

REVISED
SECOND EDITION

GETTING THE DRIFT

A COMMUNITY GUIDE TO PESTICIDES
SPRAYED IN THE NSW NORTHERN RIVERS



ABOUT US

The **Environmental Defender's Office NSW (EDO)** is a community legal centre specialising in public interest environmental law. We help individuals and community groups who are working to protect the natural and built environment. The EDO NSW is part of a national network of EDOs which help to protect the environment through law in each of the States and Territories. It has an active program of casework, education, policy and law reform and scientific services. In addition, we provide free initial legal advice to the community. The NSW office has been in operation since 1985 and is funded primarily through the NSW Public Purpose Fund. The NSW Northern Rivers office was opened in Lismore in 2006.

The **National Toxics Network (NTN)** is a community organisation working to ensure a toxic-free future for all. Formed in 1993, NTN has grown as a national network giving a voice to community and environmental organisations across Australia, New Zealand and the South Pacific. NTN is the Australian focal point for the International POPs (Persistent Organic Pollutants) Elimination Network (IPEN).

DISCLAIMER

This publication is intended to provide general information about pesticide regulation and use in the NSW Northern Rivers. While all care has been taken in its preparation, it relies substantially on information provided by third parties. It is not a substitute for legal advice in individual cases.

CURRENCY

The information in this booklet, including weblinks, was current as at 13 September 2011. The authors welcome notice of corrections or additional information. Please send these to edonr@edo.org.au

Designed by Craig Peterson, Handpress Graphics: www.handpress.com.au

Cover photo copyright Matt Lepkowski 2003, courtesy of www.TravelsInParadise.com

REVISED SECOND EDITION PUBLISHED SEPTEMBER 2011

FIRST EDITION PUBLISHED OCTOBER 2010

PRINTED ON 100% RECYCLED PAPER

Contents

About this booklet	2
What is spray drift?	3
How are pesticides regulated?	3
Are pesticides safe?	6
What are my rights?	8
What should I do if I am concerned?	10
Top ten toxics	11
About the table	15
Table	16
More information	23
Notes	24



About this booklet

The Northern Rivers region of NSW combines rich agricultural land and high rainfall with relatively high numbers of people living on urban fringes, rural residential properties and small farms. This mix of land uses can sometimes lead to conflict between neighbours where pesticides are used.

This booklet has been compiled to help inform residents of this region about the most common and potentially hazardous pesticides that may be sprayed on agricultural or public land near them, and to provide information about the relevant legislation and regulations that govern the use of pesticides in NSW.

With access to information, people can make more informed choices about where to live, whether and when to drink rainwater, when children should play outside, what to ask neighbouring farmers about their activities, and what to do if they feel their rights have been infringed or their health has been affected by spray drift.

This booklet focuses on pesticides applied to crops and weeds by various spraying methods, including ground rigs, fan blasts, backpacks and aerial application by cropdusters. Other potential sources of pesticide exposure and contamination in the Northern Rivers include building pest treatments, old chemical containers,¹ old rubbish dumps, contaminated agricultural land,² and cattle tick dip sites.

The information in this booklet is based on current, independent and peer-reviewed information from sources including the Australian Pesticides and Veterinary Medicines Authority (APVMA) and Pesticide Action Network (PAN) databases. The table was assembled by compiling lists of all pesticides registered for use in NSW on each of the selected industries or crops. These long lists were then filtered to exclude those active constituents which are not either rated 6 (poison) or 7 (dangerous poison) on the APVMA database or banned or restricted by the European Union. The resulting table is intended to highlight those pesticides most likely to be of concern to neighbours and the environment in the Northern Rivers.

More detailed information about specific pesticide products is provided on the product labels (many of which are available on the APVMA's PUBCRIS database) and the material safety data sheet (MSDS) for each pesticide, which can be obtained from the manufacturer or retailer.

What is a pesticide?

Pesticides are chemicals used to control insect, vertebrate and weed pests. They include herbicides, fungicides, insecticides, fumigants, bactericides, rodenticides, baits, lures, repellents and pesticides used on animals to control external parasites.

What is spray drift?

The APVMA defines spray drift or vapour drift as the physical movement of spray droplets (and their dried remnants) through the air from the nozzle to any off-target site at the time of application or soon thereafter.³

This definition does not include the secondary movement of agricultural chemicals to non- or off-target sites caused by volatility, erosion, surface or groundwater transport or windblown soil particles that occurs after application. Post-application drift can occur hours or even days after application.

When pesticides are used, spray and vapour drift can occur as a result of factors including deliberate or accidental misuse, changing weather conditions and poorly maintained and calibrated equipment. Pesticide residues can also move from where they are applied as a result of rain and the movement of dust. (This is called the secondary movement of pesticides.)

All application methods of pesticides can create spray drift if the label instructions and appropriate weather conditions for spraying are not followed. Even applying some pesticides according to the label instructions can result in the movement of pesticide residues offsite.

How are pesticides regulated?

There are two levels of pesticide regulation in Australia. Nationally, the APVMA is responsible for deciding which pesticides can be registered and the conditions under which they should be used and sold. State and territory governments are responsible for ensuring that pesticides are used according to label directions and permits.

Commonwealth

The APVMA is an Australian government statutory authority established in 1993 to centralise the registration of all agricultural and veterinary chemical products into the Australian marketplace. Previously each State and Territory government had its own system of registration. The APVMA is almost entirely “funded by fees, charges and levies imposed on the industry it regulates.”⁴

The APVMA administers the *Agricultural and Veterinary Chemicals Code Act* (“the Agvet Code”).⁵ As well as introducing a uniform regulatory system around Australia, the Agvet Code was intended to enhance ‘the protection of the health and safety of human beings, animals and the environment;’ ‘to ensure that the use of such products today will not impair the prospects of future generations’ in line with the principle of ecologically sustainable development; and ‘to establish a regulatory

system that is open and accountable and gives opportunity for public input.⁶

The main roles of the APVMA relevant to pesticides are to:

- Assess applications from chemical companies and individuals seeking registration of their product.⁷
- Determine the conditions under which registered pesticides must be applied, as specified on product labels.⁸
- Issue permits for particular uses of some non-registered products.⁹
- Restrict the use of some registered pesticides.¹⁰
- Review older products that have been on the market for a substantial period of time to ensure they still do the job users expect and are safe to use.¹¹

Some pesticides can still be used legally in Australia even though they may be banned in other countries or there may be strong evidence of their toxicity to humans, other animals, native vegetation and waterways.¹² APVMA reviews of existing pesticides can take many years, and rarely results in pesticides being withdrawn or banned.¹³ The APVMA can act more quickly when necessary.¹⁴

In 2010 the Commonwealth Government announced a program of reform of the APVMA's regulation of pesticides. Some priority areas for reform include putting the onus on industry to justify registration of old products against contemporary standards; using the science and studies from overseas to their full extent; providing a comprehensive risk framework; and establishing an independent science panel to report progress with reviews and registrations.¹⁵

Oysters on the Richmond River

In recent decades the Richmond River has become increasingly hostile to marine life. The causes are complex, including algal blooms, sewerage and stormwater discharge and deoxygenation after flooding. Pesticides appear to have also played a part. One of the industries to suffer has been the oyster farms near the river mouth at Ballina — a place name derived from the local Bundjalung word apparently meaning 'place of many oysters.' Over a million oysters were produced from the Richmond every year for decades, but now the oysters often die after significant rainfall, and the annual harvest is down to as few as 100,000. University of Queensland research published in 2010 found that as little as 5 parts per billion of insecticide, fungicide or wetting agent has a dramatic impact on the hormone function of oysters. Some pesticides (including surfactants) also appear to impact on the endocrine function of shellfish and fish. The Richmond River catchment has large areas devoted to horticulture, cane farms and other crops such as soya beans. Measures that could help to reduce residues finding their way into the river include the use of smother grass and constructed wetlands on macadamia farms to reduce the sediment load in the river, more effective controls to prevent spray drift, less pesticide use and fencing and revegetating riparian areas as buffer zones. There is no routine, publicly accessible monitoring program to test for levels of pesticides in NSW rivers using techniques such as passive samplers.¹⁶

State and local

Pesticide use in NSW is regulated under the *Pesticides Act 1999*¹⁷ and *Pesticide Regulation 2009*.¹⁸ The Act makes it an offence to use a pesticide in a way that causes injury or likely injury to another person, damage or likely damage to another person's property, or harm to a non-target plant or animal, including threatened species or other protected animals.

The Act also requires that only APVMA registered or permitted pesticides be used; that instructions on the label be read and followed¹⁹; that pesticides be stored in properly labelled containers; and so on. The Act also provides for a range of remedies for breaches, ranging from penalty notices to substantial fines. However, there have been few successful prosecutions since the Act commenced in 2000.²⁰

The Regulation has additional requirements relating to record-keeping, training and notification. It also requires public authorities, such as local councils and government agencies, to have a **Pesticide Use Notification Plan**²¹ which establishes how the community will be notified when they use, or allow the use of, pesticides in public places that they own or control, such as parks and ovals. These plans must be available on the council's or agency's website.

Under the Regulation, pest management technicians or people who engage them also need to give at least five working days' notice of their intention to spray in the common areas of multiple occupancy residential complexes or within 20 metres of 'sensitive places' such as kindergartens, schools, nursing homes and community health centres.²²

Pesticide control orders can also be issued under section 38 of the Act to protect public health, property, the environment or trade, or to implement a decision or policy of the APVMA. There are control orders for endosulfan and 1080, among others. Control order Air-1 (1987) requires that

any person applying a pesticide from an aircraft shall not release, discharge or apply such pesticide within a distance of 150 metres horizontally from the boundary of any dwelling, school premises, factory premises, or any public place without the owner of the property on which the pesticide is applied or his/her nominee having obtained prior consent in writing from the occupier of the dwelling, school, factory, or public place, or person in charge, as the case may be...²³

Some local councils also maintain **chemical sensitivity registers** – that is, records of people who have notified them that they are either sensitive to particular chemicals, or organic growers whose certification requires them not to use pesticides and to

avoid any contamination from neighboring properties. Sometimes listing requires a medical certificate, while other councils only require self-identification. Councils should inform people on these registers when they are intending to spray on public land in their area, although they are not currently required to do so.

Birth defects

Gastroschisis is a birth defect that results in the baby being born with intestines and organs that form on the outside of the body through a hole in the abdominal wall, requiring surgery at birth. The cause of the birth defect is unknown and there appear to be many potential risk factors, including exposure to certain pesticides at a specific time during the early part of the pregnancy. Gastroschisis is reportedly on the increase worldwide.²⁴ The NSW rate was 2.4 per 10,000 over the past decade,²⁵ but was 11.2 per 10,000 in the north coast study area in 2008-2010.²⁶ Some parents of babies born with gastroschisis in the Northern Rivers have expressed concern that several studies have found associations between maternal exposure to pesticides such as atrazine and gastroschisis.^{27,28} However, a NSW Health study released in May 2011 argued that 'The epidemiologic evidence for an association between pesticides and herbicides and gastroschisis is poor and unconvincing',²⁹ and concluded that the high incidence in this region appears to be a 'random event.'³⁰

Are pesticides safe?

It is unlawful to promote or advertise any pesticide as 'safe'.³¹ All pesticides are designed to kill pests so they are inherently toxic.

The risk of adverse health or environmental effects from a pesticide occurs as a result of its inherent toxic properties, the concentration at which it is applied, and the potential for exposure to it. A highly toxic pesticide may only present a limited risk if there is no chance of exposure to it. On the other hand, a moderately toxic pesticide may present unacceptably high levels of risk if exposure to it is high, repeated or prolonged.³²

Some people and environments are inherently more sensitive to pesticide exposure than others. The risks to humans are different to the risks to native animals and plants, pets, livestock or aquatic environments. In general, pregnant and breastfeeding women, babies and children are far more susceptible to the toxic effects of pesticide exposures, as are people who are chemically sensitive, ill or elderly.³³

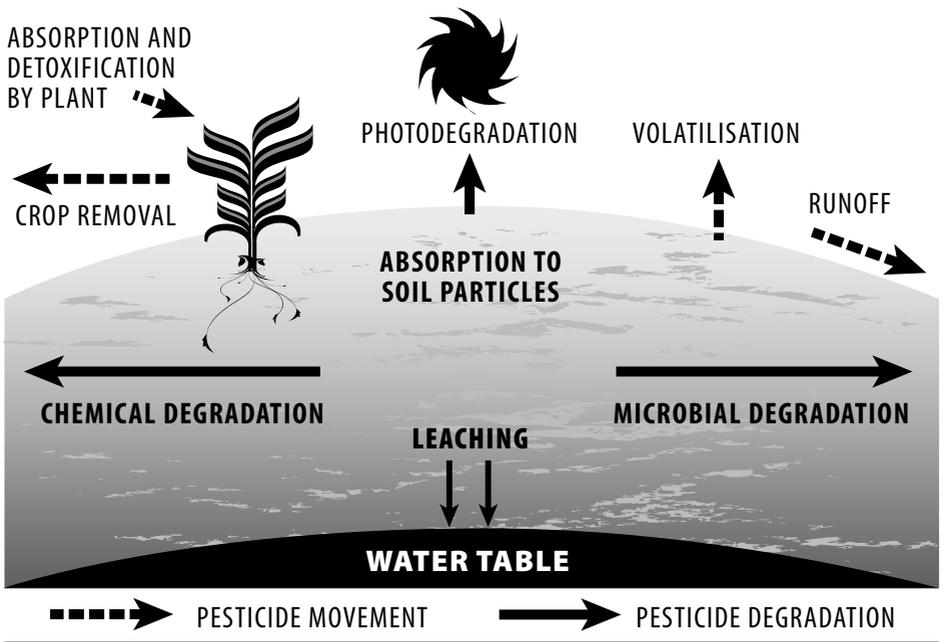
People and ecosystems also vary in their reactions to pesticide exposures, so it is difficult to make generalised statements about the risk posed by particular pesticides. Nevertheless, clinical trials, population studies and pollution records provide clear evidence of the hazard posed by some pesticides to human health and

the environment. The chemical class the pesticide belongs to gives an indication of the likely risks.

There may be impacts on health from breathing airborne pesticides, from touching residues on surfaces, coming into contact with contaminated dirt or dust, or drinking contaminated rainwater. Exposure can also occur indoors. Children's biology and behaviour places them at greater at risk of exposure and harm, as they are still rapidly developing and often eat dirt and play outside in close proximity to the ground.

Pesticides can also cause unintended damage to plants, pets and native animals.³⁴ They can enter waterways and cause fish kills and damage to other marine organisms, sometimes killing them in large numbers.³⁵ Some pesticides also have harmful impacts on native animals and plants even if they are not directly sprayed, since many animals are not aware of property boundaries and are not stopped by fences. Pesticides can drift cross-country or the runoff may pollute groundwater or surrounding forests and waterways. The impacts, whether one-off or cumulative, may take weeks, months or even years to become evident.

LIFE CYCLE OF PESTICIDES AND HOW THEY CAN AFFECT YOU



While the registration and labelling of pesticides in Australia are based on the APVMA's assessment of the available scientific evidence, there are often significant gaps in the scientific data that prevent a comprehensive assessment of toxicity and risks. For instance, it is difficult to conduct studies of long-term, low-dose exposures to human populations and ecosystems, including exposures to pesticide mixtures, before a chemical is registered for use. Whether such studies are ever conducted often depends on government funding or university or industry research priorities. As a result, many pesticides in common use have been inadequately researched for their potential long-term impacts.³⁶

What are my rights?

Ground spraying

As a neighbour, you have the right to expect that pesticides will be used in accordance with label instructions.³⁷

You have the right to expect that users will take appropriate precautions to ensure that neighbours and the environment will be protected from spray drift, runoff or any other offsite movement of pesticides.³⁸

You have the right to view the Pesticide Use Notification Plan prepared by public authorities for their pesticide use in the area and to be notified of intended pesticide use in accordance with the Plan.³⁹

You have the right to inform authorities if you believe your health or the environment has been adversely impacted by pesticides.

Where you have suffered damage as a result of another's pesticide use, you have the right to take a private common law action in court for damages against the pesticide user.⁴⁰

Neighbours do **not** have the right to be informed when another neighbour intends to spray or has sprayed pesticides on their land (although it is encouraged as part of 'best practice' by the NSW Farmers Association and industry bodies).

You do **not** have the right to be told which pesticides another neighbour intends to spray or has sprayed on their land.

You do **not** have the right to be informed when new pesticides are registered for potential use on crops on neighbouring land.

You do **not** have the right to take legal action under the *Pesticides Act or Regulation* for a breach of the law (this right only exists for the Minister for the Environment).

Aerial spraying

As a neighbour, you have the right to be asked for your prior consent in writing before aerial spraying occurs, and to refuse consent for aerial spraying, within 150 metres of your dwelling (including yards, gardens, garages and outhouses).⁴¹

Residential complexes

Residents have the right to be given at least 5 working days' notice of the intention to use pesticides in any common area of a residential complex,⁴² as well as during pesticide use.⁴³

Sensitive places

Those with the care, control or management of a sensitive place (a school, pre-school, kindergarten or childcare centre, community health centre or nursing home, but here not including a hospital) have the right to be given at least 5 working days before a pesticide is used within 20 metres of these places.⁴⁴

Glyphosate

Glyphosate⁴⁵ is said to be the most commonly used herbicide in the world,⁴⁶ and is likely to also be the most common in the Northern Rivers. It is now sold under many brand names, but was originally manufactured by Monsanto and has been sold since 1974 as **Roundup**.[®]

Glyphosate is used to control many broadleaved and narrow-leaved plants, especially deep-rooted perennials. It is non-selective (ie, harmful to all growing plants) and can persist in some soils for up to three years in cool climates and for 4-180 days in warmer climates.⁴⁷

Pure glyphosate is generally considered to have a low acute toxicity rating.⁴⁸ However, negative health and environmental effects have been noticed when it is mixed with other chemicals, especially surfactants,⁴⁹ in formulations available to the public.⁵⁰

Health studies overseas suggest a link between farmers using glyphosate and certain types of cancer, although it is unclear whether this is a function of past exposure to other agricultural chemicals, current exposure to glyphosate, or some other component of the formulation.⁵¹

Glyphosate is water-soluble and is 'increasingly found in the environment at levels that have caused significant effects on species that underpin the entire aquatic food chain. Glyphosate and/or Roundup[®] can alter the composition of natural aquatic communities, potentially tipping the ecological balance giving rise to harmful algal blooms.'⁵² The surfactant in some formulations has also been found to kill fish and tadpoles. Special care must, therefore, be taken when using it near waterways or wetlands. Recognition of this impact has led to the development of a formulation with a surfactant which is believed to be less toxic to amphibians.

What should I do if I am concerned?

If you believe you, your family, house, land, water supply or animals may have been affected by spray drift, without endangering yourself, talk to your neighbour or whoever is spraying nearby and try to find out what pesticide they are using. If they won't tell you, or if you suspect that spraying is contrary to the label or unsafe, contact the NSW Office of Environment and Heritage (OEH) information line (**131 555**) and report the incident. Compliance with the Act and Regulation are its responsibility. OEH should also report all adverse incidents to the APVMA. Individuals can also make an adverse incident report directly to the APVMA.

It is helpful to keep a written record including information about the weather conditions and details of the incident. You can also take photographs or video footage of the application. You may also need to take soil and water samples as soon as possible after exposure has occurred and have them tested at an accredited testing laboratory such as the National Measurement Institute. This may be relevant where you believe pesticide residue may have affected your water supply or streams, or the lawn or soil that children play on, or if you have observed unusual animal deaths or vegetation dieback.

More detailed information on spray drift incidents, including a Reporting Form, can be found in the NTN booklet *Community Information and Action Kit: The Threat of Pesticide Spray Drift (2009)*.

1080 vertebrate poison

Sodium fluoroacetate (1080) is listed on the APVMA database as a dangerous poison. According to the PAN Pesticides Database it is acutely toxic and is a known developmental or reproductive toxin. On the NSW Northern Rivers, it can potentially be used on any private or public land. It is used primarily as a bait to control foxes and wild dogs. However, it is listed as a 'restricted chemical product' in the Agvet Code and in NSW is the subject of Pesticide Control (1080 Liquid Concentrate and Bait Products) Order 2010. It can only be used by authorised people to control particular pest animals and, in specified circumstances that minimise the risk to people, non-target animals and surface and groundwater.

Top ten toxics

This is a list of some of the most toxic chemicals which may be in use in the Northern Rivers, selected on the basis of their hazard rating and known risks, and relies on the same data sources as the table. This does not mean that any use on crops or weeds according to labels is hazardous.

2,4-D (Dichlorophenoxyacetic acid) is a phenoxy herbicide used on cereal grass crops (such as corn), macadamias, pastures and sugarcane. It is a possible carcinogen and potential groundwater contaminant. It is rated as a poison by the APVMA. It is not approved for use on lawns and gardens in some countries. In May 2010 the APVMA announced that it had commenced a review of the spray drift risk associated with its use, after a scientific risk analysis found that 'it can pose risks to aquatic organisms, non-target terrestrial vegetation and neighbouring crops.'⁵³

ATRAZINE is a triazine herbicide used on sugarcane. It is a carcinogen, groundwater contaminant and suspected endocrine disruptor. It was prohibited in the European Union (EU) in 2003 because of concerns about groundwater contamination. It is currently under investigation by the United States Environmental Protection Agency (EPA) for health impacts. Atrazine and diuron residues from sugarcane farms have been found to be harming the health of the Great Barrier Reef.⁵⁴ The APVMA conducted a review of atrazine from 1995-2008, as a result of which (along with other minor changes) label instructions were amended to reduce the risk of atrazine entering waterways.⁵⁵ (SIMAZINE also belongs to the triazine group of herbicides and is chemically similar. The APVMA stated in June 2009 that it would commence a review of simazine within the next six months, but it does not appear to have formally commenced.)⁵⁶

CARBENDAZIM is a carbamate-benzimidazole fungicide used on macadamias and stonefruit. It is a possible carcinogen and suspected endocrine disruptor. It causes birth defects in laboratory animals. Women of childbearing age should avoid contact.⁵⁷ It is rated as a poison by the APVMA. It has been under review since 2007 'because of occupational health and safety, residue and public health concerns' after advice that 'exposure to carbendazim and compounds that can form it (namely, benomyl) could cause developmental abnormalities in experimental animals and hence might pose a potential public and occupational health and safety risk to people.'⁵⁸ Label approvals were suspended and new instructions issued in 2007.

CARBOFURAN is a carbamate insecticide and nematocide used locally on sugarcane to control nematodes. It is a potential water contaminant and suspected endocrine disruptor and is highly toxic to birds. It is rated as a dangerous poison by the APVMA. Its use is under review and registered products containing carbofuran are being withdrawn from the Australian market.⁵⁹

CHLORPYRIFOS is an organophosphorus insecticide used on a wide range of fruit and vegetable crops, sugarcane, cotton, cereals and pastures, in termite management, and on home gardens and domestic pests. It has a “caution” rating from the APVMA, but is on the USEPA list as a suspected hormone disruptor. The APVMA has been reviewing it since 1996 because of its human toxicity, acute toxicity to birds, water pollution potential and other factors. It released interim review findings in 2000 and 2009, but it is unclear whether all the recommendations made have been implemented. The APVMA has identified chlorpyrifos in its priority list of chemicals to be assessed for spray drift risks due to human health and environmental concerns. In the EU, chlorpyrifos is authorised but only for limited purposes. Chlorpyrifos is also registered in the US but its use there is also more restricted.

DIMETHOATE is an organophosphorous insecticide used on avocados, stonefruit, tea tree and vegetables. It is a possible carcinogen, cholinesterase inhibitor, water contaminant, developmental or reproductive toxin and suspected endocrine disruptor. It is rated as a poison by the APVMA. In August 2011 the APVMA announced it proposes to suspend its use because of unacceptable dietary risks posed by residues in food. The outcome is yet to be finalised.⁶⁰

Reducing reliance on pesticides

Many farmers use integrated pest management (IPM) to manage pests while minimising environmental impacts. IPM combines strategies such as biological (eg, beneficial insects), physical (eg, traps) and cultural (eg, species selection) controls, underpinned with an understanding of the lifecycle and biology of the pests being managed. The broadscale use of pesticides is considered a last resort. IPM is tailored to each crop and for each pest.⁶¹

Organic produce is grown and processed without the use of synthetic chemicals, fertilisers, or genetically modified organisms with a focus on environmentally sustainable practices and improving soil and land health. Many organic growers are ‘certified organic’ which means they must comply with strict standards that are independently audited.⁶²

Organic producers in the Northern Rivers grow a diverse range of crops including macadamias, coffee, bananas, garlic, ginger, flowers, native foods, rice, soya beans, fruit and vegetables (except stone and pome fruits).

Cattle tick dip sites

Between 1920 and the 1980s, approximately 1,647 cattle tick dips were built between the Queensland border and Grafton and west to Tenterfield: the Dip Quarantine Area.⁶³ Arsenic insecticides were used until the mid-1950s, when most dips were converted to DDT, which continued to be used until 1962. Each time the dip was cleaned or emptied, the chemical contents were emptied into a burial pit close by or onto the ground next to the dip-bath, which became known as the 'scooping mound'. By 1962, the use of DDT in dips was replaced with a range of other tickicides including carbamates, organophosphates and pyrethroids. Documents obtained from freedom of information requests to the NSW Department of Agriculture in 1991 showed extremely high contamination levels of DDT, arsenic and organophosphates in the soil surrounding the dips.⁶⁴ Residents can find out where dips are situated by going to www.dpi.nsw.gov.au and typing "dip sites" into the search box. However, no information is provided on the contamination levels. For land purchasers, additional information about land contamination, including site contamination reports, where known, is supplied on the Section 149 certificates issued by local councils. 41 houses built on top of former dip sites were bought back by the NSW Government in the late 1990s, but not all were demolished.⁶⁵

PARAQUAT is a bipyridilium herbicide used on macadamias and tea tree. It is a potential water contaminant and suspected endocrine disruptor. It is rated as a dangerous poison by the APVMA and has been under review since 1995 'because of concerns over the potential risk to occupational health and safety and the environment.'⁶⁶ (**DIQUAT** also belongs to the bipyridilium group of herbicides and is chemically similar, and has been under review since 1997.)⁶⁷

PARATHION (or methyl-parathion) is an organophosphorous insecticide used on cereal crops, fruit trees and vegetables. It is a possible carcinogen, cholinesterase inhibitor, potential groundwater contaminant and suspected endocrine disruptor. It is rated as a dangerous poison by the APVMA and has been under review since 1996 'because of concerns over worker health and safety, and the potential for adverse environmental effects, including its high toxicity to bees.'⁶⁸ It is banned or restricted in 23 countries including the EU (in 2006) and is proposed by WHO for a global ban.



The end of endosulfan

Endosulfan is an organochlorine insecticide which has been widely used for decades on a range of agricultural and horticultural crops, including macadamias and avocados in the Northern Rivers. It is a suspected endocrine (hormone) disruptor. It was rated as a dangerous poison by the APVMA and was reviewed from 1995-2005; restrictions were strengthened but its registration was only withdrawn in October 2010, shortly before it was listed under the *Stockholm Convention on Persistent Organic Pollutants* for a global ban.⁶⁹ Although a 2-year phase out period was allowed, it was banned in Australia due to 'Concerns over the impact from spray drift and runoff of endosulfan on aquatic organisms, together with new information indicating that endosulfan is persistent, bioaccumulates and has the potential to travel long distances.'⁷⁰ In 2010 the NTN sampled 6 rainwater tanks in close proximity to macadamia farms in the Northern Rivers and found traces of endosulfan in all samples.

About the table

The table only includes active ingredients that have either been prohibited (or are scheduled to be prohibited) in the European Union, or which are rated as 6 (poison) or 7 (dangerous poison) in the APVMA database.⁷¹

ACTIVE INGREDIENT

The active constituent *only* in the most common formulation/s for the use specified. The active ingredient may not be the only, or even the most, toxic ingredient.⁷²

FUNCTION

The product type listed on the APVMA database.

EU STATUS

Whether the product is permitted to be sold in EU countries, and if so until when.⁷³

RISKS

Carcinogen

Describes whether the chemical can cause cancer or not. This data is taken from the list of carcinogenic substances recognised by the International Agency for Research on Cancer.⁷⁴ The information on the following risks is derived from the PAN pesticide database.⁷⁵

Water Contaminant

Describes whether the chemical can contaminate drinking water wells.⁷⁶

Developmental or Reproductive Toxin

Describes whether the chemical is believed to interfere with fetal or child development, or to reduce fertility.

Endocrine Disruptor

Describes whether the chemical interferes with the systems that produce hormones in the body.

HAZARD WARNING

Refers to the poison schedule rating on the APVMA database, which follows the Poison Standard 2010.⁷⁷

Poison = Schedule 6: Substances with a moderate potential for causing harm, the extent of which can be reduced through the use of distinctive packaging with strong warnings and safety directions on the label.

Dangerous poison = Schedule 7: Substances with a high potential for causing harm at low exposure and which require special precautions during manufacture, handling or use. These poisons should be available only to specialised or authorised users who have the skills necessary to handle them safely. Special regulations restricting their availability, possession, storage or use may apply.

CROP

Lists on which of the following crops or uses on the NSW Northern Rivers the active ingredient is registered by the APVMA: *Avocado / Banana / Blueberry / Coffee / Forestry / Macadamia / Public land / Soybean / Stonefruit / Sugarcane / Tea tree*

Active ingredient	Function	EU status	Risks	APVMA hazard warning	Crop
2,4-D	Herbicide	Included until 2015	Possible carcinogen Potential water contaminant Developmental or reproductive disruptor Suspected endocrine disruptor	Poison	Soybean Sugarcane
Abamectin (Avermectin)	Miticide	Included until 2018	Developmental or reproductive disruptor Suspected endocrine disruptor	Poison	Soybean
Acephate	Insecticide	Prohibited in EU	Possible Carcinogen Potential water contaminant Suspected endocrine disruptor	Poison	Avocado Banana Macadamia
Acifluorfen	Herbicide	Prohibited in EU	Known/probable carcinogen	Poison	Soybean
Aldicarb	Insecticide Nematicide	Prohibited in EU	Water contaminant Suspected endocrine disruptor	Dangerous poison	Sugarcane
Alpha-Cypermethrin	Insecticide	Included until 2015	Suspected endocrine disruptor	Poison	Stonefruit
Aluminium Phosphide	Mixed function pesticide	Included until 2019	Limited information available in database	Dangerous poison	Coffee
Ametryn	Herbicide	Prohibited in EU	Potential water contaminant	Caution	Sugarcane
Atrazine	Herbicide	Prohibited in EU	Known/probable carcinogen Water contaminant Suspected endocrine disruptor	Caution	Sugarcane
Azinphos-Methyl	Insecticide	Prohibited in EU	Potential water contaminant	Dangerous poison	Blueberry Macadamia
Bendiocarb	Insecticide	Prohibited in EU	Developmental or reproductive disruptor	Caution	Avocado Banana
Beta-cyfluthrin	Insecticide	Included until 2013	Limited information available in database	Poison	Avocado Macadamia
Bifenthrin	Insecticide Miticide Termiticide	Prohibited in EU	Possible carcinogen Developmental or reproductive toxin Suspected endocrine disruptor	Poison	Avocado Banana Stonefruit Sugarcane
Cadusafos (aka Ebufos)	Insecticide Nematicide	Prohibited in EU	Limited information available in database	Dangerous poison	Avocado Banana Sugarcane
Captan	Fungicide	Included until 2017	Known/probable carcinogen	Poison	Stonefruit
Carbaryl	Insecticide Parasiticide	Prohibited in EU	Known/probable carcinogen Potential water contaminant Developmental or reproductive toxin Suspected endocrine disruptor	Poison	Avocado Macadamia Stonefruit

Active ingredient	Function	EU status	Risks	APVMA hazard warning	Crop
Carbendazim	Fungicide	Included until 2011	Possible carcinogen Suspected endocrine disruptor	Poison	Avocado Banana Macadamia Stonefruit Sugarcane
Carbofuran	Insecticide Nematicide	Prohibited in EU	Potential water contaminant Suspected endocrine disruptor	Dangerous poison	Sugarcane
Chlorothalonil	Fungicide	Included until 2016	Known/probable carcinogen Potential water contaminant	Poison	Avocado Banana
Chlorpyrifos	Insecticide	Included until 2016	Suspected endocrine disruptor	Poison	Avocado Banana Coffee Soybean Stonefruit Sugarcane
Chlorthal Dimethyl (DCPA)	Herbicide	Prohibited in EU	Possible carcinogen Water contaminant	Caution	Soybean
Clothianidin	Insecticide	Included until 2016 with additional provisions to protect honey bees	Potential water contaminant	Caution	Avocado Banana Sugarcane
Copper Compounds	Fungicide	Included until 2016	Copper oxychloride only: Suspected endocrine disruptor	Poison	Avocado Banana Macadamia Stonefruit
Coumatetralyl	Vertebrate poison	Prohibited in EU	Limited information available in database	Poison	Macadamia
Cypermethrin	Insecticide	Included until 2016	Possible carcinogen Suspected endocrine disruptor	Poison	Soybean
Cyproconazole	Fungicide	Included until 2021 after re-submission	Known/probable carcinogen	Caution	Stonefruit
Deltamethrin	Insecticide until 2013	Included	Limited information available in database	Poison	Soybean
Diazinon	Insecticide Parasiticide	Prohibited in EU	Potential water contaminant Developmental or reproductive toxin Suspected endocrine disruptor	Poison	Avocado Banana Macadamia Soybean Stonefruit Sugarcane
Dicamba	Herbicide	Included until 2018	Potential water contaminant Developmental or reproductive disruptor	Poison	Sugarcane

Active ingredient	Function	EU status	Risks	APVMA hazard warning	Crop
Dichlobenil	Herbicide	Prohibited in EU	Possible carcinogen Potential water contaminant	Poison	Banana Tea Tree
Dichlorvos (aka DDVP)	Insecticide Parasiticide	Prohibited in EU	Known/probable carcinogen Suspected endocrine disruptor	Poison	Avocado
Dicofol	Miticide	Prohibited in EU	Possible carcinogen Suspected endocrine disruptor	Caution	Banana Stonefruit
Didecyldimethyl ammonium chloride	Fungicide	Included until 2019	Limited information in database	Poison	Sugarcane
Dimethoate	Insecticide	Included until 2017	Possible carcinogen Potential water contaminant Developmental or reproductive disruptor Suspected endocrine disruptor	Poison	Avocado Banana Blueberry Forestry Soybean Stonefruit Tea Tree
Diquat	Herbicide	Included until 2015	Potential water contaminant	Dangerous poison	Avocado Banana Macadamia Stonefruit Sugarcane Tea Tree
Dithianon	Fungicide	Included until 2021 after re-submission	Possible carcinogen	Poison	Stonefruit
Diuron	Herbicide	Included under very strict conditions	Known/probable carcinogen Potential water contaminant Developmental or reproductive disruptor Suspected endocrine disruptor		Avocado Banana Coffee Sugarcane
Esfenvalerate	Insecticide	Included until 2015	Suspected endocrine disruptor	Poison	Avocado Soybean
Ethephon	Growth regulator	Included until 2017	Limited information in database	Poison	Macadamia Sugarcane
Fenamiphos	Insecticide Nematicide	Included until 2017	Potential water contaminant	Dangerous poison	Avocado Banana Sugarcane
Fenbutatin	Insecticide	Included until 2021 after re-submission	Developmental or reproductive toxin Suspected endocrine disruptor	Poison	Avocado Banana
Fenthion	Insecticide	Prohibited in EU	Potential water contaminant Suspected endocrine disruptor	Poison	Avocado Banana Stonefruit

Active ingredient	Function	EU status	Risks	APVMA hazard warning	Crop
Fipronil	Insecticide Parasiticide Vertebrate Poison	Included until 2017 with additional provisions to protect honey bees	Possible carcinogen Potential water contaminant Suspected endocrine disruptor	Poison	Avocado Banana Sugarcane
Fluazifop-P	Herbicide	Prohibited in EU	Limited information in database	Poison	Avocado Banana Blueberry Soybean Stonefruit Tea Tree
Flumioxazin	Herbicide	Included until 2015	Limited information in database	Dangerous Poison	Soybean
Flupropanate	Herbicide	Not included in database	Limited information in database	Poison	Soybean
Flusilazole	Fungicide	Included pending a judgement	Limited information in database	Poison	Sugarcane
Haloxifop	Herbicide	Prohibited in EU	Limited information in database	Poison	Avocado Banana Blueberry Soybean Stonefruit
Haloxifop-R	Herbicide	Included until 2021 after re-submission	Limited information in database	Poison	Avocado Banana Blueberry Forestry Soybean Stonefruit
Hexazinone	Herbicide	Prohibited in EU	Water contaminant	Caution	Sugarcane
Hexythioazox	Miticide	Not included in database	Known/probable carcinogen	Poison	Stonefruit
Hydramethylnon	Insecticide	Prohibited in EU	Possible carcinogen Developmental or reproductive toxin	Poison	Avocado
Imidacloprid	Insecticide	Included with additional provisions to protect honey bees	Potential water contaminant	Poison	Sugarcane
Iodine	Fungicide	Not included in database	Limited information in database	Poison	Avocado Banana Blueberry Stonefruit
Maldison (Malathion)	Insecticide	Included until 2020 after re-submission	Possible carcinogen Potential water contaminant Suspected endocrine disruptor	Poison	Stonefruit

Active ingredient	Function	EU status	Risks	APVMA hazard warning	Crop
MCPA	Herbicide	Included until 2016	Possible carcinogen	Poison	Sugarcane
Mercury as Methoxy Ethyl Mercury Chloride	Mercury Fungicide	Prohibited in EU	Known/probable carcinogen Developmental or reproductive toxin Suspected endocrine disruptor	Dangerous poison	Sugarcane
Metalaxyl	Fungicide	Included until 2020 after re-consideration	Potential water contaminant	Poison	Macadamia Soybean
Methidathion	Insecticide	Prohibited in EU	Possible carcinogen Potential water contaminant	Dangerous poison	Avocado Coffee Macadamia Stonefruit
Methomyl	Insecticide	Included until 2019 after re-submission	Potential water contaminant Suspected endocrine disruptor	Dangerous poison	Stonefruit Tea Tree
Metribuzin	Herbicide	Included until 2017	Potential water contaminant Developmental or reproductive toxin Suspected endocrine disruptor	Poison	Soybean Sugarcane
MSMA	Herbicide	Prohibited in EU	Known/probable carcinogen Potential water contaminant	Dangerous poison	Sugarcane
Oxyfluorfen	Herbicide	Prohibited in EU	Possible carcinogen Developmental or reproductive toxin	Dangerous poison	Coffee Macadamia Forestry
Omethoate	Insecticide	Prohibited in EU	Suspected endocrine disruptor	Dangerous poison	Avocado Banana Tea Tree
Oxadiazon	Herbicide	Included until 2018	Known/probable carcinogen Developmental or reproductive toxin	Poison	Tea Tree
Oxamyl	Nematicide	Included until 2016	Limited information in database	Dangerous poison	Avocado Banana
Paraquat as Paraquat Dichloride	Herbicide	Prohibited in EU	Potential water contaminant Suspected endocrine disruptor	Dangerous poison	Avocado Banana Blueberry Macadamia Soybean Stonefruit Sugarcane Tea Tree
Parathion - Methyl	Insecticide	Prohibited in EU	Possible carcinogen Potential water contaminant Suspected endocrine disruptor	Dangerous poison	Stonefruit

Active ingredient	Function	EU status	Risks	APVMA hazard warning	Crop
Permethrin	Insecticide Parasiticide Mixed function seed treatment Parasiticide	Prohibited in EU	Known/probable carcinogen Suspected endocrine disruptor	Poison	Sugarcane
Phosphine	Insecticide	Not included in database	Limited information in database	Dangerous poison	Coffee
Pidoram	Herbicide	Included until 2018	Water contaminant	Poison	Forestry
Pine Oil	Herbicide	Not included in database	Limited information in database	Poison	Stonefruit
Pirimicarb	Insecticide	Included until 2017	Known/probable carcinogen	Poison	Blueberry Stonefruit
Prochloraz	Fungicide	Prohibited in EU	Possible carcinogen Suspected endocrine disruptor	Poison	Avocado Banana Sugarcane
Procymidone	Fungicide	Prohibited in EU	Known/probable carcinogen Suspected endocrine disruptor	Dangerous poison	Stonefruit
Propargite	Miticide	Prohibited in EU	Known/probable carcinogen Developmental or reproductive toxin	Poison	Avocado Banana Stonefruit
Propiconazole	Fungicide	Included until 2014	Possible carcinogen Potential water contaminant Developmental or reproductive disruptor Suspected endocrine disruptor	Poison	Avocado Banana Stonefruit Sugarcane
Prothiofos	Insecticide	Prohibited in EU	Limited information in database	Poison	Avocado Banana
Pyridaben	Miticide	Included until 2021 after re-submission	Limited information in database	Caution	Avocado Banana
Simazine	Herbicide	Prohibited in EU	Water contaminant Developmental or reproductive toxin Suspected endocrine disruptor	Caution	Forestry Soybean
Tebuthiuron	Herbicide	Prohibited in EU	Potential water contaminant Developmental or reproductive toxin	Poison	Tea Tree
Terbufos	Mixed function pesticide	Prohibited in EU	Limited information in database	Dangerous poison	Avocado Banana
Thiadoprid	Insecticide	Included until 2014	Known/probable carcinogen	Poison	Stonefruit
Thiram	Fungicide	Included until 2014	Developmental or reproductive toxin Suspected endocrine disruptor	Poison	Stonefruit

Active ingredient	Function	EU status	Risks	APVMA hazard warning	Crop
Triadimefon	Fungicide	Prohibited in EU	Possible carcinogen Potential water contaminant Developmental or reproductive disruptor Suspected endocrine disruptor	Poison	Sugarcane
Triadimenol	Fungicide	Included until 2017	Developmental or reproductive toxin Possible carcinogen Suspected endocrine disruptor	Poison	Sugarcane
Trichlorfon	Insecticide	Prohibited in EU	Known/probable carcinogen Endocrine disruptor	Poison	Avocado Blueberry Macadamia Soybean Stonefruit Sugarcane
Tridopyr	Herbicide	Included until 2017	Potential water contaminant	Poison	Public Land
Zeta-Cypermethrin	Insecticide	Included until 2019	Possible carcinogen Endocrine disruptor	Poison	Soybean
Zinc Phosphide	Vertebrate Poison	Included until 2021 after re-submission	Developmental or reproductive toxin	Dangerous poison	Sugarcane
Zineb	Fungicide	Prohibited in EU	Developmental or reproductive disruptor Suspected endocrine disruptor	Caution	Avocado Banana
Ziram	Fungicide	Included until 2014	Possible carcinogen Developmental or reproductive toxin Suspected endocrine disruptor	Poison	Stonefruit

More information

AUSTRALIAN GOVERNMENT TEACHING MODULE ON MANAGING CHEMICAL RISK

www.environment.gov.au/education/publications/epa/modules/module5.html

AUSTRALIAN PESTICIDES AND VETERINARY MEDICINES AUTHORITY

www.apvma.gov.au

BEAUFORT WIND SPEED SCALE

www.bom.gov.au/cyclone/about/intensity.shtml#WindB

BEYOND PESTICIDES

www.beyondpesticides.org

ENVIRONMENTAL DEFENDER'S OFFICE NSW

www.nsw.edo.org.au

INTERNATIONAL CHEMICAL SAFETY CARDS

www.cdc.gov/niosh/ipcsneng/nengsyn.html

INTERNATIONAL POPS ELIMINATION NETWORK (IPEN)

www.ipen.org

NATIONAL MEASUREMENT INSTITUTE

www.measurement.gov.au

NATIONAL TOXICS NETWORK

www.ntn.org.au

NSW GOVERNMENT PESTICIDES SITE

www.environment.nsw.gov.au/pesticides

PESTICIDE ACTION NETWORK DATABASE

www.pesticideinfo.org

PESTICIDE SPRAY DRIFT KIT

www.ntn.org.au/ntndocs/ntn_spraydrift.pdf

RURAL LANDHOLDERS GUIDE

www.edo.org.au/edonsw/site/pdf/pubs/rural_landholders_2nd_ed.pdf

SAFER SOLUTIONS (TOTAL ENVIRONMENT CENTRE)

www.saferolutions.org.au/a-z-of-chemicals

TOXIPEDIA

www.toxipedia.org

WWF/NTN LIST OF AUSTRALIA'S MOST DANGEROUS PESTICIDES

www.wwf.org.au/publications/alistofaustraliasmostdangerouspesticides.pdf

Notes

- 1 The ChemClear program aims to reduce the quantity of obsolete chemicals stored on properties and in businesses across Australia: see www.chemclear.com.au .
- 2 For the regulation of contaminated land in NSW, see the *Contaminated Land Management Act 1997*.
- 3 See APVMA, APVMA operating principles in relation to spray drift risk, July 2008, 4.
- 4 See http://www.apvma.gov.au/publications/fact_sheets/docs/about_apvma.pdf .
- 5 See <http://www.apvma.gov.au/about/legislation> .
- 6 See <http://www.comlaw.gov.au/Details/C2011C00506>, preamble .
- 7 (C'th) *Agricultural and Veterinary Chemicals Code Act 1994*, Part 2.
- 8 (C'th) See www.apvma.gov.au/registration/label/index.php .
- 9 (C'th) *Agricultural and Veterinary Chemicals Code Act 1994*, Part 7.
- 10 See Schedule 4 of the AgVet Code. Restricted pesticides include bifenthrin, chlorpyrifos and sodium monofluoroacetate (or 1080) fox bait, all of which are used in the NSW Northern Rivers.
- 11 See http://www.apvma.gov.au/publications/fact_sheets/docs/about_apvma.pdf .
- 12 As identified in this booklet; for the APVMA's view, see http://www.apvma.gov.au/news_media/community/2010-09_pesticides_some_countries.php .
- 13 See <http://www.apvma.gov.au/products/review/index.php> .
- 14 For instance, in April 2010 the APVMA suspended approval for quintozone to be used in Australia following a risk assessment that showed it could contain unacceptable levels of dioxin: see www.apvma.gov.au/news_media/chemicals/quintozone.php .
- 15 See www.daff.gov.au/agriculture-food/food/regulation-safety/ag-vet-chemicals/better-regulation-of-ag-vet-chemicals .
- 16 Information supplied by aquatic veterinarian Dr Matt Landos.
- 17 For more information about the Act, go to www.environment.nsw.gov.au/legislation/DECCActsummaries.htm#pa .
- 18 For more information about the Regulation, go to www.environment.nsw.gov.au/legislation/DECCRegulationsummaries.htm#PestReg09 .
- 19 (NSW) *Pesticides Act 1999* ss. 10, 10, 11, 13, 14, 16.
- 20 See the annual reports since 2000 from DEC/DECC/DECCW/OEH. OEH does sometimes use other environmental statutes to regulate serious incidents involving pesticides including the *Protection of the Environment Operations Act* and the *Threatened Species Conservation Act* (personal communication, DECCW officer).
- 21 (NSW) *Pesticide Regulation 2009* s. 19; See http://www.environment.nsw.gov.au/pesticides/pesticide_notification.htm .
- 22 (NSW) *Pesticide Regulation 2009* s. 27.
- 23 *Pesticide Control Order 1987 Air-1*: see <http://www.environment.nsw.gov.au/pesticides/pco.htm> .
- 24 Mastroiacovo, P., et al (2006) The incidence of gastroschisis, *British Medical Journal*, 2006 February 18; 332(7538), 423–424.
- 25 Review of gastroschisis on the NSW North Coast, NSW Health 30 May 2011, Table 1, 3.
- 26 Review of gastroschisis on the NSW North Coast, NSW Health 30 May 2011, Table 2, 5.
- 27 Waller, S., et al (2010) Agricultural-related chemical exposures, season of conception, and risk of gastroschisis in Washington State, *American Journal of Obstetrics & Gynecology* 202, 3.
- 28 Mattix, K.D., (2007) Incidence of abdominal wall defects is related to surface water atrazine and nitrate levels, *Journal of Pediatric Surgery* 42, 6.
- 29 Review of gastroschisis on the NSW North Coast, NSW Health, 30 May 2011, 8.

- 30 Review of gastrochisis on the NSW North Coast, NSW Health, 30 May 2011, 7.
- 31 The publication of certain statements about chemical products is prohibited under Section 89 of the Agvet Codes: see www.apvma.gov.au/about/legislation . The NSW Agvet Code is a Schedule to the *Agricultural and Veterinary Chemicals Code Act 1994*.
- 32 See APVMA, How the APVMA Determines the Size of Protective No-Spray Zones (5 September 2008): http://www.apvma.gov.au/users/spray_drift.shtml .
- 33 See <http://npic.orst.edu/health/humhealth.html> .
- 34 See, eg, Barnet Rattner (2009), History of wildlife toxicology, *Ecotoxicology* 18, 773-783.
- 35 See, eg, Daniel Oros and Inge Werner (2005), Pyrethroid Insecticides: An Analysis of Use Patterns, Distributions, Potential Toxicity and Fate in the Sacramento-San Joaquin Delta and Central Valley. White Paper for the Interagency Ecological Program. SFEI Contribution 415. San Francisco Estuary Institute, Oakland, CA; Caroline Geeraerts and Claude Belpaire (2010), The effects of contaminants in European eel: a review, *Ecotoxicology* 19, 239-266; and D W Kelly et al (2010), Synergistic effects of glyphosate formulation and parasite infection on fish malformations and survival, *Journal of Applied Ecology* 47 (2), 1-7.
- 36 This is the considered view of the NTN after 18 years of research and advocacy on pesticides issues.
- 37 (NSW) *Pesticides Act 1999*, s 15.
- 38 (NSW) *Pesticides Act 1999*, ss 7-11.
- 39 (NSW) *Pesticides Regulation 2009*, s 19.
- 40 This type of legal action would normally involve an allegation of the tort of negligence, trespass or nuisance.
- 41 (NSW) *Pesticide control order Air-1 (1987)*: see <http://www.environment.nsw.gov.au/pesticides/pco.htm> .
- 42 (NSW) *Pesticides Regulation 2009*, s 25.
- 43 (NSW) *Pesticides Regulation 2009*, s 26.
- 44 (NSW) *Pesticides Regulation 2009*, s 27.
- 45 The information in this section is adapted from the Glyphosate page on the Safer Solutions website: <http://safersolutions.org.au/a/95-glyphosate> . For a 2011 media report summarising recent scientific, legal and regulatory news in the US concerning glyphosate, see <http://www.reuters.com/article/2011/04/08/glyphosate-epa-idUSN0819166920110408>.
- 46 According to Glyphosate Monograph, Pesticide Action Network Asia Pacific (2009): <http://www.panap.net/en/p/post/pesticides-info-database/115> .
- 47 Glyphosate Mongraph, Pesticide Action Network Asia Pacific (2009): <http://www.panap.net/en/p/post/pesticides-info-database/115> .
- 48 However, In 2009 France's Supreme Court upheld earlier decisions by two lower courts that Monsanto had falsely advertised its herbicide as 'biodegradable' and 'left the soil clean': see Monsanto guilty in 'false ad' row, BBC News, 15 October 2009: <http://news.bbc.co.uk/2/hi/8308903.stm> .
- 49 Surfactants (surface active agents) are detergents or other agents which reduce the surface tension of the active ingredient so it is more easily absorbed by plants or animals: see, eg, Toshiyuki Katagi, Surfactant Effects on Environmental Behavior of Pesticides, (2008) *Reviews of Environmental Contamination and Toxicology*, 71-177.
- 50 From the Toxipedia article on Glyphosate, referring to papers by Richard, et al, (2005) and Watts and Mcfarlane, (1999): see <http://www.toxipedia.org/display/toxipedia/Glyphosate> .
- 51 Glyphosate Mongraph, Pesticide Action Network Asia Pacific (2009): <http://www.panap.net/en/p/post/pesticides-info-database/115> .
- 52 Glyphosate Mongraph, Pesticide Action Network Asia Pacific, 2009, 2 <http://www.panap.net/en/p/post/pesticides-info-database/115> .
- 53 APVMA media release, 17 May 2010: http://www.apvma.gov.au/news_media/mediareleases/2010/mr2010-08.php .

- 54 See, eg, the 2 May 2009 media release from WWF: <http://www.wwf.org.au/news/apvma-wrong-to-defend-atrazine-wwf> .
- 55 <http://www.apvma.gov.au/products/review/completed/atrazine.php> .
- 56 http://www.apvma.gov.au/products/review/nominated/simazine_update.php .
- 57 APVMA Infopest labels <http://www2.dpi.qld.gov.au/extra/asp/infopest/nra/labels.asp?prodcode=53061>.
- 58 See <http://www.apvma.gov.au/products/review/current/carbendazim.php> .
- 59 See http://www.apvma.gov.au/products/review/nominated/carbofuran_update.php .
- 60 See <http://www.apvma.gov.au/products/review/current/dimethoate.php> .
- 61 For further information on IPM see *Integrated Pest Management for Crops and Pastures*, Paul Horne and Jessica Page (2008) Landlinks Press: <http://www.publish.csiro.au/pid/5840.htm> .
- 62 Local organic farmers Dave Forrest and Cath Ford assisted the NSW Department of Primary Industries to produce an Organic Macadamia Growing Fact Sheet (Primefact 685) which is available from www.dpi.nsw.gov.au. Further information about organic farming can be found at www.australianorganic.com.au and www.ofa.org.au .
- 63 For more information about cattle tick control in NSW, go to <http://www.dpi.nsw.gov.au/agriculture/livestock/health/specific/cattle/ticks/cattle-tick-control-nsw> .
- 64 Personal correspondence to Dr Mariann Lloyd-Smith from NSW Agriculture, North Coast Correspondence (ref. No. PJMcG:RAH) F.O.I. Application 'Cattle Tick Dip Sites (18 January 1991) Appendix 1 Pesticide Residues in Dip Yard Soils of the Tick Quarantine Area' (Spring 1980). See also Cattle Tick Dipsite Management Committee, DIPMAC Report on the Management of Contaminated Waste at Cattle Tick Dipsites in North Eastern NSW, Wollongbar Agricultural Institute NSW (March 1992).
- 65 Source: personal communication with Dr Mariann Lloyd-Smith, CoChair, International POPs Elimination Network and Senior Advisor, National Toxics Network, who served on the Cattle Tick Dip Site Management Committee from 1991-1994.
- 66 See <http://www.apvma.gov.au/products/review/current/paraquat.php> .
- 67 See <http://www.apvma.gov.au/products/review/current/diquat.php> .
- 68 See http://www.apvma.gov.au/products/review/current/parathion_methyl.php .
- 69 See <http://chm.pops.int/default.aspx> .
- 70 See http://www.apvma.gov.au/news_media/chemicals/endosulfan.php .
- 71 The regulatory system for pesticides in the EU is considered to be one of the most proactive in the world in protecting human health and the environment. Underpinning the EU's sustainable pesticide program was the systematic review of old pesticides against contemporary standards. Over 1000 pesticides were reviewed, resulting in 67% being removed from the market, 7% failing risk assessment and 26% approved for continued use: see http://ec.europa.eu/food/plant/protection/evaluation/rev_prog_exist_pest_en.htm .
- 72 More information on the various formulations may be found on the APVMA website (www.apvma.gov.au) by clicking on the 'Registered Products and Chemical Reviews' link on the left hand side of the homepage, then the 'PUBCRIS database' link, then entering the relevant crop in the field marked 'Host animal/crop'.
- 73 For more information see the EU Pesticides database: http://ec.europa.ed/sanco_pesticides/public/index.cfm .
- 74 See <http://monographs.iarc.fr/ENG/Classification/index.php> .
- 75 See www.pesticideinfo.org .
- 76 Does not include rainwater tanks, contamination of which is a risk in the Northern Rivers.
- 77 See Poison Standard 2010, Schedule 1 - Standard for the Uniform Scheduling of Medicines and Poisons No. 1, Commonwealth Department of Health and Ageing, Therapeutic Goods Administration, 1 September 2010, p. vi: <http://www.frli.gov.au/ComLaw/Legislation/LegislativeInstrument1.nsf/0/D41CD6A80FAF293ECA25778800280D92?OpenDocument> .

WANT TO KNOW WHICH PESTICIDES
COULD BE SPRAYED NEAR WHERE YOU LIVE,
AND WHAT YOU CAN DO ABOUT IT?

IF YOU LIVE IN THE NSW NORTHERN RIVERS
REGION, THIS BOOKLET WILL HELP YOU FIND OUT.



Produced by the Environmental Defender's Office NSW Northern Rivers
in association with the National Toxics Network