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POISONOUS PLANTS

INTRODUCTION

Poisonous plants have always been part of daily life. In the nineteenth century, poisonings due to plants reached near-epidemic levels as people often foraged for sources of food from natural plantings. Today, potentially dangerous plants can still be found all around us. Poisonous plants are frequently part of interiorscapes in homes as well as in landscape plantings outdoors. This has become increasingly problematic as more and more cultivated, exotic plants from throughout the world are introduced into the landscape. Recent studies have estimated that 3.5% of all poisonings in the United States are due to plants.

All types of native and introduced plants can be poisonous including ferns, herbaceous plants, woody shrubs, and trees. Identifying plants that are poisonous is difficult since poisonous plants do not appear distinctly different from their nontoxic relatives or counterparts. Many poisonous plants have such unpleasant tastes that most adults don't chew them for very long before spitting them out. However, some poisonous plants are not distasteful and can even be sweet and, if eaten in large quantity, can cause serious problems. An example is the fruit of deadly nightshade, *Solanum dulcamara*; the red berry is not only attractive but also tastes sweet. The situation of plant poisoning of children is quite different than with adults since children have great curiosity and will often chew on anything within their reach, especially attractive berries or fruit. Children are also less likely than adults to spit out unpleasant-tasting substances. Since much smaller quantities are necessary to produce a toxic reaction in children, the risks of poisoning due to ingestion are much greater than for adults. However, regardless of age, reactions to poisonous plants vary with the individual and can be influenced by diet, metabolism, and medications being taken.

The term "poisonous" designates many kinds of reactions or effects. Among the key effects are allergic reactions (caused by spores, pollen, or naturally occurring volatile compounds emitted into the air by plants), skin rashes or dermatitis (caused by direct or indirect contact with allergenic or irritant compounds), skin photosensitization (caused by exposure to irritating or allergenic compounds), and internal poisonings or irritations (from ingestion of plants or plant parts). The general types of poisoning and examples of plants responsible for each are: blood poisoning (wild cherry, *Prunus* spp.), nerve poisoning

(mushrooms), cardiac poisoning (foxglove, *Digitalis purpurea*), and skin irritation (poison ivy, *Toxicodendron radicans*).

WHY ARE PLANTS POISONOUS?

The substances responsible for poisonings or toxic reactions originate from many different pathways within plants. However, most poisonous principles are considered to be secondary metabolites or by-products from the essential functions of the plant. These are compounds that aren't considered fundamental to the life of the plant. Although there are many theories as to why plants produce these nonessential compounds, one of the key theories maintains that plants have evolved to produce these compounds in order to deter animals from grazing on them and to keep insects from eating them.

Plants can differ by degree of toxicity and many references classify plants as extremely, moderately, or minimally toxic. However, it is difficult to categorize plants with regard to their toxicity since this varies with the age of the victim (directly related to body weight) as well as other factors that influence levels of toxic principles in plants such as environment and stage of plant growth. For example, young shoots of pokeberry or pokeweed (*Phytolacca americana*) are not poisonous but roots and fruit are poisonous. The level of a particular toxic compound may also be quite variable within a plant or plant family. An example is the Nightshade Family. This family has many members that are considered poisonous plants although not every member is poisonous or even every part of a single poisonous plant contains the poisonous ingredient. For example, the cultivated tomato, *Lycopersicon esculentum*, is a member of the Nightshade Family but the ripe fruit are nontoxic. In contrast, all parts of Belladonna or deadly nightshade, *Atropa belladonna*, are toxic. Additionally, many plants are only mildly poisonous or cause symptoms only in unusual circumstances such as when they are consumed in great quantity.

Poisonous principles can be classified in many different ways based on criteria such as the chemistry of the toxic compound or its effects on the victim. As follows is one method for classifying poisonous principles into categories and an example of each:

- **Alkaloids-** these are nitrogenous compounds which are complex, physiologically active, typically taste bitter, and are usually insoluble in water; (poison hemlock, *Conium maculatum*)
- **Glycosides-** these compounds produce one or more sugars (glycones) and one or more toxic aglycones; they are usually colorless, bitter, crystalline solids; (English ivy, *Hedera helix*)
- **Minerals-** this category of poisoning is associated with high levels of particular minerals in the soil or atmosphere and subsequent uptake by plants; levels of these minerals are accumulated in the plants such that they become toxic; among the minerals often associated with toxicity are lead, copper, and arsenic;
- **Oxalates-** these consist of soluble oxalates and oxalic acid; poisonings are often attributed to small crystals of insoluble calcium oxalate which cause oral irritation when ingested; (dumb cane, *Dieffenbachia* spp.)
- **Photosensitizing Compounds-** these compounds are psoralens which result in acute sensitivity of skin to sun or other sources of light after exposure; psoralens are furocoumarins; (giant hogweed, *Heracleum mantegazzianum*)
- **Phytotoxins (Toxalbumins)-** these compounds are toxic protein molecules

that are similar to bacterial toxins in structure and reaction; (castor bean, *Ricinus communis*)

- **Polypeptides and Amines-** these are nitrogenous compounds such as phenylethylamine and tyramine; (mistletoe, *Phoradendron* spp.)
- **Resins-** these are compounds that are often chemically very different but which share certain physical characteristics; these compounds melt or burn easily, are soluble in organic solvents, insoluble in water, and don't contain nitrogen; (wisteria, *Wisteria sinensis*)

IDENTIFICATION OF POISONOUS PLANTS

One of the most effective ways to prevent poisonings due to plants is to know the identity of plants in your home interiorscape, landscape, and nearby woods or forests and their potential for plant poisoning. When buying new plants for the home or landscape, it is helpful to ask about their potential toxicity at the time of purchase. If purchasing a new home, it is prudent to identify and inventory the plants in the landscape. If you need assistance with identification of any of the plants, you can contact The Connecticut Agricultural Experiment Station or a local nursery or garden center. When identifying any plant, it is important to know the common name as well as the scientific name (Latin binomial) since common names are often misleading and imprecise. For example, the common names ground cherry, Jerusalem cherry, Chinese lantern, and strawberry tomato all refer to members of the genus *Physalis*.

If a plant has been accidentally ingested, accurate identification of the potential poisonous plant is critical to treatment. The ability to accurately identify a plant is often determined by the quality of the sample so it is important to obtain as complete a sample as possible. This includes all of the parts of the plant that are available at the time: flowers, fruits or berries, leaves, and twigs.

Information to assist with plant identification based on specific plant characteristics is available upon request.

HELPFUL INFORMATION FOR IDENTIFICATION OF PLANTS BY PHONE

Although the best way to accurately identify plants is by direct examination of plant parts, there are circumstances where it is prudent to attempt to identify a plant over the phone that has been accidentally ingested. The following list provides information that is helpful to have available in order to achieve this goal:

- What part of the plant was eaten?
- If fruit were eaten, what type of fruit was it (e.g., berry, nut)?
- Size, color, nature of the fruit (e.g., juicy, fleshy, firm, dry).
- Number of seeds or pits in the fruit.
- Arrangement of the fruit on the plant (e.g., single, in pairs, in clusters, on stalks, not on stalks).
- Were any other parts of the plant eaten (e.g., roots, leaves, twigs)?
- Appearance and growth habit of the plant (e.g., small, large, herbaceous, woody, shrub, vine, tree).
- Where is the plant growing (e.g., field, woods, hedge, roadside, garden, park, bog)?
- Size, shape, and arrangement of the leaves (e.g., round, oval, pointed, prickly, type of teeth, if any, at leaf margins)

SELECTED TERMS USED IN PLANT IDENTIFICATION

An understanding of botanical terms is very important for accurate plant identification. Although these terms are often familiar to the scientist, they are normally not used by the general public. The following glossary of terms and diagrams of selected parts of plants should be useful to describe and distinguish between different types of leaves, fruits, and parts of flowers.

Leaves:	**Descriptions:**
Crisped	Curled
Cuneate	Wedge-shaped
Deciduous	Leaves fall off in the autumn
Evergreen	Green leaves or needles persist over the winter
Glabrous	No hairs present
Incised	Cut into
Radical	Leaves which arise directly from a rootstock, not from an aerial stem
Rosette	Leaves clustered at ground level
Sessile	No stalk (petiole)
Truncate	Cut off straight across

Plants:	
Annual	Lasting only one year
Biennial	Lasting over two years (usually flowering only in second year)
Climbing	Any plant using an external support to raise itself above the ground. The term "vine" is used for certain climbing plants
Cultivar	Cultivated form of a plant, recognized as distinct
Herb(aceous)	Non-woody plant or part of a plant
Lenticel	Pore in a corky layer (allowing gaseous exchange)
Node	Point at which leaves are attached to a stem
Perennial	Lasting several years
Spine	Sharply pointed outgrowth from a plant
Tendril	Modification of a leaf or stem which grips supports for climbing
Twining	Climbing by means of a stem which grows round supports
Variety	Selected form of a plant, based on specific horticultural attributes
Whorled	Several parts (e.g., stems, leaves, or flowers) arising in a ring around the stem

Flowers:	
Carpel	Female parts of a flower or one "unit" of the female parts
Cluster	Undefined grouping of flowers
Female flowers	Flowers with carpels but no stamens

Filiform	Thread-like
Inflorescence	Group of flowers borne together
Perianth	Sepals and petals, or structure borne in their place
Zygomorphic	Irregular-shaped flower which can only be divided into two symmetrical halves along one plane

Fruits:

Achene	Single-seeded, non-splitting fruit
Aril	Fleshy outgrowth from the basal region growing round a seed
Berry	Fleshy fruit, often containing many seeds
Capsule	Dry fruit, of more than one carpel, which splits open
Celled	Divided into distinct sections
Drupe	Fleshy fruit in which one or more seeds are present, each surrounded by a hard coat
Follicle	Dry fruit, splitting open along one side
Fruit	Ripe seeds and the structure surrounding them
Inflated	Swollen up
Mesocarp	Middle part of a fleshy fruit's covering
Pod	Dry fruit, splitting open along two sides
Valved	Segments splitting from a capsule

Underground Parts and Roots:

Adventitious root	Root developing on a part of a plant (e.g., stem) other than a root
Bulb	Swollen leaves and base of a stem showing distinct layers when cut across
Corm	Swollen base of a stem, not consisting of layers
Rhizome	Swollen underground stem lasting more than one year
Rootstock (stock)	Swollen underground part of a plant
Taproot	Swollen main root
Tuber	Swollen underground portion of a root or stem

WAYS TO AVOID PLANT POISONING

Prevention is the best strategy to avoid all plant poisonings. The following suggestions are aimed toward prevention and are based on common sense. (These suggestions are not listed in a prioritized order.)

1. Teach children never to put any plant parts (e.g., twigs, berries, flowers, leaves) in their mouths. Do not allow them to suck nectar from flowers or make “tea” from leaves. Make them aware of the potential dangers of poisonous plants.
2. Know the names (common and scientific) of all the plants in your home interiorscape and yard. This will allow you to inventory the plants that are potentially dangerous. When purchasing new plants for the home or landscape, ask about their potential toxicity.
3. In the home, put poisonous plants out of the reach of children and pets.

4. Store labeled bulbs and seeds safely out of the reach of children and pets.
5. Do not rely on folklore or on pets, other animals, or birds to indicate which plants are poisonous and which are not.
6. Teach children and family members to recognize poison ivy, nettles, and other plants that cause dermatitis.
7. Avoid exposure to smoke from burning plant material unless you know exactly what is burning. Serious problems can result from exposure to burning poison ivy vines.
8. Do not use flowers or other plant materials for decorations on food or in cooking without knowing their full identity and the status of their "edibility."
9. Be aware that heating and cooking do not always destroy toxic substances.

LISTS OF POISONOUS PLANTS

Unfortunately, most lists of plants that are poisonous are not exhaustive or complete. This is due, in part, to the fact that much of the literature (especially older references) is anecdotal rather than science-based and therefore has limited reliability. Additionally, many new and often exotic plants are introduced each year and exhaustive toxicity tests are not routinely conducted on them. It is also important to realize that *any plant* may cause unexpected reactions in certain individuals.

SOURCES OF HELPFUL INFORMATION

A. PHONE NUMBERS:

- **Connecticut Poison Control Center-**
    - Emergencies and General Information 1-800-222-1222

- **The Connecticut Agricultural Experiment Station (New Haven)-**
    - Plant Disease Information Office (For Plant Identification) 1-203-974-8601
    - Toll-Free (General Information) 1-877-855-2237

B. WEBSITES:

There are many websites on poisonous plants but the following list provides some key sites that also contain a number of helpful links.

- **Canadian Poisonous Plants Information System**
    - http://sis.agr.gc.ca/pls/pp/poison
- **Nova Scotia Poisonous Plants**
    - http://museum.gov.ns.ca/poison/ppguide.htm

- **Cornell University Poisonous Plants Web Pages**
    - http://www.ansci.cornell.edu/plants/alphalist.html

I THINK SOMEONE HAS EATEN A POISONOUS PLANT!

The most important thing: *DO NOT PANIC*, just act quickly.

- Remove any plant parts from the person's mouth.
- Give the person a small amount of water to drink.
- Immediately CALL CONNECTICUT POISON CONTROL CENTER (1-800-222-1222), your local hospital, or your local police department (911).
- Try to IDENTIFY the plant that was eaten.
- OBTAIN A SAMPLE of the plant; this should be as complete a sample as possible. This includes all of the parts of the plant that are available at the time: flowers, fruits or berries, leaves, and twigs.
- FOLLOW ALL INSTRUCTIONS FROM POISON CONTROL.
- BRING THE PLANT SAMPLE with you when taking the victim for medical treatment.

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