

Are Pesticides Safe?

- News Headlines -

- Pesticide Exposure Linked to Preterm Birth
- In-Home Pesticide Exposure and Parkinson's Risk
- Pesticide Traces Found in Kids Here (Seattle)
- Pet Flea Collars May Expose Children to Pesticide Harm
- Living Near Where Pesticides Used May Boost Fetal Death Due To Birth Defects
- Killing Mosquitoes or Killing Humans?
- West Nile Spraying to Begin - Worried Marcy Residents Have Many Concerns
- Are Synthetic Pesticides Sabotaging our Children's Health, Behavior, and Academic Performance?

Table 5.5
Annual Amount of Pesticide Active Ingredients Used in the U.S. by Pesticide Type, 1982 - 2001 Estimates
All Market Sectors

Year	Million Pounds of Active Ingredient						Year	Million Pounds of Active Ingredient					
	Herbicides/ PGR	Insecticides	Fungicides	Other Conv ¹	Other ²	Total		Herbicides/ PGR	Insecticides	Fungicides	Other Conv ¹	Other ²	Total
1982	620	198	117	149	298	1,382	1992	554	116	81	189	246	1,186
1983	573	185	115	148	287	1,308	1993	527	115	80	192	248	1,162
1984	634	173	109	145	284	1,345	1994	583	124	79	199	244	1,229
1985	611	161	110	138	284	1,304	1995	556	125	77	203	249	1,210
1986	590	151	109	138	278	1,266	1996	578	116	79	222	234	1,229
1987	532	141	100	133	269	1,175	1997	568	112	81	197	270	1,228
1988	557	132	99	137	266	1,191	1998	555	103	86	168	294	1,206
1989	567	123	98	154	251	1,193	1999	534	126	79	173	332	1,244
1990	564	121	91	173	252	1,201	2000	542	122	74	188	308	1,234
1991	546	114	86	182	226	1,154	2001	553	105	73	157	315	1,203

Note: Excludes wood preservatives, specialty biocides, and chlorine hypochlorites.
Source: EPA estimates based on CropLife America annual surveys; USDA/NASS (<http://www.usda.gov/nass>), and EPA proprietary data.
1. Other conventional pesticides include nematocides, fumigants, and other conventional pesticides.
2. "Other" includes sulfur, petroleum, and other chemicals used as pesticides (e.g., sulfuric acid and insect repellents).

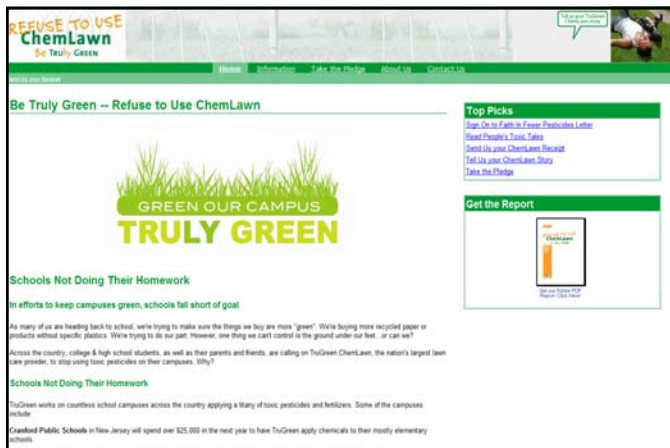


Table 5.8
Annual Amount of Pesticide Active Ingredients Used in the U.S. by Pesticide Type, 1982 - 2001 Estimates
Home and Garden Market Sector

Year	Million Pounds of Active Ingredient						Year	Million Pounds of Active Ingredient					
	Herbicides/ PGR	Insecticides	Fungicides	Other Conv ¹	Other ²	Total		Herbicides/ PGR	Insecticides	Fungicides	Other Conv ¹	Other ²	Total
1982	37	24	17	3	67	148	1992	46	12	8	2	64	132
1983	38	22	16	3	67	146	1993	46	13	8	2	62	131
1984	40	20	15	3	67	145	1994	46	13	8	2	61	130
1985	40	18	14	3	67	142	1995	47	12	8	2	59	128
1986	41	16	14	3	67	141	1996	48	12	8	2	60	130
1987	42	14	14	3	67	140	1997	49	13	8	2	60	132
1988	43	13	13	3	67	139	1998	49	13	8	2	60	132
1989	44	12	13	2	68	139	1999	54	14	10	2	60	140
1990	46	12	10	2	66	136	2000	62	15	11	2	60	150
1991	46	12	9	2	65	134	2001	71	17	12	2	61	163

Note: Excludes wood preservatives, specialty biocides, and chlorine hypochlorites.
Source: EPA estimates based on CropLife America annual surveys; USDA/NASS (<http://www.usda.gov/nass>), and EPA proprietary data.
1. Other conventional pesticides include nematocides, fumigants, and other conventional pesticides.
2. "Other" includes sulfur, petroleum, and other chemicals used as pesticides (e.g., sulfuric acid and insect repellents).

Rank the fungicides in order of their toxicity:

1. Heritage (azoxystrobin)
2. Daconil (chlorothalonil)
3. Chipco 26GT (iprodione)
4. Compass (trifloxystrobin)

All are equal > 5,000 mg/kg

LD₅₀ Values for Common Herbicides

Herbicide (Common Name)	Trade Name	LD ₅₀ Oral (mg/kg)	LD ₅₀ Dermal (mg/kg)
Metsulfuron	Manor, Blade	>5,000	>2,000
2,4-D	several	300	>2,000
Bromoxynil	Buctril	260	>3,660
Fluazifop-methyl	Fusilade	3,328	>2,420
Glyphosate	RoundUp	4,300	>5,000
MCPA	MCPA	800	>4,000
Pendimethalin	Pre-M, Pendulum	>5,000	>2,000

LD₅₀ Values for Common Fungicides

Fungicide (Common Name)	Trade Name	LD ₅₀ Oral (mg/kg)	LD ₅₀ Dermal (mg/kg)
Azoxystrobin	Heritage	>5,000	>2,000
Boscalid	Emerald	>2,000	>2,000
Chlorothalonil	Daconil Ultrex	>5,000	>2,000
Fludioxonil	Medallion	>5,050	>2,020
Iprodione	Chipco 26GT	>5,000	>2,000
Polyoxin D	Endorse	9,600	>2,000
Triadimefon	Bayleton	1,141	>2,000
Trifloxystrobin	Compass	>5,050	>2,000
Thiophanate methyl	3336	>7,500	>10,000

Rank the insecticides in order of their toxicity:

1. Distance (pyriproxyfen)
2. Talstar (bifenthrin)
3. Dursban (chlorpyrifos)
4. Orthene (acephate)

1. Dursban = 270 mg/kg
2. Talstar = 375 mg/kg
3. Orthene = 980 mg/kg
4. Distance = > 5,000 mg/kg

Rank the herbicides in order of their toxicity:

1. Buctril (Bromoxynil)
2. RoundUp (glyphosate)
3. Manor (metsulfuron)
4. 2,4-D

1. Buctril = 250 mg/kg
2. 2,4-D = 300 mg/kg
3. RoundUp = 4,300 mg/kg
4. Manor = > 5,000 mg/kg

LD₅₀ Values for Common Insecticides

Insecticide (Common Name)	Trade Name	LD ₅₀ Oral (mg/kg)	LD ₅₀ Dermal (mg/kg)
Abamectin	Avid	650	>2,000
Acephate	Orthene	980	10,250
Bifenthrin	Talstar	375	>2,000
Carbaryl	Sevin	246	>4,000
Chlorpyrifos	Dursban	270	2,000
Cyfluthrin	Tempo	826	>2,000
Delta-methrin	Delta-Gard	128	>2,000
Imidacloprid	Merit	460	2,000
Isofenphos	Offanol	20	700
Malathion	Malathion	1,000	4,000
Pyriproxyfen	Distance	>5,000	>2,000
Trichlorfon	Dylox, Proxol	250	>2,100

The Dose Makes the Poison

Chemical	Term	Oral LD50	Pounds to Kill a 150 lb. Human
Benomil	Practically Non-Toxic	10,000 mg/kg	1.50 lbs
Mancozeb	Practically Non-Toxic	8,000	1.40 lbs
Iprodione	Slightly Toxic	5,000	0.75 lbs
Baking Soda	Slightly Toxic	4,220	0.63 lbs
Table Salt	Slightly Toxic	3,000	0.44 lbs
Propiconizol	Slightly Toxic	1,300	0.20 lbs
Aspirin	Slightly Toxic	1,250	0.19 lbs
Orthene	Moderately Toxic	866	0.13 lbs
Sevin	Moderately Toxic	850	0.12 lbs
Caffeine	Moderately Toxic	192	0.027 lbs
Nicotine	Highly Toxic	53	0.008 lbs = 1/8 oz

Acute Effects

- Illnesses or injury that occur within 24 hours.
 - **Mild poisoning symptoms:** May be vague and can be compared with the flu.
 - Nausea, headache, tightness of chest, loss of appetite, stomach cramps.
 - **Moderate poisoning symptoms:** More pronounced than mild symptoms.
 - Nausea, trembling, muscular incoordination, excessive saliva, blurring of vision, tightness of chest, difficulty in breathing, flushed or yellow skin, abdominal cramps, vomiting, diarrhea, tearing from eyes, profound weakness, rapid pulse, cough.

Hazard (Risk) = Toxicity X Exposure

- Pesticides are potentially dangerous to people if exposure is high.
 - Even a relatively non-toxic pesticide can be dangerous if exposure is high.
- Pesticide Effects:
 - Acute
 - Delayed (Chronic)
 - Allergic

Acute Effects

- Illnesses or injury that occur within 24 hours.
 - **Severe poisoning symptoms:**
 - Vomiting, diarrhea, excessive sweating, inability to breathe, convulsions, fever, intense thirst, and coma.

Acute Effects

- Refers to the effects from a single exposure or repeated exposure over a short time, such as an accident during mixing or applying pesticides
- Illnesses or injury that occur within 24 hours.

Delayed (Chronic) Effects

- Effects of long-term or repeated lower level exposures to a toxic substance.
 - Do not appear immediately after first exposure - may take years
 - Cancer
 - Injury to Unborn Children
 - Birth Defects, Miscarriage, Still Birth
 - System Problems
 - Anemia, Hard-to-stop bleeding, Paralysis
 - Liver and Kidney disorders

Delayed (Chronic) Effects

- Carcinogenicity - ability to produce cancer or to assist carcinogenic chemicals;
- Mutagenicity - ability to cause genetic changes;
- Teratogenicity - ability to cause birth defects;
- Oncogenicity - ability to induce tumor growth (not necessarily cancers);
- Liver damage;
- Reproductive disorders (reduced sperm count, sterility, miscarriage);
- Nerve damage (including accumulative effects on cholinesterase depression associated with organophosphate insecticides);
- Allergenic sensitization (development of allergies to pesticides or chemicals used in formulation of pesticides).

But what about . . .



Allergic Effects

- Asthma
- Shock
- Skin Irritation - chaffing, rashes
- Sneezing, Itchy, watery eyes



1st exposure sensitizes the body.

2nd exposure causes the allergic reaction.

Pesticide Exposure

• Routes of Entry

- Eyes
- Skin
- Lungs
- Oral

Let's consider your team. . .



Routes of Entry

*****EYES*****

- Accidents often occur during mixing and loading.
 - Splashes from adding chemicals to the tank.
- Hose breaks.
- Wind blown drift.
- Rubbing of eyes.

Choose Right Equipment

Eye Protection

Especially important during mixing and loading.

- Glasses
- Goggles
- Face Shields

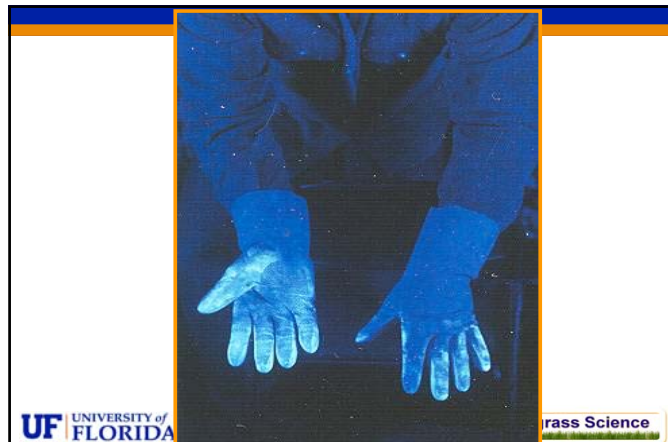


Source: Iowa State University



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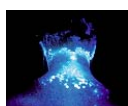
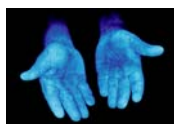
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Routes of Entry

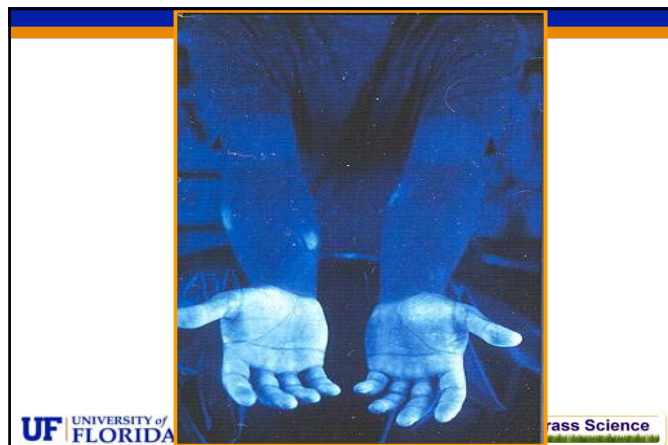
SKIN

- Most likely route because blood vessels are near the skin.
 - Fluorescent Dye Indicator Studies.
 - Hands receive the most exposure.
 - Foreheads and Mouth area.
 - Genital areas.



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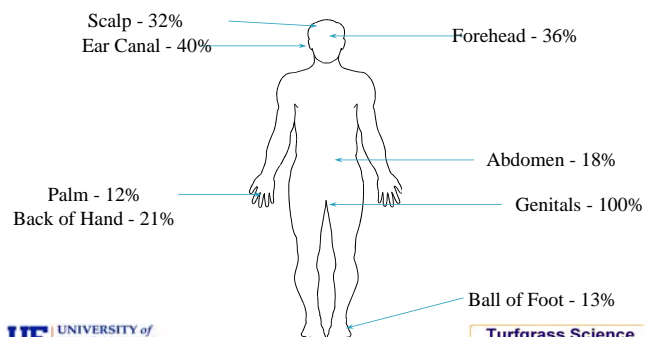
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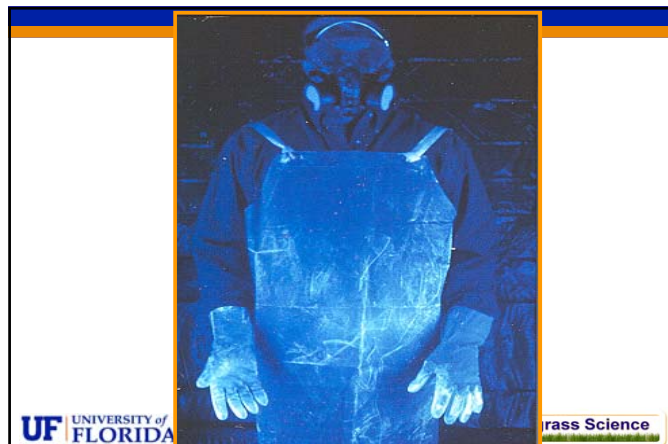
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How Much Pesticide Will Skin Absorb?



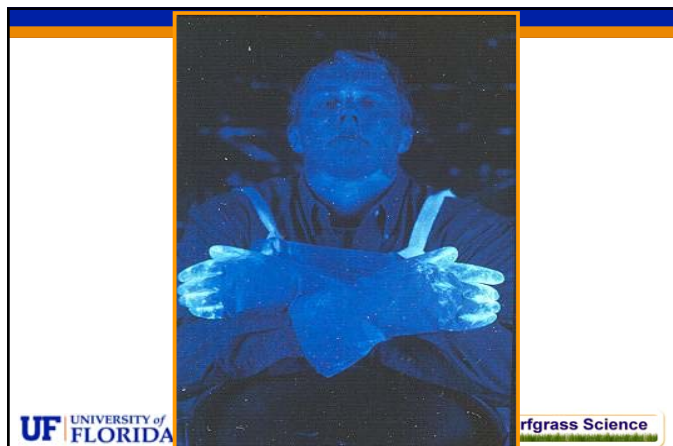
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Routes of Entry

SKIN

- Cuts, Scrapes, and Rashes
 - 100% of pesticide can enter.



Pesticide Ingredients

- ACTIVE – responsible for killing the pest
- INERT – makes the formulation safer, more effective and easier to handle
- ADJUVANT – may or may not already be present in the product; used for the same reason as the inert ingredients

The #1 product for teaching handwashing, isolation techniques, aseptic techniques, and general infection control

Using Glo Germ

Handwashing Training

1. Shake the bottle of Glo Germ oil well and place a small amount, about the size of a quarter, into the palm of one hand and spread over both hands completely as if applying hand lotion. Be sure to cover hands completely, particularly under nails, around cuticles and between fingers. Wipe off excess with paper towel. Do not let oil contact clothing as staining may result. When using white Glo Germ gel, use same procedure with a pad of gel about the size of a nickel. Wiping off excess is usually not necessary.
2. Place hands under UV lamp to view "glowing germs" that exist before hand washing. Demonstration works best in a darkened room.
3. Perform the EPA-recommended hand wash using soap and warm water. The amount of effort required to remove the simulated germs is equal to that of removing most bacteria. Again, place hands under UV lamp, paying special attention to thumbs, areas around nails and between fingers. The UV lamp reveals the remaining "germs" as proof of improper hand washing.
4. Complete removal of Glo Germ with normal washing is more difficult if skin is chapped or cracked, indicating that bacteria is also harder to remove. This will require a hand care regime with a quality lotion twice daily and a judicious use of a hand sanitizing gel.

Surface Cleaning

Glo Germ Gel

Glo Germ

GloGerm can help you become a Germ Detective!

Liquid Formulations and Abbreviations

- EC or E – emulsifiable concentrate
- RTU – ready to use
- AS – aqueous suspension / solution
- S, SL or SC – water soluble liquids
- AS, F, FL, L or WDL – flowables, water-dispersible liquids

Dry Formulations and Abbreviations

- D – dusts
- B – baits
- G – granular
- WP or W – wettable powder
- SP or WSP – soluble powder
- DF – dry flowable
- WDG – water dispersible granule

Practical Considerations

- Adjuvants:
 - Penetrants & Emulsifiers
 - Can allow pesticide to enter skin more quickly.
 - Stickers
 - Allows pesticides to stick to PPE and skin.

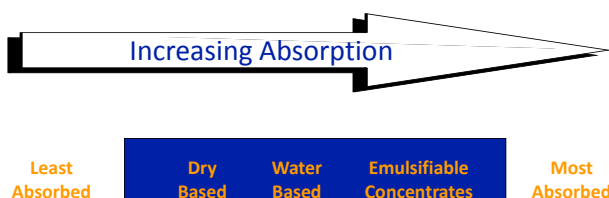
Rank most absorbed to least absorbed

- | | |
|-------------------------------|-------------------------------|
| 1. Emulsifiable Concentrates | 1. Emulsifiable Concentrates |
| 2. Dusts | 2. Soluble Concentrate |
| 3. Baits | 3. Flowable |
| 4. Water Dispersible Granules | 4. Water Dispersible Liquids |
| 5. Water Dispersible Liquids | 5. Water Dispersible Granules |
| 6. Flowable | 6. Dusts |
| 7. Soluble Concentrate | 7. Baits |

Personal Protective Equipment (PPE)

Choose the Right Equipment.
Clean and Maintain it Properly.
Use PPE Correctly.

Pesticide Formulation



STATEMENT OF PRACTICAL TREATMENT
 IF SWALLOWED: Give 1 or 2 glasses of water and induce vomiting by touching back of throat with finger. Do not induce vomiting or give anything by mouth to an unconscious person. Call a physician or poison control center.
 IF ON SKIN: Wash with plenty of soap and water. Get medical attention.
 FOR EYES: Flush eyes with plenty of water. Call a physician if irritation persists.
 NOTE TO PHYSICIAN: There is no specific antidote. All treatment should be based on observed signs and symptoms of distress in the patient. Overexposure to materials other than this product may have occurred.

PRECAUTIONARY STATEMENTS
HAZARD TO HUMANS AND DOMESTIC ANIMALS
CAUTION
 Harmful if absorbed through the skin. Causes eye irritation. Avoid contact with skin, eyes or clothing. Wash thoroughly with soap and water after handling.

SYMPTOMS OF POISONING: In severe cases of overexposure by oral ingestion, lethargy, muscle tremors, and, in extreme cases, possibly convulsions, may occur.

PERSONAL PROTECTIVE EQUIPMENT (PPE)
 Loaders and persons cleaning application equipment must wear long sleeved shirt and long pants, waterproof gloves, and shoes plus socks. Applicators must wear at least a short sleeved shirt and long pants and shoes plus socks.

User Safety Recommendations
 Wash thoroughly with soap and water after handling. Users should wash hands before eating, drinking, chewing gum, using tobacco or using the toilet. Remove clothing immediately if pesticide gets inside. Then wash body thoroughly and put on clean clothing.

ENVIRONMENTAL HAZARDS
 This pesticide is toxic to birds, fish, and other aquatic and estuarine invertebrates. Do not apply directly to water or to areas where surface water is present or to intertidal areas below the mean high water mark. Runoff from treated areas may be hazardous to aquatic organisms in neighboring areas. Cover, incorporate or clean up granules that are spilled. Do not contaminate water when disposing of equipment washwater or rinsate.

The more toxic a pesticide, the more PPE that is required

CAUTION

Regular work clothes—long-sleeved shirt, long pants, shoes & socks, waterproof gloves

WARNING

Coveralls over work clothing, shoes & socks, chemical-resistant gloves, eyewear

DANGER

Coveralls over work clothing, chemical-resistant gloves and footwear, respiratory and eye protection



Choose Right Equipment

Chemical Resistant PPE

- Cotton, Canvas, and Leather are not chemically resistant.
 - Avoid cloth lined shoes, hats, gloves, etc.



Source: Iowa State Univ.

Turfgrass Science

Routes of Entry

LUNGS

- Pesticides are more likely to enter through your lungs if you are spraying in poorly ventilated areas.
 - Protected areas – limited air movement

Routes of Entry

*****ORAL*****

- Not likely to swallow large amounts of pesticide unless someone puts chemicals in food and beverage containers.
 - Pop Bottles, Milk Containers, etc.
- Small amounts of pesticides are likely to enter if eating, drinking, smoking, or chewing tobacco & gum.

Questions or Comments

Clean and Maintain Properly

Contaminated PPE is dangerous!

- Dispose of PPE contaminated with pesticides labeled with the signal words **danger** or **warning**
- Wash contaminated work clothes and PPM separately.
 - Hot water with heavy duty detergent.
 - Rinse twice.
 - Wash the washing machine.



Source: Iowa State Univ.

Photo Credits

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- University of Nebraska
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- Gempler's

Mention of trade names in this presentation is solely for providing specific information. It is not a guarantee or warranty of the products named, and does not signify that they are approved to the exclusion of others of suitable composition. Use pesticides safely. Read and follow directions on the manufacturer's label.

Let's consider your team. . .

