

Poisonous Plants

Understanding the Need for Accurate Identification and Timely Information

ABSTRACT *Only a few of the thousands of existing plants are considered to be poisonous or potentially harmful in any manner. No universal guidelines are available to determine whether a plant or specific exposure will result in harm. This article reviews commonly encountered poisonous plants and suggests resources for information if exposure occurs. Poisonous plants are commonplace in homes or offices and should be properly identified in anticipation of a child or animal ingesting one of these plants. Although plants or mushrooms encountered in nature may resemble common foods, one should ask an expert to positively identify them before eating them. The telephone number of a regional poison control center or another emergency contact should be posted in an accessible area in case of an accidental poisoning. This is the fourth and final article in a continuing education update series. Following this series, participants should be able to recognize the hazards and know what to do when encountering a poisonous plant or mushroom, understand how plants can clean the environment, and identify the role plants play in ancient and modern-day pharmaceuticals.*

From Drug Use Management and Information Services, Oregon Health Sciences University, Portland, Ore.

Reprint requests to Dr Farthing, Oregon Health Sciences University, Drug Use Management and Information Services, 3181 SW Sam Jackson Park Rd, OP24, Portland, OR 97201; or e-mail: farthing@ohsu.edu

Only a small number of the thousands of existing plants are considered poisonous or potentially harmful in any manner.¹ Unfortunately, no universal guidelines are available to help determine whether a plant or specific exposure will result in harm.

In a 1993 study by the American Association of Poison Control Centers, plants were the fifth most common substance involved in exposure to humans. Plant accounted for 94,725 of the 1,751,476 human exposures reported in 1993.² Of these exposures, 7,178 cases were referred to a health care facility for treatment, and only one case resulted in death. The true incidence of exposure is suspected to be larger, however, because many instances of poisoning are not reported to poison control centers or documented.^{2,3}

The intent of this article is to review commonly encountered poisonous plants and to suggest resources for information when exposure to a poisonous plant occurs.

Sources of Poisonous Plants

The Home and the Workplace

The most commonly reported plant exposures are the ingestion of household plants by children.⁴ When any plant is ingested, it is important for the health care worker to know how much and what parts of the plant have been ingested. The harmful effects of a plant vary with geographic location, season, and stage of growth.⁵

Two popular houseplants, the dieffenbachia (dumbcane) (Fig 1) and philodendron, members of the arum family, contain calcium oxalate crystals in their stems and leaves.⁶ Chewing releases the sap, which can come in contact with the mouth, hands, or eyes, causing irritation, burning, and swelling. The irritation generally lasts several hours, and mouth and throat involvement is particularly bothersome. Treatment at home, on the recommendation of qualified medical personnel, consists of thoroughly washing the hands and face with soap and water, and giving milk or ice cream to soothe the irritated mouth or throat.³ If the patient experiences difficulty in breathing or excessive swelling of the mouth or tongue, he or she should be referred to a physician immediately. No specific laboratory tests are available to identify calcium oxalate toxicity.

Although the dieffenbachia and philodendron are probably the most widely known plants associated with calcium oxalate toxicity, caladiums (angel's wings), calla lilies, alocasia (giant elephant's ears), and anthuriums (tail flowers) also are members of the arum family that contain sharp calcium oxalate crystals in their leaves and stems.³

During the holiday season, the popularity of certain household plants increases as does the potential for ingestion. Mistletoe berries can cause abdominal

pain and diarrhea, even if only a few berries are eaten. Consumption of large quantities of the berries or of tea made from the leaves can result in severe stomach irritation.^{1,3} The poinsettia leaves and stem contain a milky substance that can irritate the skin, although only minor stomach upset usually is observed with ingestion.³ No specific laboratory tests are available to identify toxicity from mistletoe or poinsettia.

Outdoors

Poison ivy, poison oak, and poison sumac contain a highly irritating substance, urushiol, which is found in all parts of the plant. People sensitive to this substance experience irritation as soon as their skin comes in contact with these plants. Even the smoke produced when burning the plants or clothing that has come in contact with the plants can result in symptoms. An itchy skin rash and blisters appear on exposed areas within hours (up to 5 days) after contact with urushiol, and generally last 2 to 3 weeks. After a person has been exposed, he or she should remove and launder contaminated clothing, and wash all exposed areas of skin with soap and water. Topical or oral antihistamines may ease the itching sensation. No specific laboratory tests are available to identify urushiol toxicity.

Flowering plants that contain cardiac glycosides, which directly affect the heart, include oleander (Fig 2), foxglove, and lily of the valley. All parts of these plants are potentially toxic, and symptoms of exposure include nausea, vomiting, diarrhea, abdominal cramps, headache, slowing of the heart, and irregular heartbeat. Ingestion of cardiac glycosides can lead to convulsions and cardiac arrest. The toxicity associated with the cardiac glycosides sometimes can be detected by older, nonspecific assays, but not with specific digoxin immunoassays (Baer, DM. October 1995, personal communication), and the patient's metabolic status should be followed closely.

Some of the most serious toxicities occur when people collect and eat unfamiliar plants and mushrooms from the wild. A few mushroom varieties are highly toxic, and the person collecting mushrooms for eating should know the exact identity of the mushroom.³ Depending on the type of mushroom ingested, symptoms can range from nausea, vomiting, diarrhea, and abdominal cramps to drowsiness and hallucinations. Anyone experiencing symptoms after eating mushrooms should be treated immediately. If possible, the affected person should bring a sample of the mushroom to the treatment facility so that its identity can be confirmed.



Fig 1. The dieffenbachia (dumbcane) contains calcium oxalate crystals in its stems and leaves. The sap can cause irritation, burning, and swelling to the mouth, hands, or eyes.



Fig 2. The *Neureum oleandar* contains cardiac glycosides, which directly affect the heart. The plant, though beautiful to look at, is potentially toxic, with symptoms including nausea, vomiting, diarrhea, abdominal cramps, headache, slowing of the heart, and irregular heartbeat.



Fig 3. Poison hemlock (*Conium maculatum*) can be mistaken for a wild carrot (also known as Queen Anne's lace) and its leaves mistaken for parsley. Toxicity with this plant involves central nervous system stimulation followed by severe central nervous system depression.

CHEMICAL CATEGORIES OF POISONOUS PLANTS

Chemical Category/Characteristics	Common Plant Names	Comments
<p>Alkaloids</p> <p>Alkaloid molecules usually have a ringlike structure and contain nitrogen. They are generally thought to produce psychoactive symptoms. The alkaloid content of plants usually does not vary with changing ecologic conditions.</p>	<p>Belladonna, jimsonweed, hemlock, tobacco, poppy, ergot, nightshade, larkspur, star-of-Bethlehem, yew, coffee</p>	<p>Alkaloids represent a category of significant research in medicine and human toxicology. They usually are found throughout all parts of the plant and can be hazardous to livestock.</p>
<p>Glycosides</p> <p>Glycosides vary greatly in structure, but all contain at least a simple sugar molecule and something that is not a sugar. The glycoside content of a plant depends on both intrinsic (genetics, age) and extrinsic (climate, moisture) factors.</p>	<p><i>Cyanogenic glycosides:</i> hyangea, flax, elderberry, wild cherry, amygdalin (found in pits or seeds of wild cherry, peach, apple, apricot and almond)</p> <p><i>Steroid glycosides:</i> Cardiac glycosides: foxglove, lily of the valley, oleander</p> <p>Saponins: corn cockle, English ivy, alfalfa, pokeweed</p> <p><i>Coumarin glycosides:</i> Ohio buckeye, sweet clover</p>	<p><i>Cyanogenic glycosides:</i> Hydrocyanic acid is produced on hydrolysis of glycoside, and cyanide toxicity can result.</p> <p><i>Steroid glycosides:</i> Cardiac glycosides: They are commonly used in medicine to strengthen the heart muscle.</p> <p>Saponins: Ingestion can cause gastric irritation.</p> <p><i>Coumarin glycosides:</i> Under wet conditions, sweet clover can spoil, causing bleeding in livestock.</p>
<p>Oxalates</p> <p>Oxalic acid is irritating to tissues when ingested. In plants, it occurs in both a soluble (sodium or potassium oxalates) and an insoluble (calcium oxalate) form.</p>	<p><i>Soluble oxalates:</i> beet, sorrel, rhubarb, Russian thistle, greasewood</p> <p><i>Insoluble oxalates:</i> caladium, elephant's ear, dumbcane, philodendron</p>	<p><i>Soluble oxalates:</i> Ingestion can result in a drop in serum calcium on absorption and formation of oxalate crystals in the kidneys.</p> <p><i>Insoluble oxalate crystals (calcium oxalate):</i> When chewed, these crystals produce irritation and burning.</p>
<p>Resins and Resinoids</p> <p>Difficult to categorize in chemical terms due to diversity. Physical properties on extraction from plants are similar.</p>	<p>Urushiol, milkweed, marijuana, water hemlock, laurel, chinaberry tree, rhododendron</p>	<p>Urushiol causes contact dermatitis (poison ivy, oak, and sumac). Marijuana has become a popular euphoric drug when smoked, and some resins of the plant have medicinal value.</p>

The common name hemlock refers to several species of plants, some of which are highly toxic, and others of which, such as the hemlock tree (*Tsuga canadensis*), are harmless. Poison hemlock (*Conium maculatum*) (Fig 3) and water hemlock (*Cicuta douglasii*) are easily mistaken for edible plants; the results of this misidentification may be tragic.^{3,4} Young poison hemlock plants resemble wild carrots and the leaves can

be mistaken for parsley, whereas water hemlock has been mistaken for a turnip and various other similar-looking edible species.³ With both plants, all parts of the plant are considered toxic, but the roots and stems have the highest concentration of toxins. Symptoms of poison hemlock toxicity are similar to nicotine poisoning and include initial central nervous system stimulation followed by severe central nervous system depression. Water hemlock poisoning results in central

nervous system stimulation and symptoms include salivation, excessive sweating, convulsions, and eventual respiratory failure. The onset of symptoms after either poison or water hemlock ingestion is rapid (within an hour), and treatment by medical personnel should be immediate. No specific laboratory tests are available to identify either poison or water hemlock toxicity.

Although a comprehensive discussion of all poisonous plants is beyond the scope of this article, a partial listing of poisonous plants is shown in the Table.


Sources of Information

Parents and guardians are cautioned to keep children and pets away from harmful substances, which run the gamut from household cleaners and medications to plants and mushrooms. Regardless of whether or not you have children or pets, you should know the identity of the plants, shrubs, and bushes growing in your yard as well as inside your home. If you are unsure of the identity of a plant, consult a friend or neighbor. Confirm the identity with an expert, such as a florist or employee at a local nursery, who usually can identify plant varieties from clippings. A botanist associated with a community college or university is a good resource, as is the county extension office, for help in identifying household plants and the potentially toxic plants commonly found in your area. Always remove wild mushrooms before an exploring child finds them in the yard. Never eat wild mushrooms without knowing their proper identity.

In the event of ingestion or exposure to a plant, contact your regional poison control center. If you know the common or botanical name of the plant and are able to describe the appearance of the plant, the poison control center personnel will be able to assist you more efficiently. They will make treatment recommendations based on the type of plant, how much and which parts of the plant have been ingested, and any symptoms you or your child or pet are experiencing after exposure. The poison control center personnel also will refer you to an emergency department or to your family physician or veterinarian for follow-up if appropriate.

Conclusion

A relatively small number of plants are considered poisonous, but those that are poisonous can cause serious consequences if ingested. If exploring the wilderness, always know the identity of the plant before you eat it. Know the potential

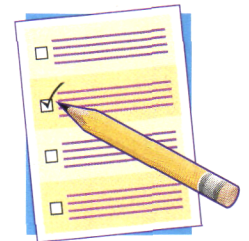
dangers in your home, especially if small children are present. The telephone number of the regional poison control center or another emergency contact should be located in an accessible area in case of an accidental poisoning. 

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References

1. Blackwell WH. *Poisonous and Medicinal Plants*. Englewood Cliffs, NJ: Prentice Hall; 1990.
2. Litovitz TL, Clark LR, Soloway RA. 1993 annual report of the American association of poison control centers toxic exposure surveillance system. *Am J Emerg Med*. 1994; 12:546-584.
3. Turner NJ, Szczawinski AF. *Common Poisonous Plants of North America*. Portland, Ore: Timber Press; 1991.
4. Bernstein JN. Common plant ingestions. *J Fla Med Assoc*. 1994; 81:745-746.
5. Eisen T. Plants—general principles. *Clin Tox Rev*. 1989; 11:1-2.
6. Gardner DG. Injury to the oral mucous membranes caused by the common houseplant, dieffenbachia. *Oral Surg Oral Med Oral Pathol*. 1994;78:631-633.



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