to health“. The latest notification was issued on 30th May 2003, as follows:

“In order to control food safety, the Ministry of public Health (MOPH) announces that - from now on - all food must not contain:

- Beta Agonist
- Borax
- Formalin
- Salicylic acid
- Hydrosulfide (Bleaching)
- Pesticide (beyond MRL)
- Anti-biotic
- Nitro-furan”

As a result of this announcement, farmers or retailers who sell fruit and vegetables that contains more than the acceptable level of pesticide can be jailed for up to 2 years.

There are two other pieces of important legislation in Thailand relating to pesticides and food safety:

The Hazardous Substances Act of 1992 (BE 2535). Under section 43 and 74 of this Act, a person who imports, produces or has in their possession a banned chemical can be fined up to one million Baht and imprisoned for up to ten years.

The Public Health Act of 1992 (BE 2535). Under Section 40 and 73, a person who breaks Local Government regulations relating to hygiene in any place “where food is sold, served, prepared, or stored” can be imprisoned for up to six months and fined 10,000 Baht.

Code of conduct

The FAO Council has adopted an International Code of Conduct on the Distribution and Use of pesticides. This document establishes voluntary standards of conduct for all public and private entities engaged in or associated with the distribution and use of pesticides.

The code deals with many topics including pest management, reducing health and environmental risks, labeling, packaging, storage, disposal and advertising.



According to law, all food should be safe.



Promotion of pesticides by giving gifts (bicycles, t-shirts, TVs) is common practice in Thailand even though it is a violation of the “International Code of Conduct on the Distribution and Use of Pesticides”.

40. Who in the Government is responsible for food safety?

The Ministry of Public Health is responsible for the implementation of both The Food Act and the Public Health Act. A Committee representing many different Government Departments controls the implementation of the Hazardous Substances Act.

Within the Ministry of Public Health, the following organisations play a role in food safety:

- ◆ The Food and Drug Administration (FDA) is the main agency responsible for implementing The Food Act, and thereby ensuring that Thai food is safe and clean. The FDA sets standards, issues import licenses and registers food products.
- ◆ Provincial Offices of Public Health support the FDA at the local level by, for example, carrying out inspections of markets and restaurants.
- ◆ The Department of Medical Science (DOMS) carries out research into food safety, including analysis of food samples.

The Ministry of Agriculture and Cooperative also plays an important role in food safety, through the work of the following organisations:

- ◆ The Department of Agriculture (DOA) is responsible for controlling the use of pesticides under The Hazardous Substances Act. Within the DOA, both the Office of Research and Development on Agricultural Production Science and the Office of Agricultural Regulatory take care of registering pesticides.
- ◆ The Department of Agricultural Extension (DOAE) is responsible for training farmers. This includes training in Integrated Pest Management (IPM).



Market places are inspected to ensure that food is safe.



In a Farmer Field School farmers become actively involved in learning about their own crops.



Field observations in a Farmer Field School. The IPM training takes place in the field of the farmers.

41. What is the Ministry of Public Health actually doing?

Prof. Dr. Pakdee Pothisiri is the Deputy Permanent Secretary of the Ministry of Public Health.

“The Ministry of Public Health has the main responsibility in the area of food safety and consumer health. The main legal instrument we are using in this particular area is The Food Act. Beside that, the Government has recently issued a policy, announced by Prime Minister himself, to make Thailand ‘The Kitchen of The World’. We want to be able to guarantee the safety of food that has been produced and distributed in, and exported from, Thailand. We want to make sure that Thai food is meeting international standards.”

“The food standards promulgated under the Food Act are referenced to Codex standards. In the past, the problem has been lack of enforcement rather than a lack of a regulatory system. Because of the new policy of the Prime Minister, we are now trying to strengthen the enforcement of the law, and we are focusing on the problem of contamination of food, both chemical and microbial. Based on our experience, the common chemical contaminants are Beta-agonists that are widely used in pigs, also illegal preservatives such as Borax and Salicylic Acid, and – of course - pesticide residues.”

“What I mean by enforcement, is to ask all our personnel working in several Departments, such as FDA and the Department of Medical Science, to work with the Bangkok Metropolitan Authority to inspect all food stalls in the market place. In the Provinces we are asking the Provincial Governor and the Provincial Health Office to do the same kind of thing.”

“We are also issuing a ‘Safe Food’ logo for food stalls that have been checked three times and no contaminated food has been found. The stall can show to the consumer that this is a place they can buy safe food. The food may not be totally free of contaminants, but the level of residues is under control. Consumers can then chose where to buy vegetables and fruit.”

“In the long-run, the certification scheme will be a big burden for the Ministry, so the responsibility will be shifted to the market owners and owners of food stalls. They will have to carry out some kind of self-regulation, while we will have a system of surveillance with spot checks from time to time. We will withdraw the certified logo if we find they are violating the prescribed limits.”

“We are working together with MOAC to solve the problem of pesticide residues. We need to take a holistic approach, whereby we look at the food chain from farm to table, and delegate responsibility to make sure we have covered all the important steps in the food chain. We can’t solve the problem by just taking action at the end of the food chain; we also have to look at what the producers are doing. The Law on Control of Hazardous Substances prevents farmers from using banned substances. Those who possess or sell these banned substances will be seriously penalized. The difficulty is – again - how to effectively enforce the existing law.”



The Ministry of Public Health had developed this logo to certify food safety in shops and market places.

42. What about the Ministry of Agriculture?

Dr. Ampon Kittiampon is the Secretary General of the National Bureau of Agricultural Commodities and Food Standards.

“The Ministry of Agriculture and Cooperative has two roles, which are ‘food safety’ and ‘food security’. Our food safety efforts are focused mainly on agricultural products that are being exported, while food security is focused on domestic production. These issues are interlinked, but our current emphasis is on food safety for exports. The food security issue - which involves both the quality and quantity of agricultural products consumed in Thailand – requires a long-term effort.”

“There is increased demand for Thailand to comply with the food safety regulations of those developed countries that are importing our produce, like the European Union, USA and Japan. Our aim is that by the end of 2004 there will be 325,000 farms in Thailand that are registered and certified for ‘Good Agriculture Practices (GAP)’. These will be farms that produce fruit and vegetables for export. We have drawn up a list of 21 vegetables and fruits that are exported from Thailand, and for each of these crops we are creating GAP standards.”



Mrs. Juntip Tumrongsiskul is the Chief of Pesticides Research Group, Office of Research and Development on Agricultural Production, in the Department of Agriculture (DOA).

“The MOAC has recently created a new logo to show what crops have been grown according to ‘Good Agricultural Practices’. The logo has a large letter Q, with ‘GAP’ written underneath. Before a farmer is certified to use this logo, he must keep a record of his practices to show that he is following the GAP standards. Also, his crop will be tested for pesticide residues.”

“We have two more logos, which are similar. The letter Q with ‘GMP’ written underneath shows that the food has been processed and packed according to Good Manufacturing Practices. Finally, the letter Q with ‘food safety’ written inside, shows that the food satisfies both sets of standards, GAP and GMP. An important part of this system is that every certified producer has a code number, and we can trace the source of any contamination that is found in the food.”



The Ministry of Agriculture and Cooperatives has developed this logo to certify farmers who produce safe food.

Mr. Sukhum Wong-Ek works at the Registration and Licensing sub-division, Office of Agricultural Regulatory, where he is responsible for the registration of pesticides.

“As part of the preparation for Food Safety Year, we are reviewing the 12 pesticides on the Watch List. These are highly toxic chemicals that are currently registered for use in Thailand, but some pesticides in this list have been banned in some other countries (see question 32). It is possible that some of these pesticides will be banned in Thailand by the beginning of 2004.”



“We are also making changes to the labeling of pesticides, so that farmers will have a clearer understanding of what chemicals are being sold. The present situation can be confusing. Approximately 320 chemicals are available in the market, but they are sold under thousands of brand names. We want to reduce the number of brands, and make sure the common name of the chemical is printed in letters that are just as large as the brand names.”

43. Are the Royal Projects involved in solving this problem?

His Majesty the King has played a leading role in agricultural development in Thailand. The Royal Projects are conducting research and educational activities that encourage self-reliance and sustainability. This is achieved through the use of appropriate technology and the conservation of nature.

Since 1985, food that is produced by the Royal Projects has been sold under the 'Doi Kham' label. Ms. Suppalak Sooksom is a Branch Manager of a Doi Kham shop located in the grounds of Kasetsart University in Bangkok.

"In the Doi Kham shop we sell pesticide-free vegetables, fruits and flowers. We also sell other types of healthy food, such as juices, brown rice and honey. Our shops have a good reputation because we are under the Royal Projects, and the Ministry of Public Health has also certified us. We don't make any profit because the income goes back to the Royal Projects that are helping the hill tribes."

"Doi Kham sells more than 50 types of vegetables. Most of these vegetables are produced in the area of Chiangmai, Chiangrai and Mae Hong Son. There is a collecting station in Chiang Mai from where vegetables are sent to Bangkok every morning. We have strict checks for pesticide contamination at all stages of the process. The Royal Project has officers who supervise every step from seed until harvest. If we find any contamination, we destroy the whole batch of vegetables."

"I am an agriculture graduate, so I know that ordinary farmers use a lot of pesticides. They start using these chemicals because they have seen other people using them, and they think that if their vegetables have a good appearance they will get a good income. But these chemicals are harmful to the health of farmers and consumers. They are polluting the environment and poisoning all kinds of living creature. The Royal Projects are helping solve these problems by research, development and marketing."



A healthy looking crop. But is it healthy to eat?

Bangkok Post, 09 December 2003

QUEEN OPENS FOOD SAFETY FAIR

"Her Majesty the Queen presides over the opening of the food safety fair at the Queen Sirikit National Convention Centre. The fair is organised by the Public Health Ministry as part of the promotion of next year as Food Safety Year. The Queen is urging food producers and vendors to be more concerned about consumers' health and to avoid using



44. When will all our food be safe?

The Thai government is very much concerned about food safety and is taking many steps to improve the current situation. This includes an active policy on pesticide registration, which has resulted in banning of the most toxic pesticides in the past few years. Unfortunately there are also still some very toxic and controversial products being used and further action is required, especially for pesticides that are on the "watch list".

The government is also very active in efforts to educate farmers in integrated pest management, good agricultural practices, organic farming, and sustainable agriculture. Laboratories are in place to test agricultural products for residues and farmers who are producing quality products are certified.

Not only the government but also several NGOs and private companies are actively promoting better agricultural practices. Many department stores and supermarkets have now become outlets of safe-labeled fruits and vegetables.

Despite all these efforts, the pesticide issue is not a problem that will be solved overnight. To speed up the process, consumers can play an active role by making a positive choice for food that is certified to be safe or food that is grown by organic farmers.

45. Where can I get more information about pesticides and food safety?

The following organisations can be contacted for more information about pesticides and food safety in Thailand. Most of these organisations have web sites in Thai and English.

Thai Websites		
◆	Ministry of Agriculture and	http://www.moac.go.th/
◆	Department of Agriculture (DOA)	?? http://www.doa.go.th/ ????
◆	Department of Agricultural Extension (DOAE)	http://www.doae.go.th/
◆	Ministry of Public Health (MOPH)	http://www.moph.go.th
◆	Food and Drug Administration (FDA)	http://www.fda.moph.go.th
◆	Ministry of Natural Resources and Environment	http://www.monre.go.th/
◆	Pollution control Department	http://www.pcd.go.th/
◆	Department of Environmental Quality Promotion	http://www.deqp.go.th/
◆	National Food Institute (NFI)	http://www.nfi.or.th
◆	Green Net & Earth Net Foundation	http://www.greennetorganic.com
◆	IPM Thailand	http://www.ipmthailand.org
◆	A website with a general introduction to pesticides	http://classroom.psu.ac.th/users/naran/536-412/content/pest_part1.htm
◆	Lemon Farm	http://www.lemonfarm.com/



A healthy looking crop. But is it healthy to eat?

Further reading in English

Try this collection of books, reports and websites to learn more about pesticides and the problems they cause.

Reports and other documents

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- ◆ John Madeley, 2002. Paraquat – Syngenta's controversial herbicide. www.evb.ch/cm_data/Syngenta_paraquat_0.pdf
- ◆ International Code of Conduct on the Distribution and Use of pesticides
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- ◆ *Background Papers* from PAN-UK (1997). Include factsheets on pesticides and food. Download from this page: <http://www.pan-uk.org/pub31.htm>
- ◆ *From Farmer Field Schools to Community IPM: Ten Years of IPM Training in Asia*. Food and Agriculture Organisation. Can be downloaded from <http://www.communityipm.org/downloads.html>
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- ◆ Hazardous Chemicals in Human and Environmental Health: a resource book for school, college and university students. WHO/UNEP/ILO, 2000. www.who.int/pcs/training_material/hazardous_chemicals/cover_pages.htm
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Books

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- ◆ Colborn, T. , Dumanoski, D. and Myers, J.P. (1997). *Our Stolen Future*. ISBN 0-452-27414-1
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- ◆ Peter Beaumont, (1993), *Pesticides, Policies and People*. Published by The Pesticides Trust, London, ISBN 0-9521656-0-0
- ◆ Christopher Robbins (1991) *Poisoned Harvest: A Consumer's Guide to Pesticide Use and Abuse*. Gollancz. ISBN 0575047976
- ◆ Robert Van Den Bosch (1989), *The Pesticide Conspiracy*. Published by the University of California Press. ISBN 0-520068238

Websites in English

- ◆ PAN Pesticides database: www.pesticideinfo.org
- ◆ International Programme On Chemical Safety, International Chemical Safety Cards (ICSCS): www.cdc.gov/niosh/ipcs/nicstart.html
- ◆ USEPA/OPP Chemical Ingredients Database Query: www.cdpr.ca.gov/docs/epa/epachem.htm
- ◆ EXTTOXNET, The EXTension TOXicology NETwork: ace.orst.edu/info/extoxnet
- ◆ Our Stolen Future: www.ourstolenfuture.org
- ◆ PANNA: Global Pesticide Campaigner Magazine: www.panna.org/resources/gpc.html
- ◆ Community Integrated Pest Management: <http://www.communityipm.org/>
- ◆ World Health organisation site on Food Safety: www.who.int/foodsafety/en/
- ◆ Food and Agriculture Organisation site on Food and Nutrition Division: www.fao.org/es/ESN/index_en.stm
- ◆ Toxic Trail: a BBC documentary on pesticides and IPM in SE Asia (available in Thai), plus factsheets that can be downloaded: www.ToxicTrail.org
- ◆ Global Toxic Initiative of the World Wildlife Fund: www.worldwildlife.org/toxics/
- ◆ Greenpeace: the chemical home: www.greenpeace.org.uk/Products/Toxics/index.cfm
- ◆ Codex Alimentarius, source of recommendations regarding Maximum Residue Levels (see question 19): www.codexalimentarius.net/
- ◆ US Environmental Protection Agency (EPA), page on pesticides and food security: www.epa.gov/pesticides/factsheets/securty.htm
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21) What can consumers do to avoid pesticide residues?

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The debate about organic versus non-organic:
<http://www.ourstolenfuture.org/NewScience/oncompounds/2002-0508bakeretal.htm>

<http://www.cce.cornell.edu/food/fsarchives/050602/pesticide.html>

IPM DANIDA Report #26, A Study of pesticide residues in Kale and Morning Glory, April 2003

27) If I want healthy food, can the supermarkets provide it?

The Mall Group of Companies (in Thai): www.themallgroup.com

Lemon Farm website (in Thai): <http://www.lemonfarm.com>

28) Are my children at risk?

'Pesticides in the Diets of Infants and Children', Commission on Life Sciences, 1993, online text at
<http://www.nap.edu/books/0309048753/html/>

'Clean Schools, Safe Kids', Agricultural Resources Center and Pesticide Education Project. 2003, download the report from
<http://www.ibiblio.org/arc/pub/CSSKexecsum.html>

'Unthinkable Risk: How Children are Exposed and Harmed When Pesticides are Used at School'. Northwest Coalition for Alternatives to pesticides, 2000
<http://www.pesticide.org/UnthinkableRisk.html>

29) What can I do to protect my children?

EPA fact sheets on Protecting Children:
http://www.epa.gov/pesticides/factsheets/health_fs.htm

'How to Protect Your Children from Environmental Risks'. Natural Resources Defence Council:
<http://www.nrdc.org/health/kids/g5worst.asp>

30) What can schools do to protect children from pesticides?

Ecoschools Network: <http://ecoschools.net/ecoschool/index.htm>

Andrew Bartlett and Marut Jatiket 'Getting REAL in Thai Schools', Pesticide News, No 61, p6 September 2003.

IPM in Schools, information from EPA (USA)
<http://www.epa.gov/pesticides/ipm/>

School Pesticide Reform Initiative:
<http://www.beyondpesticides.org/ToxicFreeSchools/index.htm>

31) What about restaurants; are they using safe food or not?

32) Why doesn't the Government just ban these chemicals?

List of banned pesticides at IPM Thailand website,
http://www.ipmthailand.org/en/Pesticides/pesticides_banned.htm

PANNA: Paraquat, Syngenta's controversial herbicide.

33) Are any Thai farmers growing crops without pesticides?

34) What is Integrated Pest Management?

What is IPM? IPM-DANIDA project website
<http://www.ipmthailand.org/en/Components/IPMInfo.htm>

For a comparison of sustainable agriculture systems in Thailand see <http://www.agnet.org/library/data/eb/eb509/eb509.pdf>

35) Is anybody helping organic farmers in Thailand?

36) Are pesticides doing any harm to the environment?

World Bank 2000, 'Thailand Environment Monitor: Green Agenda',
<http://www.worldbank.or.th/env/2001THAI/download/ENG/EGREEN.PDF>

37) Is there a Buddhist opinion about pesticides?

Buddhism and the Foundation of Science, Lecture by Bhikku P.A. Payutto, in 'Towards Sustainable Science, Buddhadhamma Foundation, Bangkok 1993, also online at
<http://www.budhas.org/ebud/budscience/bfs-01.htm>

38) Is anybody putting these Buddhist ideas into practice?

39) Do we have laws to deal with this problem?

English translation of 1979 Food Act
http://www.foodmarketexchange.com/datacenter/laws/detail/dc_lr_reference_d03.htm

List of MOPH Notifications at the FDA website:
http://www.fda.moph.go.th/eng/eng_food/notificationmoph.htm

English Translation of 1992 Hazardous Substances Act
<http://www.diw.go.th/law/hazae.html>

English Translation of 1992 Public Health Act
http://www.foodmarketexchange.com/datacenter/laws/detail/dc_lr_reference_d04.htm

40) Who in the Government is responsible for food safety?

Mandate of the FDA:
http://www.fda.moph.go.th/eng/eng_food/foodcontrol.htm

41) What is the Ministry of Public Health actually doing?

42) What about the Ministry of Agriculture?

43) Are the Royal Projects involved in solving this problem?

Office of the Royal Development Projects Board, statement on agriculture:
<http://www.rdpb.go.th/home/detailH.asp?lang=EN&file=project&subject=agri>

Magazine article about Doi Kham, at <http://welcome-to.chiangmai-chiangrai.com/doikhamI.htm>

"His Majesty the King promotes Biological Agriculture. Article by Chaipattana Foundation, December 2002.
http://www.chaipat.or.th/journal/dec02/dream_e.html"

44) When will all our food be safe?

45) Where can I get more information about pesticides and food safety?

Do we really need these pesticides?

This table provides details of the most harmful pesticides being used in Thailand. Currently there are 337 active ingredients registered for use in the country. Some of these are more dangerous than others.

The following list shows 135 chemicals that are a cause of concern because of their toxic effects. All of the chemicals on this list are known or suspected of causing harm to people, animals and the environment.

A database of all pesticides registered in Thailand can be found on this internet address:

<http://www.ipmthailand.org/en/Pesticides/Pesticides.asp> The source of information about the toxicity of these chemicals is the Pesticide Action Network, at this address: www.pesticideinfo.org

Common name	Chemical family	WHO toxicity class	Acute toxic	Carcinogen	Cholinesterase inhibitor	Ground water contaminant	Developmental toxin	Endocrine disruptor	Remark
2,4-D, dimethyl ammonium	-	Not listed	Yes	Possible	No	Potential	?	?	
Abamectin	-	Not listed	Yes	Not likely	No	?	Yes	?	
Acephate	Organophosphates	III	Slight	Possible	Yes	Potential	?	?	
Acetochlor	-	III	Slight	Yes	No	?	?	suspected	
Acifluorfen	-	III	Slight	Yes	No	?	?	?	
Alachlor	-	III	Slight	Yes	No	Yes	Yes	suspected	
Aldicarb	Carbamates	Ia	Yes	Unclassifiable	Yes	Yes	?	suspected	On watch list
Aluminum phosphide	-	FM	Yes	?	No	?	?	?	
Amitraz	-	III	Moderate	Possible	No	?	Yes	?	
Anilofos	Organophosphates	II	Moderate	?	Yes	?	?	?	
Atrazine	-	U	Slight	Yes	No	Yes	?	suspected	
Azamethiphos	Organophosphates	III	Slight	?	Yes	?	?	?	
Benfuracarb	Carbamates	II	Moderate	?	Yes	?	?	?	
Benomyl	-	U	Slight	Possible	No	?	Yes	suspected	
Bensulide	Organophosphates	II	Moderate	Not likely	Yes	Potential	?	?	
Bifenthrin	Pyrethroids	II	Moderate	Possible	No	?	Yes	suspected	
Blasticidin-S	-	Ib	Yes	?	No	?	?	?	On watch list
Brodifacoum	-	Ia	Yes	?	No	?	?	?	
Bromacil	-	U	Slight	Possible	No	Yes	?	?	
Bromadiolone	-	Ia	Yes	?	No	?	?	?	
Butachlor	-	U	Not acutely toxic	Yes	No	?	?	?	
Cadusafos	Organophosphates	Ib	Yes	Not likely	Yes	?	?	?	
Captan	-	U	Yes	Yes	No	?	?	?	
Carbaryl	Carbamates	II	Moderate	Possible	Yes	Potential	?	suspected	
Carbofuran	Carbamates	Ib	Yes	Not likely	Yes	Potential	?	?	On watch list
Carbosulfan	Carbamates	II	Moderate	?	Yes	?	?	?	
Carboxin	-	U	Not acutely toxic	?	No	?	Yes	?	
Chlormequat chloride	-	III	Yes	?	No	?	?	?	
Chlorothalonil	-	U	Yes	Yes	No	Potential	?	?	
Chlorpyrifos	Organophosphates	II	Moderate	Not likely	Yes	?	?	suspected	
Chlorpyrifos methyl	Organophosphates	U	Not acutely toxic	?	Yes	?	?	?	
Coumatetralyl	-	Ib	Yes	?	No	?	?	?	
Cyproconazole	-	III	Slight	Yes	No	?	?	?	
Cyromazine	-	U	Slight	Not likely	No	Yes	?	?	
Diazinon	Organophosphates	II	Moderate	Not likely	Yes	Potential	Yes	?	
Dicamba	-	III	Slight	Unclassifiable	No	Potential	Yes	?	
Dichlorvos	Organophosphates	Ib	Yes	Yes	Yes	?	?	?	
Dicofol	Organochlorines	III	Yes	Possible	No	?	?	suspected	
Dicrotophos	Organophosphates	Ib	Yes	Possible	Yes	Potential	?	?	On watch list
Difethialone	-	Ia	Yes	?	No	?	?	?	
Dimethoate	Organophosphates	II	Yes	Possible	Yes	Potential	Yes	?	
Dinocap	-	III	Moderate	Not likely	No	?	Yes	?	
Diuron	-	U	Slight	Yes	No	Yes	Yes	?	
DSMA	-	III	?	Yes	No	Potential	?	?	
Edifenphos	Organophosphates	Ib	Yes	?	Yes	?	?	?	
Emamectin benzoate	-	Not listed	Yes	Not likely	No	?	?	?	
Endosulfan	Organochlorines	II	Yes	Not likely	No	?	?	suspected	On watch list
EPN	Organophosphates	Ia	Yes	?	Yes	?	?	?	On watch list
EPTC	Thiocarbamates	II	Moderate	?	Yes	Potential	Yes	?	
Ethephon	Organophosphates	U	Not acutely toxic	Unclassifiable	Yes	?	?	?	
Ethion	Organophosphates	II	Yes	Not likely	Yes	?	?	?	
Ethoprophos	Organophosphates	Ia	Yes	Yes	Yes	Potential	?	?	On watch list
Etridiazole	-	III	Slight	Yes	No	?	?	?	
Fenamiphos	Organophosphates	Ib	Yes	Not likely	Yes	Potential	?	?	
Fenbutatin oxide	-	U	Yes	Not likely	No	?	Yes	?	
Fenitrothion	Organophosphates	II	Moderate	Not likely	Yes	?	?	suspected	
Fenobucarb	Carbamates	II	Moderate	?	Yes	?	?	?	
Fenoxycarb	Carbamates	U	Slight	Yes	No	Potential	Yes	?	
Fenpropathrin	Pyrethroids	II	Yes	Not likely	No	?	?	?	
Fenthion	Organophosphates	II	Moderate	Not likely	Yes	Potential	?	?	
Flocoumafen	-	Ia	Yes	?	No	?	?	?	
Fluazifop-butyl	-	III	Slight	?	No	Potential	Yes	?	

Common name	Chemical family	WHO toxicity class	Acute toxic	Carcinogen	Cholinesterase inhibitor	Ground water contaminant	Developmental toxin	Endocrine disruptor	Remark
Folpet	-	U	Not acutely toxic	Yes	No	?	?	?	
Formetanate hydrochloride	Carbamates	Not listed	Yes	Not likely	Yes	Potential	?	?	On watch list
Formothion	Organophosphates	II	Moderate	?	Yes	?	?	?	
Fosetyl-aluminium	Organophosphates	Not listed	Yes	Not likely	No	Potential	?	?	
Hexazinone	-	III	Yes	Unclassifiable	No	Yes	?	?	
Hydramethylnon	-	III	Slight	Possible	No	?	Yes	?	
Hymexazol	-	U	Yes	?	No	Potential	?	?	
Imazalil	-	II	Moderate	Yes	No	?	Yes	?	
Imazapyr	-	U	Yes	Not likely	No	?	?	?	
Iprobenfos	Organophosphates	III	Slight	?	Yes	?	?	?	
Iprodione	-	U	Slight	Yes	No	Potential	?	suspected	
Isazophos	Organophosphates	Ib	Yes	?	Yes	Potential	?	?	
Isoproc carb	Carbamates	II	Moderate	?	Yes	?	?	?	
Isoxaflutole	-	Not listed	Slight	Yes	No	?	?	?	
Kresoxim-methyl	-	Not listed	Slight	Yes	No	Potential	?	?	
Lactofen	-	Not listed	?	Yes	No	?	?	?	
Malathion	Organophosphates	III	Moderate	Possible	Yes	Potential	?	suspected	
Mancozeb	Thiocarbamates	U	Not acutely toxic	Yes	No	?	Yes	suspected	
Maneb	Thiocarbamates	U	Not acutely toxic	Yes	No	?	Yes	suspected	
Metalaxyl M	-	Not listed	Yes	?	No	?	?	?	
Methidathion	Organophosphates	Ib	Yes	Possible	Yes	Potential	?	?	On watch list
Methiocarb	Carbamates	Ib	Yes	Unclassifiable	Yes	Potential	?	?	
Methomyl	Carbamates	Ib	Yes	Not likely	Yes	Potential	?	suspected	On watch list
Methyl bromide	-	FM	Yes	Unclassifiable	No	?	Yes	?	
Metolachlor	-	III	Slight	Possible	No	Yes	?	suspected	
Metribuzin	-	II	Moderate	Unclassifiable	No	Potential	Yes	suspected	
Molinatate	Thiocarbamates	II	Moderate	Possible	Yes	Potential	Yes	?	
MSMA	-	Not listed	Slight	Yes	No	Potential	?	?	
Myclobutanil	-	III	Slight	Not likely	No	?	Yes	?	
NAA	-	U	Yes	?	No	?	?	?	
Naled	Organophosphates	II	Moderate	Not likely	Yes	?	Yes	?	
Omethoate	Organophosphates	Ib	Yes	?	Yes	?	?	?	
Oxadiazon	-	U	Slight	Yes	No	?	Yes	?	
Oxamyl	Carbamates	Ib	Yes	Not likely	Yes	?	?	?	On watch list
Oxydemeton-methyl	Organophosphates	Ib	Yes	Not likely	Yes	Potential	Yes	?	
Oxytetracycline	-	Not listed	?	Unclassifiable	No	?	Yes	?	
Oxytetracycline hydrochloride	-	Not listed	Not acutely toxic	Unclassifiable	No	?	Yes	?	
Paraquat dichloride	Paraquat	II	Yes	Not likely	No	Potential	?	?	
Parathion-methyl	Organophosphates	Ia	Yes	Unclassifiable	Yes	Potential	?	suspected	On watch list
Phenthoate	Organophosphates	II	Moderate	?	Yes	?	?	?	
Phosalone	Organophosphates	II	Moderate	?	Yes	Potential	?	?	
Phosmet	Organophosphates	II	Moderate	Possible	Yes	Potential	?	?	
Phoxim	Organophosphates	II	Moderate	?	Yes	?	?	?	
Pirimiphos-methyl	Organophosphates	III	Slight	Unclassifiable	Yes	?	?	?	
Procymidone	-	U	Not acutely toxic	Yes	No	?	?	suspected	
Profenofos	Organophosphates	II	Moderate	Not likely	Yes	Potential	?	?	
Propargite	-	III	Yes	Yes	No	?	Yes	?	
Propiconazole	-	II	Moderate	Possible	No	Potential	Yes	?	
Propineb	Thiocarbamates	U	Not acutely toxic	?	No	?	Yes	?	
Propionic acid	-	Not listed	Yes	?	No	?	?	?	
Propoxur	Carbamates	II	Yes	Yes	Yes	?	?	?	
Prothiofos	Organophosphates	II	Moderate	?	Yes	?	?	?	
Pyrazophos	Organophosphates	II	Moderate	?	Yes	?	?	?	
Pyridaphenthion	Organophosphates	III	Slight	?	Yes	?	?	?	
Quinalphos	Organophosphates	II	Moderate	?	Yes	?	?	?	
Streptomycin sulfate	-	Not listed	Moderate	?	No	?	Yes	?	
Tau-fluvalinate	Pyrethroids	U	Not acutely toxic	?	No	?	Yes	?	
Tetraconazole	-	II	Moderate	Yes	No	?	?	?	
Thiamethoxam	-	Not listed	?	Yes	No	?	?	?	
Thiobencarb	Thiocarbamates	II	Moderate	Unclassifiable	Yes	Potential	?	?	
Thiodicarb	Thiocarbamates	II	Moderate	Yes	Yes	?	?	?	
Thiometon	Organophosphates	Ib	Yes	?	Yes	?	?	?	
Thiophanate-methyl	-	U	Slight	Yes	No	Potential	Yes	?	
Thiourea	-	Not listed	Moderate	Yes	No	?	?	?	
Thiram	Thiocarbamates	III	Moderate	Unclassifiable	No	?	Yes	suspected	
Tolclofos-methyl	Organophosphates	U	Not acutely toxic	?	Yes	?	?	?	
Triadimefon	-	III	Moderate	Possible	No	Potential	Yes	suspected	
Triazophos	Organophosphates	Ib	Yes	?	Yes	?	?	?	
Trichlorfon	Organophosphates	II	Moderate	Yes	Yes	?	?	?	
Triforine	-	U	Slight	?	No	?	Yes	?	
Zeta-cypermethrin	Pyrethroids	Ib	Yes	Possible	No	?	?	suspected	
Zinc phosphide	-	Ib	Yes	?	No	?	Yes	?	
Zineb	Thiocarbamates	U	Not acutely toxic	Unclassifiable	No	?	Yes	suspected	



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