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Toxicology

HERBICIDES

(How poisonous are they?)

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Introduction

The answer is always a relative one — “Compared to what?”

Most herbicides are relatively non-toxic to man. A few, however, are quite poisonous. All must be handled with utmost care. Note that “caution with” — and “fear of” are not equivalent statements. Almost every imaginable substance can be poisonous and American agriculture uses millions of pounds of herbicides annually. America also produces the purest, highest quality food on earth.

To obtain information on toxicity, the herbicides are tested on various animals: mice, rats, etc. Few have been tested on humans. Therefore, the toxicity ratings given hereafter are the known effects on animals and it is probable that the herbicide will produce similar effects on man. Certain individuals may be allergic to a bland chemical or its carrier whereas other individuals may be resistant to some of the more toxic substances.

It should be mentioned that the LD-50 values (lethal to 50% of the animals tested) are for

a single dosage. Repeated treatments over long periods may give different results.

Any herbicide ingested in sufficient quantities can cause ill effects. Some are readily absorbed through the skin, others affect the eyes, and some produce disagreeable results when inhaled.

When using any herbicide always:

1. Read the entire label carefully. Be sure to study and follow the precautions on the label.
2. Avoid spilling the material on your skin or clothing. It is best to wear rubber footwear, long sleeves, rubber gloves and other designated protective clothing. In case of spillage, wash the contacted areas immediately with soap and water.
3. Do not smoke while using chemicals.
4. After using chemicals, change clothes and *wash thoroughly*. This is especially important if the chemical has been spilled on clothing or skin.

The following table gives the common name and one or more trade names of about 100 herbicides that have extensive to minor usage in this state.

Numerical toxicity rating is based on a modification of the classification of pesticides in the

Toxicity Response of Small Animals of Indicated Herbicide Dosages

Common Name or Designation	Some Common Trade Names	LD-50 Mg./Kg.	Ingested Toxicity Rating*	Dermal Response Rating**	Mfg. Company***
Acrolein	Aqualin	46	2	2	Shell
Ametryn	Ametryn	1,110	4	5	Geigy
AMS	Ammate	1,600	4	5	DuPont
Amiben	Amiben, Vegiben	3,500	4	—	Amchem
Amitrole	Amino Triazole Weedazol	15,000	6	5	American Cyanamid
Amitrole-T	Amitrol-T, Cytrol	5,000	4-5	—	Amchem
Aromatic solvents	Various brands	—	3	—	
Aspirin	(For Comparison)	750	4	—	
Atrazine	Atrazine	3,080	4	5	Geigy
Bandane	Bandane	540	4	4	Velsicol
Barban	Carbyne	1,350	4	—	Gulf
Benefin	Balan	10,000	4	3	Lilly
Bensulide	Betasan, Pre-San	770	4	4	Stauffer
Borate	Borax, Borascue	2,500	4	4	U.S. Borax
Bromacil	Hyvar X	5,200	5	5	DuPont
Bromoxynil	Buctril, Brominil	260	3	—	Amchem Chipman
Cacodylic acid	Ansar 560,120	1,000	4	5	Ansul
Calcium arsenate	Various brands	35	2	4	Chipman, etc.
Calcium cyanamide	Aero-Cyanamide	1,400	4	—	Am. Cyanamid
CDA	Radox	700	4	2	Monsanto
CDEC	Vegadex	850	4	3	Monsanto
Chloroxuron	Tenoran	2,700	4	—	C.I.B.A.
CIPC	Chloro-IPC	5,000	5	5	PPG
CMA	Super-Dal-E-Rad	440	3	5	Ansul
Copper sulfate	Various brands	300	3	—	
Cypromid	Clobber	900	4	—	Gulf
Dalapon	Dowpon	9,300	4	4	Dow
—	Daxtron	80-100	3	5	Dow
DCPA	Dacthal	3,000	4	5	Dia. Alkali
Diallate	Avadex	395	3	3	Monsanto
Dicamba	Banvel D	1,040	4	4	Velsicol
Dichlobenil	Casoron	2,460	4	5	T. Hayward
Dichlone	Phygon	1,380	4	3	Naugatuck-div. U.S. Rubber
Diphenamid	Dymid, Enide	2,200	4	4	Elanco
Diquat	Diquat	400	3	3	Chevron Ortho Div.
Diuron	Karmex	3,400	4	4	DuPont
DMPA	Zytron	1,000	4	4	Dow
DMTT	Mylone	500	4	4	U. Carbide
DNBP	Sinox, Dow General	30	2	1	Dow-Niagra
DNBP (amine)	Premerge, Sinox PE	40	2	1	Dow-Niagra
DSMA	Sodar, Ansar, Methar	600	4	3	Ansul-Niagra

* The toxicity ratings in the table have the following relative meanings when taken internally:

Toxicity rating	Class activity	LD 50 (Mg./Kg.)	Probable lethal dose for 150-lb. man
1	Extremely toxic	less than 5	A taste (less than 7 drops)
2	Very toxic	5 to 49	7 drops to 1 teaspoonful
3	Moderately toxic	50 to 499	1 teaspoon to 1 ounce
4	Slightly toxic	500 to 4,999	1 ounce to 1 pint (1 pound)
5	Almost Nontoxic	5,000 to 14,999	1 pint to 1 quart
6	Nontoxic	15,000 and above	more than 1 quart

** Dermal response ratings have the following relative meanings:

1. Absorbed and poisonous
2. Causes burns and blisters
3. Moderately Irritating
4. Mildly Irritating
5. Nonirritating

*** May not be sole or primarily manufacturer(s).

Toxicity Response of Small Animals to Indicated Herbicide Dosages

Common Name or Designation	Some Common Trade Names	LD-50 Mg./Kg.	Ingested Toxicity Rating*	Dermal Response Rating**	Mfg. Company**
Endothal	Endothal, Aquathol	35	2	3	Pennsalt
EPTC	Eptam	1,630	4	4	Stauffer
Erbon	Baron, Novon	1,000	4	3	Dow
Fenac	Fenac	3,000	4	—	Amchem
Fenuron	Dybar	6,400	5	4	DuPont
Fenuron + TCA	Urab	4,000	4	—	
Fluometuron	Cotoran	8,900	5	5	CIBA
Gasoline	Various brands	—	3	—	
GP31393	Ramrod	1,200	4	1	Monsanto
HCA (hexachloroacetone)	HCA Weed Killer	1,290	4	—	Allied Gen. Div.
Ioxynil	Bentrol	305	3	—	Amchem
IPC	Propham	3,000	4	—	PPG
Isocil	Hyvar	3,250	4	—	DuPont
Kerosene	Various brands	—	2-3	—	
KOCN	Various brands	85	3	5	Am. Cyanamid
Linuron	Lorox	1,500	5	—	DuPont
MAMA	Ansar, Methar	720	4	—	Ansul, etc.
MCPB	Various brands	—	—	—	Chipman
MCPA	Various brands	700	4	4	
MCPP	Mecoprop, Mecopex	650	4	—	Chipman
Methyl bromide	Various brands	17 ppm (air)	2	2	Dow, etc.
Metobromuron	Patoran	2,700	4	5	CIBA
MH (amine)	MH-30	2,340	4	5	Naugatuck-div. U.S. Rubber
Monuron	Telvar	3,500	4	4	DuPont
Monuron + TCA	Urox-Various	2,300	4	—	
MSMA	Weed-E-Rad, Ansar	700	4	—	Ansul
Norea	Herban	2,500	4	5	Hercules
NPA	Alanap (Na. salt)	1,770	4	5	Naugatuck-div. U.S. Rubber
Paraquat	Paraquat	157	3	3	Chevron
PBA	Benzac, Zobar	700	4	—	Amchem
PCP (Na. salt)	Weedbeads	210	3	1	Monsanto, etc.
Pebulate	Tillam	1,120	4	4	Stauffer
Petroleum solvents	Various brands	—	4	1	
Picloram	Tordon	8,200	5	4	Dow
PMA	PMAS, TAT-C-Lect	40	2	2	Cleary Corp.
Prometone	Prometone	2,980	4	5	Geigy
Prometryne	Caparol	3,750	4	5	Geigy
Propanil	Stam F-34, Rogue	1,384	4	5	Rohm-Haas
Propazine	Propazine	5,000	4	5	Geigy
Pyrazon (PCA)	Pyramin	3,600	4	—	Amchem
Sesone	Sesone	1,000	4	4	Un. Carbide
Siduron	Tupersan	2,500	5	5	DuPont
Silvex	Kuron, Weedone-TP	500	4	4	Dow, etc.
Simazine	Simazine	5,000	4	5	Geigy
SMDC	Vapam	285	3	3	Stauffer
Sodium arsenite	Atlas A	10	2	1,2	Allied
Sodium Chlorate	Atlacide	850	4	4	Chipman-etc.
Table salt (NaCl)	(For comparison)	3,320	4	5	
TCA	Various brands	3,370	4	2	Dow, etc.

Toxicity Response of Small Animals to Indicated Herbicide Dosages

Common Name or Designation	Some Common Trade Names	LD-50 Mg./Kg.	Ingested Toxicity Rating*	Dermal Response Rating**	Mfg. Company***
Terbacil	Sinbar	7,500	5	5	DuPont
Triallate	Avadex BW	1,340	4	3	Monsanto
Trifluralin	Treflan	3,700	4	4	Elanco
2, 3, 6-TBA	Trysben, Benzac	1,644	4	5	DuPont, etc.
2, 4-D	Various brands	500	4	4	
2, 4-DB	Butyrac, Butoxone	500	4	—	Chipman Amchem
2, 4-DEP	Falone	850	4	4	Naugatuck
2, 4, 5-T	Various brands	300	3	4	
Vernolate	Vernam	1,780	4	4	Stauffer

Federal Insecticide, Fungicide, and Rodenticide Act; from "Clinical Toxicology of Commercial Products" by Gleason, M.N., Gosselin, R. E., and Hodge, H. D. Williams and Wilkins Co., Baltimore, Md., 1963; from 1966 Pesticide Manual, North Carolina State University; and from data supplied by numerous basic product manufacturers.

Poison Control Centers

Pocatello—Poison Control Center, College of Pharmacy, Idaho State College 233-2160 Ext. 254—Night—233-5587, 233-2638, 233-7204, John V. Bergen, Ph.D.

Spokane, Poison Information Center Deaconess Hosp., W. 800 5th Ave., Riverside 7-4811, A. Greer, M.D., E. Erickson, R.N.

Discussion

Before any herbicide can be marketed, its toxicity to animals must be registered with the Department of Health, Education and Welfare, and its usefulness as an herbicide must be established with the U. S. Department of Agriculture. These dual regulations place very strict requirements on the development, federal registration, and labeling of all herbicides. These rigid regulations are undoubtedly responsible, in part, for the extremely low number of known cases of herbicide poisoning.

However, accidents do happen and severe errors have been made. The major difficulties have been:

1. failure to read the label.
2. availability to small children.
3. carelessness in handling, leaving containers open, not destroying old containers.

Federal regulations also extend to limiting the quantity of any herbicide that can remain as a residue in any treated crop.

Food inspection for pesticide residues is constantly in progress and several shipments with residues in excess of tolerance have been seized and destroyed. To assure the highest quality of food, inspection and detection services are provided by both Federal personnel and by our Idaho State Department of Agriculture.

The ultimate question is, what influence have herbicides and other pesticides had on public health? Recently Drs. R. C. Teal, M. D., and C. H. Hine, M. D., Ph.D., representing the California Medical Association testified as follows:

1. "There has been no increase in morbidity (proportion of diseased persons) due to the ingestion of agricultural chemicals."

2. "Surveys show—the total public health has improved by the use of pesticides."

3. "Pesticides constitute only a moderate health hazard."

4. "Accidental ingestion by children and adults is due to careless handling. Therefore, more educational efforts are desirable."

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JAMES E. KRAUS, Director