

Common Garden Plants Poisonous to Camelids

by James E. Perry, PhD, PWS

Spring is just around the corner! For many of us that means that it is time to start planning our gardens. When we think of gardens we usually think of them as a source of food, such as fruits or vegetables, or a source of beauty in the form of cut flowers. Unfortunately, there may be a negative side to our gardens: they may contain plants that are poisonous to animals.

In this article I discuss some common garden plants that may be hazardous to the health of our camelids. For ease of presentation I have divided the article into two sections; the first is gardens for food, and the second on cut flowers. Plants within each of these groups are arranged phylogenetically by family, and alphabetically by genus within the families.

Given that space is limited, I only address the most common species in North America. However, I have included a list of books and web sites at the end of this article to help you identify plants you suspect might be poisonous.

It is important to consider that there is not a large amount of information available on what plants are toxic to camelids. As a result, I have had to draw most of my information from literature documenting poisoning of other livestock including horses, cattle, goats and sheep.*

Some Things to Consider

Animals (and people for that matter) can be poisoned by the ingestion of any part of a poisonous plant including the leaves, fruit, twigs or root. The level of toxicity (lethality) of a poisoning depends on the maturity, part and amount of the plant ingested. In some species – the tomato, for example — the fruit may be poisonous when immature, but edible when mature.

Certain poisonous principles in plants are destroyed by heat, such as the cyanide-containing molecule found in black cherries. Others, such as the toxic glycosides found in the mustards, are destroyed by cold. However, the toxic principle in poison ivy (an oily resin), is not destroyed by either heat or cold. In fact, the resin may actually be spread as attachments to aerosol droplets in the smoke of a fire!

Some toxins can become more concentrated and accumulate in leaves as they wilt. Wilted leaves of the black cherry, for example, have higher concentrations of cyanide and, therefore, can be more toxic than when fresh.

FRUIT AND VEGETABLE GARDEN PLANTS

Nightshade Family (*Solanaceae*)

Few people realize that some of our most common edible plants may also be the most deadly to livestock. Tomatoes (*Lycopersicon esculentum*), potatoes (*Solanum tuberosum*) and eggplants (*Solanum melongena*), all commonly planted in our gardens, are members of the Nightshade family (*Solanaceae*). The toxic principle of the nightshade family is a group of several alkaloids that are steroidal in nature. Most members of this family found in the US are herbaceous vines planted for food or aesthetic purposes, or introduced weeds.



Tomato plants are actually a vine (which is why we need to stake them) and were originally classified by botanists as a deadly member of the Nightshade genus, *Solanum*.

Poisoning from ingestion of the unripe fruit and/or green leaves of tomatoes is unfortunately common. Cattle, pigs, and even children have been

poisoned by ingestion of portions of the plants, the leaves proving to be particularly toxic to cattle and pigs. Numerous reports exist of poisoning from “suckers” removed from the plants by gardeners and fed to livestock. Cattle are known to be particularly prone to intruding into a fenced garden and ingesting immature tomato plants.



Potato vines, sprouts, and peelings are also lethal to livestock. Spoiled potatoes have proven to be particularly lethal. This is possibly due to the effect of microbial poisoning compounding the effects of the toxic alkaloids from the plant itself.

There are several other weedy members of the Nightshade family that are not cultivated but frequently invade gardens as weeds. Those included are: jimsonweed (*Datura stramonium*), horse-nettle (*Solanum carolinense*) and black nightshade (*Solanum nigrum*). It is thus important to note that it is not wise to feed garden weeds to camelids!

Signs of Poisoning: Solanaceous poisoning is quite variable and is difficult to recognize. Signs include apathy, vomiting, difficulty breathing, and prostration. The pupils of the eye may or may not be dilated, though this is difficult to detect in camelids. You may also see either constipation or diarrhea.

Bean Family (*Fabaceae*)

There are two members of the bean family commonly planted in our gardens that may be a problem for livestock: the lima bean (*Phaseolus lunatus*) and the garden pea (*Pisum sativum*). The varieties of lima bean found in Europe and the tropics have been historically associated with cyanide poisoning. The poisonous principle involved is cyanogenic, that is, cyanide producing. The cyanide concentration in most North

American varieties of the lima bean is much lower than lethal levels. Luckily, poisoning is usually not a problem.

When forage made from the vines and pods of the garden pea have been fed to pregnant sheep, the newborn lambs have shown nervous disorders. While the newborns tended to grow at a normal rate under low-stress conditions, they did not survive if stressed. Forage made from the Austrian pea (*Pisum sativum* L. var. *arvense*) in the western US has caused severe intestinal and colon compaction in horses leading to death.



Signs of Poisoning: Lima bean poisoning exhibits the signs of typical cyanide poisoning. This includes stimulation of respiration after ingestion, quickly

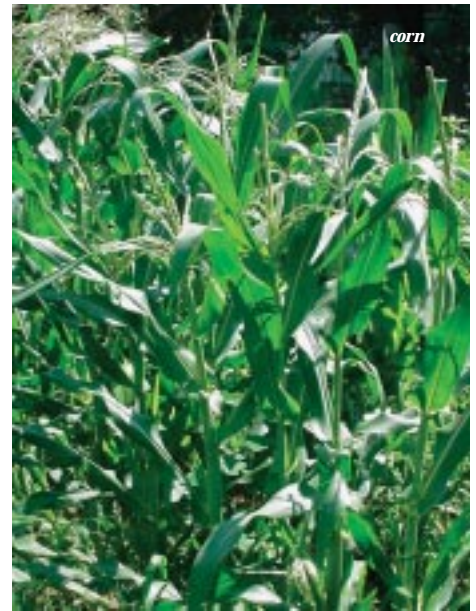
followed by shortness of breath and overall difficulty breathing, a strong bitter odor to the breath, gasping, staggering, prostration and eventually coma and death.

Signs of garden pea poisoning include nervousness, tenseness, lowered head, and unsteady gate. The later signs may increase under stress (such as running or loud noises).

Grass Family (Poaceae)

Corn (*Zea mays*) is the most common member of this family found in our gardens. While normally a delight to our palate, corn may be poison to our livestock in several ways, including high nitrate concentrations and mold. Mold on corn forage is usually only a problem when it has been stored improperly in silos. Nitrate levels in corn plants, on the other hand, can become dangerously high in garden stock plants when the plant is stressed (under drought conditions, for example). This can occur before tasseling because flowering and fruiting use large amounts of nitrogen. Concentrations are greater in the stem than the leaves.

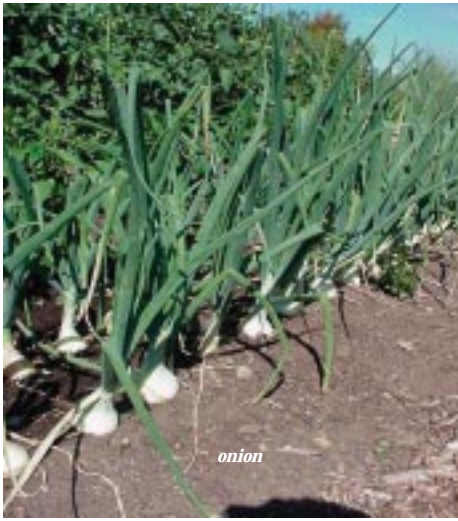
Signs of Poisoning: Signs of nitrate poisoning include poor lactation,



discolored urine, hypothyroidism (usually detected by a blood test, but signs may include lethargy and poor appetite), and in extreme cases, death. Nitrate poisoning may also cause abortion.

In ruminants, and more than likely in camelids as well, nitrate may be converted to nitrites. Nitrites are much more toxic than nitrates and may destroy the ability of red blood cells to provide oxygen to an

animal's body. Signs of nitrite poisoning include anemia, cyanosis (pale color of mouth parts, delayed blood perfusion), difficulty and/or labored breathing, and dark brown blood. Death may occur from respiratory failure.



Lily Family (Liliaceae)

The cultivated onion (*Allium cepa*) contains an alkaloid that produces a sulfur compound that when ingested can

produce poisoning in livestock strikingly similar to nitrite poisoning. In large amounts the compound oxidizes the red blood cells and subsequently deprives the body of the oxygen it needs. All portions of the plant are poisonous.

Most poisonings occur from feeding large amounts of discarded plants to livestock. Feeding on small amounts, however, does not appear to be harmful. Knight and Walter indicate that cattle can be fed up to 25% onion dry matter as long as it is part of a balanced diet.

Signs of Poisoning: Similar to nitrite poisoning described above for corn.

Mustard Family (Brassicaceae)

While there are several genera of this family of concern, I will only be discussing one of our more prominent garden groups: the mustard genus (*Brassica*). Members of this genus grown for food include turnip (*Brassica campestris*), rutabaga (*Brassica napobrassica*), kale (*Brassica oleracea* var. *acephala*), cabbage (*Brassica oleracea* var. *capitata*), broccoli (*Brassica oleracea* var. *botrytis*) and Brussels sprout (*Brassica oleracea* var. *gemmifera*). All have been



shown to have some poisoning potential and all portions of the plant (seeds, buds, leaves, and tubers) can cause poisoning.

There are several toxic compounds found in Brassica. The most common are a group of glucosinolates, classified as glycosides. Glucosinolates themselves vary in form according to the variety of Brassica species in which it are found. They are sulfur-containing compounds that interfere with oxygen uptake of red blood cells and iodine uptake in the thyroid.

For the most part it is the seed and tubers that have caused poisoning. This occurs particularly when it is fed to livestock after the seeds have been commercially processed for oil or when



broccoli



brussel sprout



eggplant



cabbage



rutabaga

livestock are allowed to graze for extended periods of time on succulent new growth of Brassica dominated pastures. Rape (*Brassica napus*), although not a garden variety of the genus, is grown as forage and oil (known as canola) in the northern US and Canada. It has also been quite problematic for livestock causing “rape blindness”. Although acute poisoning from grazing small amounts of Brassica greens is uncommon, some animals have developed gastric distress.

Signs of Poisoning: Signs of poisoning include gastric and/or respiratory distress (the latter may be seen as extended neck and/or open mouthed breathing), increased heart rate, and partial paralysis of the stomach and intestines (detected by no or few digestive noises). Jaundice and pulmonary emphysema (seen as coughing, panting, or open mouth breathing), subcutaneous emphysema (felt as air bubbles just under the skin), and/or bloody urine may occur after several days.

**SIMPLE PRECAUTIONS
You Can Take To Protect
Your Camelids From
Garden Plant Poisoning**

1. Fence garden areas well.
2. Dispose of culled garden plants, suckers, and clippings properly.
3. NEVER feed garden clippings or weeds to livestock!
4. Maintain good and ample pasture for your animals at all times.

**FLOWER GARDEN PLANTS
*Amaryllis Family (Amaryllidaceae)***

The Amaryllis family contains several poisonous genera. The most common garden varieties are: amaryllis (*Amaryllis spp.*), snowdrop (*Galanthus nivalis*), daffodil or jonquil (*Narcissus spp.*) and the Atamasco lily (*Zephyranthes atamasco*). Daffodils and jonquils are by far the most common member of this family throughout temperate North America. I have seen entire fields of daffodils commercially grown in some parts of eastern Virginia.

The bulbs, fortunately rarely eaten by animals except under duress, are the



daffodil

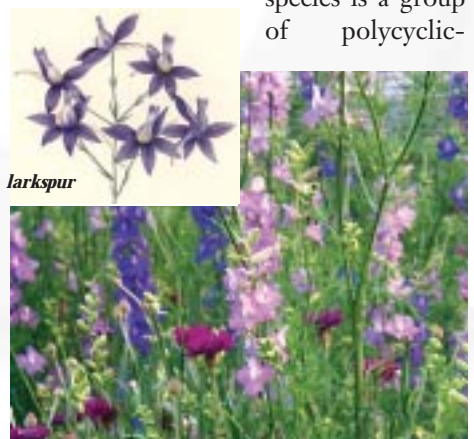
most poisonous portion of the plant and have proven lethal to both horses and cattle. Although I was not able to find any information on the toxicity level of the leaves I would suggest ranchers be cautious with any member of this family around livestock.

Signs of Poisoning: Soft feces (often with bloody mucus), slight jaundice, uneven gait, possible death.

Buttercup Family (Ranunculaceae)

Two garden-grown members of the buttercup family, larkspur (*Delphinium*, a.k.a. wolfbane) and monkshood (*Aconitum*), are known to be toxic to livestock. The larkspur is more prevalent than monkshood, both in the garden and in nature. Because it is so common, larkspur has caused most of the livestock poisoning from this family; it is second only to the various locoweeds responsible for livestock losses from poisoning in the west. The two are very similar in looks, but may be distinguished by the spur uniquely found on the flower of the larkspur.

The principal poison found in both species is a group of polycyclic-



larkspur

diterpine alkaloids that act on the animal's neuromuscular system. All portions of the plants are toxic, particularly the root of the monkshood and the leaves of the larkspur. Most poisoning that occurs from this family, particularly in cattle, has come from grazing young larkspur leaves. The leaves tend to decrease in toxicity as the plant matures. Cattle are more susceptible than sheep. Unlike other plants, larkspur is not always distasteful to livestock.

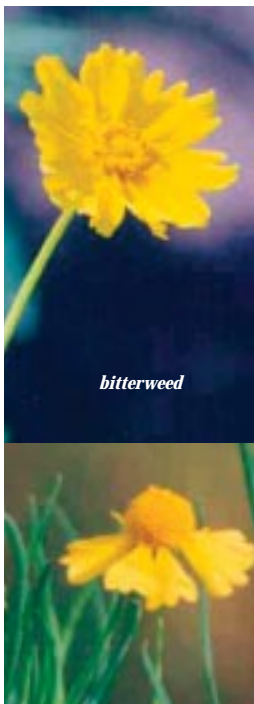
Signs of Poisoning: Unfortunately, Knight and Walter note that the first sign of larkspur poisoning is often sudden death.

However, in some cases you may see cardiac arrhythmias (irregularities in the heart beat), overall weakness, a "staggered" stance (back legs splayed, head usually lowered), difficulty breathing, salivation and bloating (due to inability to release gas).

Many animals will become recumbent and quiet for a short period of time and then, violently, try to stand. Once on their feet, weakness will again overtake them and they will fall into the recumbent position once again. This process may repeat itself several times until either the rancher and/or vet intervene or the animal dies.

Daisy Family (Asteraceae)

Of the many members of this family grown in flower gardens, only the sneezeweed (*Helenium spp.*), bitterweed (*Hymenozys spp.*



and *Senecio spp.*) and tansy (*Tanactum vulgare*) are of concern. There are many varieties of sneezeweed and bitterweeds. While all contain oils that act as irritants to the gastric system, some have proven lethal to cattle, horses, and sheep.

The plants are usually not consumed by animals unless they are starved. Some sheep, however, have developed a taste for sneezeweed after sampling it.

Tansy has caused abortion in cattle after consumption of an unknown amount, but in general the plant is quite distasteful to livestock. The toxins of all of these species do not lose their potency

when dry and have become a problem in the west when dried and accidentally included in hay.

Signs of Poisoning: Signs may include gastric distress, anorexia, salivation, diarrhea, metabolic acidosis, hypoglycemia, shortness of breath (*dyspnea*), overall weakness and possibly abortion. Convulsions are common with sneezeweed poisoning, but rare with bitterweed. Additionally, Kingsbury noted a hunched-back appearance in range animals poisoned by bitterweed.

Figwort Family (Scrophulariaceae)

One of the most common members of North American flower gardens is the foxglove (*Digitalis purpurea*). Known for its medical uses, it was introduced to our gardens from Europe. There are several garden varieties of the species with



flower colors ranging from blue to white.

Cardiac glycosides (*digoxin*, *digitoxin*, *digitonin*) are the prominent poisoning agents and cause a slow, bounding heart beat. All portions of the plant are toxic, however, livestock does not readily consume foxglove. Toxicity of the plant is not lost upon drying.

Signs of Poisoning: Gastric distress with bloody feces, diarrhea, loss of appetite, slow but bounding heart beat (digitalis-like heart effects). Death may occur from cardiac arrest.

Iris Family (Haemodoraceae)

The iris (*Iris spp.*) is a staple in many flower gardens and is found in many varieties and colors. Both the leaves and roots are slightly toxic and can cause gastric distress. Ranchers need to be very careful with it because, unlike most



poisonous plants, iris appears to be palatable to some livestock.

Signs of Poisoning: Signs include gastric distress and shortness of breath (*dyspnea*). Note: At least one species of iris has caused death when fed in large amounts to cattle.

Lily Family (Liliaceae)

Cultivated members of this family known to be toxic include the crocus (*Colchicum autumnale*), lily-of-the-valley (*Convallaria majalis*), dogtooth lily (*Erythronium spp.*), hyacinth (*Hyacinthus orientalis*) and the star-of-Bethlehem (*Ornithogalum umbellatum*). A very toxic member of the family, death camas (*Zigadenus spp.*), is not cultivated.

The poisonous principal in all genera are various cardiac glycosides noted for their purgative action. Like members of the Amaryllis family, the bulbs tend to be

Managing Your Garden for Safety

As indicated in the list of plants discussed above, our gardens may harbor harmful species. It is critical to make sure that they are safe for our animals. Needless to say, we don't need to give up gardening if we want to raise camelids. There are a number of simple precautions that we can take to assure a safe co-existence of the two.

First and foremost, make sure to fence garden areas securely so that livestock cannot visit your garden's salad bar (don't forget to account for those long-reaching necks of camelids). Next, dispose of culled garden plants, weeds, suckers and clippings properly. This is particularly important in all cases of nightshades, since toxins accumulate upon dehydration. NEVER feed garden clippings or weeds to livestock!

Finally, maintain ample and good pasture for your animals at all times. Many of the plants discussed above are not palatable to camelids so they usually will not graze them unless they are very hungry. As an alpaca or llama owner, this is one of the easiest and most important preventive steps you can take against livestock poisoning.

the worst culprit. However, livestock poisoning from the leaves of the crocus and lily-of-the-valley (and the death camas) has been noted.

Signs of Poisoning: Gastric distress, digitalis-like heart trouble (see foxglove above), diarrhea and shortness of breath (*dyspnea*).

Poppy Family (Papaveraceae)

There are over a dozen poppy species (*Papaver spp.*) currently under cultivation, many of which are grown for the illegal production of heroin (*Papaver somniferum*). There are several varieties, however, that are grown in our gardens. The most common garden poppies are the oriental (*P. orientale*), red (*P. rhoeas*) and iceland poppy (*P. nudicaule*).

All members of the genus contain isoquinoline alkaloids that have proven lethal to cattle. The most toxic portion is the crude resin extracted from the unripe fruiting capsule.

Due to their distastefulness, poppies are usually not grazed upon by livestock. Kingsbury notes that the residual seed left from oil extraction is lethal when fed



to cattle. He also notes that we need to be cautious with garden varieties of poppies, particularly in the form of discarded clippings, since we are not sure of their potential toxicity.

Signs of Poisoning: Excitement, uncoordinated body and/or muscle movement (ataxia), and gastric distress.

CQ



About the Author

Dr. Perry has studied plants and their dynamics for over twenty-five years. He currently conducts research and teaches courses in plant identification, coastal ecology and global natural resource management at the College of William and Mary, Virginia Institute of Marine Science graduate program. Jim has owned camelids for over ten years and currently has over thirty alpacas and llamas on his farm. He can be reached at ambalpaca@aol.com or jperry@vims.edu.

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**Kingsbury (1964), and Knight & Walter (2001), were used extensively to compile this information. Web sites and several professional journal articles, all of which are listed below, were also utilized.*

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RECOMMENDED READING

Johnson, L. 2003. Putting Camelids and Poisonous Plants into Perspective. ILReport Spring 2003, Vol. 8(1):8-12.

Kingsbury, J.M. 1964. Poisonous Plants of the United States and Canada. Prentice-Hall, Inc., Edgewood Cliffs, NJ. 626pp.

Knight, A.P. and Walter. 2001. A Guide to Plant Poisoning of Animals in North America. Teton NewMedia, Jackson, WY. 367pp.

Perry, J.E. 2003. Managing your ranch for poisonous plants. Camelid Quarterly 2(4):7-13.

Perry, J.E. 2004. Friends or Foes: North American Trees and Camelids. The Camelid Quarterly 3(3):1-6.

Perry, J.E. and P.A. Richards. 2004. Nursery plants that may be harmful to Camelids. The Camelid Quarterly 3(4): 99-104.

WEB SITES OF INTERESTS

Canadian Poisonous Plants Info. System (presents all potentially poisonous plant north of the US border): http://www.cbif.gc.ca/pls/pp/poison?p_x=px

Cornell University: <http://www.ansci.cornell.edu/plants/index.html>

Oregon State University (complete list of western North American species): <http://extension.oregonstate.edu/linn/content1/poisonplants.php>