

The List of Lists

The List of Lists - 3rd edition, 2009

A catalogue of lists of pesticides identifying those associated with particularly harmful or environmental impacts

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Introduction

Pesticides are chemicals designed to kill or control insects, weeds, diseases and other unwanted organisms. Over 800 active ingredients are sold worldwide in tens of thousands of formulations. Products are widely used in agriculture, public health, domestic and urban areas. Many pesticides have been found to be harmful to human and animal health or to the environment.

This document is a compilation of listings of those pesticides which have been identified as particularly harmful, or on which bans or restrictions have been placed, by various Governments and intergovernmental organisations. Following feedback from a variety of food sector companies, NGOs, and other stakeholders on how useful they have found the List of Lists, PAN UK is publishing this third updated edition.

Some pesticides have been identified as posing a long-term, global environmental hazard, and are banned or severely restricted by international conventions (the Stockholm POPs, LRTAP and OSPAR Conventions). International and regional bodies have classified some pesticides according to their acute toxicity, carcinogenicity, or their potential to disrupt hor-

mone systems. National concerns may lead to a government ban or restriction. For pesticides listed under the Rotterdam PIC Convention, information on such national action must be circulated; the treaty thus offers potential to prohibit imports of certain chemicals.

Final decisions about which pesticides can be used are primarily taken at country level or by a regional authority such as the European Union. The classifications included in this document are of real value for assisting authorities in developing countries to take practical actions to mitigate pesticide risks and to prioritise specific problematic pesticides for review in their regulatory procedures. Increasingly, private standard schemes in the food and fibre sectors are making use of official hazard classifications and EU and US regulatory decisions to prohibit, restrict or phase out specific hazardous pesticides in their supply chains. PAN UK welcomes these actions as a major contributor to reducing human exposure to and environmental contamination from harmful pesticides, while highlighting the need for standard schemes to support farmers to change to safer alternatives.



Pesticide Action Network UK promotes healthy food, sustainable agriculture and a safe environment without using hazardous pesticides

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Changes to the 2009 edition

The Endocrine Disrupters section now includes a list compiled by Our Stolen Future, a group of independent scientists, while the lists from OSPAR, the UK Environment Agency and the German Environment Agency have been removed for reasons explained in that section.

The explanatory notes for '*Regulating water in the EU*', '*Pesticides banned or severely restricted in the EU*', and '*Phasing out pesticides in the EU*' have been expanded. It is hoped that this will make it easier to navigate the relevant legislation. However, in the case of pesticides being phased out in the EU, the list itself is no longer included, partly for practical reasons, as it is a long and frequently changing list and partly because the legislation will be revised in 2009.

In the context of international concern about declining bee populations, a section on pesticides highly toxic to bees has been added. There are two lists in this section: one drawn up by the UK Pesticides Safety Directorate in 2008, and one compiled according to the US Environment Protection Agency criteria.

There have been several noteworthy changes in pesticides legislation since the 2005 edition, including:

- One further pesticide was added to the PIC Convention list in 2008: tributyl tin compounds, used as anti-fouling agents on boats.
- A further 57 pesticide active ingredients, and one hazardous formulation, now qualify as bans or severe restrictions in the EU, bringing the total to 110.
- Under EU water regulations, endosulfan has been upgraded to a Priority Hazardous Substance. This persistent and hazardous pesticide is the subject of a PAN International campaign for a global ban.

About PAN UK

PAN UK is an independent, non-profit organisation. We work nationally and internationally to promote healthy food, sustainable agriculture and an environment which will provide food and meet public health needs without dependence on toxic chemicals and without harm to food producers and agricultural workers.

PAN UK is a member of PAN International, a global network of over 600 organisations in over 90 countries, working to eliminate the hazards of pesticides.

Pesticides included in international conventions and the PAN Dirty Dozen

Active ingredient	PIC	POPs	LRTAP	Dirty Dozen
2,4,5-T and its salts and esters (1)	✓			✓
Aldicarb				✓
Aldrin	✓	✓	✓	✓
Binapacryl	✓			
Captafol	✓			
Chlordane	✓	✓	✓	✓
Chlordecone			✓	
Chlordimeform	✓			✓
Chlorobenzilate	✓			
DBCP				✓
DDT	✓	✓	✓	✓
Dieldrin	✓	✓	✓	✓
Dinoseb and Dinoseb salts	✓			
Ethylene dibromide (EDB, 1,2-Dibromoethane)	✓			✓
DNOC and its salts (ammonium salt, potassium salt and sodium salt)	✓			
Endrin		✓	✓	✓
Ethylene dichloride	✓			
Ethylene oxide	✓			
Fluoroacetamide	✓			
HCH, mixed isomers	✓		✓(2)	✓
Heptachlor	✓	✓	✓(2)	✓
Hexachlorobenzene	✓	✓	✓	
Lindane	✓		✓	✓
Mercury compounds, including inorganic mercury compounds, alkyl mercury compounds and alkyloxyalkyl and aryl mercury compounds	✓			
Methyl bromide (3)	-	-	-	-
Mirex		✓	✓	
Monocrotophos	✓			
Paraquat				✓
Parathion	✓			✓
Pentachlorophenol and its salts and esters	✓			✓
Toxaphene (camphechlor)	✓	✓	✓	✓
Tributyltin (TBT)	✓			

The following severely hazardous formulations are in PIC

Dustable powder formulations containing a combination of: benomyl at or above 7 per cent, carbofuran at above 10 per cent, thiram at or above 15 per cent	✓			
Methamidophos 600 g/l (SL) formulation and higher	✓			
Phosphamidon 1000 g/l (SL) formulation and higher	✓			
Methyl parathion emulsifiable concentrates (EC) with 19.5%, 50%, 50%, 60% active ingredients and dusts containing 1.5%, 2% and 3% active ingredient)	✓			✓

Notes

(1) 2,4,5-T itself is not listed under the POPs treaty, but it is often contaminated with dioxin, which is a POP chemical.

(2) HCH and lindane are counted as one chemical under LRTAP

(3) Methyl Bromide is an ozone-depleting pesticide gas covered by the Montreal Protocol on ozone-depleting substances, which requires industrialised countries to phase out its use by 2005, with a period of grace for developing countries to 2015. The pesticide is still widely used as a fumigant and soil sterilant. The protocol includes a temporary exemption procedure for countries to apply for crop-specific 'Critical Uses' if they can show that no alternatives are economically feasible. Only the EU has committed fully to eliminating methyl bromide, with all EU Critical Uses eliminated from 2009. The US, Japan, Israel, Canada and Australia continue to use over 6 million kg under Critical Use exemptions.

The Rotterdam Convention on Prior Informed Consent (PIC)

This convention entered into legal force in February 2004. PIC is an early warning system about all bans and severe restrictions on pesticides. Pesticides that have been banned by two countries in two regions of the world, under criteria in the Convention, are entered on a PIC List, and importing countries must indicate whether they allow or prohibit import. Exporting countries must ensure compliance. It currently includes 40 chemicals: 29 pesticides, including four severely hazardous pesticide formulations, and 11 industrial chemicals.

There is an ongoing review process. Tributyltin (TBT) was added to the PIC list in 2008. Endosulfan has been recommended for PIC status by the Chemical Review Committee (CRC). Alachlor and Aldicarb are to be reviewed at the 5th PIC meeting, scheduled for 2011. Azinphos-methyl, paraquat, methyl-parathion, mirex, phorate, hexachlorobenzene and hexachlorobutadiene were all in the early stages of review at the time of writing.

Source: *Annex III of Rotterdam Convention + later inclusions*, <http://www.pic.int/>

The Stockholm Convention on Persistent Organic Pollutants (POPs)

This convention entered into legal force in May 2004. It currently covers 12 chemicals, including eight pesticides and others contaminated with dioxin. Governments will take measures to eliminate or reduce release into the environment of intentionally produced POPs. It aims ultimately to eliminate releases of unintentionally produced POPs such as dioxins and furans. Seven pesticides are scheduled for elimination with a phase out period for DDT (allowed use: indoor control of malaria vectors). Many POPs remain in stockpiles and require safe disposal.

There is an ongoing review process. The Review Committee (POPRC) has recommended the following pesticides for inclusion: Chlordecone, Lindane, Alpha hexachlorocyclohexane and Beta hexachlorocyclohexane. Endosulfan passed the screening stage in 2008 and entered the next phase: drawing up a risk profile.

Source: *Annex A, B and C of Stockholm Convention*, <http://www.pops.int/>

WWF has identified an additional 20 chemicals to be added to the convention, of which seven are pesticides (some of which are now under review): chlordecone, hexachlorocyclohexane (HCH)/lindane, pentachlorophenol, endosulfan, hexachlorobutadiene, dicofol, methoxychlor.

Source: *Stockholm Convention: "New POPs" Screening Additional POPs candidates, WWF, April 2005*, [http://www.worldwildlife.org/toxics/pubs/New POPs FIN AL.pdf](http://www.worldwildlife.org/toxics/pubs/New_POPs_FIN_AL.pdf)

The Convention on Long-range Transboundary Air Pollution (LRTAP)

This convention of the UN Economic Commission for Europe covers chemicals that travel long distances. A 1998 Protocol formed the basis of the Stockholm Convention. Of 45 countries in the region, 23 have ratified. LRTAP covers 11 pesticides (counting HCH and lindane as one), two industrial chemicals and three by-products or contaminants.

Source: *Annex 1 of Convention on Long-range Transboundary Air Pollution*, <http://unece.org/env/lrtap/>

The PAN Dirty Dozen

The PAN 'Dirty Dozen' (in fact 18 pesticides) was the first PAN global awareness campaign, launched on World Environment Day in 1985. These particularly hazardous pesticides, all once in widespread use, were identified as exemplifying the full spectrum of serious pesticide concerns (persistence, acute toxicity, carcinogenicity etc). Most of the Dirty Dozen are now included in the PIC and/or POPs conventions. Three pesticides, aldicarb, DBCP and paraquat, are not yet subject to international regulation.

World Health Organisation classifications

The WHO classification measures mammalian acute toxicity, that is, the risk to health of single or multiple exposures over a relatively short period of time¹. Acute toxicity is measured through LD₅₀ tests on mammals (see box for explanation). Tests are carried out only on individual active ingredients, not on the final pesticide products: the toxicity of the product may vary, depending on the formulation. Some countries have their own system of hazard classification for products, e.g. the US EPA.

The FAO recommends in its Pesticide Code of Conduct that WHO Ia and Ib pesticides should not be used in developing countries, and if possible class II should also be avoided. In recent years, several private voluntary standards in the food retail sector, including Fair Trade and Rainforest Alliance, have decided to prohibit or phase out the use of WHO Class I pesticides. Some supermarket companies have also included WHO acute toxicity rank as one of their criteria for prohibiting or restricting the use of particular hazardous pesticides by growers in their supply chains.

Source: *The WHO recommended classification of pesticides by hazard and guidelines to classification 2004, corrigenda published by 12 April 2005 incorporated, corrigenda published on 28 June 2006 incorporated:*
http://www.who.int/ipcs/publications/pesticides_hazard_rev_3.pdf

Food and Agriculture Organisation of the United Nations (FAO) *International Code of Conduct on the Distribution and Use of Pesticides (2003)*
http://www.fao.org/ag/AGP/AGPP/Pesticid/Code/PM_Code.htm

PAN UK Food & Fairness case study 'Reducing hazardous pesticide practice in coffee supply chains', July 2008, gives details of pesticide prohibitions in six private standards <http://www.pan-uk.org/Projects/Fairness/documents.html>.

WHO Classifications

Class	LD ₅₀ for the rat (mg/kg body weight)			
	Solids (Oral)	Liquids (Oral)	Solids (Dermal)	Liquids (Dermal)
Ia Extremely hazardous	5 or less	20 or less	10 or less	40 or less
Ib Highly hazardous	5-50	20-200	10-100	40-400
II Moderately hazardous	50-500	200-2000	100-1000	400-4000
III Slightly hazardous	500-2000	2000-3000	1000-4000	4000-6000
U	Over 2000	Over 3000	Over 4000	Over 6000
O	Active ingredients believed to be obsolete or discontinued for use as pesticides			

*The terms 'solid' and 'liquids' refer to the physical state of the active ingredient.
The LD₅₀ value is a statistical estimate of the number of mg of toxicant per kg of bodyweight required to kill 50% of a large population of test animals.*

¹The WHO does not specify a time period; the PAN North America pesticides database gives the time period as 0 – 7 days

WHO Ia - Extremely Hazardous

Aldicarb	Chlormephos	Ethoprophos	Parathion methyl	Sulfotep	<i>Classified as obsolete since the November 2001 edition of the List of Lists:</i>
Brodifacoum	Chlorophacinone	Flocoumafen	Phenylmercury acetate	Tebupirimfos	
Bromadiolone	Difenacoum	Hexachloro-benzene	Phorate	Terbufos	
Bromethalin	Difethialone	Mercuric chloride	Phosphamidon (all isomers)		
Calcium cyanide	Diphacinone	Mevinphos	Sodium fluoroacetate	Fonofos	
Captafol	Disulfoton	Parathion			
Chlorethoxyfos	EPN				

WHO Ib - Highly Hazardous

3-chloro-1,2-propanediol	Coumaphos	Flucythrinate	Methomyl	Strychnine	<i>Classified as obsolete since the November 2001 edition of the List of Lists:</i>	
Acrolein	Coumatetralyl	Fluoroacetamide	Monocrotophos	Tefluthrin		
Allyl alcohol	Demeton-s-methyl	Formetanate	Nicotine	Thallium sulfate		
Azinphos ethyl	Dichlorvos	Furathiocarb	Omethoate	Thiofanox		
Azinphos methyl	Dicrotophos	Heptenophos	Oxamyl	Thiometon		
Blasticidin-S	Dinoterb	Isoxathion	Oxydemeton methyl	Triazophos		Isazofos
Butocarboxim	DNOC and its salts	Lead arsenate	Paris green	Vamidothion		Isofenphos
Butoxycarboxim	Edifenphos	Mecarbam	Pentachlorophenol	Warfarin		Pindone
Cadusafos	Ethiofencarb	Mercuric oxide	Propetamphos	Zeta cypermethrin		Pirimiphos ethyl
Calcium arsenate	Famphur	Methamidophos	Sodium arsenite	Zinc phosphide		Propaphos
Carbofuran	Fenamiphos	Methidathion	Sodium cyanide			
Chlorfenvinphos		Methiocarb				

WHO II - Moderately Hazardous

2,4-D	Chlorphonium chloride	Fenitrothion	Mercurous chloride	Prosulfocarb	<i>Classified as obsolete since the November 2001 edition of the List of Lists:</i>	
Alanycarb	Chlorpyrifos	Fenobucarb	Metaldehyde	Prothiofos		
Alpha cypermethrin	Clomazone	Fenpropathrin	Metam-sodium	Pyraclofos		
Anilofos	Copper sulfate	Fenpropidin	Methacrifos	Pyrazophos		
Azaconazole	Cuprous oxide	Fenthion	Methasulfocarb	Pyrethrins		
Azocyclotin	Cyanazine	Fentin acetate	Methyl isothiocyanate	Pyroquilon		Etrimfos
Bendiocarb	Cyanophos	Fentin hydroxide	Metolcarb	Quinalphos		Formothion
Benfuracarb	Cyfluthrin	Fenvalerate	Metribuzin	Quizalofop-p-tefuryl		Heptachlor
Bensulide (SAP)	Cyhalothrin	Fipronil	Molinate	Rotenone		Sodium fluoride
Beta cyfluthrin	Cypermethrin	Fluxofenim	Nabam	Spiroxamine		Sodium hexafluorosilicate
Bifenthrin	Cyphenothrin [(1R)isomers]	Fuberidazole	Naled	TCA acid	Sulprofos	
Bilanafos	DDT	Gamma-HCH (lindane)	Paraquat	Terbumeton	Vernolate	
Bioallethrin	Deltamethrin	Guazatine	Pebulate	Tetraconazole		
Bromoxynil	Diazinon	Haloxypop	Permethrin	Thiacloprid		
Bromuconazole	Difenzoquat	HCH	Phenthoate	Thiobencarb		
Bronopol	Dimethoate	Imazalil	Phosalone	Thiocyclam		
Butamifos	Dinobuton	Imidacloprid	Phosmet	Thiodicarb		
Butylamine	Diquat	Iminoctadine	Phoxim	Tralomethrin		
Carbaryl	Endosulfan	Ioxynil	Piperophos	Triazamate		
Carbosulfan	Endothal sodium	Ioxynil octanoate	Pirimicarb	Trichlorfon		
Cartap	EPTC	Isoprocarb	Prallethrin	Tricyclazole		
Chloralose	Esfenvalerate	Lambda cyhalothrin	Profenofos	Tridemorph		
Chlordane	Ethion	Lindane	Propiconazole	Xylylcarb		
Chlorfenapyr	Fenazaquin		Propoxur			

Gaseous or volatile fumigants

1,2-Dibromoethane	Hydrogen cyanide
1,3-Dichloropropene	Magnesium phosphide
Aluminium phosphide	Methyl bromide
Chloropicrin	Phosphine
Ethylene dichloride	Sulfuryl fluoride
Ethylene oxide	
Formaldehyde	

The WHO classification does not set out any criteria for air concentrations on which classification could be based. Most of these compounds are of high hazard and recommended exposure limits for occupational exposure have been adopted by national authorities in many countries.

Organophosphate pesticides

Organophosphates (OPs) are among the most widely used insecticides in the world, and many do not appear on restricted lists. They are among the most acutely toxic of all pesticides to vertebrate animals and humans as well as insect pests. OPs act as 'cholinesterase inhibitors': they deactivate an enzyme called Cholinesterase which is essential for healthy nerve function. OPs are used in both professional and amateur products. They are common in veterinary medicines such as sheep dips as well as agricultural products.

They are regularly detected as residues in food items such as fruit and vegetables, and may occur above the safety level known as the Acute Reference Dose, a measure of the highest dose which can be safely consumed at one sitting. In 1993 the US National Research Council expressed concern over potential medium or long-term damage to brain function from children's exposure to very low levels of organophosphate and other neurotoxic pesticides found on a routine level in foodstuffs. This was instrumental in the US setting its Food Quality Protection Act of 1996, requiring much stricter residue levels for organophosphate and carbamate pesticides to be set to protect children.

Active Ingredient	WHO Class	Active Ingredient	WHO Class	Active Ingredient	WHO Class
Acephate	III	EPN	Ia	Parathion methyl	Ia
Anilofos	II	Ethion	II	Phenthoate	II
Azamethiphos	III	Ethoprophos	Ia	Phorate	Ia
Azinphos ethyl	Ib	Famphur	Ib	Phosalone	II
Azinphos methyl	Ib	Fenamiphos	Ib	Phosmet	II
Butamifos	II	Fenitrothion	II	Phosphamidon	Ia
Cadusafos	Ib	Fenthion	II	Phoxim	II
Chlorethoxyfos	Ia	Fosamine	U	Piperophos	II
Chlorfenvinphos	Ib	Fosthiazate	--	Pirimiphos methyl	III
Chlormephos	Ia	Heptenophos	Ib	Profenofos	II
Chlorpyrifos	II	Isopropyl O-(methoxyamino thiophosphoryl) salicylate		Propetamphos	Ib
Chlorpyrifos methyl	U	Isoxathion	Ib	Prothiofos	II
CI 26691	--	Malathion	III	Pyraclufos	II
Coumaphos	Ib	Mecarbam	Ib	Pyridaphenthion	III
Cyanophos	II	Methacrifos	II	Quinalphos	II
Cythioate	--	Methamidophos	Ib	Sulfotep	Ia
Demeton-s-methyl	Ib	Methidathion	Ib	Tebupirimfos	Ia
Diazinon	II	Mevinphos	Ia	Temephos	U
Dichlorvos	Ib	Monocrotophos	Ib	Terbufos	Ia
Dicrotophos	Ib	Naled	II	Tetrachlorvinphos	U
Dimethoate	II	Omethoate	Ib	Thiometon	Ib
Dimethylvinphos	--	Oxydemeton methyl	Ib	Triazophos	Ib
Disulfoton	Ia	Parathion	Ia	Trichlorfon	II
Edifenphos	Ib			Vamidothion	Ib
Obsolete					
Bromophos	O	Dimefox	O	Isofenphos	O
Bromophos ethyl	O	Dioxabenzophos (Salithion)	O	Isothioate	O
Carbophenothion	O	Dioxathion	O	Leptophos	O
Chlorphoxim	O	Ditalimfos	O	Menazon	O
Chlorthiophos	O	Endothion	O	Mephosfolan	O
Crotoxyphos	O	ESP	O	Phosfolan	O
Crufomate	O	Etrimfos	O	Pirimiphos ethyl	O
Cyanofenphos	O	Fenchlorphos	O	Propaphos	O
Demephion-O	O	Fensulfothion	O	Prothoate	O
Demephion-S	O	Fonofos	O	Schradan	O
Demeton-O	O	Formothion	O	Sulprofos	O
Demeton-S	O	Fosmethilan	O	TEPP	O
Demeton-S methylsulphon	O	Fosthietan	O	Thionazin	O
Dialifos	O	Iodofenphos (Jodfenphos)	O	Trichloronat	O
Dichlofenthion	O	Isazofos	O		

This list is taken from the PAN active ingredient database and referenced against WHO classification of active pesticide ingredients (see page 3).

Pesticides which cause cancer

This list cites potential pesticide carcinogens from the International Agency for Research on Cancer (IARC), US Environmental Protection Agency (EPA) and the European Union (EU) found in public documents.

In 1993, Pesticides News listed 70 possible carcinogens – now the list has grown to over 240. Many of the pesticides included are obsolete chemicals but may be found in stockpiles. Other pesticides are still in use, especially those cited by the US EPA. For some pesticides, like DDT, there is agreement about carcinogenic potential, but with many others authorities do not have similar positions.

The information supplied is taken from a range of sources, and it has not been easy to locate the relevant information. Indeed there are some inconsistencies and inaccuracies between and within the source documents. We invite comment, and hope that this information helps to stimulate international debate on how regulators deal with potentially carcinogenic pesticides.

Active Ingredient	US EPA	EU	IARC	Active Ingredient	US EPA	EU	IARC
2,4,5-T(2,4,5 Trichlorophen oxyacetic acid)			2B	Chlorzolinate		3	
Acephate	C			Cinidon-ethyl		3	
Acetaldehyde	B2*		2B	Clodinafop-propargyl	SECP		
Acetamide	C*	3	2B	Clofencet (MON 21200)	C		
Acetochlor	SECP			Clofentezine	C		
Acifluorfen, sodium salt	2,4			Cocamide diethanolamine	2		
Acrolein	C*		3	Coumarin			3
Acrylonitrile	B1	2	2B	Cumyluron	3		
Alachlor	L2	3		Creosote	B1*	2	2A
Aldicarb			3	Cyanazine	C		
Aldrin	B2	3	3	Cypermethrin (and zeta cypermethrin)	C		
Amitraz	SECP			Cyproconazole (SAN 619F)	3		
Amitrole	B2*	3	3	Dacthal (DOPA; Chlorthal-dimethyl)	C		
Aniline	B2*	3	3	Daminozide	B2		
Aramite	B2*		2B	DDT	B2*	3	2B
Asulam	C			Deltamethrin			3
Atrazine			3	Di(2-ethylhexyl) phthalate	B2*		3
Azobenzene	B2*	2	3	Di-allate		3	3
Benfluralin	3			Dibromochloropropane(DBCP)	B2	2	2B
Benomyl	C			Dichlobenil	C		
Benthiavalicarb-isopropyl	LCH			Dichloroethane, 1,2-	B2	2	2B
Benzyl-4-chlorophenol, 2-	C			Dichloromethane (methylene chloride)	B2*	3	2B
Bifenthrin	C			Dichloropropene, 1,3- (Telone)	B2		2B
Bioallethrin	3			Dichlorvos	3		2B
Bis(chloroethyl)ether (BCEE)	B2*			Diclofop-methyl	L1		
Boscalid (Nicobifen)	SECP, IIACP			Dicofol	C		3
Bromacil	C			Dicrotophos	3		
Bromoxynil	C			Dieldrin	B2*	3	3
Buprofezin	3			Difenoconazole	C		
Butachlor	A*			Dimethenamid	C		
Cacodylic acid	B2		1	Dimethipin	C		
Captafol	B2	2	2A	Dimethoate	C		
Captan	b	3	3	Dimethoxane	3		3
Carbaryl	2	3	3	Dinoseb	C		
Carbendazim	C			Dithianon	SECP		
Carbon tetrachloride	B2*	3	2B	Diuron	Known	3	
Chlordane	B2*	3	2B	Endrin			3
Chlordecone		3	2B	Epichlorohydrin	B2*	2	2A
Chlordimeform (and its HCl)	B2	3	3	Epoxiconazole	2	3	
Chlorfenapyr	3			Esbiothrin (S-Bioallethrin)	3		
Chloroaniline, p- (4-chloroaniline)	B2		2B	Ethaboxam	SECP		
Chloroform	B2*	3	2B	Ethalfuralin	C		
Chloroprotham		3	3	Ethofenprox	4		
Chlorothalonil	B2	3	2B	Ethoprop (ethoprophos)	L1		
Chlortoluron		3					

Active Ingredient	US EPA	EU	IARC
Ethylene dibromide (1,2-dibromoethane)	B2*	2	2A
Ethylene dichloride (1,2-dichloroethane)	B2		2B
Ethylene oxide		2	1
Etridiazole (terrazole)	B2	3	
Fenbuconazole	C		
Fenoxycarb	L1		
Fentin acetate		3	
Fentin hydroxide (triphenyltin hydroxide)	B2	3	
Fenvalerate			3
Ferbam	2		3
Fipronil	C		
Flonicamid	SECP, IIACP		
Fluazinam	3		
Fluometuron	C		3
Flusilazole		3	
Fluthiacet-methyl	L1		
Folpet	B2	3	
Forchlorfenuron		3	
Formaldehyde	B1	3	1
Furfural (2-furaldehyde)		3	3
Furilazole (MON 13900)	L1		
Furmecyclox	B2	3	
Haloxyp-methyl	B2		
Heptachlor	B2*	3	2B
Hexachlorobenzene	B2*	2	2B
Hexachlorocyclohexane	B2*		2B
Hexaconazole	C		
Hexythiazox	C		
Hydramethylnon	C		
Hydrogen cyanamide	C		
Imazalil	L1		
Iodomethane		3	3
Iprodione	L1	3	
Iprovalicarb	2*		
Isophorone	C*	3	
Isoproturon		3	
Isoxaben	C		
Isoxaflutole	L1		
Kresoxim-methyl	L1	3	
Lactofen	2,4		
Lindane (Hexachloro cyclohexane)	3		2B
Linuron	C	3	
Malathion	3		3
Maleic hydrazide			3
Mancozeb	B2		
Maneb	B2		3
Mecroprop-p	3		2B
Mepanipyrim	2	3	
Mercaptobenzothiazole, 2-	C		
Metaaldehyde	SECP		
Metam sodium and its dihydrate	B2		
Methidathion	C		
Methoxychlor			3
Methyl bromide			3
Methyl isothiocyanate	B2		
Methylene (bis)thiocyanate	B2		

Active Ingredient	US EPA	EU	IARC
Methylphenol, 3-(meta-cresol)	C*		
Metiram	B2		
Metofluthrin	c		
Metolachlor	C		
Metrafenone	SECP		
MGK repellent 326	B2		
Mirex		3	2B
Molinate	3	3	
MON 4660	L1		
Monuron		3	3
Monuron-TCA		3	
Naphthalene		2	2B
Nitrapyrin	2		
Nitrofen		2	2B
Norflurazon	C		
Orthophenylphenol - Na salt			2B
Orthosulfamuron	SECP		
Oryzalin	2		
Oxadiazon	C		
Oxadixyl	C		
Oxyfluorfen	C		
Oxythioquinox	B2		
Paradichlorobenzene (p-Dichlorobenzene)	d	3	2B
Parathion (ethyl parathion)	C		3
Parathion methyl (methyl parathion)			3
Pendimethalin	C		
Penoxsulam	SECP, IIACP		
Pentachloronitrobenzene (quintozene, PCNB)	C		3
Pentachlorophenol	B2	3	2B
Permethrin	2		3
Phosmet	3		
Phosphamidon	C		
Pinoxaden	e		
Pirimicarb	LCH		
Polyhexamethylenebiguanide (PHMB)	3		
Prochloraz	C		
Procymidone	B2		
Prodiamine	C		
Pronamide (Propyzamide)	B2	3	
Profoxydim		3	
Propachlor	L1		
Propanil	3		
Propargite	B2	3	
Propazine		3	
Propham			3
Propiconazole	C		
Propoxur	B2		
Propylene oxide	B2	2	2B
Prosulfuron	e		
Pymetrozine	L1	3	
Pyraflufen-Ethyl	2		
Pyrasulfatole	3		
Pyrimethanil	C		
Pyriothiobac-sodium	C		
Resmethrin	LCH		
Simazine		3	3

Active Ingredient	US EPA	EU	IARC
S-Metolachlor	C		
Spirodiclofen	LCH		
Sulfallate		2	2B
Sulfosulfuron	L1		
TCMTB (Busan 72)	C		
Tebuconazole	C		
Tebufenpyrad	3		
Tembotrione	3		
Tepraloxymid	d	3	
Terbutryn	C		
Tetrachloroethane, 1,1,2,2-	C*		3
Tetrachlorvinphos	2		3
Tetraconazole	2		
Tetramethrin	C		
Thiabendazole	2,4		
Thiacloprid	2		
Thiazopyr	C		
Thiodicarb	D		
Thiopianate-methyl	2		
Thiourea		3	3
Thiram			3
Tolyfluanid	2		
Topramezone	a		
Toxaphene (campheclor)	B2		2B
Tralkoxydim	SECP, IACP		
Triadimefon	C		
Triadimenol	C		
Triallate	C		
Tribenuron methyl	C		
Tribufos (DEF)	L2		
Trichlorfon	L2		3
Trichlorophenol, 2,4,6-	B2	3	2B
Tridiphane	C		

Active Ingredient	US EPA	EU	IARC
Trifluralin	C		3
Triflusulfuron-methyl	C		
Triforine	SECP, IACP		
Trimethylaniline 2,4,5- (Silvex; 2,4,5-TP; Fenoprop)	D		2B
Uniconazole	C		
Vinclozolin	C	3	
Zineb			3
Ziram	2,3		3

Breakdown products (B), impurities (I), solvents (So) and synergists (Sy)

	US EPA	EU	IARC
<i>Benzene (I,So)</i>	1	1	1
<i>DDE (B)</i>	B2*		
<i>Dichloroethylene, 1,1- (I)</i>	C		
<i>Ethylene thiourea - ETU (B,I)</i>	B2		3
<i>Heptachlor epoxide (B)</i>	B2	3	
<i>Hexachloroethane (So)</i>	C		2B
<i>MGK-264 (Sy)</i>	C		
<i>Piperonyl butoxide (Sy)</i>	C		3
<i>Trichloroethane, 1,1,2- (So)</i>	C		3
<i>UDMH (I,B)</i>	B2	2	2B

Pesticide groups	US EPA	EU	IARC
Anthracene oils		2	3
Arsenic and its compounds (herbicides and wood preservatives)	A	1	1
Cadmium and its compounds (fungicides)	B1	2,3	1
Chlorophenoxy herbicides			2B
Chromium VI compounds (Hexavalent Chromium (CrVI))1 (insecticides, fungicides and wood preservatives)			1
Hexachlorocyclohexanes (insecticides)	B2		2B
Methylmercury compounds (fungicides)			2B
Nickel and its compounds (fungicides)			1
Paraffin oil & waxes	2		
Petroleum oils	1,2		
Phenols	2		
Pyrethrins	f		

Definitions of cancer categories

US Environmental Protection Agency

The US EPA has changed its classification systems in recent years. Some categories have similar definitions:

1986 classifications

Group A - Human Carcinogen

Group B - Probable Human Carcinogen: B1 indicates limited human evidence; B2 indicates sufficient evidence in animals and inadequate or no evidence in humans.

Group C - Possible Human Carcinogen:

Group D - Not classifiable as to human carcinogenicity

1996 classification

Known/Likely available tumour effects and other key data are adequate to demonstrate convincingly a carcinogenic potential for humans.

L1 = Likely to be carcinogenic to humans, available tumour effects and other key data are adequate to demonstrate carcinogenic potential for humans.

L2 = Likely at high doses but Not Likely at low doses

1999 classification

1 = Carcinogenic to humans

2 = Likely to be carcinogenic to humans

3 = Suggestive evidence of carcinogenicity, but not sufficient to assess human carcinogenic potential

4 = Not likely to be carcinogenic to humans - evidence that carcinogenic effects are not anticipated below a defined dose range.

2005 classification

Carcinogenic to Humans

Likely to be Carcinogenic to Humans [denoted as LCH in this table]

Suggestive Evidence of Carcinogenic Potential [denoted as SECP in this table]

Inadequate Information to Assess Carcinogenic Potential [denoted as IIACP in this table]

Not Likely to be Carcinogenic to Humans

Additional, detailed classifications that do not fall into the above are noted in the table by letters a-f.

Notes on additional US EPA classifications from 2007 list

* means active ingredient not included on latest US EPA list of 2007

a. Not likely to be Carcinogenic to Humans at doses that do not alter rat thyroid hormone homeostasis

b. Likely at prolonged, high-level exposure, but not likely at dose levels that do not cause cytotoxicity and regenerative cell hyperplasia

c. Not Likely to be Carcinogenic to Humans at doses that do not result in a mitogenic response

d. Not likely at doses that don't perturb homeostasis of liver cell proliferation

e. Data are inadequate

f. Not Likely to be Carcinogenic to Humans at doses that do not cause mitogenic response in the liver cell proliferation

SOURCE:

Office of Pesticide Programs List of Chemicals Evaluated for Carcinogenic Potential, US EPA, [see details at www.epa.gov/pesticides/carlist/ although list not available on website], July of 2004. [details of latest list updated October 2008 via

<http://www.epa.gov/opp00001/carlist/>

The webpage at

<http://www.epa.gov/pesticides/health/cancerfs.htm#terms> discusses how US EPA reviews pesticides for potential carcinogenicity and explains the Agency's guidelines for evaluating a chemical's potential carcinogenicity.

European Union

There is no single EU list available denoting carcinogenic pesticides. EC Directive 67/548 and subsequent amendments provide the classification of dangerous substances, including pesticides. The cancer classifications are:

Category 2 (denoted as R45 on the pesticide label) = May Cause Cancer

Category 3 (denoted as R40 on label) = Possible Risk of Irreversible Effects (Cancer, as cited in table)

SOURCE: Commission Directive 2008/58/EC of 21 August 2008 adapting to technical progress for the 30th time Council Directive 67/548/EEC on the approximation of the laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances.. Available at http://ecb.jrc.ec.europa.eu/documents/Classification-Labeling/DIRECTIVE_67-548-EEC/ATPS_OF_DIRECTIVE_67-548-EEC/30th_ATP.pdf

International Agency for Research on Cancer

Group 1 = Carcinogenic to humans

Group 2A = Probably carcinogenic to humans.

Group 2B = Possibly carcinogenic to humans.

Group 3 = Not classifiable as to carcinogenicity in humans.

Group 4 = Probably not carcinogenic to humans

SOURCE: Overall Evaluations of Carcinogenicity to Humans. As evaluated in IARC Monographs Volumes 1-99 (a total of 935 agents, mixtures and exposures) Last update July 2004. Website lists by classification and alphabetical order their classifications of Carcinogenic Pesticides, available at <http://monographs.iarc.fr/ENG/Classification/index.php>

Endocrine disrupting pesticides

Some pesticides are suspected of being endocrine (hormone) disruptors. These chemicals affect parts of the body's hormone systems and can lead to an increase in birth defects, sexual abnormalities and reproductive failure, and may increase the risk of cancers of reproductive organs. As yet, there are still many aspects of these substances that we do not understand. Regulators cannot even agree on what is, and what is not, an endocrine disrupting chemical (EDC) and from the lists cited below there are few pesticides that all the authorities agree on as an EDC. The nearest they come to it is with DDT, atrazine, lindane and tributyltin.

In May 2005 international experts and scientists from different disciplines convened in Prague to discuss European research on EDCs, known as the cluster for research on endocrine disruptors (CREDO). The results, summarised in the Prague Declaration on Endocrine Disruption, reinforced concerns over the long-term consequences of exposure in humans and wildlife.

<http://www.ehponline.org/docs/2007/10517/suppl.pdf>

Active ingredient	EU	OSF	WWF
2,4-D	2		✓
2,4-DB	1		
2,4,5-T	1 or 2		
Acephate	2		
Acetochlor	1	✓	✓
Alachlor	1	✓	✓
Aldicarb	2		✓
Aldrin	2	✓	✓
Amitrol	1	✓	✓
Atrazine	1	✓	✓
Beta-HCH	1		✓
Bifenthrin	1	✓	✓
Bioallethrin	2		
Boric acid ^a	1		
Bromoxynil	2		✓
Carbaryl	1	✓	✓
Carbendazim	2		
Carbofuran	2		✓
Carbon disulphide	2		
Chlordane	1	✓	✓
Chlordecone	1	✓	✓
Chlordimeform	1		
Chlorfenvinphos	2		
Cyanazine	2		✓
DDT	1	✓	✓
Delta HCH	2		
Deltamethrin	1		✓
Diazinon	2		
Dibromochloropropane ¹ or 2 (DBCP)			✓
Dicofol	2	✓	✓
Dieldrin	2	✓	✓
Dimethoate	2		✓
Diuron	2		
Endosulfan	2	✓	✓
Endrin	2		✓
Epichlorohydrin	1		
Ethylene dibromide (EDB; 1,2- dibromoethane)	1		
Ethylene thiourea (ETU)		1	
Etridiazole	2		✓

Active ingredient	EU	OSF	WWF
Fenarimol	1	✓	✓
Fentin acetate	2		
Fenitrothion	1	✓	✓
Fenothrin	2		
Fenoxycarb	2		
Fenvalerate	2		✓
Fluvalinate	2		
HCB	1		
HCH (mixed)	1		
Heptachlor	2	✓	
Ioxynil	1		
Iprodione	2	✓	
Ketoconazole	1		
Lambda cyhalothrin	1		✓
Lindane	1	✓	✓
Linuron	1	✓	
Malathion	2	✓	✓
Mancozeb	1	✓	✓
Maneb	1	✓	✓
Metam sodium	1		
Methomyl	2	✓	✓
Methoxychlor	1	✓	✓
Methyl bromide	2		
Metiram	1		✓
Metribuzin	1		✓
Mevinphos	2		
Mirex	1	✓	✓
Nitrofen	1	✓	✓
Omethoate ^a	1		
Oxychlordane	2	✓	✓
Parathion ethyl	2		✓
Parathion methyl	2	✓	
Pentachlorophenol	1		✓
Permethrin	2	✓	✓
Phenthoate	2		
phenylphenol, 2-; o-phenylphenol	2		
Phosphamidon	2		✓
Photomirex	2		✓
Picloram	1		✓
Piperonyl butoxide	2		
Prochloraz	2		

Active ingredient	EU	OSF	WWF
Procymidone	1		
Prometryn	2		
Propanil	2		
Pyrethrin ^a	2		✓
Quinalphos	1		
Resmethrin	1		
Simazine	2		✓
Tebutryn	1		✓
Tetrabutyltin (TTBT)	1		
Thiram	1	✓	
Toxaphene	1		✓
Triadimefon	2	✓	✓
Triadimenol	2	✓	
Tributyltin compounds	1	✓	✓
Trichlorfon	2		
Trifluralin	1	✓	✓
Triphenyltin	✓		
Vinclozolin	1	✓	✓
Zeta cypermethrin	2	✓	
Zineb	1	✓	✓
Ziram	2	✓	✓

Notes:

a added to EU list since 2005

b changed classification since 2005

EU

Category 1. At least one study providing evidence of endocrine disruption in an intact organism. Not a formal weight of evidence approach.

Category 2. Potential for endocrine disruption. In vitro data indicating potential for endocrine disruption in intact organisms. Also includes effects in-vivo that may, or may not, be ED-mediated. May include structural analyses and metabolic considerations.

Source: Brussels, 30.11.2007 SEC(2007) 1635 COMMISSION STAFF WORKING DOCUMENT on the implementation of the "Community Strategy for Endocrine Disruptors" - a range of substances suspected of interfering with the hormone systems of humans and wildlife (COM (1999) 706), (COM (2001) 262) and (SEC (2004) 1372).

WWF list of pesticides reported to have reproductive and/or endocrine disrupting effects. Pesticides are only included in the table if the EU has also listed them as potential EDCs. WWF's complete list of suspected ED pesticides is given below the table.

The WWF list was originally published in: Colborn T, vom Saal FS, and Soto AM, Developmental Effects of Endocrine-Disrupting Chemicals In Wildlife and Humans. Environmental Health Perspectives 101(5): 378-384. 1993.

<http://www.ehponline.org/members/1993/101-5/colborn-full.html>

A more detailed version of the list is available at

<http://www.pan-uk.org/pestnews/Actives/endocrin.htm>

Our Stolen Future is a book published in 1997 by three authors, Dr Theo Colborn, Dianne Dumanoski and Dr John Peterson Myers, which documents research into chemicals which interfere with hormones. The authors have also set up a website, www.ourstolenfuture.org which is regularly updated with developments in research and policy on EDCs. Their list can be found online at <http://www.ourstolenfuture.org/Basics/chemlist.htm>

Changes to 2009 edition

The list from Our Stolen Future has been added; like the WWF list, this is compiled by scientists working independently and provides a useful comparison with official sources.

Previous editions of the List of Lists included three additional lists:

UK Environment Agency. The list was taken from an undated strategy document, which is no longer available. The loss of this list has resulted in two previously listed pesticides, dichlorvos and demeton-s-methyl, being taken off the List of Lists.

German Environment Agency. It was decided to omit this list from this edition of the LoL, as it is simply a subset of the EU list, identified by the German EA as a priority list.

OSPAR. The OSPAR convention identifies hazardous chemicals primarily as those that are persistent, bioaccumulative and toxic (PBT chemicals). Some chemicals that fall outside this category are also listed if they cause an equivalent level of concern, including EDCs. However, as endocrine disruption is not a main criterion for inclusion in OSPAR, the list has been omitted from this table. Pesticides included in OSPAR are listed on p.

WWF complete list of pesticides suspected of having reproductive and/or endocrine disrupting effects

(those not included on the EU list are in bold type)

2,4-D, acetochlor, alachlor, aldicarb, aldrin, amitrole, atrazine, **benomyl**, beta-HCH, bifenthrin, **bromacil**, bromoxynil, carbaryl, carbofuran, chlordane, chlordecone, **chlorfentezine**, cyanazine, DDT, **Dacthal (DCPA)**, deltamethrin, dibromochloropropane (DBCP), dicofol, dieldrin, dimethoate, endosulfan, endrin, **ethiozin**, **ethofenprox**, etridiazole, fenarimol, **fenbuconazole**, fenitrothion, **fenchlorphos** (OBS), fenvalerate, **fipronil**, **flufenacet**, **fluorenylacetamide n-2**, **glufosinate-ammonium**, HCB, HCH (mixed), heptachlor, ioxynil, , lambda cyhalothrin, lindane, linuron, malathion, macozeb, maneb, methomyl, methoxychlor, metiram, metribuzin, mirex, **molinate**, **nabam**, nitrofen, **oryzalin**, oxychlordane, **paraquat**, parathion ethyl, parathion methyl, **pendimethalin**, pentachlorophenol, **PCNB**, permethrin, photomirex, picloram, **prodiamine**, **pronamide**, pyrethrin, simazine, terbutryn, **thiazopyr**, toxaphene, **trans-nonachlor**, triadimefon, tributyltin compounds, **trichlorobenzene**, trifluralin, vinclozolin, zineb, ziram.

Pesticides toxic to bees

Many insecticides, unsurprisingly, are highly toxic to bees, some more so than others. There are also a few herbicides and fungicides which are toxic to bees. Some pesticides have restrictions placed on their use, to try to minimise risk to bees: for example, they must not be used in a field where bees are foraging. In the UK beekeepers must be notified 48 hours before certain pesticides are sprayed.

Honey bees are of particular concern when considering the environmental impact of a pesticide because they pollinate 40% of the world's major food crops. In recent years honey bee populations in the US and Europe have been falling dramatically. Pesticides may be a contributing factor, along with parasites, diseases and unfavourable weather conditions. Pesticides at low concentrations which do not directly kill the bees may nevertheless have sublethal effects (such as altering foraging behaviour) on a colony already under stress from disease. A number of pesticides belonging to the group known as neonicotinoids have now been withdrawn in France, Germany, Italy and Slovenia, because of concerns that they are contributing to bee deaths.

Active Ingredient	US EPA	UK PSD	Active Ingredient	US EPA	UK PSD
Abamectin	✓	✓	Fipronil	✓	✓
Acrinathrin		✓	Fluometuron		✓
Alpha cypermethrin	✓	✓	Formetanate	✓	✓
Aluminum phosphide	✓	✓	Fosthiazate	✓	✓
Azamethiphos	✓		Hexaconazole	✓	
Bendiocarb	✓		Hexaflumuron	✓	
Beta-cyfluthrin	✓	✓	Imazethapyr	✓	
Bifenthrin	✓	✓	Imidacloprid	✓	✓
Butocarboxim	✓		Indoxacarb	✓	✓
Cadusafos	✓		Lambda-cyhalothrin	✓	✓
Carbaryl	✓		Malathion	✓	
Carbofuran	✓		Mepronil	✓	
Chlorate		✓	Methiocarb	✓	✓
Chlorpyrifos	✓	✓	Methomyl	✓	
Chlorpyrifos-methyl	✓	✓	Milbemectin		✓
Clothianidin	✓	✓	Oxamyl	✓	✓
Copper compounds		✓	Oxydemeton-methyl	✓	
Cyfluthrin	✓	✓	Phosmet	✓	✓
Cypermethrin		✓	Pirimicarb		✓
Deltamethrin	✓	✓	Pyridaben		✓
Diazinon	✓		Quinoclamine	✓	✓
Dichlorvos	✓		Spinosad	✓	✓
Dimethoate	✓	✓	Spiroxamine		✓
Esfenvalerate	✓	✓	Tefluthrin	✓	✓
Ethprophos		✓	Thiamethoxam	✓	✓
Etofenprox	✓	✓	Thiodicarb	✓	
Fenamiphos	✓	✓	Tralkoxydim	✓	
Fenazaquin	✓	✓	Trichlorfon	✓	
Fenbuconazole		✓	Zeta cypermethrin	✓	✓
Fenitrothion	✓				
Fenoxycarb	✓				
Fenthion	✓				

Definitions of categories

UK PSD

In May 2008 the UK Pesticides Safety Directorate (PSD) published an analysis of 286 pesticide substances on the EU market, identifying 40 as being toxic to bees.¹

USA EPA

The US EPA defines substances as being highly toxic to bees if they have an LD50 value of less than 2µg/bee.² Using this definition, the pesticides listed below were identified using data from the FOOTPRINT database.³

Sources:

1. Pesticide Safety Directorate (May 2008): *Assessment of the impact on crop production in the UK of the 'cut off' criteria and substitution in the proposed Regulation of the European Parliament and of the Council concerning the placing of plant protection products in the market.*
[http://www.pesticides.gov.uk/uploadedfiles/Web_Assets/PSD/Impact_report_final_\(May_2008\).pdf](http://www.pesticides.gov.uk/uploadedfiles/Web_Assets/PSD/Impact_report_final_(May_2008).pdf)

2. U.S. EPA (2007): *Technical Overview of Ecological Risk Assessment Analysis Phase: Ecological Effects Characterization*, U.S. Environmental Protection Agency, Washington, DC via www.epa.gov/oppfed1/ecorisk_ders/toera_analysis_eco.htm

3. FOOTPRINT (2007): *The FOOTPRINT Pesticide Properties DataBase. Database collated by the University of Hertfordshire as part of the EU-funded FOOTPRINT project (FP6-SSP-022704)* (<http://www.eu-footprint.org>).

Pesticides in the Marine Environment of the North-East Atlantic (OSPAR Convention)

The 1992 OSPAR Convention is the current instrument guiding international cooperation on the protection of the marine environment of the North-East Atlantic. It combined and up-dated the 1972 Oslo Convention on dumping waste at sea and the 1974 Paris Convention on land-based sources of marine pollution. The work under the convention is managed by the OSPAR Commission, made up of representatives of the Governments of 15 Contracting Parties (Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom) and the European Commission, representing the European Community. Observers from 25 non-governmental organisations, representing environmental groups and industry, also contribute to the Commission's work.

OSPAR has a broad remit. Pesticides come under OSPAR's 'Hazardous Substances' strategy. Hazardous substances are defined as substances which are persistent, liable to bioaccumulate and toxic (PBT substances), or which give rise to an equivalent level of concern as the PBT substances. This might be, for example, concern that they can interfere with the hormone system of organisms. The strategy aims to achieve concentrations near background values for naturally occurring substances, and close to zero for synthetic substances.

The pesticides agreed as 'priorities for action' are listed here (updated in 2007), as well as a list of substances of 'possible concern' including 98 pesticides (updated in 2008).

Pesticides listed as 'Priorities for Action'

Active Ingredient

1,2,3-Trichlorobenzene
1,2,4-Trichlorobenzene
1,3,5-Trichlorobenzene
Cadmium
Dicofol
Endosulfan
HCH isomers
Methoxychlor
Mercury compounds
Nonylphenol/ethoxylates (NP/NPEs) and related substances
Octylphenol
Organic tin compounds (organotin compounds)
Pentachlorophenol (PCP)
Trifluralin
ethyl O-(p-nitrophenyl) phenyl phosphonothionate (EPN)
Flucythrinate
Isodrin
Tetrasul

Source: OSPAR List of Chemicals for Priority Action (Update 2007)

(Reference number 2004-12), download from

http://www.ospar.org/content/content.asp?menu=00940304440000_000000_000000

OSPAR convention Substances of Possible Concern

The OSPAR List of Substances of Possible Concern is a dynamic working list and is regularly revised as new information becomes available. This may lead to exclusion of substances present on the current version and to inclusion of other substances if data on persistence, toxicity and liability to bioaccumulate (or evidence that they give rise to an equivalent level of concern) show that they should be added. The OSPAR List of Substances of Possible Concern was last revised in August 2008. A revised list will be published by OSPAR in 2009.

[1,1'-biphenyl]-4-ol, 3,5-bis(1,1-dimethylethyl)-	dicofol	PCP (pentachlorophenol)
1,3,5-triazine-2,4,6(1H,3H,5H)-trione,	DIDT	penfluridol
1,3,5-tris(2,3-dibromopropyl)-	dieldrin	phenol, 2,2'-thiobis[4,6-dichloro-
2,2,5-endo,6-exo,8,9,10-hep-	endosulfan	phenol, 3,5-bis(1,1-dimethylethyl)-
tachloronorborene	endrin	phosphorodithioic acid, O,O-diisooctyl
2,4,5-T esters	ethyl O-(p-nitrophenyl) phenyl phospho-	ester
2,4,6-bromophenyl 1-2(2,3-dibromo-2-	nothionate (EPN)	phosphorothioic acid, O,O,O-tris(4-nitro-
methylpropyl)	fenbutatin oxide	phenyl)ester
2,4,6-tri-tert-butylphenol	fentin hydroxide	phoxim
4,6-di-tert-butyl-m-creso	fentin, TPT	pimozide
4-sec-butyl-2,6-di-tert-butylphenol	flubenzimine	profluralin
aldrin	flucythrinate	propanoic acid, 2-(2,4,5-trichlorophe-
atrazine	fluoxetine-hydrochloride- (INN)	noxy)-, 2-butoxyethyl ester
benfluralin	furo[3,4-b]pyridin-7(5H)-one, 5-[4-	quintozen
benzene, 1-[2-(2-chloroethoxy)ethoxy]-4-	(diethylamino)-2-ethoxyphenyl]-5-(1-	sibelium
(1,1,3,3-tetramethylbutyl)-	haloxifop-ethoxyethyl	TBTO (tributyltin oxide)
beta hexachlorocyclohexane	heptachlor	technical-grade HCH
bifenox	heptachlor epoxide	terofenamate
bromocyclene	hydramethylnon	tetradifon
bromophos	iodofenphos	tetrasul
bromophos-ethyl	isobenzan (ISO)	toxaphene
chlordane	isodrin	triallate
chlordene	kepone/chlordecone	triclocarban
chlorfenethol	leptophos	tridemorph
chlornitrofen	lindane	trifluralin
chlorobenzilate	methoxychlo	trikloronat (ISO)
chlorpyrifos	miconazole	vinclozolin
cyhalothrin	mirex	
cyhexatin	mitotane	
DDD, P,P'	naphthenic acids, tributyltin compounds	
DDE, P,P'	nitrofen	
DDT	o,p-DDE	
DFDT	o,p'-DDT	
dichloricide aerosol	oxirane, 2-(3,5-dichlorophenyl)-2-(2,2,2-	
	trichloroethyl)-	

Notes:

Three pesticides have been deselected since the 2005 List of Lists, following the scrutiny of new industry data, and re-evaluation of these substances against the cut-off values for the selection criteria used in the initial selection procedure in 2001. Fenpropathrin and pendimethalin were deselected in 2006, and propaquizafop in 2008.

Source: *Ospar List of Substances of Possible Concern*

http://www.ospar.org/v_substances/browse.asp?menu=00950304450072_000000_000000
accessed November 2008

Pesticides banned or severely restricted in the European Union

Pesticide regulation in the European Union (EU) is a slow and complicated process, and is continually changing as many of the older generation pesticides developed in the 1950s-1980s are under review, while newer products are appearing all the time. Although hundreds of pesticide active ingredients are no longer registered for use in EU countries, withdrawal of registration approval alone is not sufficient to qualify formally as a ban. The Rotterdam PIC Convention defines a banned chemical as a “chemical all uses of which, within one or more categories, have been prohibited by final regulatory action in order to protect human health or the environment”. To qualify as a ban, a decision not to grant approval, not to re-register, or to withdraw a pesticide, must be accompanied by clear evidence that this action has been taken in order to protect human health or the environment.

The EU's European Chemicals Bureau and Joint Research Centre analyse each year all regulatory decisions made by the European Commission on agricultural and non-agricultural pesticides (biocides) to assess whether they qualify as a ban under the PIC Convention and publish this information on the European Database Export Import of Dangerous Chemicals (EDEXIM) website.

Three important pieces of legislation cover EU pesticide bans. Council Directive 79/117/EEC prohibited placing on the market and use of plant protection products containing certain active substances which, even if applied in an approved manner, could give rise to harmful effects. This legislation banned 18 mainly persistent and bioaccumulating organochlorine compounds, including DDT, during the 1980s and early 1990s. Council Regulation (EC) 850/2004 on persistent organic pollutants implements the Stockholm POPs Convention in the EU and amends the earlier directive 79/117/EEC.

Council Regulation 304/2003 concerning the export and import of dangerous chemicals implements the Rotterdam PIC Convention. It imposes the same packaging and labelling requirements for exports of all dangerous chemicals as apply within the EU. The regulation does not itself ban any chemicals but provides notification for European exporters and importers outside the EU on ban status of chemicals under other EU legislation. Annex 1 Part 1 of 304/2003 lists industrial chemicals and pesticides which are subject to export notification procedures because they are banned or severely restricted in one of the PIC Convention use categories (i.e. either as plant protection products for agricultural use or for non-agricultural uses). Part 2 of the same Annex lists those which qualify for PIC notification, having been banned or severely restricted in the EU for both agricultural and non-agricultural uses. Regulation EC 304/2003 is regularly amended to reflect new regulatory decisions under EU agricultural pesticide and biocide legislation and to add further compounds to the Annex.

A total of 113 active ingredients or formulations qualify as bans or severe restrictions in the EU, as of 11/08.

* Chemical qualifying for PIC notification because banned or severely restricted within EU in the pesticide category.

Sources:

Directive 79/117/EEC prohibiting the placing on the market and use of plant protection products containing certain active substances.

Regulation (EC) 304/2003 concerning the export and import of dangerous chemicals. Annex 1 Part 1 listing chemicals subject to export notification procedure and Part 2 listing chemicals qualifying for PIC notification. Available on European Database Export Import of Dangerous Chemicals (EDEXIM) website, managed by the EU European Chemicals Bureau/Joint Research Centre.
http://edexim.jrc.it/index.php?id_left=0

Guide to regulation (EC) of the European Parliament and of the Council 304/2003 concerning the export and import of dangerous chemicals. European Commission, 2004.

Regulation (EC) 777/2006 amending Annex I to Regulation EC 304/2003.

Regulation (EC) 1376/2007 amending Annex I to Regulation EC 304/2003.

Regulation (EC) 689/2008 concerning the export and import of dangerous chemicals.

Regulation (EC) 850/2004 on persistent organic pollutants and amending Directive 79/117/EEC. This regulation implements the Stockholm POPs Convention in the EU.

PAN UK's Food & Fairness briefing no. 1 'Which pesticides are banned in Europe?' provides more detailed explanation and sources of information.

http://www.pan-uk.org/PDFs/Banned%20in%20The%20EU_April%20Update.pdf

Substance	Use limitation	Regulation/Directive (Regulatory Decision excluding substance from Annex I of Directive 91/414)
1,3,-dichloropropene	Ban	777/2006 (02/2076)
2,aminobutane (sec-butylamine)	Ban	777/2006 (02/2076)
2,4,5-T and its salts and esters	Ban	777/2006 (02/2076)
Acephate*	Ban	1212/2003 (03/219)
Acifluorfen	Ban	777/2006 (02/2076)
Alachlor *	Ban	304/2003 (06/966)
Aldicarb*	Severe restriction as plant protection product. Ban on other uses.	1212/2003 (03/219) 777/2006
Aldrin	Ban and export ban	79/117/EEC (1991) + 850/2004 (1)
Ametryn	Ban	777/2006 (02/2076)
Amitraz *	Severe restriction	775/2004 (04/247)
Arsenic compounds	Severe restriction	Noted in 304/2003
Atrazine*	Severe restriction as plant protection product. Ban on other uses.	775/2004 (04/247)
Azinphos-ethyl	Ban	777/2006 (95/276)
Azinphos-methyl	Ban as plant protection product	1376/07 (05/1335)
Bensultap	Ban	777/2006 (02/2076)
Binapacryl	Ban	79/117/EEC (1991)
Cadusafos*	Ban	1376/07 (07/428)
Calciferol	Ban as plant protection product	777/2006(04/129)
Captafol	Ban	79/117/EEC (1991)
Carbaryl*	Ban	1376/07 (07/355)
Carbofuran*	Ban	1376/07 (07/416)
Carbosulfan*	Ban	1376/07 (07/415)
Cartap	Ban	777/2006 (02/2076)
Chinomethionat	Ban	777/2006 (02/2076)
Chlordane	Ban and export ban	79/117/EEC (1981) + 850/2004
Chlordecone	Severe restriction for non plant protection pesticide uses	689/2008
Chlordimeform	Ban	Noted in 304/2003
Chlorfenapyr*	Severe restriction	Noted in 304/2003
Chlorfenvinphos	Ban	777/2006 (02/2076)
Chlormephos	Ban	777/2006 (02/2076)
Chlorobenzilate	Ban	2076/2002 (00/626)
Chlozolinate*	Ban	Noted in 304/2003 (00/626)
Cholecalciferol	Ban as plant protection product	777/2006 (04/129)
Coumafuryl	Ban	777/2006 (04/129)
Crimidine	Ban as plant protection product	777/2006 (04/129)
Cyanazine	Ban	777/2006 (02/2076)
Cyhalothrin	Ban	Noted in 304/2003 (94/643)
DDT	Ban and export ban	79/117/EEC (1986) + 850/2004
Diazinon	Ban as plant protection product	1376/07 (07/393)
Dichlorvos	Ban as plant protection product	1376/07 (07/387)
Dicofol containing less than 78% p,p*-Dicofol or more than 1 g/kg of DDT and DDT related compounds*	Ban	79/117/EEC (1991) 777/2006
Dieldrin	Ban and export ban	79/117/EEC (1981) + 850/2004
Dimethenamid*	Ban	1376/07 (06/1009)
Dinobuton	Ban	777/2006 (02/2076)
Dinoseb, its acetate and salts	Ban	79/117/EEC (1991)
Dinoterb*	Ban	Noted in 304/2003 (98/269)
Diuron	Formerly banned as plant protection product Re-included on 91/414 Annex 1 Oct. 2008	1376/07 (07/417) 149/2008
DNOC	Ban	Noted in 304/2003 (99/164)
Endosulfan*	Ban as plant protection product	777/2006 (05/864)
Endrin	Ban and export ban	79/117/EEC (1991) + 850/2004
Ethion	Ban	777/2006 (02/2076)
Ethylene dichloride	Ban	79/117/EEC (1989)
Ethylene dibromide (1,2 dibromoethane)	Ban	79/117/EEC (1988)
Ethylene oxide	Ban as plant protection product	79/117/EEC (1991)
Fenitrothion	Ban as plant protection product	1376/07 (07/379)
Fenpropathrin	Ban	775/2004 (02/2076)
Fenthion*	Severe restriction	775/2004 (04/140)
Fentin acetate*	Severe restriction	Noted in 304/2003 (02/478)
Fentin hydroxide*	Ban	Noted in 304/2003 (02/479)
Fenvalerate	Ban	Noted in 304/2003 (98/270)
Ferbam	Ban	Noted in 304/2003 (95/276)
Fluoroacetamide	Ban as plant protection product	777/2006 (04/129)
Flurenol	Ban	777/2006 (04/129)
Furathiocarb	Ban	777/2006 (02/2076)

Haloxyfop-R*	Ban	1376/07 (07/437)
HCH containing less than 99.0% of the gamma isomer	Ban	79/117/EEC (1981)
Heptachlor	Ban and export ban	79/117/EEC (1984) + 850/2004
Hexachlorobenzene	Ban and export ban	79/117/EEC (1981) + 850/2004
Hexazinone	Ban	777/2006 (02/2076)
Iminoctadine	Ban	777/2006 (02/2076)
Isoxathion	Ban as plant protection product	777/2006 (02/2076)
Lindane (gamma-HCH)	Ban as plant protection product Severe restriction for other uses	Noted in 304/2003 (00/801)
Malathion	Ban as plant protection product	1376/07 (07/389)
Maleic hydrazide and its salts, other than choline, potassium and sodium salts; choline, potassium and of sodium salts maleic hydrazide containing more than 1 mg/kg of freehydrazine expressed on the basis of the acid equivalent	Ban as plant protection product Severe restriction for other uses	79/117/EEC (1991)
Mercury compounds including mercuric oxide, mercurous chloride (calomel); other inorganic mercury compounds: alkyl mercury compounds: and alkoxyalkyl and aryl mercury compounds	Ban as plant protection product Severe restriction for other uses	79/117/EEC (1991,1992)
Methamidophos	Ban for non plant protection pesticide uses. Plant protection use given only 18 month authorisation, until June 08.	777/2006 06/131
Methidathion	Ban	777/2006 (04/129)
Metoxuron	Ban	777/2006 (02/2076)
Mirex	Ban and export ban	850/2004
Monocrotophos	Ban	1212/2003 (02/2076)
Monolinuron	Ban	Noted in 304/2003 (00/234)
Monuron	Ban as plant protection product	777/2006 (02/2076)
Nitrofen*	Ban	79/117/EEC (1988)
Nonylphenol ethoxylate*	Ban	775/2004 (02/2076)
Omethoate	Ban	777/2006 (02/2076)
Oxydemeton-methyl*	Ban	1376/07 (07/392)
Parathion	Ban	Noted in 304/2003 (01/520) 777/2006
Parathion methyl (methyl parathion)*	Ban	Noted in 304/2003 (03/166) 777/2006
Pebulate	Ban	777/2006 (02/2076)
Pentachlorophenol and its compounds	Ban as plant protection product Severe restriction for other uses	91/173/EEC
Permethrin	Ban as plant protection product	Noted in 304/2003 (00/817)
Phosalone*	Ban	1376/07 2006/1010
Phosphamidon	Ban	777/2006 (02/2076)
Propham	Ban as plant protection product	Noted in 304/2003 (96/586)
Pyrazophos*	Ban	Noted in 304/2003 (00/233)
Quintozene*	Ban	79/117/EEC (1991) (00/816)
Scilliroside	Ban as plant protection product	777/2006 (04/129)
Simazine*	Severe restriction)	775/2004 (04/247)
Strychnine	Ban as plant protection product	777/2006 (04/129)
Tecnazene*	Ban	Noted in 304/2003 (00/725)
Terbufos	Ban	777/2006 (02/2076)
Thallium sulphate	Ban as plant protection product	777/2006 (04/129)
Thiocyclam	Ban	777/2006 (02/2076)
Thiodicarb	Ban	1376/07 07/366)
Toxaphene (camphechlor)	Ban and export ban	79/117/EEC (1984) + 850/2004
Triazophos	Ban	777/2006 (02/2076)
Trichlorfon*	Ban	1376/07 (07/356)
Tridemorph	Ban	777/2006 (04/129)
Triorganostannic compounds * (tributyltin compounds)	Severe restriction	Noted in 304/2003 02/2076)
Vamidothion	Ban	777/2006 02/2076)
Vinclozolin	Ban as plant protection product	304/2003 (05/1335)
Zineb	Ban as plant protection product	Noted in 304/2003 01/245)
Dustable powder formulation containing a combination of: Benomyl at or above 7% Carbofuran at or above 10% Thiram at or above 5%	Ban	777/2006

Phasing out pesticides in Europe

Agricultural Pesticides

In 1992, the EU embarked on a full review of the approximately 1,000 active ingredients used in the region for agricultural pesticides at that time (non-agricultural pesticides, known as biocides, are covered under separate legislation). Previously, pesticides were regulated mainly at the level of individual Member States. In 1992 a new authorisations directive, 91/414, harmonised the process of risk assessment and pesticide approvals across the EU. Since 1993, pesticide manufacturers applying for EU-wide approval for a specific pesticide have to submit new data to show that the substance can be used without unacceptable risks, meeting stricter standards on health and environmental safety than before. Pesticides that are given EU-wide approval are placed on Annex 1 of the authorisations directive 91/414.

Previous versions of the List of Lists included details of the pesticides withdrawn from the market under directive 91/414/EEC. This list has now grown to over 500 active ingredients that no longer have EU approval, because they failed to meet health and environmental requirements or other criteria in the review process, or because their re-registration was not supported by the manufacturers, for economic or other reasons. PAN UK has decided not to include a list of substances withdrawn for agricultural use in this updated List of Lists, partly because the list is constantly changing as the review process continues and partly because the EU is revising its authorisation directive in 2009.

Instructions on how to find information on EC regulatory decisions for agricultural pesticides under directive 91/414 can be found on the PAN Europe website:

http://www.pan-europe.info/Resources/Links/EC_Regulatory_Decisions.pdf

Biocides

In parallel, the EU's Biocides authorisation directive 98/8/EC covers approvals and withdrawal procedures for biocide and pesticide active ingredients intended for uses other than in agriculture. These include biocidal substances used in soaps, food and drinking water disinfectants, rodenticides, veterinary hygiene, in-can preservatives, anti-fouling substances used on boats, wood preservatives and many other treatments. Information on biocide legislation can be found at <http://ec.europa.eu/environment/biocides/index.htm>

Over 600 biocidal substances and uses have failed to gain EU-wide approval. A consolidated list of biocidal substances which are no longer approved is at

http://ec.europa.eu/environment/biocides/pdf/list_dates_product_phasing_out.pdf

Regulating water in Europe

Regulation of water in Europe is in the process of change. Community policy on water pollution was introduced three decades ago with the **Dangerous Substances Directive 76/464/EEC** of 4 May 1976. This had the ambitious objective of regulating potential aquatic pollution by thousands of chemicals produced in Europe at that time. It covered discharges to inland surface waters, territorial waters, inland coastal waters and groundwater. Protection of groundwater was removed in 1980 and regulated under the separate directive **80/68/EEC** on the protection of groundwater against pollution caused by certain dangerous substances.

Community water policy continues to be restructured under the Water Framework Directive **2000/60/EC**, adopted in September 2000. The Water Framework Directive (WFD) is a broad umbrella for all relevant water policies, with the overall objective to achieve "good status" for all waters by December 2015. It repeals a number of Directives, including the Freshwater, Shellfish Water, Groundwater and Dangerous Substances Directives, by 2013. A series of 'daughter directives' is under preparation to implement the many different elements of the Water Framework Directive.

Priority substances in surface water: A first list of priority and possible priority hazardous substances under the WFD was made in 2001, with the aim of cessation or phasing out of discharges, emissions and losses within an appropriate timetable not exceeding 20 years. In 2006 the European Commission proposed a daughter directive to protect surface water from pollution (Proposal for a directive on environmental quality standards in the field of water policy **COM(2006)397 final**). The proposals set limits on concentrations in surface waters of 41 dangerous chemical substances (including **33 priority substances and 8 other pollutants**) that pose a particular risk to animal and plant life in the aquatic environment and to human health. These proposals consolidate the 2001 lists and include 4 pesticides under Priority Hazardous Substances and a further 16 under Priority substances. Under the WFD, member states will be obliged to cease or phase-out discharges, emissions and losses of priority hazardous substances to surface water bodies and achieve progressive reduction in discharges of priority substances. Under the 2006 environmental quality standards proposals, anthracene and endosulfan pesticides have been upgraded to Priority Hazardous Substances.

Water pollution discharge controls: Directive **2006/11/EC** now replaces the replaces the former water pollution discharge legislation under *Dangerous Substances Directive 76/464/EEC*. Member States must take appropriate steps to eliminate water pollution by certain chemical groups under List I in the Annex to this directive. List I of Directive 2006/11 contains certain individual substances selected mainly on the basis of their toxicity, persistence and bioaccumulation.

Groundwater: in 2006 the EU adopted daughter directive 2006/118/EC on the protection of groundwater against pollution and deterioration. This covers specific measures to prevent and control groundwater pollution, including developing criteria to assess water status and monitor trends in its improvement.

Water Framework Directive (2000/60/EC)

Article 16 Strategies against pollution of water

Priority substances under the Water Framework Directive

Priority hazardous substances:

Anthracene
Cadmium and its compounds
Endosulfan
Hexachlorobenzene
Hexachlorobutadiene
Hexachlorocyclohexane (gamma-isomer, Lindane)
Mercury and its compounds
Nonylphenols (4-(para)-nonylphenol)
Tributyltin compounds (Tributyltin-cation)

Priority substances:

Alachlor
Atrazine
Benzene
Chlorpyrifos
Chlorfenvinphos
1,2-Dichloroethane (Ethylene dichloride)
Dichloromethane (Methylene chloride)
Diuron
Fluoranthene
Isoproturon
Naphthalene
Nickel and its compounds
Pentachlorophenol
Simazine
Trifluralin

Aquatic Pollution by Dangerous Substances Directive 2006/11**List 1 substances**

1. Organohalogen compounds and substances which may form such compounds in the aquatic environment;
2. organophosphorus compounds;
3. organotin compounds;
4. substances which have been proved to possess carcinogenic properties in or via the aquatic environment (1);
5. mercury and its compounds;
6. cadmium and its compounds;
7. persistent mineral oils and hydrocarbons of petroleum origin;
8. persistent synthetic substances which may float, remain in suspension or sink and which may interfere with any use of the waters.

References

DIRECTIVE 2006/11/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
of 15 February 2006 on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community

Directive text at

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:064:0052:0059:EN:PDF>

The EU Water Framework Directive - integrated river basin management for Europe

Home page at http://ec.europa.eu/environment/water/water-framework/index_en.html

Directive text at <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2000:327:0001:0072:EN:PDF>

WFD priority substances at

http://ec.europa.eu/environment/water/water-framework/priority_substances.htm

WFD Groundwater home page at <http://ec.europa.eu/environment/water/waterframework/groundwater.html>

DIRECTIVE 2006/118/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 12 December 2006 on the protection of groundwater against pollution and deterioration

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:372:0019:0031:EN:PDF>

EEB Handbook on EU Water Policy under the Water Framework Directive, European Environmental Bureau

<http://www.eeb.org/activities/water/documents/EEB-Water-Handbook-Final2001.pdf>

PAN Europe briefing no. 7. Pesticide residues in water as ruled by EU legislation (2006) gives a more detailed overview of relevant EU legislation, including drinking water standards, measures relating to water contamination in the authorisation directives for agricultural pesticides and biocides, and the WFD and its daughter directives.

European Union Risk Phrases

The European Union (EU) requires that risk phrases (R-phrases) appear on each label and safety data sheet for hazardous chemicals. R-phrases consist of the letter R followed by a number. The precise meaning of each of these appears below (see www.ilpi.com/msds/ref/riskphrases.html)

Labels will also have symbols or pictograms, but the R-phrase specifies the particular danger(s). For example, sodium metal may have a large F and flame icon on the label, but the particular risk is denoted by R14/15 and R34 which correspond to "Reacts violently with water liberating highly flammable gases" and "causes burns".

Safety phrases (S-phrases) for handling precautions are also part of the same requirements (see www.ilpi.com/msds/ref/safetyphrases.html).

More than one R-phrase may appear on a Materials Safety Data Sheet (MSDS). These are usually presented in combination, such as R36/37/38. In the first table below, single phrases are given, and in the second table, combinations are given. In general, no more than four R-phrases should be sufficient to adequately communicate the risks of a particular material. The R-phrases selected should be those applicable to the substance(s) present in the concentration which gives rise to the most severe classification.

Single Risk Phrases

R1	Explosive when dry.	R40	Possible risks of irreversible effects.
R2	Risk of explosion by shock, friction, fire or other sources of ignition.	R41	Risk of serious damage to eyes.
R3	Extreme risk of explosion by shock, friction, fire or other sources of ignition.	R42	May cause sensitization by inhalation.
R4	Forms very sensitive explosive metallic compounds.	R43	May cause sensitization by skin contact.
R5	Heating may cause an explosion.	R44	Risk of explosion if heated under confinement.
R6	Explosive with or without contact with air.	R45	May cause cancer.
R7	May cause fire.	R46	May cause heritable genetic damage.
R8	Contact with combustible material may cause fire.	R47	May cause birth defects.
R9	Explosive when mixed with combustible material.	R48	Danger of serious damage to health by prolonged exposure.
R10	Flammable.	R49	May cause cancer by inhalation.
R11	Highly flammable.	R50	Very toxic to aquatic organisms.
R12	Extremely flammable.	R51	Toxic to aquatic organisms.
R13	Extremely flammable liquified gas. This code is no longer in use.	R52	Harmful to aquatic organisms.
R14	Reacts violently with water.	R53	May cause long-term adverse effects in the aquatic environment.
R15	Contact with water liberates highly flammable gases.	R54	Toxic to flora.
R16	Explosive when mixed with oxidizing substances.	R55	Toxic to fauna.
R17	Spontaneously flammable in air.	R56	Toxic to soil organisms.
R18	In use, may form flammable/explosive vapour-air mixture.	R57	Toxic to bees.
R19	May form explosive peroxides.	R58	May cause long-term adverse effects in the environment.
R20	Harmful by inhalation.	R59	Dangerous for the ozone layer.
R21	Harmful in contact with skin.	R60	May impair fertility
R22	Harmful if swallowed.	R61	May cause harm to the unborn child
R23	Toxic by inhalation.	R62	Possible risk of impaired fertility
R24	Toxic in contact with skin.	R63	Possible risk of harm to the unborn child
R25	Toxic if swallowed.	R64	May cause harm to breast-fed babies
R26	Very toxic by inhalation.	R65	Harmful: may cause lung damage if swallowed
R27	Very toxic in contact with skin.	R66	Repeated exposure may cause skin dryness or cracking
R28	Very toxic if swallowed.	R67	Vapours may cause drowsiness and dizziness
R29	Contact with water liberates toxic gases.	R68	Possible risk of irreversible effects
R30	Can become highly flammable in use.		
R31	Contact with acids liberates toxic gas.		
R32	Contact with acids liberates Very toxic gas.		
R33	Danger of cumulative effects.		
R34	Causes burns.		
R35	Causes severe burns.		
R36	Irritating to eyes.		
R37	Irritating to respiratory system.		
R38	Irritating to skin.		
R39	Danger of very serious irreversible effects.		

R14/15	Reacts violently with water, liberating extremely flammable gases
R15/29	Contact with water liberates toxic, extremely flammable gases
R20/21	Harmful by inhalation and in contact with skin
R20/22	Harmful by inhalation and if swallowed
R20/21/22	Harmful by inhalation, in contact with skin and if swallowed
R21/22	Harmful in contact with skin and if swallowed
R23/24	Toxic by inhalation and in contact with skin
R23/25	Toxic by inhalation and if swallowed
R23/24/25	Toxic by inhalation, in contact with skin and if swallowed
R24/25	Toxic in contact with skin and if swallowed
R26/27	Very toxic by inhalation and in contact with skin
R26/28	Very toxic by inhalation and if swallowed
R26/27/28	Very toxic by inhalation, in contact with skin and if swallowed
R27/28	Very toxic in contact with skin and if swallowed
R36/37	Irritating to eyes and respiratory system
R36/38	Irritating to eyes and skin
R36/37/38	Irritating to eyes, respiratory system and skin
R37/38	Irritating to respiratory system and skin
R39/23	Toxic: danger of very serious irreversible effects through inhalation
R39/24	Toxic: danger of very serious irreversible effects in contact with skin
R39/25	Toxic: danger of very serious irreversible effects if swallowed
R39/23/24	Toxic: danger of very serious irreversible effects through inhalation and in contact with skin
R39/23/25	Toxic: danger of very serious irreversible effects through inhalation and if swallowed
R39/24/25	Toxic: danger of very serious irreversible effects in contact with skin and if swallowed
R39/23/24/25	Toxic: danger of very serious irreversible effects through inhalation, in contact with skin and if swallowed
R39/26	Very Toxic: danger of very serious irreversible effects through inhalation
R39/27	Very Toxic: danger of very serious irreversible effects in contact with skin
R39/28	Very Toxic: danger of very serious irreversible effects if swallowed
R39/26/27	Very Toxic: danger of very serious irreversible effects through inhalation and in contact with skin
R39/26/28	Very Toxic: danger of very serious irreversible effects through inhalation and if swallowed
R39/27/28	Very Toxic: danger of very serious irreversible effects in contact with skin and if swallowed
R39/26/27/28	Very Toxic: danger of very serious irreversible effects through inhalation, in contact with skin and if swallowed
R42/43	May cause sensitisation by inhalation and skin contact
R48/20	Harmful: danger of serious damage to health by prolonged exposure through inhalation
R48/21	Harmful: danger of serious damage to health by prolonged exposure in contact with skin
R48/22	Harmful: danger of serious damage to health by prolonged exposure if swallowed
R48/20/21	Harmful: danger of serious damage to health by prolonged exposure through inhalation and in contact with skin
R48/20/22	Harmful: danger of serious damage to health by prolonged exposure through inhalation and if swallowed
R48/21/22	Harmful: danger of serious damage to health by prolonged exposure in contact with skin and if swallowed
R48/20/21/22	Harmful: danger of serious damage to health by prolonged exposure through inhalation, in contact with skin and if swallowed
R48/23	Toxic: danger of serious damage to health by prolonged exposure through inhalation
R48/24	Toxic: danger of serious damage to health by prolonged exposure in contact with skin
R48/25	Toxic: danger of serious damage to health by prolonged exposure if swallowed
R48/23/24	Toxic: danger of serious damage to health by prolonged exposure through inhalation and in contact with skin
R48/23/25	Toxic: danger of serious damage to health by prolonged exposure through inhalation and if swallowed
R48/24/25	Toxic: danger of serious damage to health by prolonged exposure in contact with skin and if swallowed
R48/23/24/25	Toxic: danger of serious damage to health by prolonged exposure through inhalation, in contact with skin and if swallowed
R50/53	Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment
R51/53	Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment
R52/53	Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment
R68/20	Harmful: possible risk of irreversible effects through inhalation
R68/21	Harmful: possible risk of irreversible effects in contact with skin
R68/22	Harmful: possible risk of irreversible effects if swallowed
R68/20/21	Harmful: possible risk of irreversible effects through inhalation and in contact with skin
R68/20/22	Harmful: possible risk of irreversible effects through inhalation and if swallowed
R68/21/22	Harmful: possible risk of irreversible effects in contact with skin and if swallowed
R68/20/21/22	Harmful: possible risk of irreversible effects through inhalation, in contact with skin and if swallowed

Web resources that support this List of Lists

The information in this document was accurate at the time of printing. However for the most up-to-date data it is best to visit the sites of those organisations responsible for the various classifications.

International organisations

Codex Alimentarius Commission

<http://www.codexalimentarius.net/>

Food and Agriculture Organization of the UN (FAO)

<http://www.fao.org/>

Pesticide Management Unit

<http://www.fao.org/ag/AGP/AGPP/Pesticid/Default.htm>

Global Information Network on Chemicals

<http://www.nihs.gov.jp/GINC/>

International Agency for Research on Cancer (IARC)

<http://www.iarc.fr/>

Intergovernmental Forum on Chemical Safety (IFCS)

<http://www.who.int/ifcs/index.html>

International Programme on Chemical Safety (IPCS)

<http://www.who.int/pcs/>

Organisation for Economic Co-operation and Development - Work on Chemical Safety

<http://www.oecd.org/ehs/>

OECD Pesticide Programme

http://www.oecd.org/depart/0,2688,en_2649_34383_1_1_1_1_1,00.html

OSPAR Commission for the Protection of the Marine Environment of the North-East Atlantic

<http://www.ospar.org/eng/html/welcome.html>

United Nations Environmental Programme (UNEP)- Programmes in Geneva, Switzerland

<http://www.unep.ch/>

World Health Organisation

<http://www.who.int/>

Pesticides Evaluation Scheme

<http://www.who.int/whopes/>

Food Safety Programme

<http://www.who.int/fsf/>

Governments

Canada

Pest Management Regulatory Agency

<http://www.hc-sc.gc.ca/pmra-arla/english/index-e.html>

European Union

DCAgriculture

http://europa.eu.int/comm/agriculture/index_en.htm

Agriculture and the Environment

http://europa.eu.int/comm/agriculture/envir/index_en.htm

DGEnvironment

http://europa.eu.int/comm/environment/index_en.htm

Chemicals

<http://europa.eu.int/comm/environment/chemicals/index.htm>

DG Health and Consumer Protection

http://europa.eu.int/comm/dgs/health_consumer/index_en.htm

Food Safety

http://europa.eu.int/comm/food/index_en.htm

United Kingdom

Central Science Laboratory

<http://www.csl.gov.uk/>

Department for Environment, Food and Rural Affairs

<http://www.defra.gov.uk>

DEFRA - Chemicals

<http://www.defra.gov.uk/environment/chemicals/index.htm>

Environment Agency (EA)

<http://www.environment-agency.gov.uk/>

Pesticides Safety Directorate

<http://www.pesticides.gov.uk/>

Pesticide Residues Committee

http://www.pesticides.gov.uk/prc_home.asp

United States

Environmental Protection Agency (EPA)

<http://www.epa.gov>

Pesticides

<http://www.epa.gov/pesticides/>

Recognition and Management of Pesticide Poisonings Handbook

<http://www.epa.gov/oppfod01/safety/healthcare/handbook/handbook.htm>

Pesticides RED Fact Sheets

<http://www.epa.gov/pesticides/reregistration/status.htm>

California Department of Pesticide Regulation

<http://www.cdpr.ca.gov/dprdatabase.htm>

Department of Health and General Services - Agency for Toxic Substances and Disease Registry

<http://www.atsdr.cdc.gov/>

National Toxicology Program - Department of Health and Human Services

<http://ntp.niehs.nih.gov/>

Academic

EXTOXNET - EXTension TOXicology NETwork

<http://ace.ace.orst.edu/info/extoxnet/ghindex.html>

Pesticides Information Profiles

<http://extoxnet.orst.edu/pips/ghindex.html>

Pesticide Management Education Program (Cornell University)

<http://pmep.cce.cornell.edu/>

Program on Breast Cancer and Environmental Risk Factors (Cornell University)

<http://envirocancer.cornell.edu/>

Active ingredients

chemfinder.com

<http://chemfinder.cambridgesoft.com/>

Material Safety Data Sheets

<http://www.ilpi.com/msds/index.html>

Cancer

US EPA

www.epa.gov/pesticides/carlist/

International Agency for Research on Cancer (IARC)

<http://www.iarc.fr/>

List of all agents, mixtures and exposures evaluated to date

<http://www.cie.iarc.fr/monoeval/grlist.html>

Endocrine disruption

UK Environment Agency - Chemicals

<http://www.environment-agency.gov.uk/business/444304/444362/>

Endocrine Disrupters

http://www.environment-agency.gov.uk/business/444304/444362/368813/379069/576137/576155/?version=1&lang=_e

DEFRA Endocrine Disrupting Substances in the Environment

<http://www.defra.gov.uk/environment/chemicals/hormone/index.htm>

US EPA Programme on endocrine disrupters

<http://www.epa.gov/scipoly/ospendo/index.htm>

OECD Test Guidelines programme on endocrine disrupters

http://www.oecd.org/document/42/0,3343,en_2649_34377_2348650_1_1_1_1,00.html

EU Endocrine Disrupters Website

<http://europa.eu.int/comm/environment/endocrine/>

EU/DG Research website on endocrine disrupter research

http://europa.eu.int/comm/research/endocrine/activities_dg_en.html

Our Stolen Future

www.ourstolenfuture.org

OSF list of Widespread Pollutants

with Endocrine-disrupting Effects

<http://www.ourstolenfuture.org/Basics/chemlist.htm>

Methyl Bromide

UNEP Ozone Secretariat

<http://www.unep.ch/ozone/home.htm>

Montreal Protocol on Substances that Deplete the Ozone Layer

http://www.unep.ch/ozone/Treaties_and_Ratification/2B_montreal_protocol.asp

US EPA Methyl Bromide Phase Out

<http://www.epa.gov/spdpublic/mbr/>

European Community Management Strategy for the phase-out of the critical uses of methyl bromide.

Report and annexes, European Commission, Brussels, updated June 2008.

<http://ozone.unep.org/>

Obsolete Pesticides

FAO - obsolete pesticides

<http://www.fao.org/WAICENT/FAOINFO/AGRICULT/A GP/AGPP/Pesticid/Disposal/default.htm>

International HCH and Pesticides Association (IHPA)

<http://hjem.get2net.dk/HCH-Pesticides/>

Persistent Organochlorine Pollutants (POPs)

United Nations Environment Programme on POPs

<http://www.chem.unep.ch/pops/>

Stockholm Convention

<http://www.pops.int/>

International POPs Elimination Network

<http://ipen.ecn.cz/>

Prior Informed Consent (PIC)

Joint FAO and UNEP Secretariat - Rotterdam Convention

<http://www.pic.int/>

PAN

Pesticide Database

The PAN Pesticide Database developed by PAN North America contains information on pesticides from a collection of sources, providing data on human toxicity (chronic and acute), ecotoxicity and regulatory information for about 5,400 pesticide active ingredients and their transformation products, as well as adjuvants and solvents used in pesticide products. This database of active ingredients has been integrated with the US EPA product databases, which provide information on formulated products (the form of the pesticide that growers and consumers purchase for use) containing the active ingredients. The information is most complete for pesticides registered for use in the United States.

<http://www.pesticideinfo.org/>



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