Ornamental Plants Potentially Hazardous to Cattle

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The most common occurrences of plant poisoning in cattle are associated with range conditions where little alternative forage is available. However, under unusual conditons, ornamental plants used around homes or public buildings may present a hazard for livestock. On occasion, gates left open or fences in a poor state-of-repair allow cattle access to shrubbery around farm homes. In many instances abandoned farmsteads with their perennial shrubs are subsequently used for livestock grazing. However, the most important mode of exposure of livestock to ornamental plants is perhaps the disposal of shrub trimmings into areas where animals are kept. This hazard is particularly true of evergreen plants because the foliage is attractive during the late winter or early spring when little other green forage is available. Pruning is quite often conducted at this time of year. The following plants, presented in approximate order of their hazard potential, are representative of ornamentals which may be dangerous to cattle.

Yews

This group is probably the most hazardous of all ornamental shrubs. They are extensively grown throughout the U.S. often as hedges or screens. *Taxus cuspidata* Sieb and Zucc, Japanese yew, and *T. baccata* L., English yew, are the principally grown species with others such as *T. media* Sieb, Hicks yew locally popular. All are evergreen conifers ranging in size from low shrubs to small trees. The needle-like leaves are linear, flattened, stiff 2-3 cm long and project from each side of the twig to form two ranks. They are dark green on the upper side and lighter green below with a prominent midrib. Plants are dioecious, that is the staminate and ovulate cones are borne on separate individuals. The ovulate cones, borne in the axils of the leaves, are bright scarlet, forming a fleshy cup, known as the aril, which partially surrounds the seed (Fig. 1). These cones are attractive to birds and other animals which eat them and thus spread the seeds.

Yew was well known as a toxic plant in antiquity; even its shade was considered dangerous to anyone sleeping underneath it. It enjoys a notorious reputation in Europe and England for causing sudden death in livestock. Yew is reputed to be the most dangerous shrub in England and probably is among the most hazardous in this country as well. The toxins include the cardiotoxic alkaloid taxine, cyanide, ephedrine and a volatile irritant oil. The specific toxicant responsible for death appears to be taxine although cyanide may also be a factor under some conditions. All parts of the plant are toxic except the fleshy aril of the fruit. Approximately 1.5-2 kg of leaves may be lethal in adult cattle. Fresh plant material is generally considered to be of very low palatability because of the volatile irritant oil but poisonings frequently occur during the winter, a time when the evergreen foliage is presumably more attractive to livestock. Dried or stored leaves remain toxic.

In some cases few premonitory signs are evident prior to death. In other situations, tremors or a mild diarrhea may be noted. Death may occur a few hours or several days after eating the plant. There are few post-mortem lesions other than non-specific organ congestion and perhaps pulmonary edema.

Taxine is a very potent cardiac conduction depressant and death appears to be due to cardiac failure. Although there is no recognized effective antidote, cardiac conduction stimulants may be helpful in cases where ingestion is observed but clinical signs have not yet occurred. Once clinical signs occur, it is too late for therapy. Occasionally, only gastrointestinal irritation may occur in cattle due to the volatile oil, in which case, treatment is symptomatic.

In a recent case approximately 18 cows and calves passed through a fence into a house yard and stripped the leaves from several large Japanese yew bushes as high as they could reach. One cow and two calves died the same morning; subsequently one cow died each of the next three mornings for a total of six deaths. There were no premonitory clinical signs and no pathological abnormalities, only large amounts of the leaves in ruminal ingesta. The poisoning occurred in February, the cattle apparently attracted by the evergreen foliage which they ate avidly.

Heaths

The Ericaceae or Heath Family contains a large number of very toxic plants including *Kalmia* (laurels), *Rhododendron* (rhododendron and azalea) and *Pieris* (andromeda). Most are not heat tolerant and have high

moisture requirements and thus are restricted in their national distribution. Evergreen, rhododendrons range in size from small compact shrubs to larger, more open shrubs 3 m tall with characteristic alternate elliptic to oblanceolate, thick glossy green leaves 1-30 cm long. The rhododendrons and azaleas have very attractive showy flowers ranging in color from white to red and which may be very large and striking (Fig. 2 & 3). Andromeda, also an evergreen shrub, has flowers that are quite different from those of rhododendron, as they are small, white and hang almost bell-like from an elongated axis (Fig. 4). Recent information suggests that blueberries (Vaccinium) may also produce toxic effects similar to other members of the Heath family.

The toxic principle is a diterpinoid grayanotoxin or resinoid termed andromedotoxin since it was first isolated from andromeda. It is not completely characterized chemically, but is known to act as a severe gastrointestinal irritant. It is purported to taint meat and produce secondary intoxication in animals feeding on herbivores which have eaten laurels. Honey from laurel flowers is also reputed to be toxic.

The clinical signs which develop several hours after ingestion include anorexia, copious salivation, repeated swallowing, bloat and severe abdominal pain. Diarrhea is not commonly seen. There is often bellowing or other vocalized indications of pain and odontoprisis. The toxin also produces some hypotension and respiratory depression. There are few changes at post-mortem other than minor congestion of the ruminal epithelium and gastrointestinal mucosa. Treatment is supportive. There are no specific antidotes; however, analgesics and ephedrine have been reported of value.

Oleander

Nerium oleander L., or oleander as it is commonly known, is a very attractive ornamental shrub which is widely used in the southernmost areas of the country. A native of the Mediterranean, the species is now naturalized in many areas. It is not cold-hardy, and in some parts of the U.S. is grown as a tub plant to be moved indoors in the winter. Plants generally grow 2-3 m tall in tubs. The leathery, dark green, lanceolate leaves are 8-20 cm long with sharp-pointed tips. They are short stalked and borne opposite each other or in whorls of three. The flowers occur in clusters at the ends of the branches. The five petals (doubled in some varieties) are fused and form a flaring tube. Color ranges from scarlet to yellowish-pink to white (Fig. 5). The fruits are long, narrow pods 8-15 cm long, which hang in pairs and contain numerous silky-haired seeds. The fruits are very similar to those of wild indian hemp *Apocynum* to which it is closely related; both are members of the Apocynaceae or Dogbane Family.

Oleander is consistently highly toxic, being among the most widely recognized toxic ornamental plants because of numerous reports of intoxication in man. Fortunately it is very unpalatable and is seldom eaten fresh. The dried leaves remain toxic, albeit somewhat less so, and trimmings may be a serious hazard when discarded in areas to which livestock have access..

The toxic principles are several cardiac glycosides which have actions similar to the widely used therapeutic digitalis-glycosides, digoxin and digitoxin. In addition, there are irritant saponins. All parts of the plant are toxic. Although ruminants are often considered to be less susceptible to oral cardiac glycosides than monogastric animals, oleander remains highly toxic to cattle; the leaves from several branches are sufficient to kill a 150 kg calf.

The initial clinical signs, which may occur very quickly, are those associated with the irritant saponins in concert with the gastrointestinal effects of the digitalis-glycosides. These signs include weakness, emesis, abdominal pain and diarrhea. As the disease progresses, cardiac-associated signs predominate with weakened pulse and cold extremities due to circulatory deficiencies. Bradycardia and a wide variety of arrhythmias may occur. The only post-mortem changes are non-specific scattered petechial hemorrhages and mild gastroenteritis in some cases. As with the clinically used digitalis glycosides, therapy requires control of the cardiac conduction abnormalities which produce the various degrees of heart block and other arrhythmias. Atropine and/or diphenylhydantoin are most useful in this regard. The less serious gastrointestinal effects will usually clear when the other effects are controlled.

Cyanogenic Species

There are several plants which contain sufficient quantities of cyanogenic glycosides to be hazardous when small amounts of foliage are eaten. All are of less importance than the widely used sorghum forages but they may be hazardous under appropriate conditions. The most important of these are *Nandina domestica* Thunb., *Photinia* spp. and *Prunus laurocerasis* L.

Nandina domestica Thunb., heavenly-bamboo or Chinese sacred-bamboo, is a beautiful evergreen shrub (Fig. 6) widely utilized throughout the southern U.S. but unfortunately very hazardous. It is a member of the Berberidaceae or barberry family which is noted for its many garden shrubs. Plants are 1-2 m tall with many, erect, unbranched stems. The delicate, alternate leaves are 30-45 cm long and 2 or 3 times pinnately divided. The leaflets are smooth-edged, 2-7 cm long. The small, whitish flowers are borne in large terminal pyramidal clusters. More decorative and attractive, especially during the Christmas season, are the abundant, long-lasting clusters of bright-red, globose berries, each with a pair of seeds. Some varieties have white or purple berries. The immature spring foliage may have a bronze tint while in the autumn many of the mature leaves turn reddish.

Species of *Photinia,* often called Christmas berry or simply photinia, are large shrubs. The common *P. serrulata*

Figure 1 - Japanese yew fruit and needle-like leaves

Figure 2 - Rhododendron, flowers

Figure 3 - Azalea, showy flowers and leaves

Figure 4 - Andromeda, bell-like flowers and leaves

Figure 5 - Oleander, flowers and long leathery, pointed leaves

Lindl. and *P. glabra* Maxim. are evergreen with alternate, undivided, usually toothless leaves 5-10 cm long. The foliage is often bronze-red when young. The showy, creamy-white flowers are abundant in the spring, crowded in terminal panicles 5-10 cm wide (Fig. 7). The red berry-like fruits contain 1-4 seeds.

Prunus laurocerasis L., cherry-laurel, is an evergreen with rather leathery, dense foliage and abundant, elongated racemes of small whitish flowers which occur in the spring in the axils of the older leaves. Subsequently, the small black-purple fruits (drupes) develop, each containing a spherical, cherry-like stone.

In addition to these cyanogenic taxa, other *Prunus* species and plants of the genus *Chaenomeles*, the flowering quince, may also be used as ornamentals and represent a significant cyanide hazard.

When the foliage containing the cyanogenic glycoside is eaten the glycoside is hydrolysed to form the volatile and

Figure 6 - Nandina, shrubby habit, red berries and flowers

Figure 7 - Photinia, flowers and leaves

highly toxic hydrogen cyanide. If sufficient quantities are eaten rapidly, clinical signs of intoxication will occur within 30 minutes. The animals become apprehensive and frequently attempt to urinate. Polypnea, dyspnea, then apnea, bradycardia and recumbency occur very quickly. The entire sequence may occur in as short a period as 5 to 10 minutes in some cases. Terminally there may be a brief period of clonic convulsions. There are no consistent specific lesions at necropsy. If the animal survives the first hour, the likelihood of complete recovery is greatly improved.

Laboratory diagnosis is difficult because of the highly volatile nature of hydrogen cyanide and the analytical difficulty in identifying it. Diagnosis is usually based on knowledge of animal access to cyanogenic plants, clinical signs and response to treatment. A traditional indication of the presence of cyanide is that venous blood, if seen in the early stages, will appear bright red and very similar to arterial blood because of the minimal oxygen uptake and utilization by peripheral tissues. A rapid field test has been used on suspect plants to assess their cyanogenic potential. Known as the picrate test, it is described in detail in toxicology texts.

Treatment includes the use of sodium thiosulfate IV with or without sodium nitrite. When used alone, the dose of sodium thiosulfate should be approximately 0.5 g/kg while when; used in combination with sodium nitrite lower doses are often used with reasonable efficacy. However, the disease usually develops and progresses so rapidly that treatment is seldom available soon enough to be effective.

Jessamine

There are several genera to which the common names jasmine or jessamine are applied. Only *Gelsemium sempervirens* (L.) Ait., the carolina or yellow jessamine will be considered here. Species of *Cestrum,* the night and day blooming jessamines, are restricted to a small area of the U.S. due to their marked sensitivity to frosts and the remainder are of very low hazard. *Gelsemium sempervirens* is a perennial evergreen vine widely used as an ornamental and common as a wild plant in the southeastern U.S. It has opposite, lanceolate leaves 5 cm long, and showy, yellow, fragrant tubular flowers with five petals about 3 cm long (Fig. 8).

Toxicity is attributed to indole alkaloids similar in structure to strychnine, but producing nicotinic-type signs. A variety of clinical signs may be seen including hypothermia, mydriasis, muscular weakness and prostration. Convulsions may occur but death is due to respiratory failure. There are no specific antidotes and although morphine is reputed effective, the clinical signs and respiratory depression may contraindicate narcotic analgesics.

Lantana

Lantana camara L., known as lantana, or red sage, is a shrub which is not winter-hardy in much of the U.S. It is

Figure 8 - Carolina jessamine, flowers

Figure 9 - Lantana, variably-colored flowers and mint-like leaves

Figure 10 - Castor bean, leaves and immature reddish fruits

Figure 11 - Privet, foliage

commonly grown as a tub plant on patios and then taken indoors during the colder months. Rapidly growing, it is also used in temporary ornamental plantings established from hothouse cuttings in the spring. In some southerly states where it is winter-hardy it is widely cultivated and tends to escape. Lantana is a shrub to 2 m tall with prominent square stems. The leaves are opposite or in whorls of three, ovate, light to dark green (sometimes almost yellow), slightly hairy and dentate. Although the species is mint-like with its square stem, opposite leaves and aromatic odor of the crushed leaves, it is a member of the Verbenaceae or Vervain family. The flowers are borne in showy, flat-topped clusters 2-5 cm broad (Fig. 9). The clusters may comprise several dozen flowers. The individual flowers are small and tubular; the tube is usually about 10 mm long while the four lobes are about 6-9 mm long. Flower color changes from a pink and yellowish combination to a more orange or red color as the flowers mature. The fruits are glossy black, single-seeded drupes 7-9 mm in diameter. A number of color varieties have been developed including yellow, white and purple.

There is considerable variation in toxicity among the different varieties of lantana; however, flower color, used by some as an indicator, is not a consistent guide. All plants and all plant parts should be considered toxic. The poisonous principle is a hepatotoxic polycyclic triterpenoid lantadene which acts by altering hepatocyte membrane permeability. Intoxication can be acute but is more often subacute after consumption of the plant for one or two days.

Early signs include depression, anorexia, constipation or diarrhea and frequent urination. Icterus and photosensiti-

zation develop several days later with eventual severe sloughing of epithelium and mucous membranes in light colored areas. The photosensitization is of the secondary or hepatic type. As the dose increases, the likelihood of diarrhea as an early sign increases. Death, which may occur in several days to a few weeks is usually due to a combination of hepatic disease and renal failure. At necropsy the effects of lantadene as a cholestatic agent are prominent. The liver is swollen and yellowish and the gall bladder is much enlarged. The kidneys are also swollen and both hepatic degeneration with necrosis and renal tubular degeneration may be evident histologically. Due to the irritant nature of the plant, gastroenteritis may be very severe in acute cases following large doses. The lesions, as described above, may be very similar to those associated with salmonellosis.

Therapy includes symptomatic care of the superficial skin sloughs and keeping the animal in the shade. Maintenance of an animal with severe hepatic and renal failure is difficult in livestock and generally unrewarding hence evaluation using serum hepatic enzymes, blood urea nitrogen and/or creatinine is advisable.

Castor Bean

Commonly known as castor-bean, castor-oil-plant, palma christi or higuerilla, *Ricinus communis* L. is cultivated as a yard plant in much of the southern U.S. Growing 1-5 m tall, it is a coarse annual herb with numerous, ascending, hollow branches. The leaves are alternate with long stalks and broad palmately lobed blades often 3-9 dm wide (Fig. 10). Green or red, the 5-11 lobed leaves are toothed on the margins and have a pungent odor. The orange-reddish, unisexual flowers are borne in stalked, terminal clusters with the pistillate or female flowers above the staminate or male flowers. Approximately 12-16 mm in diameter, the capsular fruit is spiny, nearly spherical, and contains three seeds. The seeds are ellipsoidal, 8-11 mm long and may be glossy black or white or more commonly mottled with brown. They resemble a large tick, hence the generic epithet *Ricinus* which is applied to the common European wood tick *Ixodes ricinus*.

Believed to be a native of Africa, *R. communis* is cultivated as a yard ornamental for its striking foliage. It may be a weed occasionally growing wild in vacant city lots, annually reseeding itself. Plants are grown commercially in some areas for the production of castor oil from the seeds. The seeds also contain a water soluble proteinaceous hepatotoxin, ricin, which severely inhibits hepatic protein synthesis. In addition, other less toxic alkaloids such as ricinine are also found in the seeds and leaves. Although ricin is an extremely potent toxin, very few poisonings occur mainly because the plant is very unpalatable in livestock. Unfortunately the seeds are apparently not distasteful and most livestock poisonings are due to accidental contamination of feed. Medical grade castor oil does not contain the water soluble alkaloidal toxins.

Following ingestion of the seeds and a delay of several hours to one day, severe diarrhea, abdominal pain, regurgitation and weakness may develop depending upon whether the hard seeds are chewed. Ruminants are generally of low susceptibility, requiring several hundred or more seeds in a yearling calf. Therapy is symptomatic and directed toward the severe purgation and fluid and electrolyte loss. Ingestion of the leaves or the pericarp around the seeds results in a different disease syndrome, characterized by neuromuscular signs without any apparent gastrointestinal dysfunction. In the case of ingestion of leaves, the clinical signs of tremors, ataxia and salivation are likely to be of a transient nature followed by rapid recovery after a few hours.

Privet

Ligustrum vulgare L., known as privet, common privet or privet hedge, is a large shrub with firm smooth, oblong, dark green leaves 3-8 cm long (Fig. 11). The leaves are opposite and short petioled. Borne in dense terminal pyramidal panicles, the numerous whitish flowers are small with four sepals, four petals, and two stamens. The lustrous, black or dark blue berries are ovoid or subglobose, 6-8 mm long. Other species similar to the above include *L. japonicum* Thunb., Japanese Privet; *L. lucidum* Ait., tree privet or large leaf privet and *L. ovalifolium* Hass K., California privet. There are variegated varieties of several of the above with splotchy coloration of the leaves. Additionally there is *L. sinense* Lour, the Chinese or small leaf privet, which has smaller, thinner and paler green leaves and a profusion of fragrant tiny white flowers in the spring.

Comprising about fifty species, the genus *Ligustrum* is native to the Old World and is a member of the Olive Family which also includes the lilacs, jasmines and ashes. Although normally used as an ornamental, privet has occasionally escaped from cultivation and become naturalized in open woods or along roadsides. Plants often persist at abandoned farm home sites.

Reports of privet poisoning are not common but all livestock species are probably susceptible. Both leaves and berries are reported toxic. The primary toxic effect appears to be due to a gastrointestinal irritant; however, the toxic principle is unknown.

Primary clinical signs include diarrhea, colic, vomiting and incoordination. Death may occur in some cases but is not necessarily inevitable. Treatment is symptomatic to control the purgation and to provide fluid and electrolyte compensation for dehydration.

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