



Important Signal Words on Chemical Products

When you are ready to buy a pesticide product, find the signal word — either Danger, Warning, or Caution on the pesticide label. The signal word (listed below) tells you how toxic the product is to humans.

DANGER — Highly toxic.

WARNING — Moderately toxic.

CAUTION — Least toxic.

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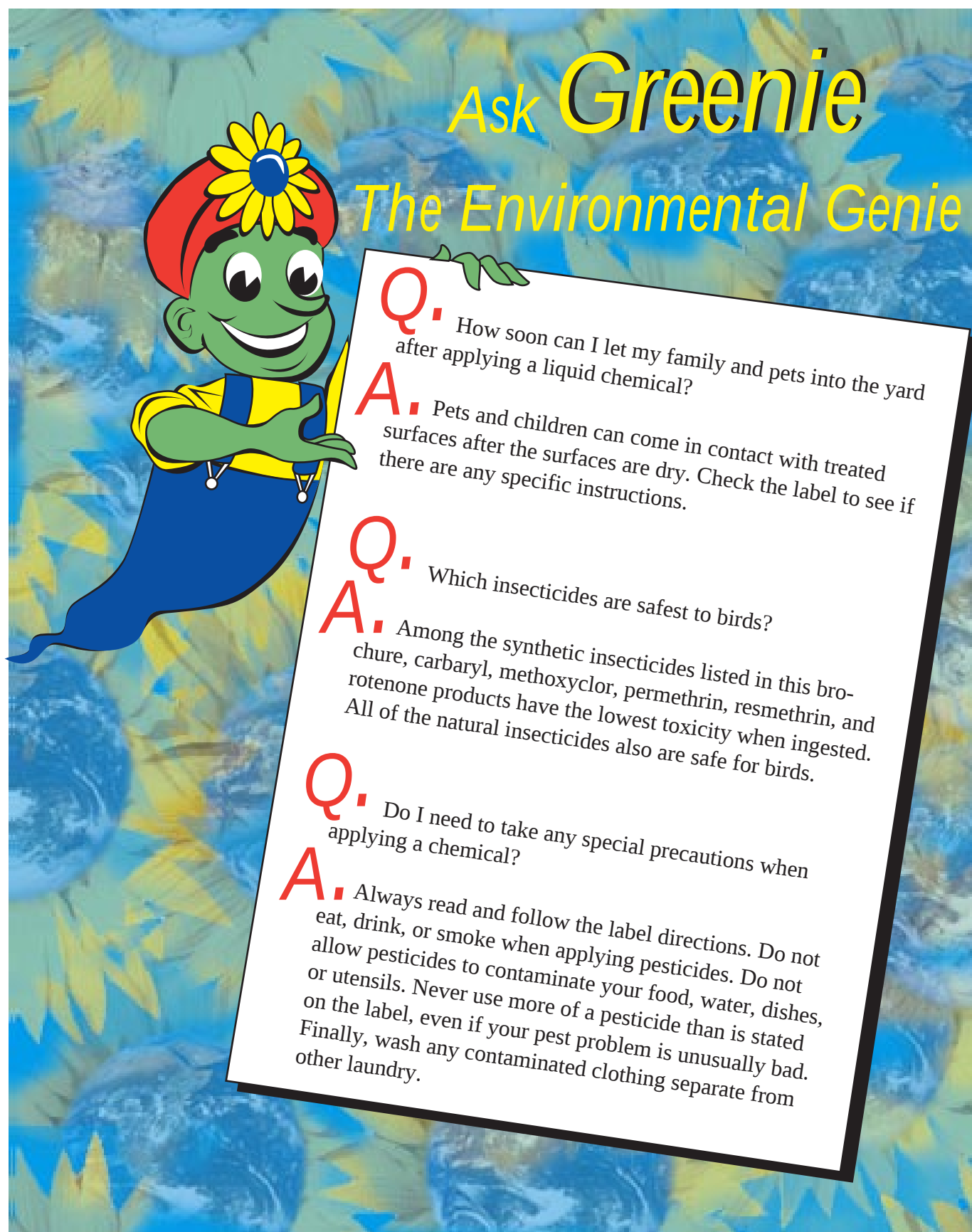
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Safety of Lawn & Garden Products



Kansas State University
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Ask Greenie

The Environmental Genie

Q. How soon can I let my family and pets into the yard after applying a liquid chemical?

A. Pets and children can come in contact with treated surfaces after the surfaces are dry. Check the label to see if there are any specific instructions.

Q. Which insecticides are safest to birds?

A. Among the synthetic insecticides listed in this brochure, carbaryl, methoxychlor, permethrin, resmethrin, and rotenone products have the lowest toxicity when ingested. All of the natural insecticides also are safe for birds.

Q. Do I need to take any special precautions when applying a chemical?

A. Always read and follow the label directions. Do not eat, drink, or smoke when applying pesticides. Do not allow pesticides to contaminate your food, water, dishes, or utensils. Never use more of a pesticide than is stated on the label, even if your pest problem is unusually bad. Finally, wash any contaminated clothing separate from other laundry.



If you are thinking of using a lawn and garden chemical product, you probably want to know all you can about the product's toxicity and safety to the environment. All chemicals pose some risk, but some require more caution in their use than others.

Environmental Protection

In general, it is best for the environment to use chemicals that break down quickly or get taken up quickly by plants. It also is best to use chemicals that are held strongly by soil particles. Chemicals that are soluble generally have a higher chance of moving into water supplies. Most natural products (such as *Bacillus thuringiensis* products and insecticidal soaps) pose the least environmental risk.

Health and Safety Ratings

The chart in this brochure gives you information on the toxicity of some of the most commonly used lawn and garden products. Toxicity ratings apply to the active ingredient. In lawn and garden products, the active ingredients are almost always greatly diluted and unlikely to cause environmental and other injury when used according to label directions. Avoid exposure during and after application. Doors and windows should be closed. People and pets should remain indoors until the product has dried. Wash all surfaces that may come into contact with food, people, or pets. Using more pesticide than the label recommends WILL NOT do a better job. The important factor in managing risk is to keep the degree of exposure to you and the environment as low as possible, especially with products containing the most highly toxic chemicals.

EPA Cancer Groups

The Environmental Protection Agency has determined the potential for some of these products to cause cancer. There are five categories:

- Group A:** Human carcinogen. Sufficient evidence from epidemiologic studies to support a causal association between exposure to the agents and cancer.
- Group B:** Probable human carcinogen. Group B has two subgroups:
 - B₁:** Sufficient animal epidemiologic evidence, but limited human evidence.
 - B₂:** Sufficient animal evidence, but inadequate or no human epidemiologic evidence.
- Group C:** Possible human carcinogen. Limited evidence of carcinogenicity in animals in the absence of human data.
- Group D:** Not classified as to human carcinogenicity. Inadequate or no human and animal data for carcinogenicity.
- Group E:** Evidence of noncarcinogenicity for humans. No evidence of carcinogenicity in at least two adequate animal tests in different species or in both adequate epidemiologic and animal studies. This classification is based on available evidence and does not mean that the agent will not be a carcinogen under any circumstances.

Storing Chemicals Safely

Store lawn and garden chemical products in a secure location that is out of reach of children and pets. It's best to keep these products locked in a well-ventilated storage area, where temperatures stay above freezing and less than 90 degrees. Never store these products with or near food, animal feed, or medical supplies.

Safety of Some Common Lawn and Garden Products*

Listed by active ingredient. Consult the product label to find the active ingredient.

Natural Insecticides

Bacillus thuringiensis (certain caterpillars and worms) — Modified from a naturally occurring disease of certain caterpillars. Does not affect humans, other mammals, birds, fish, or bees. Inactivated by sunlight shortly after application. Not a threat to water supplies.

Paraffinic oil (soft-bodied insects) — A purified, natural oil. Works only on soft-bodied insects. Must contact the insects to be effective. No harmful effects to humans, other mammals, birds, fish, or bees. Poses no threat to water supplies.

Potassium salts of fatty acids (soft-bodied insects) — A soap-like product. Works only on soft-bodied insects. Must contact the insects to be effective. No harmful effects to humans, other mammals, birds, fish, or bees. Poses no threat to water supplies.

Pyrethrins (general insect control) — Natural insecticide produced by certain chrysanthemum species. Low toxicity to humans, although infants are more susceptible. Avoid inhaling vapors. Slightly toxic to birds. Toxic to fish and bees. Breaks down rapidly and inactivated by sunlight and air.

Rotenone (general insect control) — Natural insecticide found in certain members of the pea family. Some product formulations have low toxicity to humans and carry the signal word CAUTION. Some concentrated formulations have high toxicity and carry the signal word DANGER. Rotenone products for home use are usually sold in low concentrations. Slightly toxic to birds. Highly toxic to fish. Very low toxicity to bees. Breaks down rapidly.

Sabadilla alkaloids (caterpillars, grasshoppers, and other insects) — Organic compound derived from members of the lily family. Low toxicity to humans and other mammals. Safe to wildlife. Highly toxic to honeybees. Rapid breakdown.

Safety of Some Common Lawn and Garden Products*

Listed by active ingredient. Consult the product label to find the active ingredient.

Synthetic Insecticides

Acephate (aphids, thrips, and other insects) — Products containing acephate bear the signal word CAUTION. Harmful if swallowed. Causes moderate eye irritation. It is toxic to birds; low toxicity to fish; and highly toxic to bees. EPA cancer group C. Acephate is rapidly absorbed by foliage, and rapidly broken down in the soil. Low threat to groundwater supplies on most sites. However, direct application to sandy soils with low organic matter, or over shallow groundwater, should be avoided.

Carbaryl (Sevin products, general insect control) — Low to moderate toxicity to humans and other mammals, depending on the formulation. Although it may cause minor skin and eye irritation, carbaryl is not a significant health risk at labeled use rates. EPA cancer group D. Low toxicity to birds and fish. Toxic to bees and other beneficial insects. Kills insects on contact and by ingestion. It breaks down quickly on plant surfaces. It may move into water with soil runoff, but is decomposed there. Low threat to move into water supplies.

Chlorpyrifos (Dursban products, termite, borer and grub control) — Low to moderate toxicity to humans, depending on the formulation. Chlorpyrifos is a skin and eye irritant. At labeled recommended use rates of lawn and garden product formulations, it is unlikely to cause injury or illness to the applicator. A misapplication or overdose could result in health concerns. Avoid direct contact with eyes or prolonged skin exposure. EPA cancer group E. Can be highly toxic to birds and fish. Toxic to honeybees. Moderately persistent in the soil, and does not move readily in the environment. Low threat to move into water supplies. Do not apply when runoff is likely.

Diazinon (general insect control) — Low to moderate toxicity to humans, depending on the formulation. At label recommended use rates of lawn and garden product formulations, it is unlikely to cause injury or illness to the applicator. A misapplication or overdose could result in health concerns. Avoid direct contact with eyes or prolonged skin exposure. EPA cancer group E. Toxic to birds, fish, and bees. Moderately bound to the soil and moderately persistent. For most sites, it is unlikely that diazinon will move into groundwater. Do not allow runoff to occur after application.

Dimethoate (aphids, thrips, whiteflies, and other insects) — Products containing dimethoate must bear the signal word WARNING. It should be immediately washed off skin with soap and water. Can cause skin and eye irritation. EPA cancer group C. It is highly toxic to fish, birds, and honeybees. It is rapidly broken down after application, which reduces its threat to the environment. It is highly soluble and is not held by soil particles, so it is a threat to move into groundwater.

Disulfoton (aphids, leafhoppers, thrips, spider mites) — Disulfoton products bear the signal word WARNING. Rapidly absorbed through the skin. EPA cancer group E. Highly toxic to fish and birds. Held in place strongly by soil particles. Low threat to move into water supplies except where soil erosion occurs.

Endosulfan (general insect and mite control) — Endosulfan products bear the signal word DANGER. It is toxic to birds and fish, but only moderately toxic to bees. Endosulfan has low toxicity to beneficial insects. It is held strongly by soil particles. Has been found in lakes and streams where contaminated soil has eroded.

Lindane (borer control) — Moderately to highly toxic to humans and other mammals. Avoid direct contact with eyes or prolonged skin exposure. EPA cancer group B₂/C. Low toxicity to birds. Highly toxic to fish and bees. Lindane has a longer residual than most other insecticides. Has been detected in groundwater in some states.

Safety of Some Common Lawn and Garden Products*

Listed by active ingredient. Consult the product label to find the active ingredient.

Malathion (flies, mosquitoes, and many other insects) — Low toxicity to humans. Moderately toxic to birds; highly toxic to honeybees; and varies in toxicity to fish, depending on the species. Breaks down rapidly. Low threat to move into water supplies.

Methoxychlor (general insect control) — Very low toxicity to humans. EPA cancer group D. Low toxicity to birds; toxic to fish. Breaks down rapidly and is held tightly in place in the soil. Low threat to move into water supplies.

Permethrin (termite, cockroach, and general insect control) — A man-made chemical similar to natural pyrethrins. Low toxicity to humans and other mammals. Avoid contact with eyes and skin. EPA cancer group C. Low toxicity to birds. Toxic to fish and highly toxic to bees. Breaks down rapidly by sunlight and soil microbes, and is held tightly in place in the soil. Low threat to move into water supplies except where soil erosion occurs.

Resmethrin (mosquito and general insect control) — A man-made chemical similar to natural pyrethrins. Low toxicity to humans. Slightly toxic to birds. Highly toxic to fish and bees. Breaks down very rapidly in the environment. Low threat to move into water supplies.

Herbicides (Weed Killers)

2,4-D (selectively controls broadleaf weeds) — Formulations differ in toxicity. See signal word on the product label. EPA cancer group D. 2,4-D has produced serious eye and skin irritation among agricultural workers. 2,4-D is slightly toxic to birds. Some formulations are toxic to fish; others are not. Very low toxicity to bees at recommended use rates. In contact with the soil and water, most of it is broken down by microbes within a week. May pose a threat to move into water supplies.

Dicamba (selectively controls broadleaf weeds) — Moderately toxic to humans. Label signal word WARNING. Very irritating and can cause severe damage to the eyes. May cause skin burns in some individuals. Harmful if swallowed. EPA cancer group D. Low toxicity to birds, fish, and wildlife. Very low toxicity to bees. Most of it is broken down by soil microbes within a few weeks. Dicamba is very soluble in water, and can pose a threat to move into water supplies.

Diquat dibromide (controls most plants) — Moderately toxic. May be fatal to humans if swallowed, inhaled, or absorbed through the skin. Can cause skin irritation and sores. Also causes eye irritation. Slightly toxic to fish. Very low toxicity to honeybees. Amounts not absorbed into foliage are rapidly broken down by sunlight. When diquat comes into contact with soil, it is rapidly and completely inactivated. It is unlikely to move into water supplies except where soil is being eroded.

Fluazifop (controls most grasses) — Slightly toxic to humans. Breathing the chemical may cause vomiting and severe lung congestion. A mild skin and eye irritant. Very low toxicity to bees. Little is known about its possible toxicity to birds. Toxic to fish. Rapidly taken up by plants. Breaks down rapidly in most soils. Can leach through the soil and contaminate groundwater, especially on sandy soils and where the water table is shallow.

Safety of Some Common Lawn and Garden Products*

Listed by active ingredient. Consult the product label to find the active ingredient.

Glyphosate (controls most plants) — Some formulations carry the signal word CAUTION, and others have the signal word WARNING. Can cause eye irritation. EPA cancer group D. Glyphosate has low toxicity to birds, fish, and honeybees. Applied to foliage, it is rapidly absorbed, usually within an hour. Applied to soil, it is immediately inactivated by soil particles and is eventually broken down by microbes. Low threat to move into water supplies.

Mecoprop, MCPP (selectively controls broadleaf weeds) — MCPP is typically used in combination with other chemicals for a general weed killer. Low toxicity to humans and other mammals. It is a skin irritant, and it is highly irritating to the eyes. Low toxicity to birds, fish, and honeybees. Relatively rapid breakdown. Low threat to move into water supplies.

Oxyfluorfen (selectively controls broadleaf weeds and grasses) — Moderately toxic to humans and other mammals. Products containing oxyfluorfen carry the signal word WARNING. May irritate skin and eyes. EPA cancer group C. Low toxicity to birds, but highly toxic to fish. Bound tightly to soil particles. Not readily moved into water supplies except where soil erosion occurs.

Simazine (selectively controls broadleaf weeds and grasses) — Low toxicity in humans, signal word CAUTION. Can cause rashes or dermatitis. EPA cancer group C. Low toxicity to birds, fish, and bees. It decomposes slowly and is only weakly attached to soil particles, so it is a threat to contaminate groundwater. Although it is almost insoluble, it may be washed along with soil particles into ponds, streams, or rivers, and has been found in groundwater.

Triclopyr (controls woody and broadleaf plants) — Depending on the product formulation, may have either CAUTION or WARNING on the label. Low toxicity to birds and fish. Very low toxicity to bees. Rapidly absorbed by plants. Amounts not absorbed by plants are fairly rapidly decomposed by soil microbes. In water, it is rapidly broken down by sunlight. Low threat to move into water supplies.

Trifluralin (selectively controls grasses and broadleaf plants) — Toxicity of products containing trifluralin varies from low to moderate, depending on the formulation. May cause irritation to mouth, throat, or lungs. EPA cancer group C. Trifluralin has low toxicity to birds, earthworms, and bees. It is toxic to fish. Low threat to move into water supplies except where soil erosion occurs.

Fungicides

Benomyl and the closely related product thiophanate-methyl (lawn, fruit, vegetable and ornamental spray) – Signal word CAUTION, EPA cancer group C. May cause skin irritation in some individuals. Moderately toxic to birds and fish, non-toxic to bees. Applications may significantly reduce some soil dwelling organisms such as earthworms. The locally systemic fungicide is quickly absorbed by plants. The fungicide is held tightly by soil particles and has a low threat to move into water supplies.

Bordeaux mixture, a mixture of copper sulfate and hydrated lime (fruit, vegetables and ornamental spray) – Signal word CAUTION. May cause skin and eye irritation. Low toxicity to birds and bees, but highly toxic to fish. The non-systemic fungicide has a relatively short persistence in soil and has a low threat to move into water supplies.

Safety of Some Common Lawn and Garden Products*

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Captan (primarily used in fruit spray mixtures containing a fungicide and insecticide) – Signal word CAUTION, EPA cancer group B₂. Low toxicity to birds and bees, but highly toxic to fish. The non-systemic fungicide has a relatively short persistence in soil and has a low threat to move into water supplies.

Chlorothalonil (lawn, fruit tree, vegetable, and ornamental spray) – Signal word CAUTION to DANGER depending on formulation. EPA cancer group B₂. Some formulations may cause eye and skin irritation. Very low toxicity to birds and bees, but highly toxic to fish. The non-systemic fungicide is persistent (several weeks) on plant surfaces and does not move readily in most soils. Low threat to move into water supplies.

Ferbam (fruit and ornamental spray) – Signal word CAUTION. Very low toxicity to birds and bees and moderately toxic to fish. The non-systemic fungicide is persistent on plant surfaces and does not move readily in most soils. Low threat to move into water supplies.

Imazalil (rose spray) – Moderately toxic to humans. Some individuals may experience skin irritation. Low toxicity to birds and bees when used properly. Has not been found to cause cancer. Stable in the environment. Low threat to move into water supplies.

Mancozeb, Maneb (fruit, vegetable and ornamental spray) – Signal word CAUTION; EPA cancer group B₁. Low toxicity to bees, but moderately toxic to fish. Mancozeb is non-systemic and breaks down rapidly in the environment. Certain by-products during decomposition may potentially move into water supplies.

Propiconazole (turf and ornamental spray) – Signal word WARNING, EPA cancer group C. Low toxicity to birds and bees, but highly toxic to fish. The locally systemic fungicide is quickly absorbed by plants and is a low threat to move into water supplies.

Sulfur dusts, wettable powders and liquid lime sulfur. (fruit and ornamental spray) – Signal word CAUTION or DANGER depending on formulation. Sulfur is slightly toxic to birds, bees and fish. Sulfur is a natural component of the environment.

Triadimefon (fruit, turf and ornamental spray) – Signal word WARNING, EPA cancer group C. Low toxicity to birds, bees, and fish. The locally systemic fungicide is quickly absorbed by plants and is a moderate threat to move into water supplies.

Triforine (fruit tree and rose spray) – Signal word DANGER, EPA cancer group E. May cause eye damage. Low toxicity to birds, bees, and fish. The fungicide is locally systemic and is quickly absorbed by plants. Breaks down rapidly in the environment and is a low threat to move into water supplies.

* This brochure includes many of the common lawn and garden products.

It is not intended to be a complete list. Inclusion of a product does not imply an endorsement nor does the exclusion of a product imply that it is not recommended. Persons using such products assume responsibility for their use in accordance with current label directions of the manufacturer.