

Plant Poisoning

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NUMEROUS poisonous plants grow wild over the country, yet plant poisoning in man through the digestive tract is infrequent. That which does occur is more often in children who have not learned to keep unwholesome things out of their mouths. Among adults, mushroom eating is the most frequent cause of serious poisoning from the ingestion of wild plant material. In the earlier days, man more often turned to native plants for food. In the spring, untested shoots or tender plants were eaten at times with disastrous results. Poisonings have arisen from using young shoots of poke-weed for pot greens. Experience has taught us, however, that if these are cooked in two waters, pouring away the first, poisoning is unlikely. John Smith, leader of the Jamestown Colony, writes of illness among the colonists from using Jimson-weed, also called Jamestown-weed (*Datura stramonium*), for greens. These vernacular names, no doubt, have arisen from the poisoning incident in the colony. The Jimson-weed is of the nightshade family. A number of the species of this family, e.g., belladonna and black nightshade, having been found to be poisonous, man became suspicious of all of them. Only a generation or so ago, the highly relished tomato of today was believed to be poisonous.

The use of native plant material for drugs, in the treatment of human ailments, was another source of plant poisoning in the earlier days. Poisoning developed from overdosing and from use of the wrong plant. Better knowledge of plants, their composition, and how they may be improved for human use in supplying food and drugs has almost eliminated poisoning in man from ingested plant material, though we do find idiosyncrasies of allergy. The purification and synthetic preparation of drugs has reduced the uncertainties in medicine.

More often, plant poisoning has reference to poisoning from contact with plants. Ivy poisoning is the conspicuous example. There are a number of plants which cause dermatitis in man. These will be discussed later.

• Among Domestic Animals

Plant poisoning among domestic animals is a matter of considerable concern and an important factor in the agricultural field. Wild animals seem to be little affected. Some plants which are frequently fatal to cows or sheep are a part of the regular food of deer and other wild animals. Plant poisoning among our domestic animals is localized and rather seasonal. Domestic animals are inclined to be selective of their food. When grass, their preferred food, is scarce, they begin to graze or

browse on plants which ordinarily they would not touch. It is not infrequent to find poisonous plants within easy reach of stock, but not touched by them as long as there is a good supply of grass available. Stockmen, who are aware of such potential dangers, do not allow their stock the run of the range or pasture when grass is poor, as during drought, winter, or weakened from overgrazing.

Losses of livestock from plant poisoning have been estimated to run into millions of dollars each year. Some localized outbreaks in the western cattle country have caused losses running into thousands of dollars.

• Nature of the Poisonous Principle in Plants

The poisonous principles which have been isolated from plants belong to several types of chemical compounds. The more prominent of these are the *Alkaloids*, *Glucosides*, *Phytotoxins*, *Resinoids*, *Polyhydric Alcohols*, *Phenolic substances* and *Miscellaneous substances*.

The Alkaloids. The active principles of some of the especially poisonous plants belong to the alkaloids. These are ill-defined nitrogen bases which occur in some plants. A given plant may contain more than one alkaloid, one or more of which may be particularly potent. The alkaloids are not widely distributed among plants. Among the seed plants, they occur most often in the *Apocynaceæ*, *Leguminosæ*, *Papaveraceæ*, *Ranunculaceæ*, *Rubiaceæ*, and *Solanaceæ*.

Glucosides. These are relatively complex compounds which upon hydrolysis yield a simple sugar, together with other substances commonly of an aromatic nature. Some of the glucosides are not poisonous themselves, but upon hydrolysis yield a toxic substance. A well-known example of this is the poisoning from wild cherry leaves. The fresh leaves contain the glucoside amygdalin, which in itself is not poisonous; however, if the leaves wilt a bit, the enzyme emulsin in the leaf becomes active on the glucoside, causing complicated hydrolysis, which yields, among other things, HCN. This, of course, is highly poisonous, and this action explains why the wilted leaves are very poisonous and the fresh leaves are not. A number of plants contain cyanide-yielding glucosides. These are called cyanogenetic plants, and their glucosides are likewise called cyanogenetic glucosides.

The poisonous principles of a number of plants belong to the *Saponins*. These are glucosidal compounds

which have the property of forming a long-standing foam when their water solution is shaken. The saponins are prominent poisons in the *Caryophyllaceae*, *Scrophulariaceae*, and *Compositae*.

Solanine, a characteristic poison of several *Solanaceae*, are complex compounds having both alkaloidal and glucosidal properties.

The *Phytotoxins*, also called *Toxalbumins*, are infrequent in our plants. They are protein-like substances found in the Black Locust and in the Castor Oil bean or Palma Christe, an ornamental plant of our gardens.

The *Resinoids*. These are very active poisons, difficult to purify. They are of a resinous nature, hence, their name. The poisonous principle of a number of the *Ericaceae*, *Asclepiadaceae*, and the genus *Cicuta* of the *Umbellifereae*, belong to the group called the resinoids.

Phenolic, Higher Alcohol, and other Miscellaneous compounds are responsible for the poisonous nature of

some of our plants. However, none of these compounds are believed to be widespread in the plant world. The volatile oil of the Poison Ivy (*Rhus toxicodendron*) carries a poisonous principle of the Phenolic group. This material occurs in several species closely related to the Poison Ivy. The Higher Alcohols are represented by their poisonous principle in the White Snakeroot. This is an accumulative poison which slowly affects an animal, and usually shows its effects in the fall.

Some of the more important poisonous plants are listed in the following table. Also, their action and parts, usually responsible for the poisoning, are indicated. Man is listed as being susceptible to poisoning from a number of these. Chances are that all of them are, in reality, poisonous to man. A number in the list are not liable to be eaten by man. In fact, there are few, if any, in the list which an adult would eat. However, children may pick on several of them.

SOME IMPORTANT POISONOUS PLANTS AND THEIR PROPERTIES

Name	Poisonous Principle	Important Phys. Action	Animals Poisoned. Plant Parts Poisonous
Boxwood <i>Buxus sempervirens</i>	Alkaloid (Buxine)	Irritant with nervous symptoms	Man and stock Leaves, twigs
Poison Hemlock <i>Conium maculatum</i>	Alkaloid (Coniine)	Heart (Depressant)	Man, stock, and poultry Plant, esp. seed, leaves
Larkspur <i>Delphinium tricornis</i>	Alkaloid	Heart (Aesthetic)	Cattle Plant, esp. seed
Yew <i>Taxus canadensis</i> and spp.*	Alkaloid (Taxine)	Heart (Depressant)	Man, stock, poultry Leaves and twigs
Yellow jasmine <i>Gelsemium sempervirens</i>	Alkaloid (Gelsemine)	Heart (Depressant)	Livestock, poultry Leaves, stem, seed
Death Camas <i>Zygadenus</i> spp.	Alkaloid (Zygadenine, etc.)	Heart (Depressant)	Sheep Leaves, seed, bulb
Lupine <i>Lupinus</i> spp.	Alkaloid (Spateine, etc.)	Central nervous system (Depressant)	Man and stock Leaves and roots
Rattlebox <i>Crotalaria sagittalis</i>	Alkaloid (Monocrotaline)	Inebriant	Livestock, poultry Leaves, stems, seed
Jimson Weed <i>Datura stramonium</i>	Alkaloid (Hyocyamine)	Brain (Deliriant)	Man and stock Seed and leaves
Dutchmans Breeches <i>Dicentra cucullaris</i>	Alkaloid (Cucullarine)	Spinal cord (Convulsive)	Cattle Plant, esp. tubers
Squirrel corn <i>Dicentra canadensis</i>	Alkaloid (Cucullarine)	Spinal cord (Convulsive)	Cattle Plant, esp. tubers
Hellebore <i>Veratrum viride</i>	Alkaloid (Veratrin)	Irritant with nervous symptoms	Man, stock, poultry All parts, esp. root
Kentucky Coffee Tree <i>Gymnocladus dioica</i>	Alkaloid (Cytisin)	Irritant with nervous symptoms	Man, stock Leaves and fruit
Buckeye <i>Aesculus</i> spp.	Glucoside (Aesculin)	Irritant with nervous symptoms	Man, cattle, swine, horse Seed, young shoots

* spp. = other species of same genus or two or more species of the genus named.

Name	Poisonous Principle	Important Phys. Action	Animals Poisoned. Plant Parts Poisonous
Corn Cockle <i>Agrostemma githago</i>	Glucoside (Saponin)	Irritant with nervous symptoms	Man, stock, poultry Seed
Cocklebur <i>Xanthium spp.</i>	Phenol Glucoside (Xanthostrumarin)	Irritant with nervous symptoms	Swine, sheep, cattle Seed and seedlings
Sudan grass and Johnson grass <i>Sorghum spp.</i>	Cyanogenetic Glucoside (Dhurrin)	Spinal cord (Convulsive)	Cattle, sheep Leaves and stems
Wild Cherry <i>Prunus spp.</i>	Cyanogenetic Glucoside (Amygdalin)	Spinal cord (Convulsive)	Stock Leaves, twigs
Flax <i>Linum usitatissimum</i>	Cyanogenetic Glucoside (Phascolumatin)	Nervous system (Convulsive)	Cattle, pigs Leaves, young seed
Arrow grass <i>Triglochin maritima</i>	Cyanogenetic Glucoside	Nervous system (Convulsive)	Cattle, sheep Leaves
Water Hemlock <i>Cicuta maculata</i>	Resinoid (Cicutoxin)	Brain and spinal cord (Convulsive)	Man and stock Roots
Mountain Laurel <i>Kalmia latifolia</i>	Resinoid	Heart (Depressant)	Sheep, cattle, horses Leaves and twigs
Rhododendron <i>Rhododendron maximum</i>	Resinoid	Heart (Depressant)	Sheep, cattle, horses Leaves and twigs
Stagger Bush <i>Leucothoe catesbaei</i>	Resinoid	Heart (Depressant)	Sheep Leaves and twigs
Male Berry <i>Lyonia ligustrina</i>	Resinoid	Heart (Depressant)	Sheep Leaves and twigs
Spurges <i>Euphorbia spp.</i>	Phenolic	Irritant	Man and stock Flowers, seed, etc.
Sneczeweed <i>Helenium autumnale</i>	Phenolic	Irritant	Sheep, cattle, horses Flowers
Bitterweed <i>Helenium tenuifolium</i>	Phenolic	Irritant	Horse, mule Flowers and leaves
Poison Ivy <i>Rhus toxicodendron</i>	Phenolic (Urushiol)	Irritant	Man All parts
Poison Sumac <i>Rhus vernix</i>	Phenolic (Urushiol)	Irritant	Man All parts
Nightshade <i>Solanum nigrum</i>	Solanine	Brain (Deliriant)	General Green fruit, leaves
Castor Bean <i>Ricinus communis</i>	Phytotoxalbumin (Ricin)	Irritant with nervous symptoms	Man, stock, poultry Seed and leaves
Black Locust <i>Robinia pseudo-acacia</i>	Phytotoxalbumin (Robin)	Brain (Deliriant)	Man, stock All parts, esp. inner bark
Buttercup <i>Ranunculus acris</i>	Higher Alcohol (Anemenol)	Heart	Man, cattle, sheep All parts
White Snakeroot <i>Eupatorium urticaefolium</i>	Higher Alcohol (Trematol)	Heart (Aesthenic)	Man, cattle, sheep, stock All parts
Poleweed <i>Phytolacca americana</i>	Alcoholic extract	Brain Inebriant	Man Root, young shoots, berries

Space does not permit discussion of all of the plants listed; however, a few can be considered.

Poison Hemlock is known to be one of our most poisonous plants. It is sometimes sold as an ornamental plant under the name of "California Fern." This, of course, is not a member of the fern group. Since it contains such a potent alkaloid, it is unwise to plant it where children, chickens, or stock have access to it. This, and a related species, are claimed to be the plants used by the ancients in putting people to death. It is thought that the Greeks used these in making the hemlock tea to dispose of Socrates and other political prisoners.

Larkspurs, both the annual and perennial species of gardens and the native species, contain several kinds of alkaloids, some of which are especially poisonous. Some people develop a dermatitis when the sap of these plants gets on the skin. Their most serious poisoning is of livestock. On the western cattle range, the larkspurs are especially troublesome to cattle. In the limestone sections of the Appalachians, the dwarf larkspur, *Delphinium tricorne*, is a perennial source of trouble to stockmen. The conspicuous blue flowers of the larkspur attract children and adults to gather them in bunches. It is under such conditions that susceptible skins develop a dermatitis.

Lupines occur abundantly on the western range. A large number of species are recognized. A considerable number contain poisonous alkaloids. The plants of some species contain as many as three different alkaloids. All of the species are not poisonous. Those which are poisonous occur in quantities in certain areas and cause considerable trouble in horses and cows. These alkaloids act as depressants on the central nervous system, affecting the movements of the animal.

Boxwood, which is a very popular hedge and ornamental plant, contains an active alkaloid, *Buxine*, in the leaves, twigs, and roots. It is an irritant which brings on nausea and purgation, with the development of nervous symptoms, and possibly convulsions. The fact that the leaves are very distasteful has, no doubt, saved many children who have a tendency to chew leaves.

Yew is another ornamental which contains a poisonous alkaloid, and one from which young children should be kept away.

The Kentucky Coffee tree develops a pod which occasionally has been mistaken for the honey locust. A few cases of poisoning have been reported. The tree, however, is not widely distributed over the country, but is

common in certain areas. It is sometimes planted for an ornamental tree.

The Buckeye produces an attractive nut which not only children but often adults as well have to be warned against. They are mistaken for chestnuts. A number of serious poisoning cases have developed from eating these nuts.

The old saying "beauty is only skin deep" seems to come true in the Mountain Laurel, Rhododendrons, and closely related species. The two named are among our most attractive flowering shrubs. The leaves carry toxic principles which are very poisonous to sheep and other stock. They are evergreen shrubs, hence attract animals during the winter when they are hungry for green food.

The Black Locust is a very common tree in certain parts of the country, and has been extensively transplanted. Under some conditions, which have not been determined, the inner bark, leaves, and flowers contain a toxalbumin. A number of cases of poisoning of horses and children are on record. Some years ago, a children's home in Philadelphia experienced serious poisoning among the inmates. It was found that they had climbed over a pile of freshly skinned locust fence-posts and had pulled off strips of the inner bark, still clinging to the posts, and chewed them. This resulted in a number of serious cases of poisoning.

Several cases of poisoning of horses have been reported. The animals, when tied to locust trees, gnawed off the outer bark and then chewed the sweetish inner bark. It has been claimed that honey made from the flowers of Black Locust is unwholesome.

As previously stated, those plants which cause dermatitis are more conspicuous as poisonous plants of man. The irritation commonly arises from getting the sap of the plant on the skin. In Poison Ivy, Poison Oak, and Poison Sumac, not only is the irritant in the sap but it is volatile, hence, sensitive skins are affected merely by passing, without touching the plants. The pollen of some cause dermatitis (not referring to hay fever), and in others, as the nettles, the irritation is due to formic acid in the delicate spines of the leaves and stems. When these spines penetrate the skin they break off, thus releasing the very irritating acid.

Some of the plants are irritative only to the more delicate membranes of the eyes, respiratory and digestive tracts.

Plants which may be the cause of dermatitis are listed below:

MOST TROUBLESOME

Bitterweed
Buckeye
Nettle, stinging
Parsnip, wild
Poison hemlock
Poison ivy

Helenium tenuifolium
Aesculus octandra and *spp.*
Urtica spp.
Pastinaca sativa
Conium maculatum
Rhus toxicodendron

Flowers and leaves
Fruit and young shoots
Hairy leaves and stems
Hairs on leaves and stems
Leaves
Leaves, bark, fruits

MOST TROUBLESOME

Poison oak	<i>Rhus quercifolia</i>	Leaves, bark, fruits
Poison sumac	<i>Rhus vernix</i>	Leaves, bark, fruits
St. John's wort	<i>Hypericum perforatum</i>	Leaves and pollen
Scarlet pimpernel	<i>Anagallis arvensis</i>	Leaves
Snow-on-the-mountain	<i>Euphorbia marginata</i>	Milky juice and pollen
Spurge, flowering	<i>Euphorbia corollata</i>	Milky juice

LESS TROUBLESOME

Asparagus	<i>Asparagus officinalis</i>	Young stems
Bloodroot	<i>Sanguinaria canadensis</i>	Juice from stem and rootstock
Blue cohosh	<i>Caulophyllum thalictroides</i>	Rootstocks
Buttercup, bulbous	<i>Ranunculus bulbosus</i>	Leaves
Buttercup, tall field	<i>Ranunculus acris</i>	Leaves
Celandine	<i>Chelidonium majus</i>	Juice
Corn chamomile	<i>Anthemis arvensis</i>	Leaves, flowers
Cow parsnip	<i>Heracleum lanatum</i>	Leaves
Curly dock	<i>Rumex crispus</i>	Leaves
Dog fennel	<i>Anthemis cotula</i>	Leaves, flowers
Fleabane	<i>Erigeron canadensis</i>	Leaves
Great burdock	<i>Arctium lappa</i>	Leaves
Hellebore	<i>Veratrum viride</i>	Leaves
Hercules club	<i>Aralia spinosa</i>	Bark
Iris	<i>Iris versicolor and spp.</i>	Rhizomes
Jack-in-the-pulpit	<i>Arisaema triphyllum</i>	Leaves, corms
Lily-of-the-valley	<i>Convallaria majalis</i>	Leaves
Lobelia	<i>Lobelia inflata</i>	Leaves
May-apple	<i>Podophyllum peltatum</i>	Rootstocks
Mole-plant	<i>Euphorbia lathyris</i>	Milky juice
Motherwort	<i>Leonurus cardiaca</i>	Leaves
Osage-orange	<i>Maclura pomifera</i>	Milky juice
Princes-pine	<i>Chimaphila umbellata</i>	Leaves, stem
Red cedar	<i>Juniperus virginiana</i>	Leaves
Sheep sorrel	<i>Rumex acetosella</i>	Leaves
Smartweed, water	<i>Polygonum hydropiperoides</i>	Leaves
Sneezeweed	<i>Helenium autumnale</i>	Flowers
Spurge, cypress	<i>Euphorbia cyparissias</i>	Milky juice
Spurge nettle	<i>Jatropha stimulosa</i>	Leaves, stems
Tree-of-heaven	<i>Ailanthus altissima</i>	Flowers, leaves
Vipers bugloss	<i>Echium vulgare</i>	Leaves, stems
Virgins-bower	<i>Clematis virginiana</i>	Leaves
Wild carrot	<i>Daucus carota</i>	Leaves
Wild ginger	<i>Asarum canadense</i>	Leaves
Yellow jessamine	<i>Gelsemium sempervirens</i>	Leaves, stems

The foregoing is only a partial list of those plants which may be responsible for dermatitis in man. It is unusual to find a person sensitive to a large number of these.

However, some of the puzzling cases of dermatitis are explained only after considering various of the unsuspected plants. An interesting case of this nature has been recently reported. A woman affected with spells of temporary blindness had the physicians guessing as to the cause. Thinking that her trouble might

be due to some physical or nervous condition, she was advised to take an extended trip. During the period of absence from her home, she had no return of the trouble. As soon as she returned, the spells of blindness returned. To make a long story short, it was discovered that her trouble came from the Snow-on-the-mountain which she had in her garden. An irritative principle of the plant entered her eyes when she worked among the plants and caused temporary blindness. Other cases could be cited but space is limited.