

The alternative pesticide residues report - 2005

What the Government doesn't tell us



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Whilst PAN UK have made every effort to ensure the accuracy of the information in this report, we cannot be held responsible for any errors



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Over last 12 months, the Pesticide Residues Committee (PRC) has published the results of their residues testing programme for 2005. As with previous years, they report on the numbers of samples that contain pesticides, the numbers that exceed legal residue limits and mention briefly the risk assessments for health implications

Their quarterly reports for 2005 contain a huge amount of data: a total of 37 food types were tested for between 13 and 118 different pesticides (see Table 1) and details of each sample with measurable residues can be seen. The PRC's analysis of this data, however, is somewhat selective. In this short report, we conduct our own analysis of the 2005 PRC data and highlight some of the issues that are important to consumers.

PAN UK has also undertaken a comprehensive analysis of the PRC residues data from 2000 - 2005 and has summarised the findings on our new food webpages - Pesticides in your food: the hidden extras.

Do legal limits on pesticide residues ensure our safety?

In their reports, the PRC focus on Maximum Residue Levels (MRLs) in their analysis. These are the maximum permitted residues and are set to ensure that food is grown according to good agricultural practice. They do not guarantee that the quantity of pesticide found in the food is safe.

There are two different safety levels for pesticide residues in food: the acute reference dose (ARfD) which is the amount (measured in mg of pesticide per kg bodyweight) that is safe to consume in one meal or in one day, and the acceptable daily intake (ADI) which is the amount that is safe to consume every day of your life. The ADI is usually lower than the ARfD.

The PRC assert that MRLs are set to ensure consumption of pesticides is below these safety limits, but this is in fact not true. It is a considerable amount of work to compare safety levels with the MRL for every food/pesticide combination, so PAN UK has been conducting research over the last six months to find out the most contaminated foods and the most commonly-occurring pesticides on those foods. We have selected our top ten foods that have pesticide residues, and 36 pesticides that either occur regularly or have exceeded legal limits over the last six years. Information on this can be found at <http://www.pan-uk.org/Projects/Food/index.htm>. Of our top ten foods, seven (apples, speciality green beans, cucumber, grapes, pears, bread and potatoes) were tested by the PRC in 2005. We have largely focused on these seven foods and the 36 pesticides for this report.

PAN UK's research suggests that, of the 36 pesticides, 19 have MRLs that are *not* set below one of the safety limits for one or more of the seven foods (see Table 2). This suggests that it is far from being a rare occurrence and that it is more than an aspiration than a statement of fact that MRLs protect the public. Under EU regulations, new MRLs are being set that should take safety levels into account, but this appears to be taking a considerable amount of time. It is not clear from the information on the Pesticide Safety Directorate's website, where data on safety limits and MRLs can be found, which of these are "new" and which are "old" and will be subject to revision. Of the 19 pesticides we identified, all but two had their MRLs designated "EU definitive" and came into force in 2005 or 2006.

There are some particularly striking examples of where the current system does not appear to protect us.

Chlorothalonil, a fungicide used on a number of crops including potatoes and cucumber in the UK, has an MRL for lettuce, potatoes and beans that was lower than the reporting limit in 2005 (the amount of pesticides on the food that either cannot be detected or does not need to

be reported to the regulators). Thus there may be many samples where the legal limit was exceeded that we just don't know about.

More worryingly, the reporting limit for **aldicarb** on potatoes in 2005 slightly exceeded one of the safety limits (the acute reference dose) for infants. Aldicarb is one of the most toxic pesticides currently used in the UK. It has been banned in the EU, although the UK has an exemption from this up to the end of 2007. It is astonishing that such a dangerous chemical is not treated with much greater caution by the regulatory authorities. PAN UK believes there is no justification for its continued use in the UK.

Examples of inadequate reporting limits for chlorothalonil and aldicarb

The MRL for chlorothalonil is 0.01 mg/kg for lettuce, potatoes and beans, yet in 2005 residues of chlorothalonil did not need to be reported on these crops until the levels reached 0.05 mg/kg. In 2005, the majority of the samples of lettuce, beans and potatoes were designated "chlorothalonil not found" because the levels were below the reporting limit, but could still have exceeded the legal limit.

The reporting limit for aldicarb on potatoes was 0.02 mg/kg. Using the Pesticide Safety Directorate's own model of pesticide intake, 0.02 mg/kg translates into 103% of the acute reference dose for an infant eating around 200 g of potato in one day. Levels of aldicarb less than 0.02 mg/kg do not need to be reported, which means that the 109 potato samples that were reported as having no aldicarb in 2005 could in fact have been at the safety limit for the most vulnerable consumers.

PAN UK believes that the PRC needs to reduce its reporting limits for any pesticide where they are currently greater than the MRL or greater than is necessary to ensure safe levels of consumption.

Chlorpropham, a sprout suppressant used particularly on potatoes and regularly occurring as a residue, currently has no MRL. In 2007, a MRL of 10 mg/kg is to be introduced. This MRL would mean a potential intake of about three times the acute reference dose (the safety level for a single high dose of the pesticide). According to the information given in the risk assessment for chlorpropham on potatoes in 2005, the way the intake of chlorpropham is calculated has been adjusted (probably based on industry data) and although this reduces the estimated intake, we believe it will still be 1.5 times the ARfD. This shows that even new MRLs are not necessarily set below safety limits, and also that the calculation of intakes is not particularly transparent and can be manipulated by those with a vested interest.

Imazalil, a fungicide approved in the UK for use on potatoes and cucumbers, appeared on imported pears, grapes and oranges in 2005. No risk assessment was done because it was detected at levels below the MRL and also it was deemed "not acutely toxic" so there was no acute reference dose. However, an ARfD was introduced from October 2005. This ARfD is lower than that for chlorpyrifos, endosulfan and carbendazim, pesticides that have been considered toxic for many years, suggesting it is more toxic than these. It is inexplicable how a pesticide that is classified by the World Health Organisation as 'moderately toxic' (class II) and by the US environmental protection agency as a likely carcinogen could have been considered safe enough not to warrant any risk assessment from dietary intake. The existing MRL is now inadequate and exceeds both safety levels (ADI and ARfD) for apples, pears, oranges and potatoes.

In the 4th quarter of 2005 (i.e. after the ARfD for imazalil was introduced) a risk assessment for imazalil on grapes was conducted, because the MRL was exceeded, and found that intake levels would be below the ARfD. Imazalil occurred at much higher levels on pears and oranges, but no risk assessment was conducted because the MRLs were not exceeded. Our research shows that the ARfD was exceeded in two pear samples for infants and toddlers, and for 26 orange samples, at levels up to 930% of the ARfD for infants. This was never identified by the PRC and again shows how flawed the current procedures for carrying out risk assessments are because they are so heavily weighted towards MRLs rather than safety limits.

How often are known safety levels breached?

Apart from the these 28 samples of pears and oranges with high levels of imazalil from quarter four, referred to above, two samples of pears and 31 samples of oranges from quarter two would also have exceeded the imazalil acute reference dose, had it been in force at that time.

It appears that 79% of all orange samples were contaminated with imazalil at levels above the acute reference dose. However, since the majority of this pesticide is likely to be in the peel, it may not pose as great a health risk as it would on other fruit. When the PRC conducts a risk assessment for oranges, it takes into account what it calls a “transfer factor”, which is the fraction of the total pesticide residue that is likely to be in the flesh. Since no risk assessment was carried out, we do not know what the transfer factor is for imazalil. The very high levels of imazalil detected in oranges may still exceed the ARfD even if the transfer factor is taken into account. In addition, orange peel is sometimes consumed – particularly in cooked items, like cakes, or marmalade. Orange slices complete with peel are also dropped into drinks. The levels of imazalil in oranges, and the frequency of exceeding its safety limit, should therefore be of great concern.

PAN UK believes both government and retailers need to take immediate action to reduce the amount of imazalil on oranges.

In addition to these, we found 36 other breaches of the acute reference dose during 2005, making a total of 97 (see Table 3). This is about 5.2% of the fresh produce samples – much higher than breaches of the MRL, which are typically 1 – 2%. If oranges are excluded from the data (because much of the pesticide will be in the peel and not often consumed), around 1.6% of fresh produce will still have pesticide exceeding the safety limit. Assuming this is typical, someone who eats large quantities of fruit and vegetables might expect to exceed safety limits five or six times a year. We do not think this is acceptable, particularly as we are all encouraged to increase our consumption of fresh fruit and vegetables.

What action is taken by the government when safety levels are breached?

The PRC invariably finds “no cause for concern” when acute reference doses are exceeded. These safety limit breaches are not treated with the same seriousness as breaches of the legal limits (MRLs). For MRL exceedances, retailers or suppliers are ‘named and shamed’ and are contacted by the PRC. No such action is taken for an ARfD exceedance unless it also exceeds the MRL. PAN UK has identified the retailer or supplier for the samples that exceeded ARfDs in 2005 and found that most of the major retailers – Asda, Co Op, Lidl, Marks and Spencer, Morrisons, Sainsbury, Somerfield, Tesco and Waitrose – had at least one sample out of the 97. Because of the low levels of sampling, it is not possible to determine reliably which supermarkets had the highest incidence of ARfD exceedances.

One sample of potatoes had at least *three times* the safety limit of **aldicarb** – one of the most toxic pesticides currently in use - for infants, and yet no action was taken by the PRC. There was only one case, when the pesticide **tecnazene** was found on potatoes at just below the safety limit, where the PRC took enforcement action ‘to prevent material entering the food chain and to safely dispose of contaminated potatoes’. The difference between the two is that tecnazene is banned across the EU and therefore has an MRL set at the lowest detectable level, which in this sample was exceeded. Aldicarb, however, has an essential use derogation that allows its continued use across the UK, despite being banned elsewhere in the EU, and has a very high MRL which was not exceeded in the sample. PAN UK believes that all food with residues that would exceed one of the safety limits should automatically be removed from the food chain.

How robust is the PRC’s estimate of pesticide intake?

The most commonly occurring pesticide residues are **dithiocarbamates**. These are a group of fungicides that cannot be distinguished from one another in residue analysis. The most toxic dithiocarbamate is **ziram** and therefore safety limits for dithiocarbamates are based on those for ziram. The current MRL exceeds safety limits for apples, pears, grapes, lettuce and wheat. ARfD exceedances occurred in 2005 on apples (four times), pears (five times) and lettuce (twice). No assessment of total dietary intake (i.e. from all foods consumed) of these pesticides, or of any of the others found, was carried out. The risk assessment for each sample is conducted in isolation and no account is taken of other sources of intake. PAN UK believes that the MRLs of individual foods should be set to ensure that intakes are well below

safety levels (for example, no more than half the ARfD) to ensure that total intakes from all foods are safe.

Some attention has been given to multiple residues on one sample, and an additional risk assessment is carried out if more than one pesticide on a sample has the same mode of action – e.g. carbamates and organophosphates. Again, this does not take account of the wide range of sources of pesticides in our diet and only focuses on an individual sample. PAN *UK* believes that a more realistic assessment of total intake is necessary

The PRC would probably assert that the likelihood of someone eating two different foods that both contain very high levels of residues of the same pesticide type on the same day is very small indeed. This is most likely true, but it is not impossible. In effect, we are protected by chance, rather than by a robust regulatory system.

What are the health effects of pesticides at levels greater than the acute reference dose?

The PRC rarely refer to health effects of the pesticides found in residue tests. Some well documented health impacts of the pesticides for which exceedances of the ARfD occurred are summarised in Table 4. However, there are many uncertainties about the impacts of pesticides on human health, particularly chronic illnesses, endocrine disruptors at low doses and the effect of a 'cocktail' of pesticides.

Many people believe that, in the light of these uncertainties, it is sensible to adopt a more precautionary approach to our exposure to pesticides, and try to reduce it as low as possible. On PAN *UK*'s new webpages, we give information about the foods most likely to be contaminated with pesticides, and advise that switching to organic or growing your own would help reduce pesticide intake. We also list those foods that have the fewest pesticide residues and recommend increasing consumption of these. We make it clear that it is important that everyone eats at least five portions of fruit and veg each day, but it is possible to do this without increasing pesticide intake.

PAN *UK* would also like the UK government to adopt a more precautionary approach on our behalf, by ensuring a more robust regulatory system and by developing policies that lead to a reduction in levels of pesticide in our food and our environment.

Important definitions (from PSD website)

Acceptable Daily Intake (ADI) *The acceptable daily intake is the amount of a substance which can be ingested every day of an individual's entire lifetime, in the practical certainty, on the basis of all known facts, that no harm will result. The ADI is expressed as milligrams (mg) of chemical per kg body weight of the consumer. The ADI is derived from the most appropriate No Observed Adverse Effect Level (NOAEL) by applying an assessment factor normally 100.*

ARfD Acute Reference Dose *This is intended to define (on the basis of all known facts at the time of the evaluation) an estimate of a chemical substance in food (or drinking water), expressed on a bodyweight basis, that can be ingested over a short period of time, usually during one meal or one day, without appreciable health risk to the consumer.*

MRL Maximum Residue Level *The maximum concentration of a pesticide residue (expressed as mg/kg), permitted in or on food commodities and animal feeds. MRLs are primarily a check that Good Agricultural Practice is being followed and to assist international trade in produce treated with pesticides. MRLs are not safety limits and exposure to residues in excess of an MRL does not automatically imply a hazard to health.*

Reporting Limit (RL)

The lowest calibrated level used during analysis to detect residues. The RL may vary from laboratory to laboratory depending on the equipment available and operating procedures used.

Table 1 – foods tested by PRC during 2005

Fresh fruit and veg	No of samples tested	Max no pesticides tested for	Other foods	No of samples tested	Max no pesticides tested for
Apples	119	118	Bran	72	39
Beans (green)	94	117	Bread	214	25
Broccoli	96	83	Butter	72	13
Bulb onions	48	54	Cereal based food	72	33
Carrots	144	77	Chicken	132	13
Courgettes	95	105	Cream	70	13
Cucumbers	96	111	Eggs	120	13
Exotic fruit	100	90	Fruit juice	96	111
Garlic	48	53	Infant food	156	55
Grapes	95	56	Infant formula	120	17
Lettuce	122	112	Kidney	120	13
Mango	96	77	Milk	298	13
Mushrooms	48	76	Oily fish	97	13
Oranges	72	82	Olive oils/other oils	72	59
Pears	301	76	Rice	72	25
Potatoes	143	71	Tea	96	50
Salad onions	48	53	Tinned pears	48	69
Spinach	72	105			
Swede	36	53			
Turnip	36	53			

Table 2 - Pesticide/food combinations where MRL does not appear to ensure consumption is below safety levels, either the acute reference dose (ARfD), the acceptable daily intake (ADI) or both. Based on data obtained from Pesticide Safety Directorate website (http://www.pesticides.gov.uk/psd_databases.asp). PAN's investigations included only seven foods and 36 pesticides. There may be many other instances of MRLs too high to ensure safe consumption.

Pesticides	apples		pears		grapes		lettuce		potatoes		cucumber		wheat	
	ARfD	ADI	ARfD	ADI	ARfD	ADI	ARfD	ADI	ARfD	ADI	ARfD	ADI	ARfD	ADI
aldicarb	✓		✓		✓				✓	✓				
captan ¹	✓	✓	✓	✓										
chlorothalonil	✓		✓		✓						✓			
chlorpyrifos-methyl														✓
chlorpropham									✓	✓				
deltamethrin									✓				✓	
dicofol						✓								
dimethoate														✓
diphenylamine		✓												
dithiocarbamates	✓	✓	✓	✓	✓	✓	✓							✓
imazalil	✓	✓	✓	✓					✓	✓				
iprodione		✓		✓										
maleic hydrazide										✓				
methamidaphos											✓			
methomyl							✓							
omethoate														✓
thiabendazole										✓				
tolyfluanid ¹	✓		✓				✓							
triadimenol					✓									

¹Not "EU definitive" MRL

Table 3 - Exceedances of acute reference dose – 2005

Quarter	food	pesticide	Residue level, mg/kg	Percentage of ARfD
1	lettuce	azoxystrobin	5.9	105
	lettuce	chlorothalonil	1.4	166
	lettuce	dithiocarbamates	11	490
	lettuce	dithiocarbamates	7.1	316
2	apple	carbendazim	0.6	294
	apple	dithiocarbamates	0.8	196
	apple	dithiocarbamates	0.5	123
	orange	carbofuran	0.08	118
	7 x orange	methidathion	0.08 - 0.3	106 - 398
	orange	fenthion	0.3	398
	31 x orange	imazalil	0.5 – 2.2	133 - 583
	pear	carbendazim	1.0	383
	pear	carbendazim	1.0	383
	pear	carbendazim	0.5	192
	pear	dithiocarbamates	0.8	153
	pear	imazalil	0.9	138
	pear	imazalil	0.9	138
	potato	aldicarb	0.02	146
4	apple	dithiocarbamates	0.9	220
	apple	dithiocarbamates	0.5	123
	beans	dimethoate	6.7	112
	grapes	monocrotophos	0.5	1526
	grapes	Lambda-cyhalothrin	0.2	160
	orange	methidathion	0.5	664
	orange	methidathion	0.1	133
	26 x orange	imazalil	0.4 - 3.5	106 - 928
	pear	dithiocarbamates	1.1	211
	pear	dithiocarbamates	0.6	115
	pear	dithiocarbamates	0.9	172
	pear	dithiocarbamates	0.8	153
	pear	imazalil	0.7	107
	pear	imazalil	0.7	107
	potato	aldicarb	0.06	439
	spinach	deltamethrin	0.6	170
	spinach	Lambda-cyhalothrin	0.5	190
	spinach	Lambda-cyhalothrin	0.3	110

Table 4 – health categories for those pesticides where exceedance of acute reference dose occurred during 2005. These are generally based on standard laboratory tests. There may be other health effects that are not tested, not well documented or not in the public domain.

Pesticide	Toxicity	Carcinogenicity	Endocrine disruption	EU status
Aldicarb	Extremely hazardous ¹		Potential endocrine disruptor	Banned, with essential use derogation in UK
Azoxystrobin	Not acutely toxic			
Carbendazim	Slightly toxic ²	Possible human carcinogen	Potential endocrine disruptor	
Carbofuran	Highly hazardous ¹		Potential endocrine disruptor	
Chlorothalonil	Highly toxic ²	Probably human carcinogen		
Chlorpropham	Slightly toxic ²			
Deltamethrin	Moderately hazardous ¹	Possible human carcinogen	Endocrine disruptor	
Dimethoate	Moderately hazardous ¹	Possible human carcinogen	Endocrine disruptor	
Fenthion	Moderately hazardous ¹			Severely restricted in EU
Imazalil	Moderately hazardous ¹	Likely human carcinogen		
Lambda-cyhalothrin	Moderately hazardous ¹		Suspected endocrine disruptor	
Methidathion	Highly hazardous ¹	Possible human carcinogen		Banned in EU with some essential use derogations
Monocrotophos	Highly hazardous ¹			Banned in EU
Ziram (dithiocarbamate)	Moderately toxic ²	Possible human carcinogen	Potential endocrine disruptor	

¹WHO hazard classification

²US EPA toxicity classification

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