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Highly Hazardous Pesticides in the Pacific

August 2016
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NTN, PANANZ and PANAP would like to thank Emeritus Professor David Mowbray of Environmental Sciences and Geography at the University of Papua New Guinea for his primary research on pesticides available in Pacific island countries and territories.

We would also like to thank all those people who provided information on the pesticides registered, approved, imported and/or used in their countries. Without their assistance this report would not be possible.

Contents

Acronyms

a.i. – active ingredient
FAO – Food and Agriculture Organization of the United Nations
HHPs – highly hazardous pesticides
ICCM4 – Fourth International Conference on Chemicals Management
JMPM – WHO/FAO Joint Meeting on Pesticide Management
NTN – National Toxics Network
PAN – Pesticide Action Network
PFOS – Perfluorooctane sulfonic acid
POPRC – Persistent Organic Pollutants Review Committee of the Stockholm Convention
POPs – Persistent Organic Pollutants
SAICM – Strategic Approach to International Chemicals Management
UN – United Nations
UNEP – United Nations Environment Programme
WHO – World Health Organization

Countries (as used in tables):

AS – American Samoa
CI – Cook Islands
CNMI – Commonwealth of the Northern Marianna Islands
FP – French Polynesia
FSM – Federated States of Micronesia
Kir – Kiribati
NC – New Caledonia
Pal – Palau
PNG – Papua New Guinea
RMI – Republic of the Marshall Islands
Sam – Samoa
Sol – Solomon Islands
Ton – Tonga
Tuv – Tuvalu
Van – Vanuatu

1. Summary

At the Fourth International Conference on Chemicals Management (ICCM4)[1] in 2015, countries and other stakeholders in the UN's international voluntary agreement Strategic Approach to International Chemicals Management (SAICM), adopted a resolution addressing highly hazardous pesticides (HHPs). That resolution encouraged all stakeholders to implement the strategy on HHPs developed by the UN agencies FAO, UNEP, WHO,[2] which proposed the main steps to be:

a. identification of highly hazardous pesticides in use by comparing the list of registered pesticides against highly hazardous pesticide criteria;
b. conduct a needs and risk assessment for the identified highly hazardous pesticides;
c. establishment and implementation of appropriate risk mitigation measures. Risk mitigation measures can be of a regulatory or administrative nature and can vary from prohibition of products to training in the proper use of products.

This project, undertaken by the non-government organisations National Toxics Network, PAN Aotearoa New Zealand, and PAN Asia Pacific helps to address the first step – the identification of HHPs in Pacific island countries and territories.

Government officials in 21 countries/territories were approached for assistance in providing lists of pesticides registered/approved and/or imported. All, with the exception of the Territory of the Wallis and Futuna Islands, responded.

The country information is collated in this report and HHPs identified, based on the criteria developed by FAO/WHO Joint Meeting on Pesticide Management (JMPM) criteria, and on the additional criteria developed by Pesticide Action Network (PAN).

While smaller islands states and territories have few HHPs, some of the larger ones have a surprisingly high number. Special attention is drawn to the pesticides listed or undergoing review for listing under the Stockholm and Rotterdam Conventions.[3]

Information is provided on agroecological alternatives to HHPS, as recommended by the resolution at ICCM4, and further recommendations for action provided.

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[1] The International Conference on Chemicals Management (ICCM) implements the global voluntary agreement known as SAICM (Strategic Alliance for International Chemicals Management).
[2] Proposal on highly hazardous pesticides. SAICM/ICCM.4/8.
[3] Stockholm Convention on Persistent Organic Pollutants (www.pops.int) and Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (www.pic.int). The common goal of these conventions is the protection of human health and the environment from hazardous chemicals and pesticides.

2. Impacts of pesticides

The adverse effects of pesticides on the people who use them, workers, and communities – as well as the environment – is now recognised globally as an issue of significant concern. In 2015, ICCM4 formally recognised HHPs as an 'issue of concern'.[4]

Pesticides are designed to kill living organisms but, unfortunately, their effects are not limited to the pests they are intended for. Many living organisms share common biological processes and mechanisms, making them susceptible to chemicals intended for other species. Many pesticides have numerous effects on organisms that bear little or no relationship to their intended mode of action on a pest. Together, these two things mean that the impact of pesticides on human health and the environment goes far beyond that which is intended, and often beyond that which is recognised in regulatory toxicology (see Box 1).

Box 1: Glyphosate – some unintended impacts[5]

The primary mode of action of the herbicide glyphosate on plants is to inhibit the 'shikimic pathway' by which plants manufacture amino acids, resulting in failure to produce protein, cellular disruption and death. As humans do not have a shikimic pathway (except in the essential microorganisms of the gut), it was assumed to be safe for people.

However, glyphosate also causes oxidative stress, genotoxicity, cell-cycle disruption, and endocrine disruption in mammalian cells, resulting in a wide range of adverse effects.

As a result, pesticides have taken, and continue to take, a huge toll on human life; however there are no adequate figures on exactly what that toll is. The most authoritative study of pesticide poisoning dates back to 1990, using figures derived from the 1980s. That study, published in the World Health Statistics Quarterly estimated that there were perhaps one million cases of serious unintentional pesticide poisonings each year, and an additional two million cases of people hospitalised for attempted suicide with pesticides. But the author of the study also stated that these figures reflected only a fraction of the real problem, and suggested that there could be as many as 25 million agricultural workers in the developing world suffering from occupational pesticide poisoning each year – mostly not recorded and most patients not seeking medical attention.[6] The international public health agency PAHO (Pan American Health Organization), has tracked a steady

[4] UNEP. 2015. Report of the International Conference on Chemicals Management on the work of its fourth. SAICM/ICCM.4/15.
[5] Watts M, Clausing P, et al. 2016. Glyphosate monograph. PAN International. http://pan-international.org/wp-content/uploads/Glyphosate-monograph.pdf
[6] Jeyaratnam J. 1990. Acute Pesticide Poisoning: A Major Global Health Problem. *World Health Stat Q* 43(3):139-44.

increase in acute pesticide poisoning in Latin America each year over the last two decades, and it estimates acute pesticide poisoning is under-reported by about 50-80 percent.[7]

Although the poisoning figures given above date back to the 1980s, there is no reason to believe the rate of poisoning has diminished. Recent studies show that a very high percentage of exposed workers suffer adverse effects, up to 100 percent in the case of cotton pickers in Pakistan (see Box 2).

Box 2: Some recent surveys of pesticide poisoning

* Brazil, 2012 – 44.8% of rural workers involved in vegetable production reported health problems while using pesticides.[8]
* Burkina Faso, 2013 – 82.66% of farmers surveyed reported having experienced at least one ailment during or just after spraying.[9]
* Bangladesh, 2014 – 85% of applicators reported suffering gastrointestinal problems during and after spraying, 63% eye problems, 61% skin problems, and 47% physical weakness.[10]
* Pakistan, 2012 – in a study of female workers picking cotton 3-15 days after pesticides were last used, 100% of them experienced headache, nausea and vomiting.[11]

Unfortunately, no information could be found on acute poisoning rates in the Pacific islands, but it is important to note that the conditions of use in the islands are similar to those of the countries in which high poisoning rates are being recorded: hot tropical conditions that make the use of Personal Protective Equipment (PPE) unsuitable, lack of or poor regulatory and compliance processes, and the availability of a wide range of HHPs.[12] A study on pesticides in the Pacific published by Greenpeace and PAN Asia Pacific in 1991[13] provided some information on occupational, accidental and intentional poisonings, recording that at least 29 different pesticides were at that stage known to have caused

[7]Laborde A, Tomasina F, Bianchi F, Bruné MN, Buka I, Comba P, Corra L, Cori L, Duffert CM, Harari R, Iavarone I, McDiarmid MA, Gray KA, Sly PD, Soares A, Suk WA, Landrigan PJ. 2015. Children's health in Latin America: the influence of environmental exposures. *Environ Health Perspect* 123(3):201-9.
[8]Preza DLC, Augusto LGS. 2012. Farm workers' vulnerability due to the pesticide use on vegetable plantations in the Northeastern region of Brazil. *Rev Bras Saúde Ocup* (37):125.
[9]Toe AM, Ouedraogo M, Ouedraogo R, Ilboudo S, Guissou PI. 2013. Pilot study on agricultural pesticide poisoning in Burkina Faso. *Interdiscip Toxicol* 6(4):185-91.
[10]Miah SJ, Hoque A, Paul A, Rahman A. 2014. Unsafe use of pesticide and its impact on health of farmers: a case study in Burichong Upazila, Bangladesh. *IOSR-J Environ Sci Technol Food Tech* 8(1):57-67.
[11]Tahir S, Anwar T. 2012. Assessment of pesticide exposure in female population living in cotton growing areas of Punjab, Pakistan. *Bull Environ Contam Toxicol* 89:1138-41.
[12]Conditions of use are a critical consideration with regard to the risk from pesticides in many countries. The International Code of Conduct on Pesticide Management specifically refers to the conditions of use for pesticides when defining highly hazardous pesticides: "In addition, pesticides that appear to cause severe or irreversible harm to health or the environment under conditions of use in a country may be considered to be and treated as highly hazardous." It also refers to the need for the conditions of use to be taken into account when registering pesticides.
[13]Watts MA. 1991. *Poisons in Paradise: Pesticides in the Pacific*. Greenpeace and PAN Asia Pacific, Auckland and Penang.

poisonings in the South Pacific since 1979 (Box 3), but this was regarded as the tip of the iceberg. Of these, paraquat was regarded as the most problematic. All but one of these 29 pesticides are classed as HHPs (see next section).

Box 3. Pesticides known to have poisoned in the Pacific

* have caused fatalities in the Pacific

acephate arsenic trioxide * carbaryl carbofuran chlordane coumaphos 2,4-D / 2,4,5-T DDT diazinon dichlorvos dieldrin dimethoate endrin mancozeb metaldehyde	methamidophos methomyl methyl bromide methyl parathion mevinphos monocrotophos paraquat * parathion pentachlorophenol * propoxur rotenone * sodium arsenite trichlorfon tridemorph

Source: Watts MA. 1991. *Poisons in Paradise: Pesticides in the Pacific*. Greenpeace and PAN Asia Pacific, Auckland and Penang.

In addition to acute poisoning effects, long-term health effects need also be considered. Figures for these are even less adequate. The World Health Organization (WHO), in 1990, estimated an annual 735,000 cases of specific chronic effects linked to pesticides globally, and about 37,000 cases in low-income countries alone. However, these figures are woefully inadequate, in part because of the phenomenal increases in pesticide use and in part because of our improved understanding of the links between pesticides and chronic health conditions, for example their influence on metabolic disorders such as diabetes and obesity.

Box 4: Costs of pesticide use

* In the state of Paraná, Brazil, the cost of acute poisoning alone is estimated to be $1.28 for every $1 spent on pesticides.[14]
* Dr David Pimentel of Cornell University provided an estimate of US $9.6 billion, per annum, in environmental and societal damages from pesticides in the United States. In his comprehensive estimate, environmental, agricultural, and other costs to the economy greatly exceeded those of human health – by a factor of 7.46, at least in the U.S.[15]

The costs to society from pesticide use are huge – not only in terms of human health and suffering, loss of productivity, etc, but also from damage to agroecosystems and resulting adverse impacts on ecosystem services. Key amongst the latter effects are the loss of pollinator species with the consequent effects on production, and the loss of beneficial insects that provide free natural control of pests.

Box 5: Costs to agriculture

In 2014, a team of scientists published their findings on the environmental impacts of systemic insecticides such as fipronil and imidacloprid. This "Worldwide Integrated Assessment of Systemic Insecticides",[16] found that the neonicotinoid insecticides (together with fipronil) are posing a global threat to biodiversity and the ecosystem services on which our food production depends, including nutrient recycling, soil respiration, leaf litter decomposition, pollination, and biological pest control.

Damage to the environment from pesticides is a problem everywhere, but the Pacific Islands are particularly vulnerable to these impacts. In 2002, the UN's Economic and Social Commission for Asia and the Pacific (ESCAP) reported that in Thailand, "an estimated 70 percent of applied pesticides is washed away and leaches into the soil and water, resulting in excessive pesticide residue contamination in the local ecology and food chain".[17] The close physical and cultural relationship of the Pacific Islands with the marine environment makes these countries even more susceptible to the adverse effects of pesticides washed off the land. Recent work has demonstrated that several reef foundation species are highly sensitive to acute exposure to herbicides. The build-up of contaminants can weaken the health and resilience of corals and other organisms, making them more susceptible to disease outbreaks and climate impacts.[18] In Australia, pesticide runoff from agricultural lands has been recognised as a serious threat to the health and productivity of the Great

[14]Soares WL, de Souza Porto MF. 2012. Pesticide use and economic impacts on health. *Revista de Saúde Pública* 46(2):1-8.
[15]Pimentel D, Burges M. 2014. Environmental and economic costs of the application of pesticides primarily in the United States. In: Pimentel D, Peshin R. 2014. *Integrated Pest Management: Pesticide Problems*, Vol 3. Springer, New York.
[16]The Task Force on Systemic Insecticides. 2014. http://www.tfsp.info/worldwide-integrated-assessment
[17]UNESCAP. 2002. Organic Agriculture and Rural Poverty Alleviation: Potential and Best Practices in Asia. Economic and Social Commission for Asia and the Pacific, United Nations, New York.
[18] Australian Institute of Marine Science. Backgrounder: Impact of land runoff. Australian Government. http://www.aims.gov.au/docs/research/water-quality/runoff/impact-of-runoff.html

Barrier Reef. Pesticide residues have been detected in marine waters, sediments, seagrass meadows and in freshwater plumes in the Great Barrier Reef lagoon, and water quality targets introduced to reduce the runoff of pesticides.[19]

Tourism is also at risk from the use and impacts of pesticides, not least because of their impact on the marine environment.

It is not the intention of this publication to provide an up-to-date summary of information on health and environmental impacts of pesticides in the Pacific.[20] Rather this publication is a small snapshot of the pesticides that are available, or registered for use where such a system exists, with a particular focus on the subset of HHPs, given their widespread impacts and the international concern about their use.

Globally, almost all developing countries are having a problem with HHPs and many have asked for assistance to deal with them. A collaborative approach is being taken, as it has been found that working together on this issue has greatly assisted countries in managing the problem. Almost all of the Pacific nations and territories have shown willingness in providing their lists of pesticides. Some have found that even the process of collating that information has provided them with new insights into their own situations.

[19] Pesticides dynamics in the Great Barrier Reef and its dynamics. Reef Rescue Water Quality Research and Development Programme. Australian Government. http://reefrescueresearch.com.au/news/183-pesticide-dynamics-in-the-gbr.html

[20] See Watts (1991) for some information on poisonings and environmental contamination in the Pacific.

3. What are Highly Hazardous Pesticides?

The term highly hazardous pesticides (HHPs) came into use in 2006, when the FAO Council, in discussing how it could implement the provisions of SAICM relating to the reduction of risk from pesticides, recommended that activities to reduce risk could include *a progressive ban on highly hazardous pesticides*.[21] Early that year, the first International Conference on Chemicals Management (ICCM1) had adopted SAICM, which recognised the need to reduce the use of and risk from highly toxic pesticides, and replace them with safer alternatives.[22]

Following the FAO Council decision, the WHO/FAO Joint Meeting on Pesticide Management (JMPM), in 2007, agreed criteria for identifying HHPs and recommended that a global list of HHPs be developed.[23] The JMPM defined HHPs as:

- Pesticide formulations that meet the criteria of classes Ia or Ib of the WHO Recommended Classification of Pesticides by Hazard; or
- Pesticide active ingredients and their formulations that meet the criteria of carcinogenicity Categories 1A and 1B of the Globally Harmonized System on Classification and Labelling of Chemicals (GHS); or
- Pesticide active ingredients and their formulations that meet the criteria of mutagenicity Categories 1A and 1B of the GHS; or
- Pesticide active ingredients and their formulations that meet the criteria of reproductive toxicity Categories 1A and 1B of the GHS; or
- Pesticide active ingredients listed by the Stockholm Convention in its Annexes A and B, and those meeting all the criteria in paragraph 1 of Annex D of the Convention; or
- Pesticide active ingredients and formulations listed by the Rotterdam Convention in its Annex III; or
- Pesticides listed under the Montreal Protocol; or
- Pesticide active ingredients and formulations that have shown a high incidence of severe or irreversible adverse effects on human health or the environment.

Pesticide Action Network (PAN) has chosen to establish its own criteria for HHPs because it regards the JMPM criteria as having some important shortcomings, particularly the failure to include pesticides with endocrine disrupting properties, ecotoxicity, or

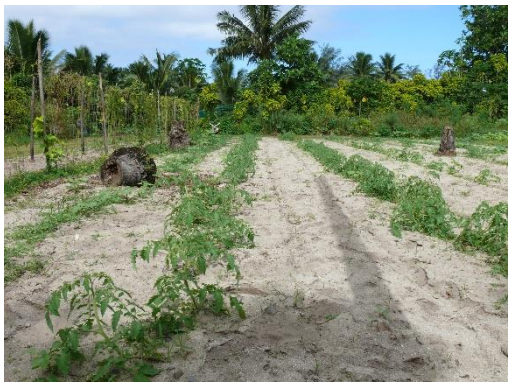
[21]FAO. 2006. Report. Hundred and Thirty-First Session of the Council. Rome, 20-25 November 2006.
[22]UNEP. 2006. Strategic Approach to International Chemicals Management. SAICM texts and resolutions of the International Conference on Chemicals Management. UNEP, Geneva.
[23]FAO, WHO. 2007. Report of the 1st FAO/WHO Joint Meeting on Pesticide Management and the 3rd Session of the FAO Panel of Experts on Pesticide Management. 22-26 October 2007, Rome. http://www.fao.org/fileadmin/templates/ agphome/documents/Pests_Pesticides/Code/JMPM_2007_Report.pdf

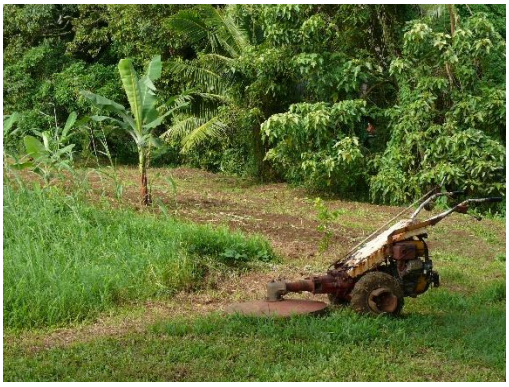
inhalation toxicity. The PAN criteria for HHPs were first established in 2008 and most recently updated in 2015. Using these criteria PAN has published a list of HHPs, as recommend by the JMPM in 2006 and in the absence of such a list from FAO and WHO.[24]

In addition to the JMPM criteria listed above, PAN criteria include:

- Fatal if inhaled (H330) according to GHS; or
- Endocrine disruptor, 'Suspected human reproductive toxicant' (Category 2) AND 'Suspected human carcinogen' (Category 2) according to GHS; or
- High environmental concern where two of the three following criteria are met:
  i) **P** = 'Very persistent' half-life > 60 days in marine or freshwater or half-life > 180 days in soil ('typical' half-life), marine or freshwater sediment (indicators and thresholds according to the Stockholm Convention); and/or
  ii) **B** = 'Very bioaccumulative' (BCF >5000) or Kow logP > 5 (existing BCF data supersede Kow logP data) (indicators and thresholds according to the Stockholm Convention); and/or
  iii) **T** = Very toxic to aquatic organisms (LC/EC 50 [48h] for Daphnia spp.< 0.1 mg/l); or
- Hazard to ecosystem services, 'Highly toxic for bees' according to U.S. EPA (LD50, µg/bee <2).

In this document, the pesticides that are imported, available, used or registered for use in the Pacific have been analysed in terms of both sets of criteria – see Section 4.





[24]PAN International List of Highly Hazardous Pesticides (PAN List of HHPs). June 2015. http://www.pan-germany.org/download/PAN_HHP_List_150602_F.pdf

4. Highly Hazardous Pesticides in the Pacific

The 1991 Greenpeace / PAN Asia Pacific report provided a list of pesticides approved/used/banned in 14 Pacific countries, but no current information was publicly available in 2014. So government officials from 21 island states or territories in the Pacific region were contacted and requested to provide information on pesticides registered/approved/imported into and/or known to be used in their countries. The officials were approached between March 2014 and June 2015 and some again in January to May 2016. They were very helpful in providing the information or in redirecting the request to more relevant people. Only Wallis and Futuna did not respond.

Information on pesticides registered/approved, imported or in use was collected for the following countries:

American Samoa
Commonwealth of the Northern Mariana Islands
Cook Islands
Federated States of Micronesia
Fiji
French Polynesia
Guam
Kiribati
Nauru

New Caledonia
Niue
Palau
Papua New Guinea
Republic of the Marshall Islands
Samoa
Solomon Islands
Tokelau – partial
Tonga
Tuvalu
Vanuatu

The information from all but one of these countries, Tokelau, is complied in a table in Annex 1. For Tokelau, Environment Officer Kelemeni Tavuto, stated that:[25]

> *"we have a law in place since the early 2000, where all forms of synthetic pesticides / herbicides are banned from the island. It is for this reason, we do not import nor freely use any Chemical control agents to control pests on the island, unless needed. I can only provide the list of the household ones, if required. In addition to that, Rat baits and Ant Baits are the only 2 chemicals allowed to be used on the island."*

This information is too generalised to include in the table in Annex 1, but it does indicate very limited use of HHPs in Tokelau.

Most countries had ready access to a list of registered or imported pesticides (e.g. Cook Islands, Fiji, French Polynesia, New Caledonia, Palau, Samoa, Solomon Islands, Tonga). Others compiled a list from known importers or stores in their countries (e.g. American Samoa, FSM, Nauru, RMI, Tuvalu). Refer to Annex 2 for a full description of the sources.

The lists for Papua New Guinea and Vanuatu were compiled by Professor Mowbray using known contacts in both countries. In Papua New Guinea, the pesticide register in the Conservation and Environment Protection Authority, which was well kept and up-to-date for 20 years, was reported by Mowbray to be both out-of-date and incomplete. He commented that no updating of the register had been done for at least 6-8 years; the present register contains chemicals no longer used, those where the permit has expired, and does not include newer pesticides imported in recent years. However, in October 2014, Pollution Science students at the University of Papua New Guinea carried out a detailed and thorough survey of all pesticides sold in many stores in Port Moresby, trades stores, supermarkets, agricultural suppliers and pharmacies. To this, further pesticides

[25] Email to D. Mowbray, dated 3/12/2104.

that had been documented as being used in agriculture, vector control and forestry throughout PNG were added.[26]

For some countries, only product names and not active ingredients were provided. Active ingredient names for most of these were found using internet searches, MSDSs, company websites, etc. Every effort has been made to provide the correct active ingredient names; however it is possible that in some cases there may be errors because of the limited nature of the information provided. Also it should be noted that, for most countries, the information was collected in 2014 and so may not reflect the actual situation in 2016. Some countries provided a list in both 2014 and again in 2016, and notable amongst these is Tonga, whose imports dropped from 92 to 35 active ingredients, although the 2016 list did not include household pesticides.

It seems that the mere exercise of collecting information on the pesticides available in countries has had some beneficial side effects. For example, FSM noted in an email that they found the exercise of collecting the information interesting, as it made obvious that they "did not have one agency tasked with keeping track of all hazardous chemicals coming in from other countries".[27] And Niue advised that it was open to any information on alternatives to paraquat.[28]

Summary of findings

1. Country with the most registered/available pesticides: French Polynesia, with 447 active ingredients registered in 2014; of these 45 were not included in the list in Annex 1 for various reasons as described in the notes following the table – for example veterinary or timber treatment chemicals, pheromones, lures or repellents. However, many of the substances authorised had not been imported in 2012, 2013 or 2014.
2. Total number of HHPs in the Pacific:
   according to JMPM criteria = 89
   according to PAN criteria = 164
3. Number of countries with HHPs:
   according to JMPM criteria= 19
   according to PAN criteria = 19
4. Number of countries with no HHPs: 0

[26] Pers comm. D. Mowbray, 11/3/16.
[27] Sulong T, 2014. Email to D. Mowbray, December 2nd.
[28] Okesene P. 2014. Email to M. Watts, October 29th.

Persistent Organic Pollutants

One pesticide listed in the Stockholm Convention on Persistent Organic Pollutants (POPs) is being used in two countries. Sulfluramid, used in French Polynesia and FSM, is a derivative of the listed industrial chemical PFOS. It has an acceptable purpose use only for control of leaf-cutting ants from *Atta spp*. and *Acronomyrmex* spp. Neither of these are known to occur in the Pacific. All other uses should have ceased. Two POPs remain in stores in PNG: DDT and lindane. The former is reported to have been often stolen and sold illegally on the streets both for agricultural crops (in the highlands) and for fishing (off Milne Bay). The lindane stocks are reported to be secure at a large agricultural company.[29]

Additionally, dicofol, which is being assessed by the POPs Review Committee for listing under the Stockholm Convention, is available in Papua New Guinea and Tonga.

Pesticides listed under the Rotterdam Convention[30]

Table 1 shows the status of pesticides listed, or recommended for listing, or under assessment for listing, under the Rotterdam Convention.

Table 1: Status of Rotterdam Convention pesticides in the Pacific

	AS	C Is	CNMI	FIJI	FP	FSM	Niue	PNG	Sam	Sol Is	Ton	Van
alachlor					x				x			
aldicarb								x				
atrazine*				x	x			x				
azinphos-methyl					x							
carbofuran*								x				
DDT								x				
methamidophos					x			x				
MSMA			x	x	x			x				
paraquat**	x	x		x	x	x	x	x	x	x	x	x
toxaphene (camphechlor)								x				

* undergoing assessment by the Chemical Review Committee (CRC)

** a paraquat formulation has been recommended by the CRC for listing under the Rotterdam Convention but, to date, listing has been blocked by a few countries

[29] Pers comm. D. Mowbray, 11/3/16.

[30] The list of chemicals contained in Annex III of the Convention and subject to the PIC procedure along with the associated Decision Guidance Documents (DGDs) as well as any additional information can be found here:
http://www.pic.int/TheConvention/Chemicals/AnnexIIIChemicals/tabid/1132/language/en-US/Default.aspx

Tables 2 and 3 below list the pesticides identified as HHPs. The first table identifies HHPs according to the JMPM criteria, and secondly the ***additional*** HHPs according to the PAN criteria. The main difference between the two are that the 'PAN' table includes pesticides regarded as being fatal if inhaled, endocrine disruptors, toxic to bees, and pesticides that meet 2 of the 3 criteria for persistence, bioaccumulation and toxicity (refer Section 3 for more information on the criteria). Table 4 provides a summary of this information by country.

HHPs according to JMPM

JMPM criteria were applied strictly for the most part[31] but guidance was also taken from the FAO Project on HHPs in Mozambique,[32]which included:

- Pesticides for which carcinogenicity evaluations by different registration/assessment authorities did not lead to consistent classification as GHS Category 1A or 1B, but which were, based on the evidence of one of these authorities.

This resulted in the following carcinogenicity evaluations:

- Pesticides classified as IARC Group 1 (carcinogenic to humans) and Group 2A (probably carcinogenic to humans) were considered, for this assessment, to meet GHS carcinogenicity Category 1A or 1B.
- EU hazard classifications follow the GHS; therefore, pesticides as "carc. 1A" are GHS Category 1A, and those listed as "carc. 1B" are GHS Category 1B.
- US EPA evaluations of carcinogenic potential: the names of categories vary over the years but in summary, GHS category 1a = US EPA class A (human carcinogen; known carcinogen) ; and GHS category 1b = US EPA class 1a and 1 b (probable human carcinogen; likely carcinogen).

Based on these, the PAN List of HHPs was then used to determine HHPs according to the JMPM criteria. However, the last of these criteria "Pesticide active ingredients and formulations that have shown a high incidence of severe or irreversible adverse effects on human health or the environment", has not been applied so this list should be regarded as indicative only: there may be other pesticides having unacceptable adverse effects, especially adverse environmental effects which are not covered by the JMPM criteria.

[31] PAN does not evaluate the acute toxicity of formulations containing WHO 1a and 1b actives, but rather includes all formulations of these actives.
[32] Come AM, van der Valk, H. 2013.Reducing Risks of Highly Hazardous Pesticides in Mozambique: Step 1 – Shortlisting highly hazardous pesticides. *draft.* FAO, Rome.

What is registered and what is used

In some countries there may be a significant differences between what is registered and what is actually used. For example, in Tonga, 92 pesticide active ingredients were registered, but only 34 were imported in 2015, although the import figures do not include household pesticides and the register does. Similarly, the very high number of registered actives in French Polynesia (447), does not reflect the number that were actually imported in 2012-14 (177).

A high percentage of HHPs

A very high percentage of total active ingredients available in most countries are HHPs, which is of considerable concern. For most countries 60-70% of the pesticide actives are HHPs.

The smaller the number of actives the higher the percentage of them are HHPs. For example, French Polynesia with its 402 registered actives (meeting the criteria for inclusion in Annex 1) – 37% of these are HHPs. But RMI has only 9 actives and 78% of these are HHPs.

Table 2: Summary of information by country

	AS	C I	CNMI	Fiji	FP	FSM	Guam	Kir	Nauru	NC	Niue	Pal	PNG	RMI	Sam	Sol	Ton	Tuv	Van
No of pesticides	21	28	33	83	402	22	33	14	8	169	39	44	116	9	64	42	35	12	40
No of JMPM HHPs	6	14	12	28	81	8	13	7	2	29	17	14	36	3	25	13	14	4	15
No of additional PAN HHPs	7	8	9	23	69	7	12	3	3	23	10	12	24	4	17	14	13	2	8
% HHPs	62	76	64	62	37	68	76	71	63	31	69	59	52	78	66	64	77	50	56

Table 3: HHPs in the Pacific – according to JMPM criteria

	AS	CI	CN	Fiji	FP	FSM	Guam	Kir	Nau	NC	Niue	Pal.	PNG	RMI	Sam	Sol	Ton	Tuv	Van
1,3-dichloropropene					x		x												
alachlor					x										x				
aldicarb													x						
antraquinone					x														
azinphos-methyl					x														
benomyl							x						x		x		x		
borax/borate/boric acid			x	x	x						x	x	x			x			x
brodifacoum		x		x	x			x		x	x	x	x		x	x	x		x
bromadiolone			x	x	x					x	x	x	x				x		
butachlor					x														
carbaryl	x		x	x	x	x	x	x				x	x		x				x
carbendazim											x				x		x		
carbofuran													x						
chlorophacinone					x														
chlorothalonil		x	x	x	x		x			x	x	x			x	x	x		x
coumaphos					x								x						
coumatetralyl				x	x								x						
cyfluthrin			x	x	x					x		x	x	x					
daminozide					x														
DDT													x						
diazinon				x	x		x	x				x	x		x			x	
dichlorvos				x	x					x	x	x	x		x				
diclofop-methyl					x														
dicofol*													x						
difenacoum				x	x														
defethialone					x														
dinocap					x														
diphacinone			x	x	x	x	x					x				x			
disulfoton					x														
diuron		x		x	x					x			x		x				
epoxiconazole					x														
ethoprophos					x					x									
etradiazole; terrazole					x					x									
fenamiphos					x														
fenoxycarb					x								x						
fentin hydroxide					x														
floucoumafen				x	x						x		x		x		x		
fluazifop-p-butyl		x			x					x			x		x				
flusilazole					x					x			x		x				
folpet					x														
formaldehyde					x								x						
formetanate					x					x									
glufosinate-ammonium				x	x					x			x		x	x			
glyphosate	x	x	x	x	x	x	x			x	x	x	x		x	x	x		x
hexythiazox					x					x									
imazalil					x					x									

	AS	CI	CN	Fiji	FP	FSM	Guam	Kir	Nau	NC	Niue	Pal.	PNG	RMI	Sam	Sol	Ton	Tuv	Van
iprodione			x		x					x									
isoxaflutole										x									
kresoxim-methyl					x														
lambda-cyhalothrin	x	x	x	x	x	x	x			x	x	x	x		x	x	x		
linuron		x		x	x					x							x		x
malathion	x	x		x	x		x	x		x	x	x	x		x	x	x	x	x
mancozeb		x		x	x		x		x	x	x		x		x	x	x		x
maneb					x	x													
metam-sodium				x	x														
methamidophos					x								x						
methiocarb					x					x	x		x		x				
methomyl		x	x	x	x												x		
methyl bromide				x	x			x					x		x	x			x
metiram					x														
MSMA			x	x	x								x						
nitapyrin					x														
oryzalin			x		x														
oxadiazon					x														
oxamyl					x		x								x				
oxydemeton-methyl					x														
oxyfluorfen					x					x									x
paraquat	x	x		x	x	x					x		x		x	x	x		x
permethrin	x	x		x	x	x	x	x			x	x	x	x	x	x	x	x	x
petroleum/mineral/ paraffin oil		x		x	x		x		x	x	x		x		x	x			x
pirimicarb					x					x									
procymidone					x														
propachlor					x					x									
propargite					x														
propoxur				x	x						x		x		x				
propyzamide					x					x									
pymetrozine					x					x									
resmethrin					x							x		x					
sodium monofluroacetate / 1080													x						
spirodiclofen					x														
sulfluramid**					x	x													
tetrachlorvinphos					x														
thiacloprid					x														
thiodicarb					x														
thiophanate methyl		x		x	x					x	x								x
tolyfluanid					x														
toxaphene/camphechor													x						
tridemorph					x								x		x				
vinclozolin					x														
warfarin					x			x					x					x	x
TOTAL: 89	6	14	12	28	81	8	13	7	2	29	17	14	37	3	25	13	14	4	15

Table 4: Additional HHPs in the Pacific – according to the additional PAN criteria

	AS	C I	CNMI	Fiji	FP	FSM	Guam	Kir	Nauru	NC	Niue	Palau	PNG	RMI	Sam	Sol	Ton	Tuv	Van
2,4-DB					x														
abamectin/avermectin	x	x		x	x		x		x	x	x			x	x	x	x		x
acephate	x			x	x		x						x		x	x	x		x
acetochlor										x									
acrinathrin					x					x									
aluminium phosphide				x	x			x					x			x			
amitrole					x														
atrazine				x	x								x						
azamethiphos					x														
bendiocarb				x	x								x					x	
bifenthrin			x	x	x	x					x	x	x		x	x		x	x
bioresmethrin				x	x						x		x		x		x		
bromoxynil					x														
chlorantraniliprole				x	x					x							x		
chlorfenapyr					x														
chlorfluazuron				x	x										x	x			
chloropicrin					x										x				
chlorotoluron					x														
chlorpyrifos				x	x					x	x	x	x	x	x	x			x
chlorpyrifos-methyl					x														
copper hydroxide		x		x	x		x			x	x		x			x	x		
cyhexatin					x														
cypermethrin/alphamethrin	x		x	x	x	x	x			x	x	x	x	x	x	x			
deltamethrin			x	x	x	x	x		x	x		x	x		x	x	x		x
diafenthurion					x														
dimethoate				x	x		x			x							x		x
diquat					x	x				x		x							
esfenvalerate					x					x		x	x						
etofenprox					x					x									
fenarimol					x														
fenbutatin oxide							x						x						
fenitrothion					x								x						
fenproparthrin					x														
fenthion													x						
fipronil		x	x	x	x		x	x	x	x				x	x	x	x		
flufenoxuron					x														
fosthiazate					x														
gamma-cyhalothrin					x														
haloxyfop					x														
hexaflumuron			x		x		x												
imazethapyr																			
imidacloprid		x	x	x	x		x			x	x		x			x	x		x
imiprothrin	x			x	x	x						x	x		x				x
indoxacarb		x	x	x	x					x			x		x	x	x		
ioxynil					x					x									
lufenuron		x		x	x					x					x		x		
magnesium phosphide	x				x														

	AS	C I	CNMI	Fiji	FP	FSM	Guam	Kir	Nauru	NC	Niue	Palau	PNG	RMI	Sam	Sol	Ton	Tuv	Van
metaflumizone					x														
methabenzthiazuron					x														
metribuzin			x		x					x							x		
milbemectin					x					x									
molinate					x														
naled			x		x		x												
phosmet					x								x						
picloram				x	x					x									x
pirimiphos-methyl		x		x	x						x				x	x	x		
prallethrin	x			x	x							x			x				
profenofos					x														
pyrazophos					x														
pyridaben					x														
quinoxyfen										x									
rotenone					x			x			x		x						x
spinetoram					x														
spinosad		x			x					x	x	x	x			x			x
sulfoxaflor					x														
temephos					x								x						
terbutryn					x								x						
tetramethrin	x			x	x	x	x					x	x		x				
thiamethoxam					x					x									
tralomethrin					x							x							
triallate					x														
trichlorfon													x		x				
trifluralin					x	x						x							
zineb					x														
ziram					x														
TOTAL: 75	**7**	**8**	**9**	**23**	**69**	**7**	**12**	**3**	**3**	**23**	**10**	**12**	**24**	**4**	**17**	**14**	**12**	**2**	**8**

5. Alternatives to Highly Hazardous Pesticides

There are two possibilities for replacing HHPs: they can be replaced by less toxic pesticides, or they can be replaced by other strategies for the management of pests, weeds and diseases. The later approach is now the preferred approach internationally.

Following the listing of endosulfan for a global phase-out by the Stockholm Convention Conference of Parties in 2011, the Parties agreed that the priority for replacing endosulfan should be given to ecosystem-based approaches to pest management. POPRC developed a guidance document on non-chemical alternatives to assist countries.[33] Following the listing of endosulfan under the Rotterdam Convention in the same year, PAN-UK together with the Rotterdam Convention Secretariat identified various strategies for growing coffee without endosulfan in Latin America. Videos and other informational material can be downloaded from PAN UK's website.[34]

More recently ICCM4, recognizing that HHPs "*cause adverse human health and environmental effects in many countries, particularly in low-income and middle-income countries*", encouraged stakeholders to undertake concerted efforts to implement the strategy developed by FAO, UNEP and WHO[35] to address HHPs at the local, national, regional and international levels "*with emphasis on promoting agroecologically-based alternatives and strengthening national regulatory capacity to conduct risk assessment and risk management*" [emphasis added].[36]

And in 2016, the International Code of Conduct on Pesticide Management's Guidelines on Highly Hazardous Pesticides[37] specifically prioritised biopesticides and nonchemical approaches to pest management as alternatives to HHPs, noting that a needs assessment should be carried out for HHPs. If agroecological or nonchemical methods can do the job, the HHPs should go.

Countries may need some assistance in replacing HHPs with agroecology and nonchemical methods, and a number of resources are available.[38] In 2015, PAN published its

[33] UNEP. 2012. Evaluation of non-chemical alternatives to endosulfan. Persistent Organic Pollutants Review Committee. UNEP/POPS/POPRC.8/INF/14/Rev.1.
[34] http://www.pan-uk.org/projects/growing-coffee-without-endosulfan/
[35] This strategy can be found in ICCM4 meeting document SAICM/ICCM.4/8.
[36] UNEP. 2015. Report of the International Conference on Chemicals Management on the work of its fourth. SAICM/ICCM.4/15.
[37] FAO & WHO. 2016. International Code of Conduct on Pesticide Management: Guidelines on Highly Hazardous Pesticides. Food and Agriculture Organization of the United Nations, Rome. http://www.fao.org/publications/card/en/c/a5347a39-c961-41bf-86a4-975cdf2fd063/
[38] An early source of some information on nonchemical methods, especially for weed management, was The "Regional Agro-Pesticide Index" produced by CIRAD, ARSAP, SPC and SPREP in 1990 for the Pacific (Volume 2).

groundbreaking book *Replacing Chemicals with Biology: Phasing out Highly Hazardous Pesticides with Agroecology*. The book contains in-depth descriptions of agroecological techniques, with a number of case studies from Asia, Africa, Latin America, Europe and North America. Although there are no case studies from the Pacific, there is information that can be of benefit to Pacific islands.[39]

Agroecology involves managing ecological relationships and promoting key ecological processes, while diversifying crops, conserving resources and minimizing toxic inputs. A wide range of agroecological practices are employed, aimed at:

- providing the most favourable soil conditions for plant growth by enhancing soil biological activity and soil organic matter, recycling nutrients through organic matter decomposition; and
- enhancing beneficial biological interactions and synergies to promote, especially, those that regenerate soil fertility and provide pest management without resorting to external inputs.

Practices include planting/sowing varieties appropriate to the conditions, composting, mulching, green manure crops, alley cropping, agroforestry, release of biological control organisms, use of attractants, traps, mating disruption with pheromones, etc. However, the exact practices a farmer uses depends on their on-farm realities and social conditions: there is no prescribed 'recipe' as there is with chemicals.

All these techniques, and more, are already employed by a considerable number of successful organic growers across the Pacific. Organic agriculture has seen phenomenal growth in the Pacific, with the land area involved increasing from 22,620 ha in 2008 to 85,660 hectares in 2014, an average annual increase of about 18 percent. Tonga experienced a 402 percent growth in organic land area in 2014 alone, followed closely by Fiji with a 326 percent increase and the Solomon Islands with 306 percent. This has no doubt been helped by the Heads of Agriculture and Forestry Services (HOAFS) in the region who decided in 2012 to "promote and mainstream organic agriculture into SPC and national agriculture strategies in recognition of its role and nutritional security and the livelihood opportunities it can provide".[40]

Organics in the Pacific is also well supported by a number of local organisations within countries and the region-wide organisation POETCom (Pacific Organic and Ethical Trade Community), which amongst other things has the regional organic certification brand

[39] An electronic version can be downloaded at http://www.panap.net/campaigns/hhps/international-instruments/saicm/iccm4/post/2675. Or a hard copy or CD can be obtained from PAN Asia Pacific at panap@panap.net.

[40] Willer H, Lernoud J (Eds). 2016. The World of Organic Agriculture. Statistics and Emerging Trends 2016. Research Institute of Organic Agriculture (FiBL) and IFOAM – Organics International.

Organic Pasifika.[41]

Table 5: Some organic growers groups in the Pacific

Country	Organics organisations
Cook Islands	Titikaveka Growers Association
Fiji	Fiji Organic Association
Bio Fenua	French Polynesia
New Caledonia	BioCaledonia
Niue	Niue Organic Farmers Association
Palau	Palau Organic Farmers Association

Source: FiBL survey 2016. In Willer H, Lernoud J (Eds). 2016. The World of Organic Agriculture. Statistics and Emerging Trends 2016. Research Institute of Organic Agriculture (FiBL) and IFOAM – Organics International.

Table 6: Organic products

Product	Country
Vanilla, ginger and other spices	Fiji, Vanuatu, Niue, Samoa
Cocoa	Vanuatu, Samoa, Papua New Guinea
Virgin coconut	Samoa, Fiji, Solomon Islands
Coconut meal	Vanuatu
Noni/ nonu	Cook Islands, Samoa, Fiji, Niue, French Polynesia
Honey	Niue
Bananas	Fiji, PNG, Samoa
Coffee	PNG, Samoa
Livestock- beef, goats, sheep	Vanuatu, Fiji
Fruit and vegetables	Fiji, New Caledonia, Samoa, French Polynesia
Forest nuts	Solomon Islands

Source: Willer H, Lernoud J (Eds). 2016. The World of Organic Agriculture. Statistics and Emerging Trends 2016. Research Institute of Organic Agriculture (FiBL) and IFOAM – Organics International.

[41] http://www.organicpasifika.com/poetcom/

Table 7: Number of organic producers in 2014

Cook Islands	50
Fiji	627
French Polyneisia	133
Kiribati	900
New Caledonia	75
Niue	52
PNG	13,356
Samoa	658
Solomon Islands	1018
Tonga	1326
Vanuatu	1226

Source: FiBL survey 2016. In Willer H, Lernoud J (Eds). 2016. The World of Organic Agriculture. Statistics and Emerging Trends 2016. Research Institute of Organic Agriculture (FiBL) and IFOAM – Organics International.

Climate change is a very real phenomenon in the Pacific. Extreme weather events have been, and will continue to be, problematic. Climatic variability and unpredictability, and increased pest pressure, are all making farming more difficult. Toxic chemicals will be increasingly mobilised and washed into marine areas – sources of precious food for Pacific communities. Hence there is a need for farming to avoid the use of these chemicals, at the same time as it addresses the challenges of climate change. Agroecology has an impressive track record of improving farm and community resilience and reducing damage from climate events.

Organic taro, French Polynesia. Photo: Gilles Parzy
Here the legume *Archis pinto* is used as cover for soils: suppresses weeds, impedes erosion, optimizes soil moisture for crops, supplies biomass direct to the soil, protects life of soil against UV rays and sun heat, assists soil structure, provides good forage. It is propagated easily by cuttings, worthwhile to establish for most crops that stay several months and more, and can thrive despite regular foot prints, floods and dry spell.

6. Recommendations

It is clear that highly hazardous pesticides are posing a threat to human health and the environment in the Pacific countries, as they are everywhere; and NTN, PANANZ and PANAP offer the following recommendations to Pacific Island countries to assist them in reducing reliance on and phasing-out HHPs.

1. Ensure a government official has oversight of all pesticides, and the quantities, being imported into the country/territory.[42]
2. Require importers of pesticides to notify the designated government official, and where appropriate require a permit before importation of specified pesticides.
3. Maintain a publically accessible list of all pesticides registered and / or imported, sold and used (active ingredients and trade names) using a standardised system Pacific-wide.
4. Ban or phase out HHPs that are not needed and those causing health and environmental problems, starting with pesticides listed or being considered for listing under the Stockholm and Rotterdam Conventions, including paraquat.
5. Consider a pacific-wide register of human health and environmental incidences involving pesticides, which identifies the country, pesticide, and particular effects. If appropriate set up health surveillance programmes for workers and communities exposed to pesticides.
6. Work with farmers and other users of pesticides to replace pesticides, with a particular focus on eliminating HHPs and replacing them with agroecological approaches to pest, weed and plant disease management.
7. Identify islands that could become completely organic and work with farmers and tourist operators to achieve this.
8. A regional publication on nonchemical alternatives could be of assistance to all countries in the region.
9. Collaborations with NGOs and other organisations to develop culturally appropriate educational materials to assist the transition away from HHPs to agroecological approaches.
10. As appropriate, seek assistance from international organisations such as FAO and PAN, the secretariats of the Basel, Rotterdam and Stockholm Conventions, and regional organisations such as National Toxics Network.
11. Become a party to the Basel, Rotterdam and Stockholm Conventions; benefits include technical assistance in reducing or eliminating HHPs.

[42] The FAO pesticide registration toolkit may be of assistance. It can be found at: http://www.fao.org/pesticide-registration-toolkit/en/

Annex 1: Pesticides Active Ingredients Registered/Used in the Pacific

Wherever possible the common names for active ingredients according to the Pesticide Properties Database[43] and the Alan Wood Compendium of Pesticide Common Names[44] have been used; if the name could not be found in these two sources, the PAN Pesticide Database[45] was referred to, or US EPA; and if these additional sources were insufficient general internet searches were resorted to in order to identify the correct names of chemicals. Therefore the names listed below are not always exactly those on country lists. Please refer to notes following the table; the general notes indicate categories of chemicals not included, and country specific notes indicate how some particular actives have been listed.

This table contains active ingredients only, and does not include adjuvants, stickers, pheromones, pool chemicals, cleaners, disinfectants, sanitizers, personal care mosquito repellents, mosquito coils, timber treatment chemicals, fertilisers, rooting hormones, vet medicines, repellents, lures, etc. It does include biocontrol organisms.

In places, the names of actives have been amended where the active given was not a recognised name and/or where it differed from the MSDS of the registered product name.

*Country name abbreviations in table

AS American Samoa
CNMI Commonwealth of the Northern Mariana Islands
CI Cook Islands
FSM Federated States of Micronesia
FP French Polynesia
Kir Kiribati
NC New Caledonia
Pal Palau
PNG Papua New Guinea
RMI Republic of the Marshall Islands
Sam Samoa
Sol Solomon Islands
Ton Tonga
Tuv Tuvalu
Van Vanuatu

[43] http://sitem.herts.ac.uk/aeru/ppdb/en/index.htm
[44] http://www.alanwood.net/pesticides/
[45] http://www.pesticideinfo.org

	AS	CI	CNMI	Fiji	FP	FSM	Guam	Kir	Nauru	NC	Niue	Pal	PNG	RMI	Sam	Sol	Ton	Tuv	Van
1,3-dichloropropene					X		X												
2,4-D			X	X	X					X		X	X		X	X			X
2,4-DB					X														
3-chloro-p-toluidine hydrochloride					X										X				
(4-CPA; 4-chlorophenoxy)acetic acid					X														
8-hydroxyquinoline sulphate															X				
abamectin/avermectin	X	X		X	X		X		X	X	X			X	X	X	X		X
acephate	X			X	X		X						X		X	X	X		X
acetamiprid					X					X									
acetic acid					X														
acetochlor										X									
acibenzolar-S-methyl					X					X									
aclonifen										X									
acrinathrin					X					X									
alachlor					X										X				
aldicarb													X						
allethrin/bioallethrin/ esbiothrin/ S-bioallethrin/ trans allethrin	X			X	X	X		X			X	X	X		X			X	X
aluminium phosphide				X	X			X					X			X			
aluminium sulphate										X									
ametryn				X	X								X						
amitraz					X								X						
amitrole					X														
ammonium sulphamate					X														
ammonium thiocyanate					X														
Ampelomyces quisqualis										X									
ancymidol					X														
anthraquinone					X														
asulam					X														
atrazine				X	X								X						
azaconazole					X														
azadirachtin (neem)					X		X			X	X	X							
azamethiphos					X														
azinphos-methyl					X														
azoyxstrobin	X			X	X					X									

	AS	CI	CNMI	Fiji	FP	FSM	Guam	Kir	Nauru	NC	Niue	Pal	PNG	RMI	Sam	Sol	Ton	Tuv	Van
Bacillus firmus										x									
Bacillus spaericus													x						
Bacillus subtilis					x					x									
Bacillus thuringiensis	x	x		x	x		x		x	x		x	x		x	x	x		
Beauveria bassiana					x					x									
benalaxyl					x														
bendiocarb				x	x								x					x	
benfluralin					x		x												
benomyl							x						x		x		x		
bentazone					x					x									
benzalkonium chloride					x						x		x			x			
benzofenap																			
bifenazate					x					x									
bifenox					x														
bifenthrin			x	x	x	x					x	x	x		x	x	x	x	x
bioresmethrin				x	x						x		x		x				
biphenyl					x														
bitertanol					x								x		x				
borax/borate/boric acid			x	x	x						x	x	x			x			x
boscalid				x						x									
brodifacoum		x		x	x			x		x	x	x	x		x	x	x		x
bromacil					x														
bromadiolone			x	x	x					x	x	x	x				x		
bromopropylate					x														
bromoxynil					x														
bromoxynil octanate					x														
bupirimate					x					x									
buprofezine					x														
butachlor					x														
butralin					x														
butylamine					x														
butylate					x														
calciferol					x														
captan					x								x					x	
carbaryl	x		x	x	x	x	x	x				x	x		x				x
carbendazim											x				x		x		
carbetamide					x					x									
carbofuran													x						
carbon disulphide													x						

	AS	CI	CNMI	Fiji	FP	FSM	Guam	Kir	Nauru	NC	Niue	Pal	PNG	RMI	Sam	Sol	Ton	Tuv	Van
carbon tetrachloride													x						
carboxin					x														
carfentrazone-ethyl													x						
cedar oil												x							
chitosan					x														
cholecalciferol					x														
chloralose				x	x														
chlorantraniliprole				x	x					x							x		
chlorfenapyr					x														
chlorfluazuron				x	x										x	x			
chloridazon					x														
chlormequat					x														
chlorophacinone					x														
chloropicrin					x										x				
chlorothalonil		x	x	x	x		x			x	x	x			x	x	x		x
chlorotoluron					x														
chlorphonium chloride					x														
chlorpropham					x					x									
chlorpyrifos				x	x					x	x	x	x	x	x	x			x
chlorpyrifos-methyl					x														
chlorthal-dimethyl					x														
citrus extract; citrus oil					x					x									
clethodim					x					x									
clofentezine					x					x									
clomazone					x					x									
clopyralid					x														
Coniothyrium minitans					x					x									
copper ammonium complex													x						
copper hydroxide		x		x	x		x			x	x		x			x	x		
copper oxide					x					x			x			x			
copper oxychloride		x		x	x					x	x		x						
copper sulphate					x	x				x					x				
coumaphos					x								x						
coumatetralyl				x	x								x						
crimidine					x														
cryolite					x														
cyanazine																			
cyantraniliprole					x														
cyazofamid										x									

	AS	CI	CNMI	Fiji	FP	FSM	Guam	Kir	Nauru	NC	Niue	Pal	PNG	RMI	Sam	Sol	Ton	Tuv	Van
cycloate					x														
cycloxydim					x														
cyfluthrin, beta-cyfluthrin			x	x	x					x		x	x	x					
cyhexatin					x														
cymoxanil					x					x			x						
Cypermethrin /alphamethrin	x		x	x	x	x	x			x	x	x	x	x	x	x			
cyphenothrin					x														
cyproconazole					x					x									
cyprodinil					x					x									
cyromazine					x					x									
dalapon					x														
daminozide					x														
dazomet					x					x									
DDT													x						
deltamethrin			x	x	x	x	x		x	x		x	x		x	x	x		x
desmedipham					x														
diafenthiuron					x														
diatomaceous earth					x														
diazinon				x	x		x	x				x	x		x			x	
dicamba			x	x	x					x		x	x		x				x
dichlobenil					x														
dichlofluanid					x														
dichlormid										x									
dichlorphen					x														
dichlorprop					x														
dichlorprop-p					x														
dichlorvos				x	x					x	x	x	x		x				
diclofop					x														
diclofop-methyl					x														
dicloran					x														
dicofol													x						
difenacoum				x	x														
difenoconazole					x					x									
difenzoquat					x														
difethialone					x														
diflubenzuron					x		x												
diflufenican					x													x	x
dikegulac					x														

	AS	CI	CNMI	Fiji	FP	FSM	Guam	Kir	Nauru	NC	Niue	Pal	PNG	RMI	Sam	Sol	Ton	Tuv	Van
dikegulac-sodium					x														
dimefluthrin				x		x													
dimethachlor					x														
dimethenamid-p					x					x									
dimethirimol					x														
dimethoate				x	x		x			x							x		x
dimethomorph					x					x									
dinocap					x														
diphacinone			x	x	x	x	x					x				x			
diquat					x	x				x		x							
disulfoton					x														
dithianon					x														
diuron		x		x	x					x			x		x				
dodemorph					x														
dodemorph acetate										x									
dodine					x														
DSMA					x														
emamectin					x					x									
endothal					x														
epoxiconazole					x														
EPTC					x					x									
esfenvalerate					x					x		x	x						
ethalfluralin					x														
ethephon (chloroethylphosphonic acid)				x	x					x			x						
ethion					x														
ethofumesate					x														
ethoprophos					x					x									
etofenprox					x					x									
etoxazole					x														
etradiazole					x					x									
famoxadone										x									
fatty acids & salts				x	x					x	x	x	x			x			
fenamiphos					x														
fenarimol					x														
fenbutatin oxide							x						x						
fenhexamid					x														
fenitrothion					x								x						
fenoxycarb					x								x						x

	AS	CI	CNMI	Fiji	FP	FSM	Guam	Kir	Nauru	NC	Niue	Pal	PNG	RMI	Sam	Sol	Ton	Tuv	Van
fenpiclonil																			
fenproparthrin					x														
fenpropidin										x									
fenpropimorph					x														
fenproximate					x														
fenthion													x						
fentin hydroxide					x														
ferbam					x														
ferric phosphate					x					x									
fipronil		x	x	x	x		x	x	x	x				x	x	x	x		
flamprop					x														
flamprop –methyl					x														
flamprop-M-isopropyl					x														
flocoumafen				x	x						x		x		x		x		
flonicamid					x					x									
fluazifop					x														
fluazifop-P-butyl		x			x					x			x		x				
fluazinam					x														
flubendiamide					x														
fludioxonil					x					x									
flufenacet										x									
flufenoxuron					x														
flumethrin													x						
flumetsulam					x														
flumeturon					x														
fluopicolide										x									
flurenol					x														
fluridone					x														
flurochloridone					x														
fluroxypyr					x					x			x			x			
flusilazole					x					x			x		x				
flutolanil					x														
flutriafol					x														
folpet					x														
fomesafen					x														
foramsulfuron			x																
formaldehyde					x								x						
formetanate					x					x									
fosamine-ammonium					x														

	AS	CI	CNMI	Fiji	FP	FSM	Guam	Kir	Nauru	NC	Niue	Pal	PNG	RMI	Sam	Sol	Ton	Tuv	Van
fosetyl-al					x					x									
fosthiazate					x														
fuberidazole					x														
furalaxyl					x														
furaflavone										x									
gamma-cyhalothrin	x				x														
garlic extract										x		x							
gibberellic acid; gibberellins					x					x									
Gliocladium catenulatum souche										x									
glufosinate-ammonium				x	x					x			x		x	x			
glutaraldehyde					x														
glyphosate	x	x	x	x	x	x	x			x	x	x	x		x	x	x		x
guazatine					x														
halosulfuron-methyl			x		x					x									
haloxyfop					x														
Helicoverpa armigera nucleopolyhedrovirus										x									
hexaconazole					x								x						
hexaflumuron			x		x		x												
hexazinone				x	x														
hexythiazox					x					x									
hydramethylnon				x	x		x			x		x			x				
hydrogen peroxide					x														
hydroprene					x														
hymexazol					x														
imazalil					x					x									
imazaquin					x														
imazethapyr																			
imidacloprid		x	x	x	x		x			x	x		x			x	x		x
imiprothrin	x			x	x	x						x	x		x				x
indaziflam					x														
indole -3-acetic acid					x														
indole -3-butyric acid					x					x			x						
indoxacarb		x	x	x	x					x			x		x	x	x		
iodine					x														
ioxynil					x					x									
ioxynil octanoate					x														
iprobenphos					x														
iprodione			x		x					x									

	AS	CI	CNMI	Fiji	FP	FSM	Guam	Kir	Nauru	NC	Niue	Pal	PNG	RMI	Sam	Sol	Ton	Tuv	Van
isazophos /wazophos															x				
isoproturon					x														
isoxaben					x					x									
isoxaflutole										x									
karanja Oil (*Pongamia* sp.)					x														
kasugamycin					x														
kresoxim-methyl					x														
lambda-cyhalothrin	x	x	x	x	x	x	x			x	x	x	x		x	x	x		
laminarin										x									
lenacil					x														
lime										x									
lime sulphur		x									x								
linuron		x		x	x					x							x		x
lufenuron		x		x	x					x					x		x		
magnesium phosphide	x				x														
malathion	x	x		x	x	x	x	x	x	x	x	x	x		x	x	x	x	x
mancozeb		x		x	x		x		x	x	x		x		x	x	x		x
maneb					x	x													
maleic hydrazide					x					x									
mandipropamid										x									
MCPA				x	x	x				x			x						x
MCPB					x														
mecoprop					x	x						x							
mecoprop-p			x		x														
mefenoxam					x					x			x						
mefluidide					x														
mesotrione										x									
metaflumizone					x														
metalaxyl		x		x	x				x	x			x				x		
metaldehyde				x	x		x			x	x	x	x		x	x	x	x	x
metamitron					x														
metam-sodium				x	x														
Metarhizium anisopliae					x														
metazachlor					x					x									
metazosulfuron				x															
metconazole					x														
methabenzthiazuron					x														
methamidophos					x								x						
methiocarb					x					x	x		x		x				

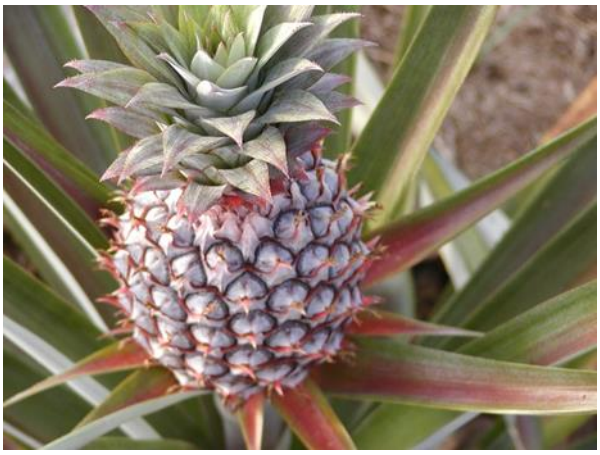
	AS	CI	CNMI	Fiji	FP	FSM	Guam	Kir	Nauru	NC	Niue	Pal	PNG	RMI	Sam	Sol	Ton	Tuv	Van
methomyl		x	x	x	x												x		
methoprene			x	x	x								x						
methoxyfenozide					x														
methyl bromide				x	x			x					x		x	x			x
metiram					x														
metofluthrin				x	x								x						
metribuzin			x		x					x							x		
metsulfuron-methyl		x	x	x	x					x			x		x	x			x
milbemectin					x					x									
molinate					x														
MSMA (monosodium methylarsonate)			x	x	x								x						
myclobutanil					x					x			x			x	x		
Myothecium verrucaria					x														
naled			x		x		x												
napthalene						x							x						
naphthylacetamide					x					x									
naphthylacetic acid					x					x					x				
napthenates					x														
naphthalene acetic acid				x															
napropamide					x														
naptalam					x														
niclosamide					x														
nicosulfuron										x									
nitrapyrin					x														
nitrothal isopropyl					x														
norfluazon					x														
novaluron					x														
noviflumuron			x																
oryzalin			x		x														
oxadiazon					x					x									
oxadixyl					x														
oxamyl					x		x								x				
oxycarboxin					x														
oxydemeton-methyl					x														
oxyfluorfen					x					x									x
Paecilomyces fumososeus					x														
Paecilomyces lilacinus					x					x									
palm oil										x									

	AS	CI	CNMI	Fiji	FP	FSM	Guam	Kir	Nauru	NC	Niue	Pal	PNG	RMI	Sam	Sol	Ton	Tuv	Van
para-aminopropiophenone (PAPP)					x														
para-dichlorobenzene / 1,4-dichlorobenzene	x				x							x							
paraquat	x	x		x	x	x					x		x		x	x	x		x
pelargonic acid					x														
penconazole					x					x									
pencycuron					x					x									
pendimethalin					x					x			x						
pentanochlor					x														
permethrin	x	x		x	x	x	x	x			x	x	x	x	x	x	x	x	x
petroleum oil/mineral oil/ paraffin oil		x		x	x		x		x	x	x		x		x	x			x
phenmedipham					x														
phenothrin/sumithrin	x				x		x	x			x	x	x		x	x			
phenylphenol					x														
phosalone					x														
phosmet					x								x						
phosphoric acid					x					x									
phosphorous acid				x						x			x						
picloram				x	x					x									x
picoxystrobin					x														
pindone					x			x											
pine oil				x						x									
piperonyl butoxide			x	x	x					x	x	x			x	x		x	x
pirimicarb					x					x									
pirimiphos-methyl		x		x	x						x				x	x	x		
plant/vegetable oils					x					x	x								
polybutene					x														
potassium bicarbonate										x									
potassium chlorate													x						
potassium phosphonate					x										x				
prallethrin	x			x	x							x			x				
prochloraz				x	x					x									
procymidone					x														
prodiamine																		x	
profenofos					x														
prometon					x														
prometryn					x														
propachlor					x					x									

	AS	CI	CNMI	Fiji	FP	FSM	Guam	Kir	Nauru	NC	Niue	Pal	PNG	RMI	Sam	Sol	Ton	Tuv	Van
propamocarb										x									
propamocarb hydrochloride					x														
propanil					x														
propaquizafop					x														
propargite					x														
propazine					x														
propiconazole					x					x			x		x		x		
propineb					x								x						
propionic acid					x														
propoxur				x	x						x		x		x				
propyzamide					x					x			x						
proquinazid					x					x							x		
prosulfocarb										x									
pymetrozine					x					x									
pyraclostrobin				x						x									
pyrazophos					x														
pyrethrins	x		x		x					x	x	x	x	x	x	x			
pyrethrum								x					x		x	x			x
pyridaben					x														
pyridate					x														
pyrimethanil					x					x									
pyriproxyfen				x	x					x		x	x			x			
quinclorac			x																
quinoxyfen										x									
quintozene					x														
quizalofop				x	x					x							x		
resmethrin					x							x		x					
rotenone					x			x			x		x						x
saponins										x									
siduron					x														
simazine					x								x						
s-metolachlor					x					x									
sodium chlorate					x														
sodium chlorite										x									
sodium dimethylarsinate/ sodium cacodylate					x														
sodium ferric EDTA	x																		
sodium fluoride					x														
sodium hydroxide													x						

	AS	CI	CNMI	Fiji	FP	FSM	Guam	Kir	Nauru	NC	Niue	Pal	PNG	RMI	Sam	Sol	Ton	Tuv	Van
sodium monofluoroactete / 1080													x						
sodium orthophenylphenate					x														
sodium nitrate												x							
sodium tetrathiocarbonate					x														
spinetoram					x														
spinosad/spinosyns		x			x					x	x	x	x			x			x
spirodiclofen					x														
spiromesifen					x					x									
spirotetramat					x					x									
spiroxamine					x														
Streptomyces griseoviridis										x									
sulcotrione										x									
sulfentrazone			x																
sulfluramid					x	x													
sulfoxaflor					x														
sulfuryl fluoride				x	x														
sulphur					x					x		x	x				x		x
tau-fluvalinate		x			x					x			x			x			x
TCA / trichloroacetic acid					x														
tebuconazole					x					x			x						
tebufenozide					x								x						
tebufenpyrad					x					x									
tebuthiuron					x														
teflubenzuron					x														
tefluthrin					x														
temephos					x								x						
terbacile					x														
terbuthylazine					x														
terbutryn					x								x						
tetrachlorvinphos					x														
tetradifon					x														
tetramethrin	x			x	x	x	x					x	x		x				
thiabendazole					x								x						
thiacloprid					x														
thiamethoxam					x					x									
thiobencarb					x														

	AS	CI	CNMI	Fiji	FP	FSM	Guam	Kir	Nauru	NC	Niue	Pal	PNG	RMI	Sam	Sol	Ton	Tuv	Van
thiodicarb					x														
thiophanate-methyl		x		x	x					x	x								x
thiram					x					x			x						
tolyfluanid					x														
tralomethrin					x							x							
toxaphene / camphechlor													x						
transfluthrin					x								x						
triademefon					x						x		x		x				x
triadimenol					x					x									
tri-allate					x														
***Trichoderma* spp.**					x					x									
trichlorfon													x		x				
triclopyr				x	x	x	x			x			x	x	x				x
tridemorph					x								x		x				
trifloxystrobin					x					x					x				
triflumuron					x					x									
trifluralin					x	x						x							
triforine					x								x						
trinexapac ethyl													x						
valifenalate										x									
Verticillium lecanii / Lecanicilliun lecanii					x					x									
vinclozolin					x														
warfarin					x			x					x					x	x
Xenorhadus nematophila				x															
zineb					x														
ziram					x														
zoxamide										x									
TOTAL	**21**	**28**	**33**	**83**	**402**	**22**	**33**	**14**	**8**	**169**	**39**	**44**	**116**	**9**	**64**	**42**	**35**	**12**	**40**



Additional Notes:

American Samoa:

1. OFF!, Deet: personal insect repellent, not included.
2. Avermectin: abamectin
3. Clorox, sodium hypochlorite: bleach, not included
4. Clorox wipes, Tilex, Lysol wipes:, alkyl dimethyl benzyl ammonium chloride = benzalkonium chloride; used here as a household cleaner so not included.
5. Pinsol, Glycolic acid: disinfectant, not included
6. Lysol, L-lactic acid: disinfectant, not included

CNMI:

1. Arch Pulsar, calcium hypochlorite: disinfectant, not included
2. HTH Algae Guard, dimethyl benzyl: appears to be a pool product, not included
3. HTH Granular, calcium hypochlorite: disinfectant, not included
4. LA Chemchlor, sodium hypochlorite: disinfectant, not included
5. Liqua-Tox II: diphacinone
6. Nuclor Chlor Tab, trichloro-s-triazine: disinfectant, not included
7. Pyrocide Fogging: pyrethrins with piperonyl butoxide
8. R-11 Spreader, dimethyl polysiloxa: adjuvant, not included
9. Target 6 Plus: MSMA (sodium hydrogen methylarsonate)
10. Triple SF herbicide: 2,4-D, Mecoprop-p, dicamba

Fiji:

1. No.88, Autoly yeast baits: could not find an active ingredient for this, so not included
2. No.145, Tim Tech cxomide, copper, Hextar chemicals, Malaysia: this product could not be found; assumed to be copper oxychloride as it is the only copper supplied by Hextar
3. No.151, Cislin Residual: 1,2-propanodiol is not an active ingredient
4. No.152, sodium salicyate: assumed not to be an active so not included
5. N0.155, calyphosate isopropylamine is taken to be glyphosate isopropylamine

6. No.164, Rainbow 480 MIPA 70% w/w Texxon Chemical Industries, Kuala Lumpur, Malaysia: neither the product, nor active, nor industry could be found
7. No.169, Lurex lactic acid: a lure, not included
8. No.180, Wet & Stick, Bermocoll EBS 0.45% w/w: appears to be an adjuvant, so not included
9. No.238, Fumitoxin Coated Ins Tablets, Phosphine: these are aluminium phosphide tablets, which release phosphine, so is entered as aluminium phosphide
10. No.241, tricosene: an attractant not an active ingredient, so not included
11. No.262, Glomacq Protein Bait – Bug for Bugs, Australia: not found, suspected to not have active ingredient.
12. No 267, Tanalith: timber treatment chemical, not included
13. No.276, D-Ter Axiital & Bird Repellent: not included
14. No.294, Polydimethylsiloxane: not found - assumed to be adjuvant, not included
15. No.311, Ethyl-4-methyloctanoate: lure, not included
16. No.321, picardine: repellent, not included

French Polynesia:

1. (Z)-11-hexadecen-1-yl acetate: pheromone, not included
2. (Z)-11-hexadecenal: pheromone, not included
3. 2 (thiocyanométhylthio)Benzothiazole (TCMTB): timber treatment chemical, not included
4. Bore: unidentified
5. 3-iodo-2-propynyl butyl carbamate (IPBC): appears to be used as a fungicide in products such as cosmetics, and in timber treatment, not included
6. Chlorure d'alkybenzyl: appears to be the same as, or similar to, chlorure de benzalkonium (benzalkonium chloride)
7. Chlorure de didécyl diméthyl ammonium (didecyldimethylammonium chloride): appears to be a disinfectant, not included
8. Cosmolure (Sordidine): pheromone, not included
9. Cue-lure: a lure, not included
10. Diethyltoluamide (DEET): repellent, not included
11. Di-1-p-menthène: anti-transpirant, not included
12. DMP (Diméthylphtalate): insect repellent, not included
13. EHD (Ethylhexanediol, Rutgers 612): insect repellent, not included
14. Géraniol (Rhodinol): insect repellent, not included
15. Goudron de pin: pine tar, wood preservative? not included
16. Harpin protéine: plant growth stimulator, fertiliser; not included
17. Hydrolysat de proteins: unable to determine use as pesticide; not included
18. Hydroxy-2 éthyloctyle, sulfure de: repellent, not included
19. Icaridin: repellant, not included
20. IR 3535 (N-butyle-N-acétyle-3-éthylaminopropionate): repellent, not included
21. Isocinchomérate de dipropyle: repellent, not included
22. Kaollin: repellent; not included
23. Métaborate de sodium: included under borax etc
24. Méthyl eugenol: attractant, not included
25. MGK 264 (Vandyke 264, Octacide 264: repellent, not included
26. Phtalate de diméthyle: repellant, not included
27. PMD (p-menthane-diol, citriodol): repellent, not included

28. Pyrithione de zinc: appears to be used in products such as paints, medicines, personal care and household products; not included
29. Résines: unidentified
30. Sel de potassium d'acides gras: entered as fatty acids
31. Tétrathiocarbonate: most likely sodium tetrathiocarbonate

Guam:

1. No. 7, Balan herbicide, N-Butyl-N-ethyl: this is probably N-Butyl-N-ethyl-a,a,a-trifluoro-2,6-dinitro-p-toluidine, also called benefin or more commonly benfluralin
2. Nos. 28,47,58; Manzate Prostik is taken to contain mancozeb

Nauru:

1. Narrow Range Oil and Summer Oil: petroleum oil
2. Lures not included

New Caledonia:

1. No.s 25 & 26, Arbinol B: repellant, not included
2. No. 43, Biosoap, Sela de potassium et acides gras: understood to be fatty acids (potassium salts) and is entered under fatty acids; also No.177
3. No. 97, Eco-Oil. An Australian product, contains unidentified plant oils. http://ecoorganicgarden.com.au/products/pest-disease/eco-oil/
4. No. 102, Eptam: more commonly known as EPTC
5. No.s 106/7/8, 154, alphamethrine: alpha-cypermethin, entered under cypermethrin
6. No.s 151.152, Lacbalsam: entered as plant oils
7. No. 157, Maniflow, copper: taken to be copper sulphate
8. No, 245, Spectrum herbicide, DMTA. No active by this name has been found. There is a Spectrum herbicide with an active florasulam, but no entry has been made for it

Niue:

1. No. 9, Rabbit mossi coil, nitrogen 4%, fluoride 7%: unsure what this is so omitted
2. No.24, Mite Killer potassium salts: taken to be fatty acids
3. No. 26, thenothrin: phenothrin
4. No.28, Eco-Oil miticide, emulsified oils: entered as plant oils

Palau:

1. 2-methyl-4-oxo-3-(2-propynyl)cyclopent-2-enyl: prallethrin
2. Enforcer 20 sec Roach killer: dicarboximide is a class of chemicals; label states esfenvalerate
3. Black Flag Ant & Roach Killer, methyl carbamate: the MSDS specifies imiprothrin, and lambda-cyhalothrin
4. Black Flag Wasp, Bee & Hornet Killer, 2-phenol methylcarbamate: the only wasp product Black Flag has is Wasp, Hornet & Yellow Jacket Killer containing lambda-cyhalothrin and prallethrin
5. N,N-diethyl-m-toluamide: repellent, not included
6. D-con mouse pruff, benzopyran: not recognisable a.i.; label states brodifacoum

7. Do it Best/ Lawn Weed Killer, dimethylamine: not a recognisable a.i. Website indicates 2,4-D, mecoprop and dicamba [https://www.doitbest.com/products/fertilome-weed-out-lawn-weed-killer?via=54f9f91669702d1b9e374100%2C54f9f92969702d1b9ebc4200%2C54f9f92a69702d1b9ec34200%2C54f9f92a69702d1b9ec94200]
8. Do It Best Spot Weed Killer, dimethylamine; most likely 2,4-D
9. E.M. Matson Jr. Corry's liquid Slug & Snail control, tetraoxycyclo-octave: not a recognisable a.i. US EPA identifies a.i. as metaldehyde (2,4,6,8-tetramethyl-l,3,5,7-tetraoxycyclo-octane).
10. Enforcer Flea Spray ,pyridine: not a recognisable a.i. Website indicates pyriproxifen (which is a pyridine) and permethrin
11. Enforcer/Overnite: assumed to be Enforcer Overnite Crack and Crevice Fumigant which contains sumithrin (= phenothrin) and imiprothrin
12. Enforcer Rat and Mouse Bars and Rat and Mouse Killer, chlorophenyl: not a recognised a.i.; not found on Enforcer website, not included
13. Enforcer Flea foggers, Nylar: the label states pyrethrins and piperonyl butoxide – so these are included. Nylar is the trade name for the active pyriproxifen – this is also included
14. Fungicide, clarified hydrophobic: could not be identified
15. Giant Destroyer: according to the MSDS, sodium nitrate is the only active ingredient
16. Gordon's Grass/Weed Killer, a.i. isoctyl: not a recognisable a.i. Gordon's website gives the following: Pronto Fast Acting weed & grass killer – glyphosate
17. Jardine, AZ wood preservatives: timber treatment chemicals, not included
18. Just One bite bar, benzopyran: not recognisable a.i., website states bromdalione
19. Maid Brands, Heavy Weight Ant & Roach Killer, benzene acetate: not recognisable a.i.; website states esfenvalerate
20. Meta Deadline Slug & Snail Killer, tetraoxycyclo-octave: not recognisable a.i.; website states metaldehyde
21. Olympic, Mildew Check, propynyl butyl carbamate: not recognisable a.i.; ai.s not found on website but appears to be a cleaner, not included
22. Dimethylamine salt taken to be 2,4-D
23. Rat Bait/ Kills Rats & mice, chlorophenyl: could not be identified so not included
24. Ropel Animal, Bird, Rodent Repellent, benzyldiethyl: not identified and a repellent not included
25. Safer, potassium salt: assumed to be potassium salt of fatty acids

Samoa:

1. Ferriade: a vet medicine
2. Foschek: phosphorous acid
3. Levamisole: a vet medicine
4. Orthene: acephate
5. Wazophos: isazophos
6. Maldison: malathion

Solomon Islands:

1. Osmose Boracol 200H fungicide: disodium octaborate tetrahydrate and benzalkonium chloride
2. Fungus Gun Systemic Disease Spray: myclobutanil
3. Insect and Mite killer: potassium salts of fatty acids
4. Pestex Fumigation Tablets: aluminium phosphide
5. Rudchem PY Fog: pyrethrum, piperonyl butoxide
6. Sumilarv Insect and Growth Regulator: pyriproxifen
7. Fumi toxin: aluminium phosphide

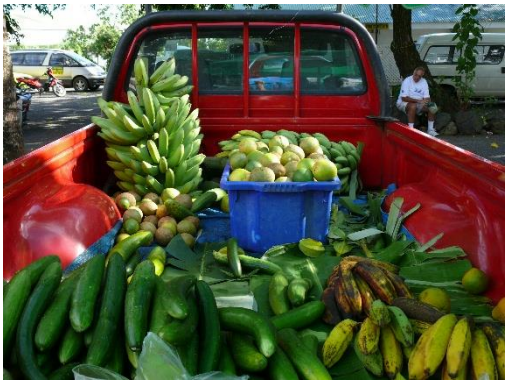
8. Karate: lambda-cyhalothrin
9. Farmicon: unknown
10. Vet sense Kilverm Pig and Poultry Wormer: vet medicine, not included
11. Chemwet: wetting agent, not included
12. LI 700: surfactant, not included
13. Activator surfactant: not included
14. Sumithrin = phenothrin

Tonga:

1. Kocide: copper hydroxide
2. Maldison: malathion
3. Tanalith, arsenic, copper, chrome: timber treatment chemicals, not included

Vanuatu:

1. Maldison: malathion
2. List described Yates Pathweeder as containing 2,2-DPA, amitrol and simazine; but the MSDS for this product specifies glyphosate, oxyfluorfen, diflufenican



Annex 2: Sources of Information

American Samoa
Pesticide Products along with their Active Ingredients found in American Samoa.
Supplied by Tualagi Gaoteote of the Environmental Protection Agency, on May 11th, 2016.

Commonwealth of the Northern Mariana Islands (CNMI)
List of pesticides imported supplied by Cal Westwood, The Pesticide Officer, DEQ Pesticides Program, Pesticide and Storage Tanks Branch, Division of Environmental Quality, Bureau of Environmental and Coastal Quality, Commonwealth of the Northern Mariana Islands. Provided on Jan 23rd 2015 to D. Mowbray.

Cook Islands
Cook Islands Registered Pesticides, 2014. Supplied by William Wigmore, Registrar of Pesticides and Director of Research, on 30th July 2014 to D. Mowbray.

Fiji
List of Registered Pesticides in Fiji-revised draft 13/03/15. Provided by Dr Apaitia Macanawai, on March 13th 2015 to D. Mowbray.

Federated States of Micronesia (FSM)
FSM EPSON007. Partial information was obtained for Federated States of Micronesia (principally for Yap, Kosrea). Provided by Tamdad Sulog, Chief of Agriculture & Forestry, Department of Resources and Development on December 2nd 2014 to D. Mowbray. Further information provided to M. Watts by Tamdad Sulog on March 23rd 2016, by Konrad Engelberger on March 24th, and by Erick Wakuk on March 30th.

French Polynesia
Liste des substances actives autorisées en Polynésie française - Septembre 2014
Références réglementaires: arrêté n°1065/CM du 25 juillet 2011 modifié par:

Arrêté n° 422/CM du 22 mars 2012
Arrêté n° 698/CM du 13 mai 2013
Arrêté n° 983/CM du 27 juin 2014
Arrêté n° 1035/CM du 04 juillet 2014

Provided by Rudolph Putoa on September 30th 2014 to D. Mowbray.

Guam
USA Registered Pesticides that are Commonly Used in Guam. Provided by Betwin Alokoa, EHS Supervsior – Pesticides, Pesticides Enforcement Programme, Guam Environmental Protection Agency on October 1st 2014 to D. Mowbray.

Kiribati
List of Pesticides Used in Kiribati. Provided by Ms Teaaro Otiuea, Principal Agriculture Officer, Dept of Agriculture and Livestock, MELAD, Kiribati, on September 12th 2014 to D. Mowbray.

Nauru
Information provided by emails to M. Watts in Dec 2015 and Jan 2016 by Sasikumar Paravanoor, Acting Secretary for CIE, identifying pesticides imported by Taiwan Technical Mission farm (pesticides they have in stock but seldom use); and Asterio Appi, Director of Quarantine, identifying quarantine pesticides (traps and lures) for fruitfy and yellow crazy ant.

New Caledonia
Liste des produits phytosanitaires à usage agricole homologués en Nouvelle-Calédonie au 26/08/2014.

Provided by Aurélie Chan, Service d'Inspection Vétérinaire, Alimentaire et Phytosanitaire (SIVAP), Direction des Affaires vétérinaires, Alimentaires et Rurales (DAVAR), on December 1st 2014 to D. Mowbray.

Niue
Niue Pesticides Registered List 2014. Provided by Poi Okesene, Senior Technical Project Manager, Department of Agriculture, Forestry & Fisheries on October 29th 2014 to M. Watts.

Palau
Palau Current Pesticides. List provided by Francesca Sungino, ODS Officer, Palau Environmental Quality Protection Board, on Aug 25th 2014 to D. Mowbray.

Republic of the Marshall Islands (RMI)
RMI Pesticides Listing (2). Provided by Henry Capelle, Chief of Agriculture & Quarantine, Ministry of Resources Development, in September 2014 to M. Watts, with a follow up email regarding the use of Garlon 4 herbicide, on October 14, 2014.

Samoa
Samoa Registered Pesticides List. Provided by Olive Jay To Alesana, Pesticides Unit, Samoa Quarantine Service, in September 2014 to D. Mowbray.

Solomon Islands
Solomons – PMS_pesticides_Solomons. Provided by Helen Tsatsia, Deputy Director/Research, Ministry of Agriculture and Livestock, originally on October 6th 2014 to M. Watts; an updated version was supplied on May 19th, 2016.

Tonga
TongaPesticidesList_2014. Provided, by Viliami T. Manu, Research & Information Division, on September 18 2014, to D. Mowbray. Updated in May 2016 with document 219-PesticidesCons-2015_Tonga(1).xlsm, being the pesticides imported into Tonga in 2015, entered into FAO Questionnaire on Pesticide Use.

Tuvalu
List of Pesticides & Insecticides used in Tuvalu. Collected from the Departments of Health and Agriculture. Provided by Matio Lonalona, Aug 27th 2014 to D. Mowbray.

Vanuatu
Complied from lists supplied by major suppliers. Information was received from Vanuatu Agricultural Supplies, Pacific Suppliers, EzzyKill, and Vanuatu Veterinary. Provided in August 2014 to D. Mowbray.