

An Overview of the PAN Pesticide Chemical Database

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The PAN Pesticide Chemical Database (hereafter referred to as PAN Chem) contains information on 3,700 pesticide ingredients including product information, human and environmental toxicity, regulatory status, chemical use types and classifications, chemical structures and pesticide use data derived from the California Pesticide Use Report (PUR) data. In all, PAN Chem contains data from over 100 discrete sources.

These data are tightly integrated so that complex searches can be performed. For example, it is a simple query to find out the number of farms using carcinogenic organophosphate insecticides registered for use in California on potatoes in Siskiyou county in May 1998. This type of search uses information that has never before been integrated in one system. This particular query makes use of data from six different sources. Using PAN Chem, this information can be retrieved in less than one minute.

Chemical Identification				Products Containing this chemical:				
ETHOPROP				%	Chem Name	Product Name	Prod No.	Category
Synonyms:				69.6	ETHOPROP	MOCAP EC	1487	1487
T	ENT 27318	Notes:	December 1988 Weaver, D.J. et al.	10.0	ETHOPROP	MOCAP 10%	32341	?
T	Jok		1988. Studies on the	10.0	ETHOPROP	CHIPCO MOCAP BRAND	26853	?
T	Moeap		Persistence and Leaching in Soil of					
CAS No.	DPR No.	EPA Code	Breakdown Products:	95.9	Ethyl S,S-dipropyl	ETHOPROP	0002640045	
13194-48-4	404	041101		15.0	Ethyl S,S-dipropyl	MOCAP 15%	0002640045	
Use Type	Chemical Class	Source		69.6	Ethyl S,S-dipropyl	MOCAP EC	0002640045	
Insecticide	Organophosphate	DPR Chemicals197						

Figure 1: The PAN Chem database contains information for identifying a particular pesticide and provides a list of products containing each active ingredient.

The primary source of pesticide ingredients listed in Pan Chem is DPR's pesticide list. In addition, each pesticide is referenced by the following: CAS number, DPR Chem Code, EPA PC Code, and a list of synonyms. PAN Chem also includes information on major use types and chemical classifications. Each pesticide ingredient includes a list of pesticide products that include that ingredient. Product data comes from DPR and EPA pesticide product databases.

All human toxicity data comes from official and/or peer reviewed sources, and these data sources are each referenced in the database. Human toxicity data includes the following categories:

- ?? Acute systemic toxins, derived from the EPA Category I definition.
- ?? Carcinogens, from California Proposition 65 list and the EPA-OPP cancer database.
- ?? Cholinesterase (ChE) Inhibitors, from DPR's list of cholinesterase inhibiting pesticides.
- ?? Reproductive and developmental toxicants, from California Proposition 65 list.
- ?? Endocrine disruptors, from a diversity of sources.
- ?? California ground water contaminants, from CA Section 6800 list.
- ?? California Restricted Use Pesticides, from CA Section 6400 list.

Chemical Identification			General Categories		Regulatory Categories					Bad Actor Categories									
Chem Code	CAS Number	Chem Name	Chemical Class	Chem Use Type	POPs	CA Registered	CA Ground Water	Category I	EPA Restricted	CA Restricted	CA Bad Actor	Acute Toxin	Carcinogens	CLE Inhibitors	Repro & Dev	Dev Toxins	Repro Toxins	Ground Water Cont	
633	62-74-8	1080		Rodenticide	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
573	542-75-6	1,3-DICHLOROPROPENE	Halogenated	Fumigant	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
5020	94-82-6	2,4-DB ACID	Chlorophenoxy	Herbicide	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
1938	55406-53-6	3-IODO-2-PROPYNYL BUTYL	Carbamate	Fungicide	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
50	504-24-5	4-AMINOPYRIDINE		Microbiocide	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1685	30560-19-1	ACEPHATE	Organophosphate	Insecticide	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2218	62476-59-9	ACIFLUORFEN, SODIUM		Herbicide	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	107-02-8	ACROLEIN		Algaecide	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
678	15972-60-8	ALACHLOR		Herbicide	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
575	116-06-3	ALDICARB	Carbamate	Insecticide	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Figure 2: Human toxicity information for a selection of pesticides.

Ecotoxicity data in PAN Chem include EPA's AQUIRE ecotoxicity data. Regulatory information includes California registration, U.S. and California restricted use categorization, California Proposition 65 status, California ground water contaminant status (section 6800), EPA Category I status and California Certified Organic Farmers (CCOF) status. International and additional U.S. regulatory status information is planned. Our plan is to make a subset of this data available on the Internet at www.pesticideinfo.org before the end of 2000.

In addition to chemical information, PAN Chem contains data on pesticide products, California counties and commodities. Product data include the full DPR and EPA pesticide product databases, including registered uses, manufacturer contact information, section 24c special local need exemptions, and product warning codes. California county data include agricultural production statistics from the California Department of Agriculture (CDFA), county agriculture commissioner contact information and pesticide use by county. Commodity data includes California commodity production statistics including acreage and production estimates, CDFA commodity classifications, and pesticide use by commodity.

Using the PUR data, we have generated 10 million PUR summaries. Each summary contains a summary description (a key) and the following data: gross pounds, pounds used on acreage, which we call acre-pounds (excludes post-harvest processing and pesticides applied to planting holes for trees or vines), acres treated, acres planted, number of pesticide applications, number of PUR records, and the number of fields where pesticides were applied. Using acreage and acre-pounds we calculate two types of intensity of pesticide use, pounds per acre treated and pounds per acre planted. All summary information can be graphed within PAN Chem or exported for further analysis. Because data are already summarized, response times are extremely fast, and most queries display in less than a second.

CA Registered
CA BAD ACTOR
Chem. Code

Export Gross Lbs

Choose County Santa Cruz
Choose Commodity Strawberries

Totals Pounds of selected chemicals									Change -Gross Lbs-	
Chem Name	1991	1992	1993	1994	1995	1996	1997	1998	198-95	198-92
<input checked="" type="checkbox"/> 385 Fu METHYL BROMIDE	474,426	677,530	418,508	590,977	554,109	475,251	500,498	553,405	-704	-124,124
<input checked="" type="checkbox"/> 136 Fu CHLOROPICRIN	256,157	385,659	236,052	338,640	310,674	274,767	298,008	320,318	9,644	-65,341
<input checked="" type="checkbox"/> 616 Fu METAM-SODIUM		287	637		2,040	1,912	2,986	284	-1,756	-3
<input checked="" type="checkbox"/> 573 Fu 1,3-DICHLOROPROPENE					27	159	1,965	133	106	133
<input checked="" type="checkbox"/> 484 Inse ALUMINUM PHOSPHIDE	4	3	2	6	4	8	0	0	-4	-3
<input type="checkbox"/> 391 Fu METHYL FORMATE										
<input checked="" type="checkbox"/> 410 Inse OXYTHIOQUINOX	61	29	23	34	10	2			-10	-29

Figure 3: The PAN Chem database provides crop- and county-specific information. In this example, the database displays fumigant use on strawberries in Santa Cruz county between 1991 and 1998.

The PUR summary description (key) has the following elements: time, location, site or commodity, and chemical or chemical group. A summary might be restricted to a block of time (all year, by month or by biological time, i.e. degree days), geographic area (all California, by county, or by field), Site or Commodity Code (either a specific commodity or all commodities), or by chemical or chemical group (either a specific chemical, group of chemicals—i.e. carcinogens—or all chemicals). For example, a user might select July, Santa Cruz county, strawberries and carcinogens for time, location, commodity and chemical respectively. PAN Chem would then find the PUR summary with the appropriate key and display that summary.

Some examples of questions that can be answered with PAN Chem (each of these queries takes about 2 minutes):

- ?? Almond acreage by county from 1991-1998.
- ?? Graphs of all insecticides used on almonds in Merced County from 1991 to 1998.
- ?? Pounds of organophosphates used on Cotton in Fresno County in May.
- ?? Graph of the application rate (pounds per acre treated) of top insecticides used on pears.
- ?? Top pesticides by pounds used in each county
- ?? Top crops and counties for methyl bromide use for any year.
- ?? Proposition 65 carcinogens used in structural fumigation in 1997.
- ?? Graph the number of farms using glyphosate from 1991 to 1998 and the pounds per acre used.
- ?? List of products containing pesticide active ingredients that are found in California ground water.