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EC85-198 Nebraska Poisonous Range Plants

Patrick E. Reece

University of Nebraska-Lincoln, preece1@unl.edu

Charles P. Moser

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NEBRASKA POISONOUS RANGE PLANTS

Patrick E. Reece^{1/}
Charles P. Moser^{2/}

INTRODUCTION

Poisonous plants cause biochemical or physiological changes in livestock when consumed. Toxic compounds are present in more than 200 range plants native to United States grazing lands (Kingsbury, 1964).

Death is the loss most often associated with poisonous plants and the easiest to evaluate economically. However, some poisonous plants do not kill the animal, but severely reduce production from the animal and/or its offspring. Loss of mother animals may also reduce performance and survival of offspring. Nonlethal losses are reflected in weaning weights, percentage calf or lamb crops, unmarketable animals due to birth deformities, and reduced breeding herd longevity.

The United States Department of Agriculture established its first poisonous plant field stations near Imperial, Nebraska and Hugo, Colorado in 1905 (Kingsbury, 1964) because of larkspur poisoning in southwest Nebraska and northeast Colorado. While much knowledge has since been gained, few attempts have been made to quantify the total impact on the livestock industry. Many ranchers may not recognize poisonous plants, and most veterinarians have only limited training in plant taxonomy.

Prevention of losses and/or reduced performance requires a knowledge of poisonous plants and how they affect livestock.

PLANT IDENTIFICATION

Poisonous plants produce some of the most beautiful wild flowers in Nebraska's rangelands. Identification and determination of plant distribution is most easily accomplished when plants are in flower. While identification of poisonous plants before flowering is not difficult, these species tend to blend with the vegetation, making them less noticeable. Many poisonous plants are most toxic during early growth stages before they have produced flowers. Therefore, leaf and stem characteristics are often more helpful than flower characteristics for plant identification.

Most problems are caused by 12 of the more than 70 species of poisonous plants which occur on Nebraska rangelands (Tables 1 and 2, Figures 1 to 12). Knowledge of those poisonous plants will benefit individuals involved in the range livestock industry. If the producer or veterinarian are uncertain of the species in their area,

someone with training in plant identification should be located. Help is available through the University of Nebraska Cooperative Extension Service or the Soil Conservation Service.

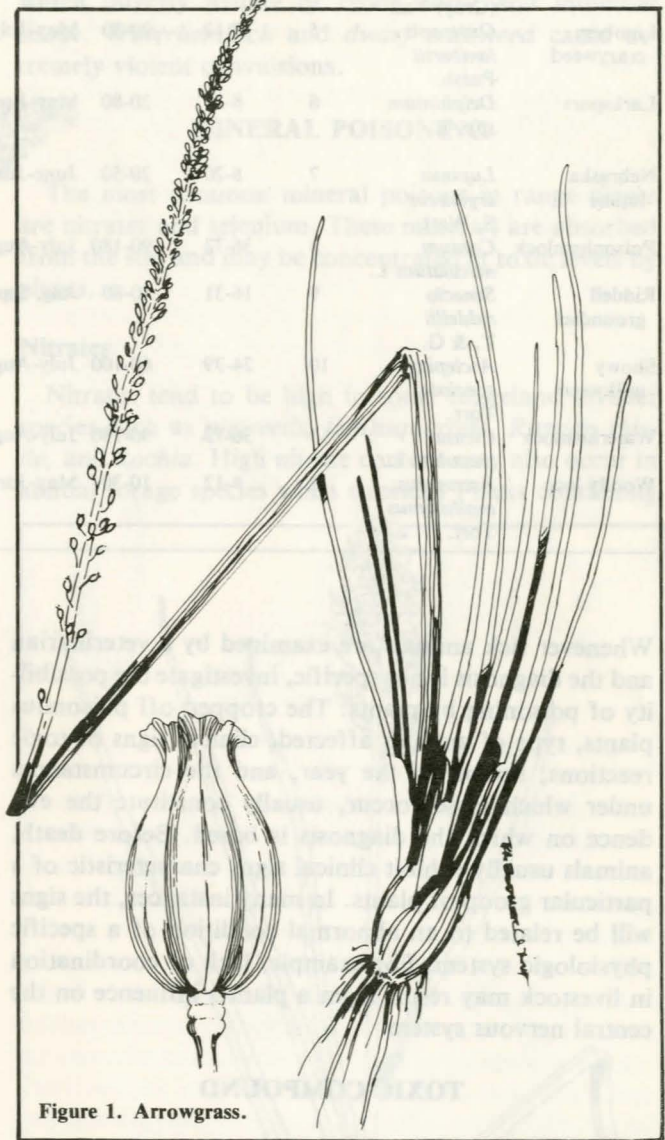


Figure 1. Arrowgrass.

DIAGNOSIS

The presence of poisonous plants on rangeland does not assure livestock losses. Other factors affect livestock, such as infectious diseases, nutrition, or chemical poisoning. So, the help of a veterinarian is important.

Livestock may be poisoned in places and during seasons that are presumably free from danger. Many stockmen are reluctant to believe that these losses are the result of poisonous plants, because stock have been pastured in the same location for several years without loss.

^{1/}Extension Range Management Specialist, University of Nebraska Panhandle Research and Extension Center, Scottsbluff, NE.

^{2/}Range Research Technician, University of Nebraska Panhandle Research and Extension Center, Scottsbluff, NE.

Table 1. Characteristics of poisonous plants that are common in Nebraska.

Common name	Scientific name	Figure number	Plant height		Date of flowering	Flower color	Toxic plant parts	Primary seasonal toxicity		
			(in)	(cm)				Spring	Summer	Fall
Arrowgrass	<i>Triglochin maritimum</i> L.	1	12-16	30-40	June-July	Green	Foliage stunted by drought or frost		x	x
Chokecherry	<i>Prunus virginiana</i> L.	2	72-360	180-910	April-May	White	Wilted leaves	x	x	x
Deathcamases	<i>Zygadenus</i> spp. Michx.	3	8-28	20-70	May-July	Yellow to white	All	x		
Dwarf milkweed	<i>Asclepias pumila</i> (Gray) Vail	4	4-8	10-20	July-Aug.	Greenish white	Above ground parts		x	
Lambert crazyweed	<i>Oxytropis lambertii</i> Pursh.	5	8-12	20-30	May-July	Pink to purple, occasionally white	All, new & mature growth	x	x	x
Larkspurs	<i>Delphinium</i> spp. L.	6	8-31	20-80	May-June	Blue to white	Above ground parts, especially new growth	x	x	
Nebraska lupine	<i>Lupinus argenteus</i> S. Wats.	7	8-20	20-50	June-July	Blue	New growth & seeds	x	x	
Poisonhemlock	<i>Conium maculatum</i> L.	8	36-72	90-180	July-Aug.	White	All, especially new leaves	x	x	x
Riddell groundsel	<i>Senecio riddellii</i> T. & G.	9	16-31	40-80	Aug.-Sept.	Yellow	All, especially new growth	x	x	x
Showy milkweed	<i>Asclepias speciosa</i> Torr.	10	24-39	60-100	July-Aug.	Pale purple with greenish tinge	Above ground parts		x	
Waterhemlock	<i>Cicuta maculata</i> L.	11	36-72	90-180	July-Aug.	White	All, especially roots	x		
Woolly loco	<i>Astragalus mollissimus</i> Torr.	12	4-12	10-30	May-June	Greenish purple	All, new & mature growth	x	x	x

Whenever sick animals are examined by a veterinarian and the diagnosis is not specific, investigate the possibility of poisoning by plants. The cropped off poisonous plants, type of animals affected, clinical signs of toxic reactions, season of the year, and the circumstances under which losses occur, usually constitute the evidence on which the diagnosis is based. Before death, animals usually exhibit clinical signs characteristic of a particular group of plants. In many instances, the signs will be related to an abnormal condition of a specific physiologic system. For example, lack of coordination in livestock may result from a plant's influence on the central nervous system.

TOXIC COMPOUND

Toxic compounds may be produced or absorbed by plants. These compounds are generally placed into nine groups based upon their chemical structure (Kingsbury, 1964). Considerable variation may occur in the effect of compounds within a given group.

Alkaloids

Alkaloids are basic compounds containing nitrogen which react with acid to form soluble salts that are absorbed in the rumen. Most plant parts of species in this group contain alkaloids. Growing conditions tend to alter the alkaloid content very little. *Larkspurs*, *lupines*,

locoweeds, and *deathcamases* contain toxic alkaloids. As a general rule, alkaloids affect the nervous system causing a drugged or opiate-like reaction in livestock. Domestic animals generally respond with altered respiration, excitation, incoordination, and possibly death from blockage of the central nervous system.

In contrast, groundsel contains a unique type of alkaloid that affects the hepatic system. *Riddell groundsel* causes chronic liver tissue damage which may allow toxic substances to build up and affect other parts of the body. If nonlethal amounts are consumed the impact of poisoning may not be apparent for several months. Liver damage may lead to death or reduced performance from secondary factors when livestock are exposed to shipping or winter stress.

Glycosides

Glycosides are compounds that combine harmless sugars with nonsugar radicals, some of which are toxic when freed by acids or enzymes. Cyanogenic glycosides which contain cyanide are present in *sorghums*, *arrowgrass*, *chokecherry* and sometimes *mountain mahogany*. The toxicity of these plants can be influenced substantially by environmental variations. Sorghums are considered excellent forage under good growing conditions, but may contain dangerous levels of hydrocyanic acid when plants are stressed.

When cyanogenic plants are frosted or wilted from

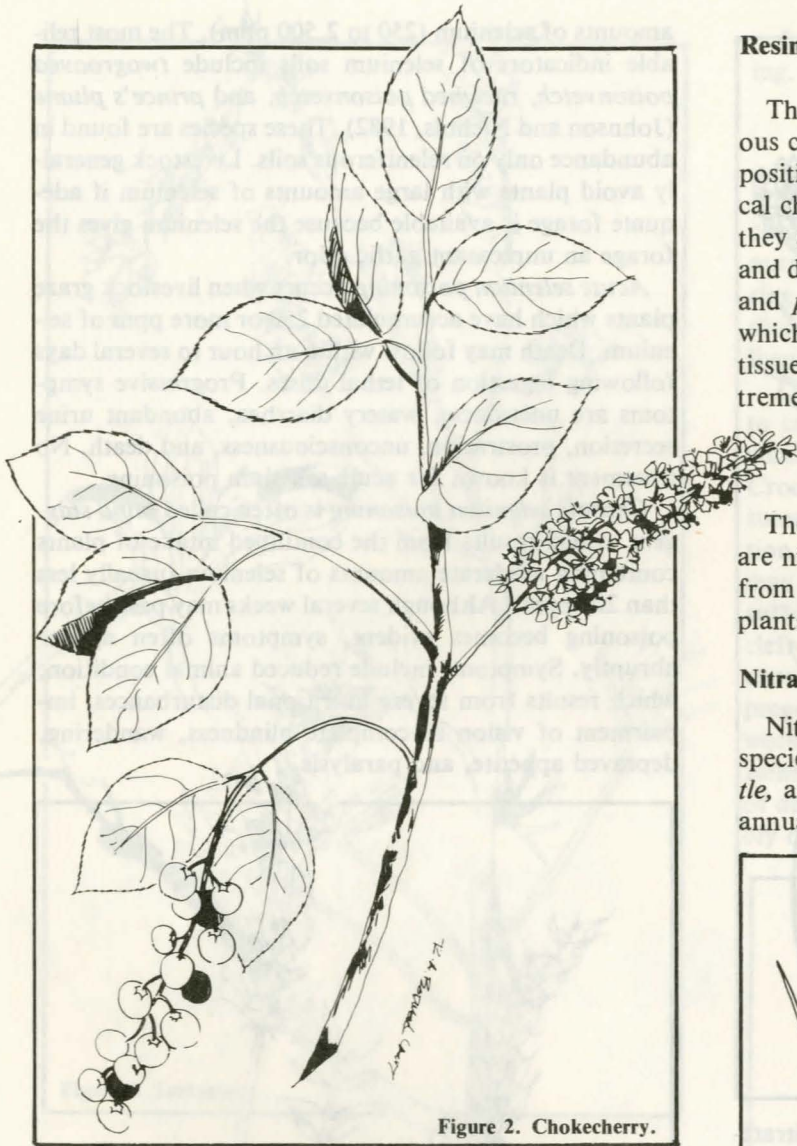


Figure 2. Chokecherry.

drought, prussic acid (hydrocyanic acid) is liberated in the plant tissue. Once consumed, the prussic acid inactivates an enzyme which links oxygen in the blood to animal cells. This causes suffocation at the cell level even though oxygen is still being carried in the blood. Because the animal cannot use the oxygen from its circulatory system, the blood becomes bright red. Symptoms of prussic acid poisoning are nervousness, abnormal breathing, muscle trembling, and spasms or convulsions continuing at short intervals until death occurs by respiratory failure.

Irritant Oils

Glycosidic combinations may also contain irritant oils. Enzymatic activity breaks down glycoside releasing volatile and fixed oils. Plants that contain irritant oils can cause serious physiological disturbances. Perhaps the most notable of these is abortion in range livestock. Plants containing rather large quantities of irritant oils include *snakeweeds*, *sagebrushes* and *junipers*. While consumption of pine needles also causes abortion, the toxic compound has not been identified.

Resinoids

The resinoid group contains some extremely poisonous compounds with a wide diversity of chemical composition. Members of this group share a common physical characteristic. When extracted from plant material, they are solid or semi-solid, brittle, insoluble in water, and do not contain nitrogen. *Milkweeds*, *waterhemlock*, and *poisonhemlock* contain toxic resinoid substances which directly irritate or erode nerve and muscular tissue. *Waterhemlock* and *dwarf milkweed* cause extremely violent convulsions.

MINERAL POISONING

The most common mineral poisons in range plants are nitrates and selenium. These minerals are absorbed from the soil and may be concentrated at toxic levels by plants.

Nitrates

Nitrates tend to be high in some rangeland invader species such as *pigweeds*, *lambquarters*, *Russian thistle*, and *kochia*. High nitrate content may also occur in annual forage species when stressed. Plants containing

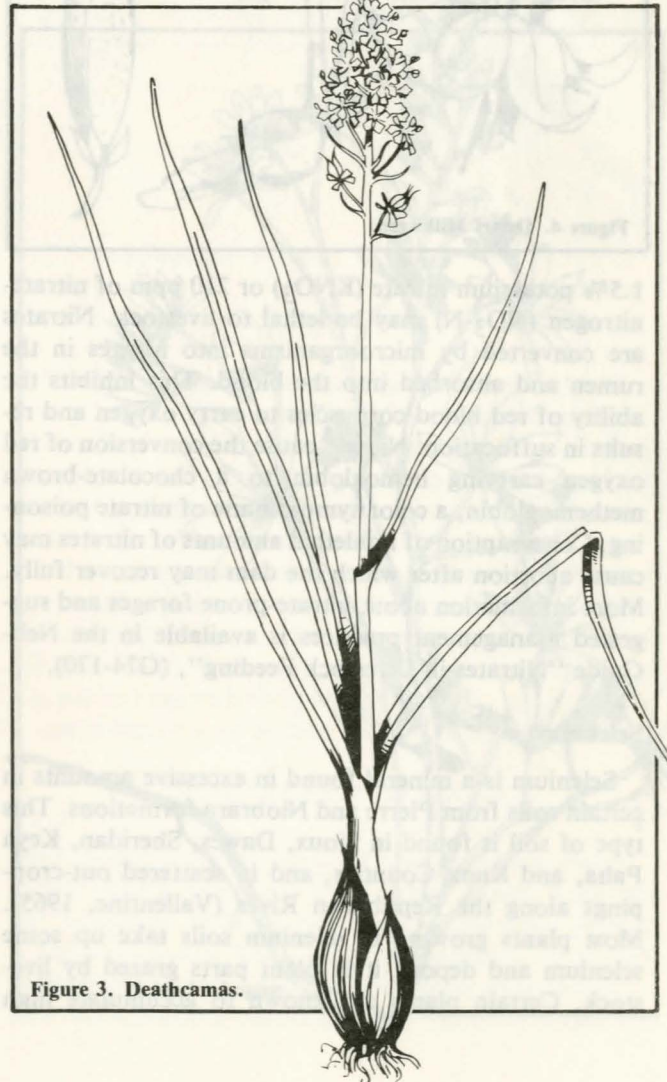


Figure 3. Deathcamas.

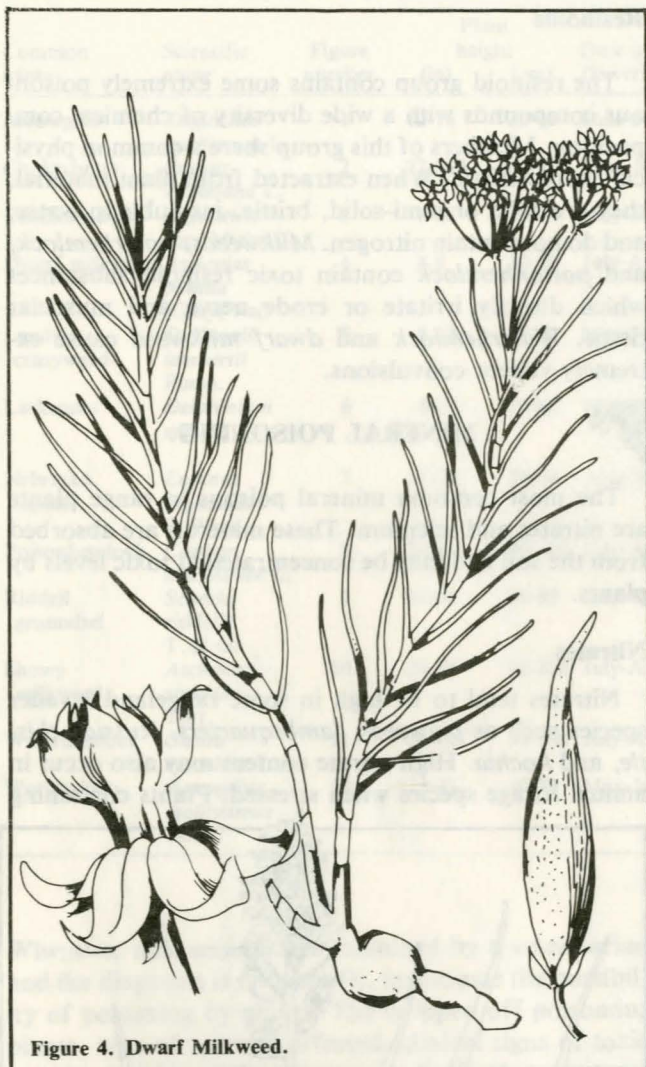


Figure 4. Dwarf Milkweed.

1.5% potassium nitrate (KNO_3) or 210 ppm of nitrate-nitrogen (NO_3-N) may be lethal to livestock. Nitrates are converted by microorganisms into nitrites in the rumen and absorbed into the blood. This inhibits the ability of red blood corpuscles to carry oxygen and results in suffocation. Nitrites cause the conversion of red oxygen carrying hemoglobin to a chocolate-brown methemoglobin, a color symptomatic of nitrate poisoning. Consumption of nonlethal amounts of nitrates may cause abortion after which the dam may recover fully. More information about nitrate-prone forages and suggested management practices is available in the Neb-Guide "Nitrates in Livestock Feeding", (G74-170).

Selenium

Selenium is a mineral found in excessive amounts in certain soils from Pierre and Niobrara formations. This type of soil is found in Sioux, Dawes, Sheridan, Keya Paha, and Knox Counties, and in scattered out-croppings along the Republican River (Vallentine, 1965). Most plants growing in selenium soils take up some selenium and deposit it in plant parts grazed by livestock. Certain plants are known to accumulate high

amounts of selenium (250 to 2,500 ppm). The most reliable indicators of selenium soils include *twogrooved poisonvetch*, *racemed poisonvetch*, and *prince's plume* (Johnson and Nichols, 1982). These species are found in abundance only on seleniferous soils. Livestock generally avoid plants with large amounts of selenium if adequate forage is available because the selenium gives the forage an unpleasant garlic odor.

Acute selenium poisoning occurs when livestock graze plants which have accumulated 250 or more ppm of selenium. Death may follow within an hour to several days following ingestion of lethal doses. Progressive symptoms are uneasiness, watery diarrhea, abundant urine secretion, prostration, unconsciousness, and death. No treatment is known for acute selenium poisoning.

Chronic selenium poisoning is often called *blind staggers*, which results from the continued intake of plants containing moderate amounts of selenium (usually less than 200 ppm). Although several weeks may pass before poisoning becomes evident, symptoms often appear abruptly. Symptoms include reduced animal condition, which results from severe nutritional disturbances, impairment of vision to complete blindness, wandering, depraved appetite, and paralysis.



Figure 5. Lambert Crazyweed.

6. Stock lightly or moderately to allow selective grazing.

CONGENITAL DEFORMITIES

Several factors can cause congenital deformities, including genetic inheritance, infectious diseases, and nutritional imbalances. The fact that naturally occurring compounds in plants also cause deformities was discovered in the 1960's but is still not widely known by livestock producers (James, 1977).

Lupines, *poisonhemlock*, and *locoweeds* are known to cause congenital deformities in cattle when females consume these plants during gestation (Keeler, 1972). Crooked calf disease is caused by lupine when consumed by dams between the 40th and 70th days of gestation. This disease affects primarily the front legs, but may also distort the neck, back, and hind legs. Calves suffering from crooked calf disease may also have a cleft palate. Skeletal malformations similar to those caused by lupine have also been observed in calves when pregnant cows have consumed poison hemlock or locoweed. The fetus can be affected by locoweed when consumed by dams during any stage of gestation. Offspring of dams that have consumed locoweed may not be visibly deformed but may be small and weak at birth.

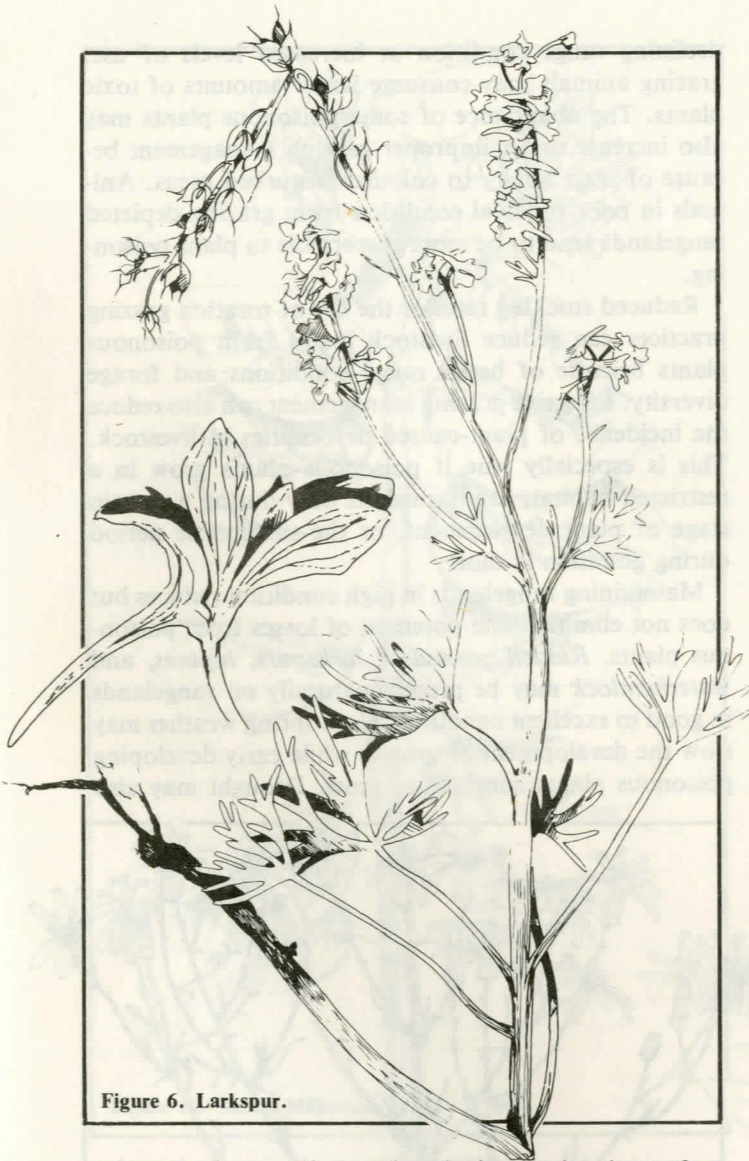


Figure 6. Larkspur.

A second type of chronic selenium poisoning, often called *alkaloid disease*, results from the continued intake of range grasses, cereal crops, or hays with low amounts of selenium (10 to 30 ppm), over several weeks or months. Dullness, emaciation, lameness, and loss of long hair are typical. Another characteristic symptom is a partial sluffing of the hooves. Because of sore feet, livestock may be seen grazing on their knees. Death may result after several weeks from starvation or thirst.

Excessive selenium in diets of range livestock is known to lower conception rates, increase the number of services required per cow, and cause weak and deformed offspring. Recommendations for managing livestock in areas of chronic selenium poisoning include:

1. Change to a steer program where feasible.
2. Check bulls frequently for lameness.
3. Use an earlier breeding program for cows where feasible.
4. Graze selenium-affected range in winter and fall, when plant content of selenium is lowest.
5. Rotate livestock between seleniferous and selenium free range to lower selenium accumulation in animal tissues.



Figure 7. Nebraska Lupine.

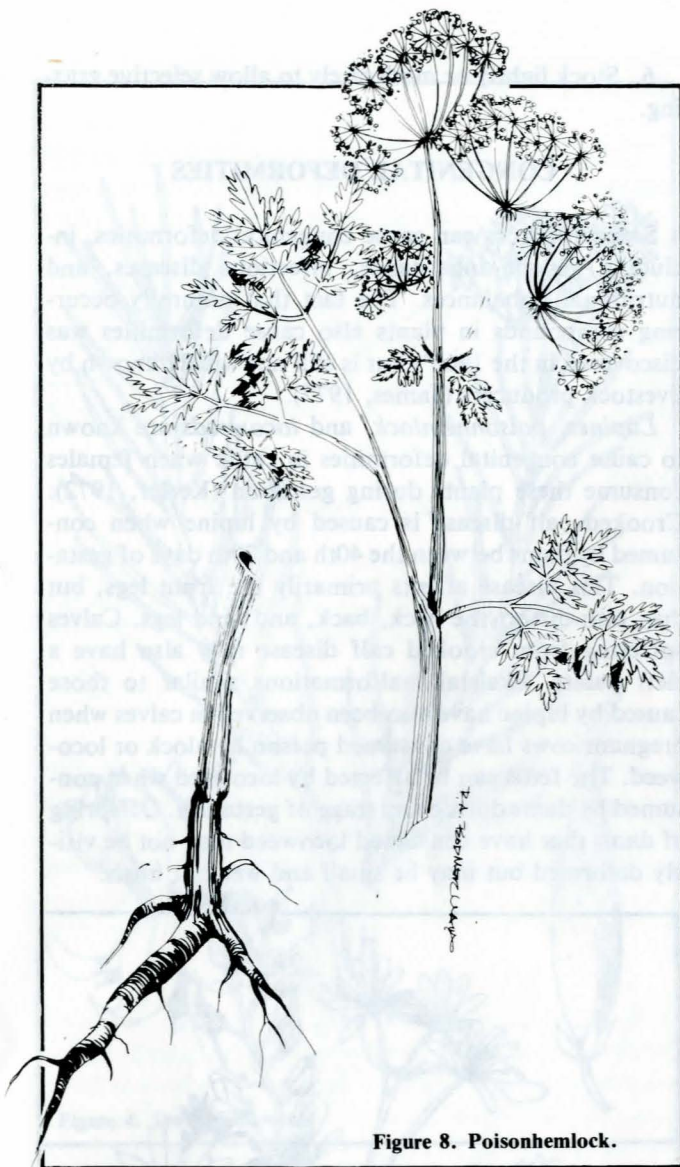


Figure 8. Poisonhemlock.

TREATMENT OF POISONED ANIMALS

Treatment of poisoned animals is seldom practical on rangelands because effects of many poisonous plants have no known treatment. The intoxication may also be too far advanced to treat. Under usual range conditions, poisoned animals cannot be readily caught or handled without substantial stress to the animal. Excitement of animals may result in death even though normally lethal doses have not been consumed. If poisoned animals can be removed from pastures without great disturbance, move them slowly and keep them away from water for several hours. If irreversible tissue damage has not occurred, the animal may be treated by a veterinarian.

GRAZING MANAGEMENT

Grazing management practices are important in minimizing livestock losses from poisonous plants. Maintaining rangelands in good or excellent condition will reduce the potential hazard of most poisonous plants.

The impact of all plant poisons is dosage dependent. As desirable forage plants decrease in availability with

declining range condition or increased levels of use, grazing animals may consume larger amounts of toxic plants. The abundance of some poisonous plants may also increase under improper grazing management because of their ability to colonize disturbed areas. Animals in poor physical condition from grazing depleted rangelands tend to be more susceptible to plant poisoning.

Reduced stocking rates or the use of rotation grazing practices can reduce livestock losses from poisonous plants because of better range conditions and forage diversity. Effective grazing management can also reduce the incidence of plant-caused deformities in livestock. This is especially true if poisonous plants grow in a restricted habitat, are hazardous only during a certain stage of plant development, or the susceptible period during gestation is short.

Maintaining rangelands in high condition reduces but does not eliminate the potential of losses from poisonous plants. *Riddell groundsel*, *larkspurs*, *lupines*, and *waterhemlock* may be present naturally on rangelands in good to excellent condition. Cool spring weather may slow the development of grasses while early developing poisonous plants continue to grow. Drought may also

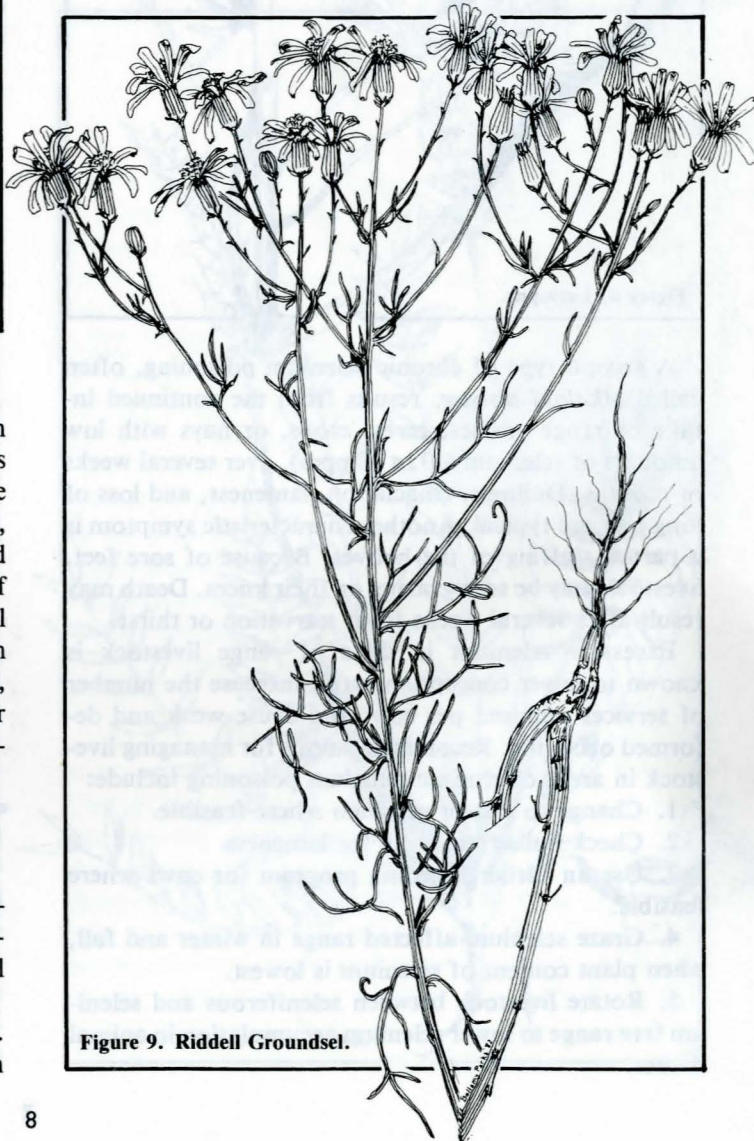


Figure 9. Riddell Groundsel.

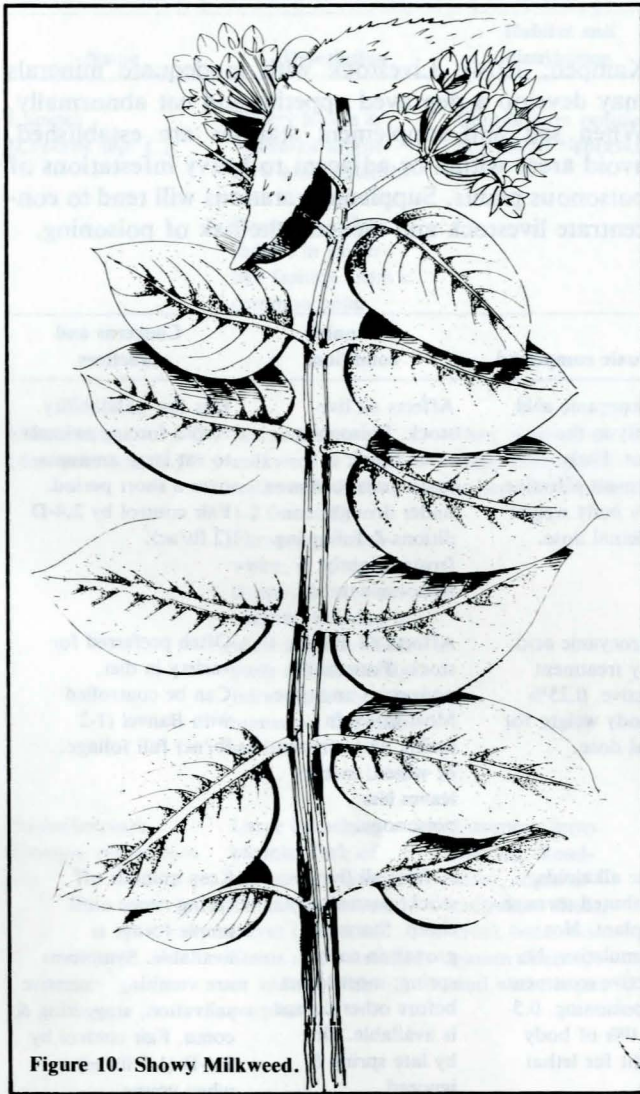


Figure 10. Showy Milkweed.

reduce the development of desirable forage species more than the growth of poisonous plants. Furthermore, drought tends to increase the concentration of some toxic compounds in plants.

Snow during the early part of the growing season may increase the potential of livestock losses where early developing poisonous plants such as *larkspurs*, and *lupines* occur. These species are very succulent and frequently taller than the associated grasses from late March to early May. Consequently, the only forage not covered by a late snowfall may be poisonous.

LIVESTOCK MANAGEMENT

Ranchers who are able to recognize poisonous plants and are aware of the potential impact of climatic variability can make modifications in livestock management which can effectively reduce the hazard (Tables 1 and 2). While a complete management program requires a specific knowledge of the existing species, there are concepts that can be used in the initial planning:

1. With few exceptions, the known dangerous plants are not palatable to stock and must be consumed in rela-

tively large quantities to be toxic. Only a few poisonous plants such as *larkspurs* are relatively palatable to livestock and even fewer are addictive, such as *locoweeds*. Losses are difficult to prevent when these types of plants are present. *If any livestock show symptoms of poisoning, remove all animals from the pasture immediately.*

2. Use caution in handling livestock in areas known to have poisonous plant problems. Hungry livestock may fill themselves on the first green forage they find, regardless of the palatability or forage value. Cattle transported from other areas tend to suffer more losses from poisonous plants than do local or native cattle. Stock turned out too early in the spring, before grass has made adequate growth, may consume early developing poisonous plants.

3. All animals do not exhibit the same forage preference or susceptibility to poisonous plants (Table 2). Differences have been observed between yearling cattle and mature cattle and also between dry and lactating cows. Sheep are relatively tolerant of *larkspurs*, while cattle are highly susceptible. Sheep and cattle are more tolerant of *locoweeds* than are horses.

4. Provide adequate water for livestock when animals are being handled or when they are grazing. The feed intake of thirsty animals is reduced until their thirst is quenched. Once that thirst is quenched, they often eat

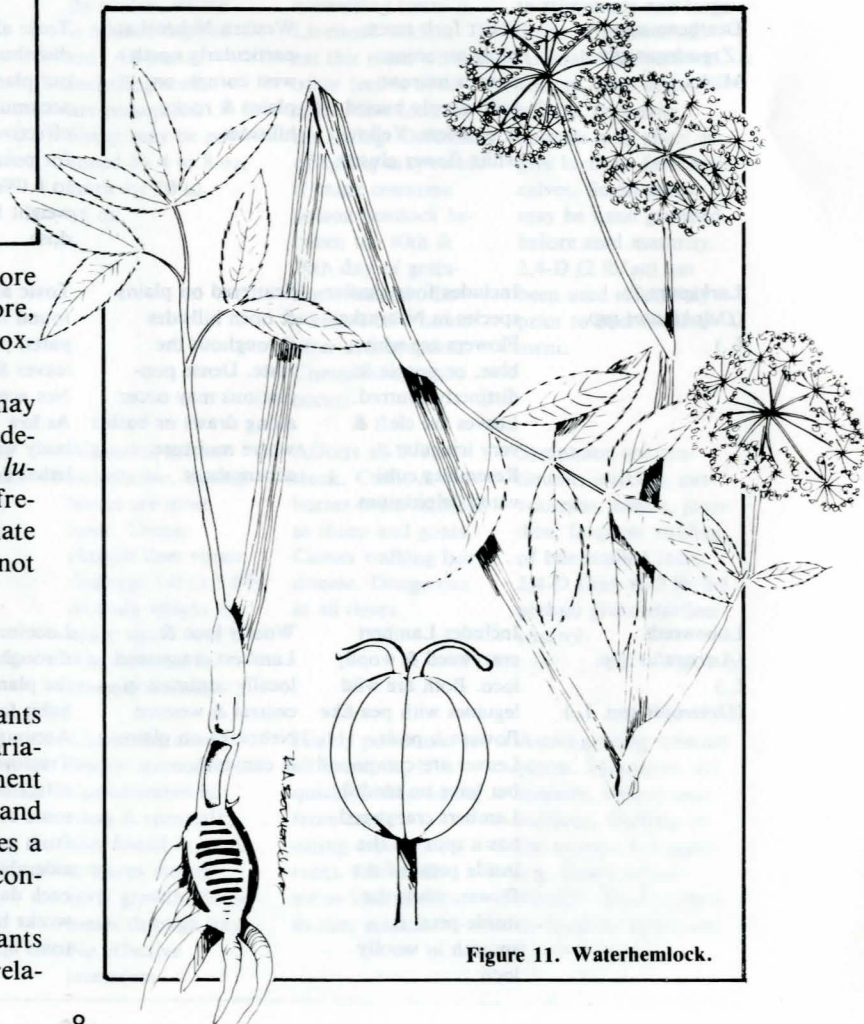


Figure 11. Waterhemlock.

large quantities of any plant available, including some of the most unpalatable poisonous plants.

5. Lack of salt or minerals is frequently associated with livestock grazing poisonous plants. *Locoweed* poisoning is an exception because protein and mineral supplements have not reduced losses (James and Van

Kampen, 1974). Livestock with inadequate minerals may develop a depraved appetite and eat abnormally. When salt and supplement stations are established, avoid areas within or adjacent to heavy infestations of poisonous plants. Supplement stations will tend to concentrate livestock and increase the risk of poisoning.

Table 2. Poisonous plants common in Nebraska.

Name	Description	Habitat and distribution	Toxic compound	Poisoning conditions	Concerns and practices
Arrowgrass (<i>Triglochin maritima</i> L.)	Leaves grasslike but thickened & semi-circular; flowers greenish & closely arranged along seedstalk; fruits are rounded & golden brown.	Wet & alkaline meadows. Common around alkaline lakes & marshes of western & central Nebraska.	Hydrocyanic acid, mostly in the leaves. Early treatment effective. 0.5% body weight for lethal dose.	Affects all livestock. Poisonous at all times; losses most common under drought conditions & following frosts; slightly poisonous in hay.	Has fair palatability. Avoid forcing animals to eat large amounts over a short period. Fair control by 2,4-D (2 lb/ac).
Chokecherry (<i>Prunus virginiana</i> L.)	Large shrubs with white flowers in long cluster; berries small & red; leaves shiny, dark green & entire leaf edge serrate (small tooth-like notches).	Along streams; on hillsides & canyon slopes where moisture is plentiful. Widely distributed.	Hydrocyanic acid. Early treatment effective. 0.25% of body weight for lethal dose.	Affects all livestock. Potentially poisonous any time. Most losses in spring when frozen or wilted; mature leaves less poisonous.	Often preferred for variety in diet. Can be controlled with Banvel (1-2 lb/ac) full foliage.
Deathcamases (<i>Zygadenus</i> spp. Michx.)	Short forb resembling an onion. Leaves narrow; bulb deeply buried & odorless. Yellow-white flower cluster.	Western Nebraska; particularly northwest corner, on plains & rocky hillsides.	Toxic alkaloids, distributed throughout plant. Not accumulative. No effective treatment for poisoning. 0.5 to 6.0% of body weight for lethal dose.	Affects all livestock, particularly sheep. Starts growth in early spring; most losses before other forage is available. Dry by late spring & ignored.	Keep animals off spring range until ample forage is available. Symptoms are vomiting, excessive salivation, staggering & coma. Fair control by 2,4-D (1.5 lb/ac) when young.
Larkspurs (<i>Delphinium</i> spp. L.)	Includes four similar species in Nebraska. Flowers are white, blue, or purple & distinctly spurred. Leaves are cleft & very irregular. Resembles cultivated delphinium.	Scattered on plains & open hillsides throughout the state. Dense populations may occur along draws or basins where moisture accumulates.	Toxic alkaloids found in all plant parts, particularly leaves & flowers. Not accumulative. As low as 0.5% of body weight for lethal dose.	Affects primarily cattle, will affect sheep at six times the lethal dose for cattle. Poisonous at all growth stages but, eaten usually only in spring. Plant dries up after spring flowering.	Palatable when young. May require grazing range after June 15. Symptoms include staggering, bloating, frequent swallowing, paralysis & rigid extension of legs. Tordon 22 K or 2,4-D Ester (2 lb/ac) plus wetting agent, pre-bud stage.
Locoweeds (<i>Astragalus</i> spp. L.) (<i>Oxytropis</i> spp. L.)	Includes Lambert crazyweed & woolly loco. Both are wild legumes with pea-like flowers & pods. Leaves are compound but have no tendrils. Lambert crazyweed has a spur on the inside petal of the flower, while the inside petal is smooth in woolly loco.	Woolly loco & Lambert crazyweed locally common in central & western Nebraska on plains & canyons.	Locoine, distributed through all parts of the plant. Probably habit forming. Accumulative. Treatment not effective. Stock must be removed from pastures. Considerable quantities each day for several weeks before symptoms appear.	Affects all livestock. Horses often times more susceptible than cattle or sheep. Poisonous any time, but most dangerous in spring. May green up in fall or winter, if mild & moist. Usually not eaten when dry. Birth defects if consumed during gestation.	Locoed animals show incoordination, irregular gait, nervousness, faulty vision. Brain damage often permanent. Abortion rate high in cows & ewes. 2,4-D Ester (2 lb/ac) early bud.

Table 2. Poisonous plants common in Nebraska (continued).

Name	Description	Habitat and distribution	Toxic compound	Poisoning conditions	Concerns and practices
Lupines (<i>Lupinus spp.</i> L.)	Silvery lupine & Nebraska lupine. Low growing forbs with blue pea-like flowers. Leaflets radiate in finger-like fashion from a common point.	Common on prairies in western Nebraska.	Toxic alkaloids not accumulative. All plant parts potentially poisonous, particularly fruit & seed. No effective treatment. 0.2 to 1.5% of body weight for lethal dose.	Primarily sheep, infrequently, cattle. Most losses in spring or summer. Pods & seed retain poison after maturity. Deformed offspring may result if cattle consume lupine between 40th & 70th day of gestation.	Avoid lupine patches in mid-summer. Symptoms include breathing difficulty, muscular incoordination, frothing, bloating, convulsions & coma. Fair to good control with 2,4-D Ester (2 lb/ac) early bud.
Milkweeds (<i>Asclepias spp.</i> L.)	Includes showy milkweed & dwarf milkweed. Forbs 1-2 feet tall. Flowers greenish-white, in spreading cluster. Leaves are narrow, whorled in some species. Plant parts contain milky juice. Pods contain numerous flat silky seeds.	Over much of the state, particularly in dry sandy soils.	Glycosides & a resenoid compound distributed in above ground part. Very toxic. Small amounts of whorled milkweed can kill. No effective treatment. 0.2 to 2.0% of body weight for lethal dose.	Affects cattle & sheep, sometimes horses. Dangerous at all times, most poisonous during active growth.	Do not concentrate stock at milkweed infested corrals, bedgrounds & holding pastures. Avoid hay with large amounts of milkweeds. Symptoms are staggering, violent spasms, bloating & breathing difficulty. 2,4-D (1 lb/ac) + Banvel (0.5 lb/ac) bud to bloom. Roundup (3 lb/ac).
Poisonhemlock (<i>Conium maculatum</i> L.)	Large branching biennial forb of the parsley family. Pinnately dissected leaves (fern like). Stems often streaked or spotted with purple.	European introduction. Road-sides, edges of cultivated fields, creek beds, irrigation ditches, and waste areas.	Alkaloids, primarily conine, which is a heart depressant. All parts, including seed, are poisonous. Sheep may be poisoned by 4 to 8 oz, cattle by 10 to 16 oz.	Fresh leaves have nauseating taste. Livestock seldom eat this plant when other feed is available. Most toxic in the spring. Deformed offspring may result if cattle consume poison hemlock between the 40th & 70th day of gestation. Animals die within 3 to 4 hours after consumption. Convulsions rarely occur.	Animals may respond to stimulants and large doses of mineral oil. Animals that recover seldom show after-effects. Pregnant animals may abort or give birth to deformed calves. Small areas may be hand grubbed before seed maturity. 2,4-D (2 lb/ac) has been used effectively prior to bud development.
Riddell groundsel (<i>Senecio riddellii</i> T. & G.)	Forb, 1 1/2 to 3 feet tall, with narrow or finely divided leaves. Stems are much branched. Numerous flower heads yellow & comparatively small.	Central & western Nebraska; frequent on sandy & rocky soils.	Alkaloids are accumulative. Young leaves are most toxic. Causes chronic liver tissue damage. 1.0 to 5.0% of body weight for acute lethal dose. Any amount for chronic toxicity.	Affects all livestock. Cattle & horses twice as much as sheep and goats. Causes walking horse disease. Dangerous at all times.	Symptoms are continuous walking, nervousness, mania, jaundice, frequent voiding of bile-stained feces. 2,4-D Ester (1-2 lb/ac) prebud gives excellent control.
Waterhemlock (<i>Cicuta maculata</i> L.)	Tall forb resembling a parsnip in flower & odor. Flowers are white, in umbrella-shaped clusters. Root-stalk is chambered & bears a cluster of tubers.	Wet meadows & along streams & seeps throughout Nebraska.	Cicutoxin, a very deadly resenoid. Concentrated in roots & rootstalk; also found in stems & leaves during early growth. Some losses through hay. No effective treatment.	Highly poisonous to all livestock, kills quickly. Most losses from cattle eating exposed roots. Leaves & stems lose toxicity as they mature.	Avoid grazing infested places. Symptoms are tremors, violent convulsions, frothing at the mouth, & staggering. Death follows shortly. Grub patches by hand or spray with 2,4-D (2 lb/ac).

CHEMICAL CONTROL OF POISONOUS PLANTS

Herbicides seldom eradicate poisonous plants, but together with proper grazing management, may help attain safe levels. Multiple chemical treatments may be needed to reduce the density of some species. While the cost of control may be high on a per acre basis, spot treatment of infested areas may be highly profitable. The cost of chemical control is often less than the cost of the livestock losses.

Herbicides may increase both the toxicity and palatability of poisonous plants (Williams and Cronin, 1963). Avoid herbicide drift on poisonous plants in adjacent pastures where livestock are grazing. Apply herbicides early in the season when plants are actively growing, not under drought stress, and have not flowered. The effect of herbicides is greatly reduced when plants begin to flower because the herbicides are not readily translocated. Drought stress will cause a substantial reduction in herbicide effectiveness.

If forage use restrictions are not included on herbicide labels, defer grazing until poisonous plants have dried or desirable vegetation has grown to provide a substantial forage source. This generally requires a minimum of three weeks. Usually, dead vegetation loses its toxicity, but certain plants such as *locoweeds* and *groundsels* may remain toxic even when dried.

The use of most herbicides requires that the applicator be certified. EC 85-130 A 1985 Guide for Herbicide Use in Nebraska, lists recommended herbicides. This circular also contains information on herbicide rates, carriers, and susceptible stages of plant development. Contact your local Extension agent for a copy.

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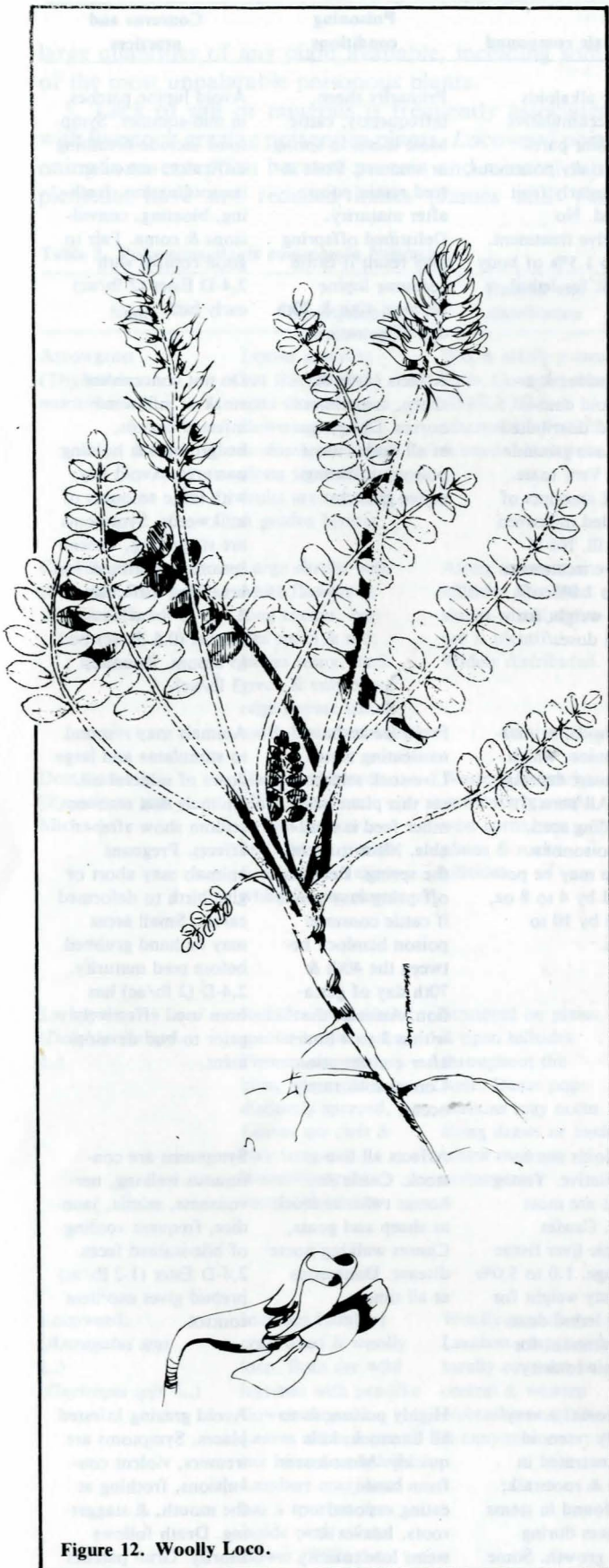


Figure 12. Woolly Loco.