Poisonous Plants in Manitoba Gardens

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Chemical Warfare serves a variety of functions

- Defense
  - Herbivores
  - Diseases
    - Fungi, Bacteria,
    - Protozoa, Viruses
  - Other plants
    - Competition,
    - Parasitism

- Metabolic Waste Storage

- Storage of Environmental Toxins
Plants invented chemical warfare and have perfected it over a long period of time.

Bluegreen algae are the most primitive plant cells on earth (> 3.5 billion years old). They have evolved a huge number of poisonous compounds, some of which are the most toxic natural substances on earth.
Common Secondary Plant Compounds

- Alkaloids (>10,000 known so far)
- Cyanogenic glycosides
- Cardiac glycosides
- Unusual amines
- Glucosinolates
- Coumarins
- Unusual fatty acids
- Phenols
Secondary compounds continued……

- Monoterpenes
- Diterpenes
- Limonoids
- Cucurbitacins
- Sesquiterpene lactones
- Tannins
- Saponins
Secondary compounds continued......

- Polyacetylenes
- Unusual dipeptides
- Unusual proteins
- Selenium compounds
- Fluorine compounds
- Toxic latex compounds
- Toxic alcohols
- Toxic organic acids
- And many others......
Modus Operandi

- May smell or taste unpleasant (astringents, volatile oils)
- May be corrosive to skin and mucous membranes
- May be allergenic (unusual proteins)
- May interfere with neurotransmitters (paralysis)
- May alter brain function (hallucinogens, intoxicants)
- May alter heart muscle contractions (cardiac glycosides)
- May cause hemorrhage (coumarins, unusual proteins)
- May stimulate intestinal smooth muscle contraction
- May inhibit digestion (tannins)
- May interfere with mitochondrial respiratory enzymes
- May interfere with growth of consumer (preocenes)
- May interfere with reproduction of consumer (selenium cpds.)
- May cause premature aging (e.g. lathyrism)
- May damage liver and kidney function
- May promote cancer
- May cause photosensitivity
>10,000 known so far
Some are valuable drugs (in LOW doses!!!) e.g. quinine, strychnine, cocaine, morphine
Many interfere with neurotransmitters, causing brain and nervous system malfunction which can lead to paralysis and death
Widely distributed throughout many plant families
Common examples of alkaloid-containing plants

*Aconitum* (Monkshood)
ALL parts (*aconitine*)

*Delphinium* (Larkspur)
ALL parts, but especially young leaves
Alkaloid-containing plants....

Amaryllis
Bulb

Anchusa
Summer Forget-Me-Not
ALL Parts
Alkaloid-containing plants......

Anemone
ALL Parts
(Protoanemonin + Glycosides)

Antirrhinum
Leaves
Strong laxative!
Alkaloids continued......

**Aquilegia**
Columbine
ALL parts
(+ Thujone)

**Asclepias**
Gay Butterfly Plant
ALL parts
(+ Cardiac glycosides, Resinoids)
Alkaloids continued...

**Brugmansia + Datura**
Angel’s (Devil’s) Trumpet,
Jimson Weed

**ALL parts**
(Scopolamine, Hyoscyamine,
Atropine + Nitrates)

**HUMAN FATALITIES**

**Cynoglossum**
Chinese Forget-Me-Not
ALL parts
Alkaloids continued...

*Dicentra*
Bleeding Heart
ALL parts
HUMAN FATALITIES

*Echinops, Echium*
Blue Thistle
Leaves
Alkaloids continued...

*Papaver*
Oriental Poppy
Leaves, pods
Ca. 35 alkaloids
HUMAN FATALITIES

*Escholtzia*
California Poppy
Seeds
Alkaloids continued...

**Iris**
ALL parts
(+ resinoids)

**Lobelia**
ALL parts
(lobeline)
Emetic
Alkaloids continued...

**Nicotiana**
Flowering Tobacco
ALL green parts *(nicotine, anabasine)*

**Lupinus**
Lupine
ALL parts neurotoxic *(quinolizidine alkaloids)*
Alkaloids continued...

**Vinca**

Periwinkle *(vincristine, vincamine)*

**ALL parts**

**Gloriosa superba**

Gloriosa Lily

**ALL parts** *(colchicine ++)*

HUMAN FATALITIES
Alkaloids continued.....

**Symphytum officinale**

Comfrey

Leaves and Roots

(ECHIMIDINE, CYNOGLOSSINE, CONSOLIDINE) FATALITIES

**Heliotropium**

Heliotrope

ALL Parts

(HELIOTRINE, LASICARPINE) HUMAN FATALITIES
MORE ALKALOIDS

Narcissus
Paperwhites, Daffodils
ALL Parts

Allium giganteum
Giant Tibetan Onion
ALL Parts
**ALKALOIDS**

**Borago officinalis**

**BORAGE**

Leaves, flowers

(Leaves: Dihydropyrrolizidine alkaloids: Lycopsamine, Amabiline, Supinine)

Flowers: Thesinine)

Banned in Germany for internal use since 1991
Cyanogenic glycosides

Cotoneaster
Berries

Hydrangea
Leaves
Cyanogenic glycosides continued...

**Linum**
Flowering Flax
Leaves *(linamarin)*

**Malus, Prunus**
Apple, Plum, Cherry, Apricot
Bark, leaves, seeds *(amygdalin)*

HUMAN FATALITIES
Cardiac glycosides

Convallaria
Lily of the Valley
ALL parts
(convallarin, convallatoxin)

HUMAN FATALITIES

Digitalis
Foxglove
ALL parts
(digoxin, digitoxin)

HUMAN FATALITIES
Saponins

Agrostemma
Ornamental Corn
Cockle
Leaves

Saponaria
Soapwort
Seeds
Proteins and Dipeptides

*Lathyrus spp.*
Sweet Pea (annual + perennial)
SEEDS, vines
(lathyrogen)
LACTONES

*Tulipa* (Tulip) ALL Parts (tulipalins)
Oxalic Acid

Arisaema
Jack in the Pulpit
ALL parts

Caladium, Zantedeschia
Angel Wings, Calla Lily
ALL parts
HUMAN FATALITIES
Oxalic Acid continued...

Colocasia, Alocasia
Elephant Ear, African Mask
ALL parts (including RAW tubers = raw taro)

Portulaca
Leaves
Studies of traditional medicines have shown that some species of \textit{Convolvulus} and \textit{Ipomoea violacea} (morning glory) contain hallucinogenic substances. These plants are known as \textit{Morning Glory Seeds} and belong to the \textit{ERGOLINES} class.
Ricin, Ricinoleic Acid

Ricinus
Castor Bean
ALL parts
HUMAN FATALITIES
Furanocoumarins

*Levisticum officinale*

Lovage

Phototoxic dermatitis

Symptoms occur ONLY when ingestion is combined with skin exposure to sun

Longterm consumption: carcinogen + bleeding
**Dictamnus**
Gas Plant
All parts
*alkaloids, furans, limonoids* ++
HUMAN FATALITIES

**Eupatorium**
Joe Pye Weed
All parts
*pyrrolizidine alkaloids, toxic alcohols (tremetol), nitrates*
You mean we have to be careful in our vegetable gardens too?
What the ...........?

Vegetables are our friends, but they may still be looking out for their own best interests, i.e. you can eat some of their body parts (under some conditions and under THEIR terms), but ......
not.....so.....fast...............
Oxalic Acid

*Rheum*

Rhubarb

ALL GREEN parts are Toxic

(+ dihydroxyanthracene)

Petiole is edible* → *(reasonable amounts)
Yes, more oxalic acid..........  

**BEET leaves**

- Oxalic levels depend on variety, growing conditions and age
- Levels of more than 12% by weight have been reported!
- Irreversible silent liver and kidney damage, may lead to fatal uremic shock
- Leaves can also contain toxic levels of nitrates when grown in over-fertilized soils
- Another oxalic hazard: SORREL leaves (*Rumex crispus*) (FATALITIES)
- Both sorrel and beet leaves can be fatal to livestock
- Spinach, Chard
Unidentified toxin

Asparagus

The berries and MATURE leaves are toxic when ingested

Mature leaves may also cause dermatitis
Potatoes, Tomatoes and other Solanaceae

*Lycopersicon esculentum*
Tomato
*Solanum tuberosum*
Potato

ALL GREEN PARTS
(Alkaloid: solanine, + tomatine in tomatoes)
Toxic Latex Compounds

*Lactuca sativa*

Lettuce

Leaves of BOLTED PLANTS contain bitter compounds which are toxic (similar to poppy alkaloids)

Lettuce opium poisoning
LECTINS (Proteins)

*Phaseolus vulgaris*

Bean

The RAW SEEDS contain toxic proteins which are destroyed on heating. These proteins affect the intestinal lining, heart muscle and cause red blood cells to clump (haemagglutinins).
Cyanogenic glycosides

**Vicia faba**

**Phaseolus lunatus**

Broad, Lima, Fava Beans

ALL Parts

(linamarin, vicine, convicine)

Risk increases with increasing soil nitrogen

Susceptibility to illness depends on human genetic factors
GARDEN SAFETY

- Supervise children in the garden. Teach them never to put things in their mouths indiscriminately.
- Wear gloves when handling toxic plants or seeds.
- Wash hands promptly using soap and water.
- Keep hands away from eyes, ears and mouth.
- Avoid breathing bulb dust.
- Do not use the same knife or shears to cut flowers and harvest garden food.
- Do not chop vegetables and trim flowers on the same cutting board.
Garden safety continued...

- Harvest vegetables and cut flowers separately.
- Store fruits and vegetables properly.
- Do not consume if they have started to taste bitter.
- Never OVERFERTILIZE leafy vegetables (spinach, chard, mustard greens, cabbages, beets).
- Use items such as sorrel, lovage, green tomatoes, lima beans, chick peas SPARINGLY.
- Never assume that just because one part of a plant is edible, all parts are.
- Never assume that if animals or birds eat it, it is safe for people.
GARDEN SAFETY continued...

- Never consume a plant if you are not certain of the identification.
- Use only safe flowers for salads, cooking and garnishing.
- Never feed discarded vines, bolted lettuce, beet tops etc. to animals.
- Use only clean soil in the vegetable garden.
- Remove pits and apple seeds as early as possible in the cooking process.
- Exercise special caution if you have diabetes, liver, heart or kidney disease.
GARDEN SAFETY continued...

- It is safe to compost toxic plants.
- Seek medical help if accidental ingestion has occurred. Tell the medical professional what has been ingested, and bring a sample of the plant with you.

Happy Gardening!
THE END