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Texas Agricultural Extension Service

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# Poisonous Plant Management

Texas Agricultural Extension Service • The Texas A&M University System • College Station, Texas

# POISONOUS PLANT MANAGEMENT

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Poisonous plants are among the most significant causes of economic loss sustained each year by the livestock industry. Direct economic losses to U.S. cattle producers in 1978 were estimated at more than $91 million. Toxic plants also contribute to indirect losses, such as reduced calving, lambing or kidding percentages and reduced fiber production and weight gain. Direct and indirect losses from poisonous plants in Texas cost livestock producers from $50 million to $100 million annually.

In the United States, more than 400 species of poisonous plants have been identified. These toxic plants are generally not found in greatest abundance on good-to-excellent condition range but are, with few exceptions, invading species or species that increase under heavy grazing pressure. However, poisonous plant problems are not restricted to only those pastures in low range condition. Toxic species are often common in the climax plant community and in all lower successional stages. This is especially true for arid western rangelands.

Even though most western rangelands support some toxic plants, livestock poisoning is generally not a major problem on good-to-excellent condition range. Most poisonous plants are relatively unpalatable and must be consumed in substantial quantities to be lethal. Generally, animals do not graze poisonous plants by choice and are rarely poisoned if other forage is readily available.

Plants do not always fall into easily defined poisonous or nonpoisonous classes. Probably thousands of plants would be toxic if consumed in large quantities. Consumption of these plants is limited by abundance, availability or palatability. Many plants classified as poisonous can be eaten in small amounts with no toxic effects. Other plants are highly poisonous during a certain season of the year but are much less poisonous in other seasons.

Most losses from poisonous plants can be attributed to hunger which may be caused by overgrazing, poor grazing management or inadequate mineral and/or supplemental feeding programs. Many livestock are lost each year by importing grazing animals from other geographic areas. Animals from other areas are more likely to consume toxic plants than are native cattle.

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## DIAGNOSING POISONOUS PLANT PROBLEMS

Accurate diagnosis of poisonous plant problems can be extremely difficult. Many cases of livestock poisoning by plants have been improperly diagnosed as disease and millions of dollars wasted treating these animals. Some toxic plants produce easily identifiable symptoms. Sacahuista is an excellent example. It causes photosensitization (hyper-reaction to sunlight) which results in obvious inflammation, swelling and sloughing of the skin. In contrast, chronic poisoning from perennial broomweed is less obvious with the only symptom often being abortion. It is difficult to differentiate this symptom from problems arising from improper management practices or disease.

Contributing to the difficulty of accurate diagnosis of poisoned animals is the time frame in which symptoms occur. Many plants are capable of producing toxic amounts of prussic acid, with sorghum species being the most common prussic acid producer in Texas. Livestock consuming large amounts of these plants under certain conditions can die within 15 minutes after grazing such plants, However, certain species of Senecio may not produce clinical signs or death for 9 to 12 months after consumption.

When a sick or dead animal is found, first determine whether the loss was caused by plant poisoning or infectious disease. The observance of symptoms and lesions of affected animals coupled with a thorough knowledge of plants native to the area is essential for correct diagnosis.

Assuming that a poisonous plant is responsible, the next step is to identify the plant. Again, symptoms are very important in narrowing down the suspected plant to one or a few species. Carefully examine plants being grazed. Generally, a significant quantity of toxic plant must be consumed to be lethal. Many times these plants are readily identified in the field by evidence of grazing. Also helpful at this time is a rumen sample. The rumen of a dead animal can be opened quickly and a sample obtained of the injested forage. Careful examination of this rumen material often leads to identification of the toxic plant responsible.

If death has been recent, a post-mortem examination may be beneficial. For example, Senecio poisoning is identified many times by observing a hard, yellow liver in affected animals. Nitrate poisoning is often identified

by chocolate-brown colored blood present for 2 to 4 hours after death. After that time, a laboratory analysis of body fluids is needed for diagnosis. If a layman attempts to perform the autopsy, take adequate sanitary precautions to prevent self-infection in the event the animal died from an infectious disease.

Correct diagnosis of a poisonous plant death is often a difficult, time-consuming process. Assistance is available from local veterinarians, county Extension agents, Extension range specialists, Soil Conservation Service range conservationists or Texas Veterinary Diagnostic Laboratory personnel.

## LIVESTOCK NUTRITION

Livestock poisoning occurs infrequently when animals are on an adequate plan of nutrition. Although poisoning is possible under good as well as poor nutritional conditions, the magnitude of losses can be reduced through proper nutrition management.

Range forage is composed of many plant species that vary in quality between plants, with the seasons and from year to year. Under ideal situations, the plant community, as a whole, provides the required amounts and kinds of nutrients for grazing animals. Poisoning in epidemic proportions most likely occurs when grazing animals have limited access to desirable plants and liberal access to toxic plants.

All livestock require a certain level of protein, energy, minerals, vitamins and water to obtain maximum production. In Texas, nutrients which are most likely to be deficient are protein, energy, phosphorus and vitamin A. Deficiencies often alter an animal's grazing behavior, as evidenced by the commonly observed eating of rocks, bones and soil. Poisonous plant consumption can also result when an animal's normal grazing behavior is altered by such a deficiency.

In general, green, growing plants are high in nutrients, while dry, dormant plants are low in these same nutrients. Green color is especially associated with vitamin A content. Although vitamin A can be stored in the body and is generally not a problem, a lack of green forage for 3 months or more can result in a deficiency. In Texas, phosphorus can be assumed to be deficient all year and should receive top priority in any mineral supplementation program. Other minerals including potassium, copper, zinc and magnesium can be deficient during certain seasons, and are suspected of being associated with consumption of some poisonous plants.

To reduce toxic plant problems through nutritional management, use two approaches concurrently. The first, or short range approach, is a sound supplemental feeding program. This should provide the required amounts of nutrients at the proper time. No two feeding programs are exactly the same since the timing and amount of protein, energy, minerals and vitamins required often vary from ranch to ranch, pasture to pasture and year to year. A sound forage quality testing program is helpful in providing data for developing a proper supplemental feeding program.

The second, or long range approach, is to follow proper range management practices that slowly create better range conditions. This allows grazing animals greater latitude in diet selection and reduces the probability of toxic plant consumption.

## GRAZING MANAGEMENT

Grazing system research to determine methods for reducing losses from toxic plants was initiated on the Sonora Research Station in Texas during 1949. From then until 1970, livestock losses from toxic plants at three stocking rates (heavy, medium and light) for both continuous and four-pasture, deferred rotation grazing systems were monitored. Losses from poisonous plants were most severe at heavy stocking rates, while few losses occurred at light stocking levels. Death losses were also directly related to kinds or combinations of livestock being grazed. When combinations of cattle, sheep and goats were grazed at moderate stocking rates, losses to bitterweed were reduced due to decreased spot grazing which limited the invasion of bitterweed.

Any grazing system, whether deferred-rotation, short duration or others, which improves range condition reduces the magnitude of livestock losses from poisonous plants. This is especially true when toxic plants are annuals and not climax constituents of the plant community. If, however, the toxic plant is a perennial and a contributor to the climax community, improved range condition could theoretically increase the availability of that plant. Proper grazing management should, however, reduce livestock losses regardless of the ecological status of the toxic species by improving vigor, cover and production of desirable forage plants and by increasing species diversity of the total community.

Short duration grazing systems will probably prove to be the most flexible system for managing toxic plants. Assuming good forage response under this system, there is the additional advantage that a large number of pastures will allow skipping a particular problem pasture during critical times. Also, since each pasture is generally grazed for only a few days by a high density of animals, it is possible to concentrate a large number of animals in a problem pasture. With this flexibility, certain toxic species can be controlled by "flash-grazing" while intake of the poisonous plant by each animal is kept at a sub-lethal level.

The greatest potential disadvantage of short duration grazing systems in terms of poisonous plant management is the possible promotion of nonselective grazing if livestock remain in a particular pasture too long. Non-selective grazing can shift livestock to poisonous plants in a short time.

## CONTROLLING POISONOUS PLANTS

Even with proper supplemental feeding programs and grazing management, losses from poisonous plants are possible. Thus, control methods may be necessary to reduce poisonous plant numbers quickly. Control may be accomplished using mechanical, biological, chemical or prescribed burning methods.

Most poisonous plants are herbaceous in growth form; thus, mechanical control methods are rarely used. There are a few exceptions. Whitebrush, a woody plant poisonous to horses, may be effectively controlled by root plowing. Rayless goldenrod, a herbaceous toxic plant infesting considerable acreage of West Texas, can be effectively controlled by shallow disking.

One excellent technique for controlling poisonous plants is through the use of grazing animals. Classes or kinds of livestock not susceptible to the plant must be used or the amount consumed by each animal must be kept below minimum toxic levels. For example, high densities of sheep are often used to "flash-graze" bitterweed. Using this method, bitterweed density is reduced while sheep are allowed to consume sub-lethal doses. Another example is using sheep to control woolly paperflower. This plant is toxic to sheep, but only after approximately 2 weeks of grazing. Thus, large numbers of sheep can be used for short periods to control this plant. Combinations of treatments, such as chaining followed by intense grazing at high stocking densities with goats, have been used to control oak species.

The most popular method of controlling most poisonous plants is with herbicides. Following herbicidal control, most poisonous plants die relatively slowly over a 2- to 4-month period. Therefore, ranchers must anticipate on-coming toxic plant problems to insure that herbicide applications are made in advance of actual losses from toxic plants.

Ranchers should be aware that some herbicides such as 2,4-D may increase the palatability of sprayed plants to livestock and/or increase the concentration of toxic compounds in the plant. Defer from grazing, areas treated with herbicides until treated plants are completely desiccated.

A discussion of all major toxic plants and herbicide treatments used to control them is beyond the scope of this publication. In general, chemical control of most toxic plants is achieved by foliar sprays or soil-applied herbicides. Foliar-applied herbicides are most effective when plants are young and actively growing. The growth period is determined by the growth stage of the plant and soil moisture, texture and temperature.

Generally, soil-applied herbicides are much less sensitive to time of application. They should be applied before expected rainy periods. The efficacy of soil-applied herbicides is affected by soil type, in particular clay and organic matter content, cation exchange capacity and pH. In most cases higher rates are needed for effective control as clay, organic matter and cation exchange capacity increase.

Prescribed burning is one method of noxious plant control being used increasingly in Texas. This technique also controls certain toxic plants. Research in New Mexico shows that fire is very effective for reducing perennial broomweed density. Texas Agricultural Experiment Station personnel achieved a 35 percent reduction of rayless goldenrod following a February burn. While much is still to be learned concerning the effect of fire on specific toxic plants, it appears to offer a low-cost alternative method for controlling some species.

## SUMMARY

Poisonous plants are a natural component of rangeland ecosystems. Management influences the severity of livestock losses resulting from grazing toxic plants. A summary of some general management techniques to reduce livestock losses to poisonous plants follows:

- Do not overgraze rangeland. Many poisonous plants are classified as increasers or invaders, thus becoming more prevalent on low condition rangeland.
- Be cautious when introducing livestock to your ranch from other geographic locations. Such livestock are more likely to consume toxic plants than are native cattle.
- Do not turn hungry stock onto toxic plant-infested pastures. Hungry livestock lose much of their selective grazing behavior.
- Make certain livestock have free access to salt, phosphorus and other needed elements. Nutrient deficiencies may also reduce selective grazing behavior.
- Provide adequate, clean water.
- Do not feed hay that contains poisonous plants.
- Minimize grazing pressure when poisonous plants are the most dangerous. Flexible grazing systems can be used to avoid high risk areas during periods of greatest toxicity hazard.
- Use the proper kind and class of livestock. Many times one class of livestock is more resistant to a toxic plant than others.
- Be alert when herding livestock through infested areas. Also, avoid crowding animals. Stock should have full stomachs when trailed or penned.
- Be aware of special environmental conditions that may restrict animal movement or change diet selection. Such conditions would be periods of drought, snow or extremely wet conditions.
- Be cautious when grazing areas where recently burned or sprayed with herbicide. Both of these practices have the potential to increase toxic plant palatability.
- Finally, know the potential toxic plants on your ranch and watch for evidence of grazing. When detected early losses can be minimized.

# APPENDIX
## Poisonous Plants of Texas*

| Scientific name | Common name | Basic toxic principle | Typical symptoms | Remarks |
|---|---|---|---|---|
| *Acacia berlandieri* | Guajillo | Three sympatho-minetic amines | Locomotor incoordination of the legs | Guajillo is a valuable browse plant if managed correctly |
| *Acacia constricta* | Whitethorn | Hydrocyanic acid | See prussic acid poisoning | Livestock will generally not graze whitethorn unless severely stressed |
| *Aesculus spp.* | Buckeye | Glycosides | Staggering gait, weakness, trembling, congested mucous membranes, pupils dilated | Children have been poisoned by eating the nut-like seed |
| *Agave lecheguilla* | Lecheguilla | Saponin | Listlessness and yellow discharge from eyes and nostrils, urine port wine color; see hepatic photosensitization | Sheep and goats most frequently poisoned |
| *Allium spp.* | Wild onion | Alkaloids | Intense gastroenteritis, urine port wine color, icterus, anemia | Large amounts are needed to be toxic |
| *Aloysia lycioides* | Whitebrush, beebrush | Unknown | Lack of stamina, emaciation, lameness, excessive sweating | Only horses, mules and burros affected |
| *Amaranthus spp.* | Amaranth, careless-weed, pigweed | Nitrates | See nitrate poisoning | Can be relatively palatable to livestock |
| *Apocynum cannabinum* | Dogbane, indian hemp | Resins and glycosides | Symptoms not well documented | Cases of poisoning rare |
| *Asclepias latifolia* | Broadleaf milkweed | Glycosides | Restlessness, abdominal pain, excessive salivation and labored breathing | Young plants are more toxic than mature plants |
| *Asclepias subverticillata* | Horsetail milkweed | Glycosides | Rapid and weak pulse, respiratory paralysis, loss of muscular control, trembling, staggering, violent convulsions | Generally not considered palatable to livestock; most poisoning is from hay |
| *Asclepias verticillata* | Whorled milkweed | Glycosides | See *Asclepias subverticillata* | Poisonous at all stages of growth |
| *Astragalus emoryanus* | Peavine, emory loco | Misertoxin | Collapse of leg muscles when animal attempts sudden movement, general incoordination of hind legs, labored respiration | Plant easily confused with nontoxic species |
| *Astragalus spp.* | Locoweed | Unknown | Slow staggering gait, rough coat, staring look, emaciation, muscle incoordination | Very large amounts necessary for poisoning |
| *Avena fatua* var. *sativa* | | Nitrates | See nitrate poisoning and photosensitization | |
| *Baileya multiradiata* | Desert baileya | Unknown | Frothy green salivation, extreme weakness, rapid heartbeat, trembling of limbs, stand with arched back or lie down and refuse to move | Poisoning under range conditions generally limited to sheep |
| *Baptisia spp.* | False indigo, baptisa | Alkaloids | Diarrhea, anorexia | Plants rarely consumed except in hay |

*Scientific names of grass species follow those of F.W. Gould (1975), *The Grasses of Texas*, Texas A&M University Press. Scientific names of other plant species follow those of D.S. Correll and M.C. Johnston (1970), *Manual of the Vascular Plants of Texas*, Texas Research Foundation.

| Scientific name | Common name | Basic toxic principle | Typical symptoms | Remarks |
|---|---|---|---|---|
| *Cassia obtusifolia*<br><br>*Cassia occidentalis* | Coffee senna, sicklepod | Unknown | Bright alert downer, weakness, diarrhea and sometimes dark urine | Seed pods usually eaten after frost |
| *Cassia roemeriana* | Twinleaf senna | Unknown | Depending on dose, may be same as coffee senna or may show CNS signs due to liver damage | Entire plant consumed when in bloom or in early seed pod stage |
| *Centaurium beyrichii* | Mountain pink, centaury | Unknown | Loss of appetite, abdominal pain, diarrhea | Relatively unpalatable |
| *Centaurium calycosum* | Buckley centaurium, centaurium | Unknown | Loss of appetite, abdominal pain, diarrhea | Relatively unpalatable |
| *Cephalanthus occidentalis* | Buttonbush | Glycosides | Symptoms now well documented | Livestock poisoning cases are rare |
| *Cestrum diurnum* | Jessamine, cestrum | Vitamin D metabolite | Weight loss, emaciation, lameness, death | Plants must be consumed over period of time |
| *Chenopodium spp.* | Lambs-quarters | Nitrates | See nitrate poisoning | |
| *Cicuta maculata* | Spotted water-hemlock | Cicutoxin | Excessive salivation, tremors, violent convulsions, abdominal pain | Scores of cases of human poisoning from this plant are recorded in the United States |
| *Colubrina texensis* | Hogplum | Hepatic toxin | Symptoms similar to lechuguilla poisoning | Livestock poisoning is rare |
| *Conium maculatum* | Poison hemlock, poison parsley | Alkaloids | Nervousness, trembling, ataxia, dialation of pupils, slow heartbeat, coma, congenital crooked calf disease | Used to put Socrates to death |
| *Conyza coulteri* | Coulter conyza | Unknown | CNS signs, incoordination, blindness, convulsions and death | Not proven experimentally |
| *Corydalis aurea* | Golden corydalis | Alkaloids | Face muscles twitch, pant, stagger and fall in convulsions, when downed make running motions with feet, diarrhea, animals bite nearby objects | Cattle and horses not as susceptible as sheep; no evidence of being toxic to goats |
| *Cynodon dactylon* | Bermuda grass | Fungi | A variety of symptoms are produced depending upon type of fungus | The plant itself is probably not toxic |
| *Datura spp.* | Jimsonweeds, thornapples | Alkaloids | Thirst, distorted vision, uncoordinated movement, high temperature, rapid and weak heartbeat, convulsions, death | Human poisoning is relatively common for children |
| *Delphinium virescens* | Plains larkspur, delphinium | Alkaloids | Uneasiness, stiff gait, straddled stance, prostration, nausea, abdominal pain | Poisoning rare in Texas |
| *Descurainia pinnata* | Tansy mustard | Unknown | Partially or completely blind, wander aimlessly, push against solid objects for hours, lose use of tongue | Generally large amounts are required for poisoning to occur |
| *Drymaria pachyphylla* | Inkweed, thickleaf drymary | Unknown | Loss of appetite, diarrhea, arched back and "tucked up abdomen," coma | Animals poisoned generally die before symptoms are noticed |
| *Ergot poisoning* | Tobosagrass ergot, dallisgrass ergot, ergot of cereal grains | Alkaloids | *Acute* - Extreme nervousness, muscular trembling, frequent urination, ataxia, prostration<br>*Chronic* - Gangrene | Most cases of Ergot poisoning in Texas occur with cattle; dallisgrass ergot only causes acute symptoms |

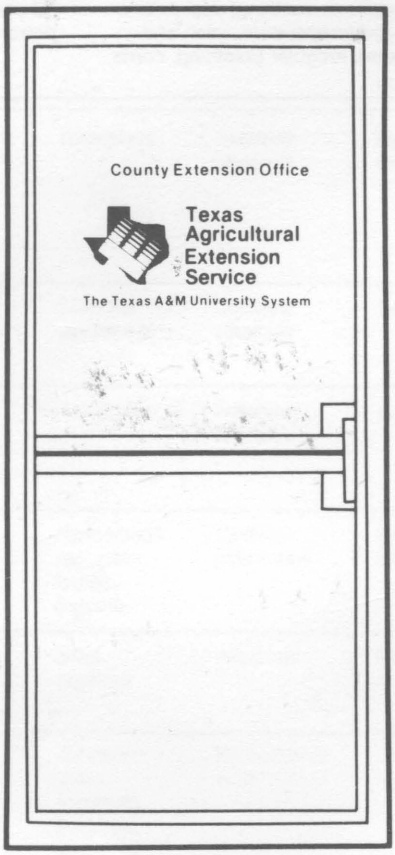
| Scientific name | Common name | Basic toxic principle | Typical symptoms | Remarks |
|---|---|---|---|---|
| *Erodium cicutarium* | Alfilaree, heronbill, storkbill | Nitrates | See nitrate poisoning | This plant is considered a valuable forage plant |
| *Eupatorium rugosum* | White snakeweed, richweed | Tremetol | Trembling, depression, weakness, labored respiration, constipation, blood in feces, odor of acetone in breath | Humans can be poisoned by milk from affected animals |
| *Euphorbia maculata* | Spotted spurge | Acrid juice | See primary photosensitization | |
| *Euphorbia marginata* | Snow on the mountain | Acrid juice | Irritation of mouth and gastrointestinal tract, diarrhea | Rarely causes death; intestinal astringents should be administered to relieve diarrhea |
| *Fagopyrum spp.* | Buckwheat | Photodynamic agent | See primary photosensitization | Most problems seen in cattle |
| *Festuca arundinacea* | Fescue | Alkaloids | Gangrene, loss of feet, tip of tail and ears | Poisoning generally restricted to cattle |
| *Flourensia cernua* | Tarbush, blackbrush | Unknown | Loss of appetite, abdominal pain, reluctance to move, occasionally respiratory distress | Tarbush is extremely unpalatable and will not be consumed if alternate forage is available |
| *Gelsemium sempervirens* | Yellow jessamine | Alkaloids | Muscular weakness, staggering, dialated pupils, convulsions | Many children have been poisoned by sucking nectar from the flowers |
| *Helenium amarum* | Bitter sneezeweed | Dugaldin | Weakness, staggering gait, dairrhea, vomiting, salivation, bloat, grind teeth and retract lips, nasal discharge | Sheep most often poisoned in Texas |
| *Helenium microcephalum* | Smallhead sneezeweed | Dugaldin | See *Helenium amarum* | Very toxic but seldom consumed |
| *Hymenoxys odorata* | Bitterweed | Hymenoxon | Loss of appetite, cessation of fermentation, abdominal pain, bloating, green salivary discharge | Bitterweed slowly increases in toxicity with maturity |
| *Isocoma wrightii* | Rayless goldenrod, jimmyweed, alkaliweed | Tremetol | Muscular trembling, stand in "humped-up" position and move with stiff gait | Poison can be transmitted to man through the milk |
| *Jatropha cathartica* | Berlandier mettlespurge | Purgative oil and phytotoxin | Vomiting, diarrhea, abdominal pain | Reportedly poisonous only to sheep and goats |
| *Jatropha dioica* | Leatherstem | Purgative oil and phytotoxin | Severe gastroenteritis, vomiting, diarrhea, abdominal pain | Reportedly poisonous only to sheep and goats |
| *Kallstroemia spp.* | Caltrop | Unknown | Weakness in hind legs and knuckling of fetlock joint, posterior paralysis, convulsions | One-third of animal's weight of caltrop must be consumed for poisoning to occur |
| *Karwinskia humboldtiana* | Coyotillo | Unknown | *Seed ingested* - Weakness and incoordination of hind legs, exaggerated high stepping, may jump or move backwards, prostration<br>*Foliage ingested* - Loss of condition, wasting, nausea, progressive weakness | Ingestion of seeds or leaves produce different poisoning syndromes |

| Scientific name | Common name | Basic toxic principle | Typical symptoms | Remarks |
|---|---|---|---|---|
| *Kochia scoparia* | Kochia, summer cyperus | Oxalic acid and unknown | See oxalate poisoning, hepatic photosensitization, polio encaphamalamia | Poisoning occurs when large amounts of plants consumed over 45 days |
| *Lantana camara* | Largeleaf lantana | Lantadene A and B | Sluggishness, partial paralysis and bloody diarrhea; also, see hepatic photosensitization | Normally escaped; introduced ornamental plant |
| *Lathyrus hirsutus*<br>*Lathyrus pusillus* | Singletary pea | Unknown | Lameness, incoordination, leading to rear leg paralysis primarily in horses; cattle also affected | Desirable forage plant except in seed stage; predominant incidence with hay containing maturing plants with seed pods |
| *Lobelia berlandieri* | Berlandier lobelia | Alkaloids | Incoordination and extreme narcosis (downer animal) | Limited to deep South Texas |
| *Melia azedarach* | Chinaberry | Unknown | Become stiff, incoordinated, lose appetite, are constipated with blood stained feces | Hogs are most frequently poisoned |
| *Melilotus spp.* | Sweetclover | Dicumarol | Subcutaneous sweeling due to internal bleeding, blanching of visible mucous membranes, weakness | Poisoning restricted primarily to cattle eating moldy hay |
| *Nerium oleander* | Oleander | Cardiac glycosides | Abdominal pain, vomiting, diarrhea trembling, paralysis, coma and usually death | Extremely toxic, even smoke can poison humans |
| *Nicotiana glauca* | Tree tobacco | Nicotine and alkaloids | Weak pulse, staring eyes, unsteadiness, stumbling, trembling, salivation, frequent urination | Cattle and horses are most often poisoned |
| *Nitrate poisoning* | | Nitrates | Weakness, unsteady gait, collapse, shallow and rapid breathing, rapid pulse, coma | Plants containing more than 1.0% nitrate are dangerous |
| *Nolina texanna* | Sacahuista | Unknown | See hepatic photosensitization | The fruit and flowers contain the toxic agent |
| *Notholaena sinuata* | Jimmyfern | Unknown | Walk with stilted, uncoordinated motions, stand with arched back, tremble violently, respiration and heartbeat increase, become prostrate | Usually fatal to sheep and goats when sick animals are forced to move |
| *Oxalate poisoning* | | Oxalic acid | Dullness, colic, depression, prostration, coma | Calcium - rich feeds may reduce oxalate poisoning |
| *Oxytropis lambertii* | Lambert loco, crazyweed, point loco | Unknown | See *Astragalus spp.* | Rare in Texas |
| *Panicum antidotale* | Blue panicum | Unknown | Labored respiration | Blue panicum is a valuable forage grass; most problems occur shortly after fertilization and irrigation |
| *Panicum coloratum* | Kleingrass | Fungus | See hepatic photosensitization | Poisoning generally restricted to sheep and goats |
| *Peganum harmala* | African rue | Alkaloids | Weakness of hind legs and knuckling of fetlock joints, stiffness, trembling, frequent urination and excessive salivation | Is extremely unpalatable |
| *Perilla frutescens* | Perilla mint | Ketones | Labored respiration | Plant found only in East Texas |
| *Photosensitization* | Primary | Photo-dynamic agents | Reddening, swelling of skin exposed to sunlight, will seek shade, evidence of itching, swelling of coronary band | Most economic loss due to weight damaged udders and teats; secondary infection and eye damage, seldom death |

| Scientific name | Common name | Basic toxic principle | Typical symptoms | Remarks |
|---|---|---|---|---|
| | Hepatic | Green pigments and liver damage | Same as above | Same as above, but more often death due to liver damage |
| *Phyllanthus abnormis* | Abnormal leafflower | Unknown | See hepatic photosensitization | Poisoning generally restricted to cattle |
| *Phytolacca americana* | Pokeweed | Alkaloids and phytolas-cotoxin | Abdominal pain, vomiting, purging, convulsions | Humans use the cooked leaf for greens |
| *Pinus ponderosa* | Ponderosa pine | Unknown | Abortion | Limited to high elevations in West Texas |
| *Portulaca oleracea* | Purslane | Oxalic acid | See oxalate poisoning | |
| *Prosopis glandulosa* | Mesquite | Unknown | *Acute* · Impaction, colic in horses<br>*Chronic* · Swelling of jaw and tongue in cattle | Beans must make up most of the diet for 60 days |
| *Prunus spp.* | Wild plum, wildcherry, chokeberry | Hydrocyanic acid | See prussic acid poisoning | Bruising, wilting, withering or frost damage of leaves increase toxicity |
| *Prussic acid poisoning* | | Hydrocyanic acid | Salivation and labored breathing, muscle tremors, incoordination, bloating, tetanic muscle contractions, convulsions | Sorghum species in Texas most frequently produce prussic acid poisoning |
| *Psilostrophe gnaphalodes*<br>*Psilostrophe tagetina* | Cudweed paperflower<br>Wolly paperflower | Unknown | Incoordination and stumbling, sluggish, lose appetite, cough violently causing vomiting of a greenish liquid | Can be grazed for approximately 2 weeks by sheep before poisoning occurs |
| *Pteridium aquilinum var. pseudocaudatum* | Bracken fern | Thiaminase and unknown | Loss of condition, incoordination, lethargic, stand with legs apart, tremors, prostration, convulsions in horses; cattle have sudden death and hemoragic syndrome | A large amount of bracken fern is required to produce symptoms |
| *Quercus spp.* | Oaks | Tannins | Emaciation, edema, constipation or diarrhea, rough haircoat, depression, discomfort | Most problems occur in spring when livestock consume buds, small leaves, stems and flowers; or in fall when acorns are consumed |
| *Ricinus communis* | Castorbean | Ricin | Nausea, violent purging, blood in feces, muscular tremors, general weakness | Only one or two castorbeans are lethal to humans |
| *Salsola kali var. tenuifolia* | Tumbleweed | Nitrates and oxalic acid | See nitrate poisoning and oxalate poisoning | |
| *Salvia reflexa* | Annual sage | Unknown | Muscular weakness | Suspected to be toxic but not proven |
| *Sartwellia flaveriae* | Sartwellia | Unknown | Gradual weight loss, normal appetite, distended abdomen | Poisoning generally restricted to goats |
| *Senecio longilobus*<br>*Senecio spartioides* | Threadleaf groundsel, riddell groundsel | Alkaloids | Continuous walking, nervous disturbances, voiding of liquid bile-stained feces, may attack any moving object | May be a time lapse of months between consumption of the plant and the occurrence of symptoms |

| Scientific name | Common name | Basic toxic principle | Typical symptoms | Remarks |
|---|---|---|---|---|
| *Sesbania drummondii* | Drummond sesbane, poison bean | Unknown | Uneasiness, depression, arched back, anorexia, diarrhea, shallow and rapid respiration, coma | Generally 1 oz of seed will kill sheep and less than 2 oz will kill large animals |
| *Sesbania vesicaria* | Bagpod sesbane | Unknown | See *Sesbania drummondii* | |
| *Solanum carolinense* | Carolina horsenettle | Solanine alkaloids | Symptoms show either nervous effects such as trembling, "crazy cow syndrome" (fall when excited, can't get up, roll head or held sideways), labored breathing, paralysis or gastrointestinal irritation such as nausea, abdominal pain or diarrhea | Solanine content of this plant was found to increase ten fold with maturity |
| *Solanum dimidiatum* | Treadslave | Solanine alkaloids | Hyper-excitement, cows fall when trying to make rapid movements | Chronic low level consumption causes "crazy cow syndrome," larger amounts cause symptoms of other *Solanum spp.* |
| *Solanum elaeagnifolium* | Silverleaf nightshade | Solanine alkaloids | See *Solanum carolinense* | Man has also been poisoned by silverleaf nightshade |
| *Solanum rostratum* | Buffaloburr | Solanine alkaloids | See *Solanum carolinense* | In addition to the toxic effects of solanine, the prickles cause internal irritation when grazed |
| *Sophora secundiflora* | Mescalbean, mountain laurel, frigolito | Cytisine, sophonine | Increased pulse, stiffening of hind legs, muscular trembling, coma | Sheep usually recover following poisoning, cattle often die |
| *Sophora nuttalliana* | Silky sophora | Alkaloids | Not well documented | Most losses attributed to this plant occurred in extreme West Texas |
| *Sorghum spp.* | Johnson-grass, sorghum, sorghum alum | Hydrocyanic acid | See prussic acid poisoning; horses get rear leg paralysis, dribbling urine | Cattle and horses are most susceptible to poisoning by sorghum |
| *Stillingia treculiana* | Trecul queensdelight | Hydrocyanic acid | See prussic acid poisoning | Numerous sheep losses to this plant have occurred in the Edwards Plateau |
| *Tribulus terrestris* | PunctureVine, goathead | Nitrates and unknown | See nitrate poisoning and hepatic photosensitization | All growth stages are toxic |
| *Viguiera annua* | Annual goldeneye | Unknown | Not well documented | Poisoning has been restricted to cattle |
| *Xanthium spp.* | Cocklebur | Unknown | Weakness, depression, unsteady gait, nausea, vomiting; make running motions with legs when down, or show marked curvature of neck | Only young plants have shown to be toxic |
| *Xanthocephalum microcephalum* | Perennial broomweed, threadleaf broomweed, turpentine weed | Saponin | Listlessness, loss of appetite, nasal discharge, fecal mucous, bloody urine, vaginal discharge in females | Most economic loss due to abortion of calves in cattle |

| Scientific Name | Common name | Basic toxic principle | Typical symptoms | Remarks |
|---|---|---|---|---|
| *Xanthocephalum sarothrae* | Perennial broomweed, broom snakeweed, turpentine weed | Saponin | See *Xanthocephalum microcephalum* | |
| *Zigadenus nuttallii* | Nuttall deathcamas | Alkaloid | Salivation, nausea, vomiting, depression, weakness, low temperature, weak and irregular pulse, irregular breathing, coma | All parts of plant are poisonous, even when dry |

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