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REVIEW ON POISONOUS AND INJURIOUS RANGE PLANTS IN THE NORTHWEST

INTRODUCTION

The purpose of this paper is to summarize in a very brief, general way some points concerning poisonous and injurious plants commonly found on the range in the Pacific Northwest.

Loss of range livestock from poisonous plants is an important factor in ranching. The number of poisonous plants occurring in the range area is great, and some of them have not been definitely analyzed. However, a general knowledge of the more common poisonous plants will be of value to those dealing with ranges and range livestock.

CLASSIFICATION

In general, there are several different methods by which poisonous plants can be classified. These include the following:

1. Botanical Method (The botanical classification system)

The following plant families, with a generic example of each, are those notable for the poisonous plant species they contain:

Liliaceas.....	Zigadenus	Death Camas
Chenopodiaceae.....	Halogeton	Halogeton
Ranunculaceae.....	Delphinium	Larkspur
Leguminosae.....	Lupinus	Lupine
Umbelliferae.....	Cicuta	Water Hemlock
Ericaceae.....	Leucothoe	Black Laurel
Solanaceae.....	Nicotiana	Coyote Tobacco
Compositae.....	Helenium	Sneezeweed

2. Chemical Method (The chemical nature and properties of the toxic principle)

Most poisonous plants contain toxic principles that belong to the following groups of chemical compounds:

- a. Alkaloids - These occur widely and are most common in the plants of the following families: Liliaceae, Ranunculaceae, Leguminosae, and Solanaceae. They occur in plants mostly in the form of oily or crystalline bases. Most alkaloids are decidedly bitter and repugnant to the human taste but may not affect livestock in the same manner.

- b. **Glucosides** - There are several groups of glucosides found in poisonous plants but the group that we are commonly concerned with is:

Cyanogenetic glucosides - found in Choke Cherry, Arrow grass, and others. In this, the toxic principle is Hydrocyanic or Prussic Acid.

- c. **Resinoides** - These are found in Black laurel (*Leucothoe*), Water hemlock (*Cicuta* spp), Whorled milkweed (*Asclepias* spp), and others.
- d. **Phytotoxins** - Found in Black locust (*Robinia pseudoacacia*).
- e. **Oxalates of sodium and potassium** - This occurs in many plants in insufficient quantities to cause poisoning. On occasion Greasewood (*Sarcobatus vermiculatus*) has been consumed in large enough quantities to cause death losses. Halogeton (*Halogeton glomeratus*) is the outstanding example of this category of poisons.

3. **Physiological Method** (The physiological action of the toxic principle)

This classification is difficult to use because so many toxins have complex actions and the effects of the same plant species may vary with the amount consumed.

- a. **Blood poisons** - Choke cherry and Black locust
- b. **Neurotic poisons** - Monkshood (*Aconitum*)
- c. **Neuro-muscular poisons** - Foxglove (*Digitalis*)
- d. **Muscular poisons** - False-Hellebore (*Veratrum*)
- e. **Irritants** - Poison ivy (*Rhus*)
- f. **Acute hypocalcemia** - Halogeton (*Halogeton*)

4. **Circumstantial Method** (The condition under which the poisoning is produced)

- a. **Plants causing poisoning by contact only (dermatitis)** - Poison ivy.
- b. **Plants causing poison only when taken into the digestive tract.** This includes most kinds of poison plants. Most poisonous plants are eaten by animals at a time of the year when other forage is scarce and they are forced to eat unpalatable plants. This may be true also on over-grazed areas and on ranges in poor condition.

Most poisonous plants are low in palatability and are not readily taken by stock.

- c. Plants varying in degree of poison from season to season - Cocklebur (*Xanthium*).

SPECIAL CONDITIONS REQUIRED

Some plants are poisonous or injurious only under special conditions. Some of these plants are listed below.

A. Dermatitic (Plants causing dermatitis)

Dermatitis is caused by a plant which poisons upon contact. It consists of minor or temporary irritations of the skin which may last only a few days or persist for several weeks. Animals are seldom, if ever, fatally poisoned in this way. Some individuals are more susceptible to this type of poison than others. Some common plants falling within this category are listed below with the part of the plant that usually causes dermatitis upon contact.

Tree of Heaven	<i>Ailanthus altissima</i>	Flowers, leaves
Catalpa	<i>Catalpa speciosa</i>	Flowers
Jimson Weed	<i>Datura Stramonium</i>	Leaves, flowers, fruit
Cow parsnip	<i>Heracleum lanatum</i>	Leaves
Goat weed	<i>Hypericum perforatum</i>	Leaves
Poison ivy	<i>Rhus toxicodendron</i>	Leaves, bark, fruit
Poison oak	<i>Rhus diversiloba</i>	Leaves, bark, fruit
Nettles	<i>Urtica</i> spp.	Leaves and stems

B. Photodynamic (Plants causing photosensitization)

Some plants contain certain substances which, when eaten by animals, sensitize them to light so that when they are exposed to bright sunlight they develop serious symptoms. Before this can take place, however, all the following conditions must be fulfilled.

- a. The animal must have white skin or be white, so as not to screen out certain light rays.
- b. The animal must eat enough of the plant to furnish the photodynamic substance.
- c. The animal must be exposed to bright sunlight after feeding on the plant.

The following common plants cause photosensitization:

Hypericum perforatum	Goat weed
Tetradymia canescens	Horsebrush
Tribulus terrestris	Puncture vine
Trifolium hybridum	Alsike clover

C. Cyanogenetic (Plants producing hydrocyanic or Prussic acid)

Many species of both wild and cultivated plants are capable of producing hydrocyanic or Prussic acid, which is highly poisonous. Under practical conditions, however, only a few are actually dangerous. Some of the more dangerous plants include: Choke cherry (*Prunus demissa*), Bitter or Black cherry (*Prunus serotina*), Sorghum (*Holcus sorghum*), Arrow grass (*Triglochin maritima*), Flax (*Linum usitatissimum*), Sudangrass (*Holcus sorghum sudanensis*).

Hydrocyanic acid is not found in any appreciable quantities in healthy growing plants. The acid develops only when the normal growth of the plant is retarded or stopped by drought, frost, bruising, trampling, wilting, mowing, etc. It is then formed by a chemical reaction between two substances within the plant, neither of which is poisonous alone, nor are they normally in contact with each other.

The potential acid content of a plant is affected by the stage of growth, climatic conditions, and soil. Younger plants and poorer soil both increase the potential acid content. Dried plants do not retain the acid but some seeds are especially poisonous, for example: immature flaxseed, ragoon beans, bitter almonds, peach kernels, and wild cherry bark.

Symptoms of hydrocyanic acid poisoning include a brief stimulation followed by depression and paralysis. Symptoms of colic often appear. Stupor, difficulty of breathing, frequent convulsions result from the action of the poison on the brain centers that control respiration. Death is caused by respiratory paralysis, the heart continuing to beat for some time after breathing has stopped. The acid acts very quickly, frequently killing the animal within a few minutes, although it may take several hours.

If the dose of this acid is enough to cause sickness in an animal, it is highly probable that the animal will die. Lethal doses are 6 grains (0.4 gram) for a horse, 14 grains for a cow, and 1.6 grains for a sheep. If a plant contains as little as 0.02 percent potential hydrocyanic acid, and if the animal eats it all rapidly, 5 pounds will be fatal for a horse or cow and 1.25 pounds would kill a sheep, if no factors enter in to prevent the development of the acid. But since many cyanogenetic plants contain 10 to 12 times as much potential acid as that just mentioned, a fatal dose may be comparatively small.

Preventive measures include the fact that the presence of some feeds in the stomach prevents the formation of the acid and lessens the danger markedly. These feeds include alfalfa hay, linseed cake, corn and other starchy feeds. The most dangerous plants are those in which the acid is already formed and the animal gets a dose of the acid already formed. Thus when an animal eats wilted cherry leaves, it receives a ready formed dose of poison, yet when normal unwilted leaves are eaten, the acid must develop in the stomach and may not be effective.

D. Oxalitic (Plants producing oxalates of sodium and potassium)

As early as 1901 it was discovered that certain salts such as sodium and potassium oxalate precipitated calcium out of the blood and caused increased irritability. Lowering the calcium of the blood produced an improper balance of minerals in the extracellular fluids and within the tissues of the cells. As a result, nerve stimuli are disturbed. If this drop in calcium is rapid, it is described as "acute hypocalcemia".

Plants producing sodium and potassium oxalates include greasewood and halogeton. Halogeton is by far the most dangerous in that the soluble oxalate content of the entire plant is high, ranging from about 5% to 28% with variations between sites and seasons of year. Highest oxalate content occurs in the early fall and the amount of reduction through winter is less if the plants are covered by snow. Leaves averaged 28%, seeds 8%, and stems 4% soluble oxalates in the winter grazing season.

Forced feeding trials showed that it required about 12 ounces of halogeton containing 8.7% soluble oxalates or about 1 ounce of soluble oxalates to cause death of a sheep when fed at one time after the animal had been fasted 36 hours. However, 18 ounces of plant or 1.6 ounces soluble oxalates caused death of a sheep when the animal had a normal fill.

Death is believed the result of asphyxia or heart failure brought about by muscular spasms.

When halogeton was fed with a calcium-fortified pellet as much as 2 pounds of halogeton was consumed at one time without harmful effects. When fed halogeton over a 12 hour period, tests showed no ill from effects of a consumption of 2.5 pounds containing 10.3% soluble oxalates providing that it was consumed along with range feed or a calcium supplement. Without the calcium supplement or range feed and on an empty stomach a sheep can tolerate only about 1.5 pounds in a 12 hour period.

The best pellet tested was composed of 83% alfalfa, 15% calcium carbonate, 2% molasses.

Attempts to correct the sudden loss of blood calcium by intravenous injections of calcium gluconate at various stages of poisoning were ineffective and merely prolonged the period from feeding until death.

Prolonged feeding of sub-lethal doses of halogeton or consumption of heavy doses just before lambing did not cause abortion and all ewes that survived produced lambs at the normal term of gestation.

Control by mechanical or chemical measures frequently increases the halogeton because of the resulting decrease in competing native vegetation, unless successful reseeding can be accomplished.

E. Toxic Seed (Plants producing poisonous seeds)

Many common plants, mostly of grain fields, produce herbage that may be eaten fresh or dry without harm, but the seeds contain a high concentration of toxic substances. In areas where these seeds constitute a large portion of the screenings from grain, it would be dangerous to feed the screenings to stock without mixing them with other feeds and diluting until harmless. Some of these common plants are:

Brassica spp.	Mustards
Lepidium perfoliatum	Field peppergrass
Linum usitatissimum	Flax
Polygonum spp.	Smartweeds
Sisymbrium altissimum	Tumble mustard

F. Seleniferous (Plants that absorb selenium from soil)

Certain range plants are able to absorb selenium compounds from soils from Cretaceous or Eocene shales in sufficient quantities to be poisonous to animals. "Alkali disease", predominant in South Dakota, results from eating small amounts over an extensive period, while "blind staggers", the acute type predominating in Wyoming, results from getting relatively large amounts of selenium in a short time.

Some common plants sometimes made poisonous by selenium are:

Astragalus (several species)	Vetch
Atriplex canescens	Salt-bush
Atriplex confertifolia	Shad-scale
Eurotia lanata	Winter fat
Grindelia squarrosa	Gumweed
Iva axillaris	Poverty weed
Thermopsis montana	Golden pea
Triglochin maritima	Arrow-grass

G. Odoriferous (Plants producing undesirable flavors in milk and milk products)

Achillea lanulosa	Yarrow
Allium spp.	Wild onion
Artemisia spp.	Sagebrush
Rumex spp.	Dock
Thlaspi arvense	Fan weed

H. Injurious (Plants causing mechanical injury)

Some plants, though not poisonous, possess hard sharp awns, spines, or thorns, causing mechanical injury to stock. The wounds about the mouth, eyes, feet, and in the alimentary tract may not only cause pain but act as channels for bacterial infections.

Some common plants having these characteristics are:

Bidens spp.	Begger's ticks
Bromus tectorum	Cheat grass
Bromus rigidus	Rip gut grass
Cenchrus spp.	Sandbur
Elymus caput-medusa	Medusia-head rye
Hordeum jubatum	Squirrel tail grass
Opuntia	Prickly pear
Stipa comata	Needle-and-thread grass
Tribulus terrestris	Puncture vine
Verbascum thapsus	Mullen
Xanthium spp.	Cockleburs (Poisonous too)

RELATED TO RANGE MANAGEMENT

In an attempt to clarify the classification of some of the common poisonous plants found in the range area in the Pacific Northwest from a practical range management viewpoint, the following grouping was made. This grouping separates the plants (1) by season in which poisoning from the plant usually occurs, (2) by class of livestock affected by the plant, and (3) by placing the plants in the approximate order of their relative importance for each class of livestock.

SPRING

Sheep

Death Camas
Choke Cherry
Water Hemlock
Lupine
Horsebrush
Greasewood
Cockleburs
Arrow Grass

Cattle

Low Larkspur
Hemlock
Death Camas
Choke Cherry
Arrow Grass
Cockleburs

Horses

Lupine
Water Hemlock
Death Camas
Cockleburs

SUMMER

Sheep

Death Camas
Water Hemlock
Black Laurel
Rhododendron
Coyote Tobacco
Sneezeweed

Cattle

Tall Larkspur
Water Hemlock
Bracken Fern
Coyote Tobacco
Sneezeweed

Horses

Water Hemlock
Coyote Tobacco

FALL

Halogeton
Lupine
Water Hemlock
Whorled Milkweed

Water Hemlock
Bracken Fern (in hay)
Whorled Milkweed
Halogeton

Lupine
Water Hemlock
Whorled Milkweed
Bracken Fern
(in hay)
Horsetail (in hay)

The following discussion covers a few of the more commonly encountered poisonous plants with which one should be quite familiar.

DEATH CAMAS

(Zygadenus spp.)

Occurrence.....The various species occur from slightly above sea level up to 12,000 feet in Utah. They grow in almost every type of soil and flourish in both dry and moist situations, sometimes even growing in water. Some species grow in patches but most of them grow among various other herbaceous plants. Usually most species seek sunlight, but a few prefer shaded sites.

Part of Plant

Causing Losses....Entire plant, even when dry.

Kind of

Poison.....Alkaloids.

Season of

Poisoning.....Spring and early summer.

Class of

Stock.....Sheep mainly, cattle sometimes, horses rarely.

Symptoms.....Salivation, nausea followed by vomiting, lowered temperature, staggering or prostration from weakness, difficult breathing, coma which may last for days before death.

Remedies.....No practical remedies.

Prevention.....This plant grows very early in the spring and is in full growth when grasses are just starting and other feed is scarce. Preventative measures include:

1. Avoid too early spring use of range so that animals have sufficient forage.
2. Avoid close herding.
3. Avoid overgrazing which results in slower spring growth of the principle forage plants the following year.
4. Recognize plants and stay away from them, avoid having a careless herder.

WATER HEMLOCK

(Cicuta spp.)

Occurrence.....Range from sea level to about 9,000 feet in elevation. Occur along streams, in swamps, ditches, wet meadows, boggy places, and in fresh, brackish, or saline marshes in almost every state.

Part of Plant

Causing Losses....Rootstocks, and roots especially, but also the foliage when young.

Kind of

Poison.....Resinoides and alkaloides.

Season of

Poisoning.....Spring, summer, and fall.

Class of

Stock.....Cattle, sheep, and horses (humans also).

Symptoms.....Frothing at the mouth, very violent convulsions and extending the legs, throwing back the head. Death results from respiratory failure.

Remedies.....No practical remedy known.

Prevention.....Grubbing infested areas, being certain to burn all the grubbed plants and rootstocks. If grubbing plants not practical, fence off the area from livestock. With sheep, herd off the infested area.

LOW LARKSPUR

(Delphinium spp.)

Occurrence.....Ranges from 1,000 to 10,500 feet elevation. Found growing in Aspen, openings of Lodgepole pine, Sagebrush, Oakbrush, Ponderosa pine, but more commonly in open grass-weed-brush areas from the desert to the foothills. Found in variety of soils, dry to moist, shallow and shady, gravelly or rocky, to deep richloams or heavy clays.

Part of Plant

Causing Losses....Entire plant, most acute up until flowering time.

Kind of Poison....Alkaloids.

Season of

Poisoning.....Spring.

Class of

Stock.....Cattle

Symptoms.....Sudden falling, repeated several times possibly. Constipation and nausea from contents of stomach getting into windpipe. Falling is usually with head down hill.

Remedies.....Turn animal so head is higher than rest of body and keep quiet as possible. Relieve bloating and constipation.

Prevention.....Keep animals off infested areas by riding or drift fences until danger period is past (flowering). Eradication of the denser patches (expensive).

TALL LARKSPUR

(Delphinium spp.)

Occurrence.....Ranges from 4,000 to timber line in elevation. Found growing on moist, well-drained sites in canyons, alpine meadows, along streams, and in snow drift pockets.

Part of Plant

Causing Losses....Entire plant, most acute up until flowering time.

Kind of

Poison.....Alkaloids.

Season of

Poisoning.....Early summer (on higher ranges).

Class of Stock....Cattle.

Symptoms.....Sudden falling, repeated several times possibly. Constipation and nausea from contents of stomach getting into windpipe. Falling is usually with head down hill.

Remedies.....Turn animal so head is higher than rest of body and keep as quiet as possible. Relieve bloating and constipation.

Prevention.....Keep animals off infested areas by riding or drift fences until danger period is past (flowering). Eradication of the denser patches (expensive).

CHOKO CHERRY

(Prunus spp.)

Occurrence.....Range from sea level to about 7,000 feet elevation. Found in sunny moist or relatively dry situations, in canyons, in open valleys, about springs, seeps, and other moist places. Usually occur on deep, rather fertile, well-drained soils, but also do well on rocky talus slopes and rim rocks.

Part of Plant

Causing Losses....Young leaves and shoots. Poison may not be effective until animals drink water.

Kind of Poison....Hydrocyanic acid.

Season of

Poisoning.....Spring.

Class of Stock....Sheep mainly, cattle sometimes.

Symptoms.....Animal becomes uneasy, staggers, falls, has convulsions, breaths with difficulty with tongue out. Death usually within less than an hour.

Remedy.....No practical remedy because of rapidity of action.

Prevention.....If necessary to take stock through a bad choke-cherry area, fill them up good first. Since losses occur mainly on areas where little other vegetation is available, overgrazing, close trailing, and central bedding all aggravate the losses. Avoidance of infested areas should be practiced whenever possible.

LUPINE

(Lupinus spp.)

Occurrence.....This is one of the largest, commonest, most wide-spread genera of western plants. They occupy a large variety of sites, extending from the plains, prairies, and foothills, to the stream courses, canyons, timbered areas, grasslands, and meadows of the mountains. Range from sea level to above timberline in elevation. Relatively few species in Pacific Northwest have significant poisoning records.

Part of Plant

Causing Losses....Pods and seeds mainly, but the foliage is also poisonous (especially poisonous during wet weather or after drinking).

Kind of Poison....Alkaloids.

Season of

Poisoning.....Fall mainly, when seeds are formed, and in the spring when foliage is young.

Class of Stock....Sheep mainly, but also cattle and horses.

Symptoms.....Frenzied actions, crazed, butting objects, frothing at mouth, difficult breathing. Drooping of the ears characteristic.

Remedies.....No medical remedy known.

Prevention.....Keep stock off infested areas in spring, and especially keep the sheep out of the Lupine patches in the fall and during wet weather.

COCKLEBUR

(Xanthium)

Occurrence.....On alkaline bottomlands, in moist waste places around barnyards and in pastures, along ditch and river banks, and on overflow areas of warm lakes, ponds, rivers.

Part of Plant

Causing Losses....Very young plants and especially the seeds (not burs).

Kind of Poison....Glucosides.

Season of

Poisoning.....When the cotyledons have just emerged and before the true leaves are formed the plant is highly relished and most poisonous. After the leaves are fully formed this plant is mildly toxic and seldom eaten because of the bitter taste that develops during growth. Seeds may germinate and produce young plants for an extended season if sufficient moisture is available.

Class of Stock....Sheep, cattle, horses, hogs.

Symptoms.....Depression, nausea, and vomiting, rapid and weak pulse, low temperature. Symptoms begin a few hours after plant is eaten and commonly continue only a few hours.

Remedies.....Fats and oils such as unskimmed milk, bacon grease, lard, linseed oil.

Preventatives....Destruction of the entire stand before seed maturity for two or more consecutive years. The plant is an annual producing 2 seeds per bur, both of which do not necessarily germinate the following year.

GREASEWOOD

(Sarcobatus vermiculatus)

Occurrence.....Most commonly on bottomlands having high concentrations of alkali. Also found on terraces of ancient lakes where soils are highly alkaline (pH about 8.6 and over).

Part of Plant

Causing Losses....Young stems and fresh leaves. Whole plant contains toxic material.

Kind of Poison....Sodium and potassium oxalates but not in as high quantities as in Halogeton.

Season of

Poisoning.....Spring. Little trouble in fall and winter.

Class of Stock....Sheep mainly. Some cattle.

Symptoms.....First, dullness, lowering of head, loss of appetite, reluctance to follow rest of herd. Followed by slight drooling and white froth on mouth and lips. Then loss of balance, incoordination, and muscular spasms, especially in hind legs. May lie down and stand up repeatedly. Lungs filled with blood, dark red or purple rather than normal pink.

Remedies.....Calcium carbonate fed prior to entering infested area. It has been found cheap, easy to pellet with alfalfa, harmless to the animal, and when fed prior to or with the halogeton, it is effective.

Preventatives.....Provide an abundance of other forage. Do not allow very hungry animals to graze exclusively on Greasewood.

FALSE HELLEBORE

(Veratrum californicum)

Occurrence.....Depleted mountain meadows and other moist bottomlands at higher elevations.

Part of Plant

Causing Losses....Bulbs probably most poisonous. Whole plant more or less toxic.

Kind of Poison....Alkaloids.

Season of

Poisoning.....Late spring, early summer.

Class of Stock....Sheep mainly.

Symptoms.....Not violently poisonous, possibly due to the unpalatability of the leaves which are acrid and burning. Poisoned animals are salivated. They vomit, show muscular weakness, tremors, and spasms. Death results from paralysis of heart.

Remedies.....Raw linseed oil may relieve irritation.

Preventatives.....Provide sufficient forage so livestock will not take amounts to cause sickness. Improve condition of meadows and bottomlands by management to reduce concentrated occurrence through natural plant competition.

HALOGETON

(Halogeton glomeratus)

Occurrence.....In the Intermountain and Great Basin areas in association with salt desert shrubs and sagebrush, at elevations up to 7,000 feet, from 2 to 20" ppt., and on soils both high in and relatively free of saline salts.

Halogeton thrives on arid lands, especially where soils have been disturbed or where native plant cover is sparse and in low vigor. Dense stands are found on

burns, abandoned fields, railroad rights-of-way, around watering places, bed grounds, driveways, along highway shoulders and road cuts.

Part of Plant

Causing Losses....All the plant including seeds.

Season of

Poisoning.....Summer, fall, winter.

Class of Stock....Sheep mainly.

Symptoms.....First, dullness, lowering of head, loss of appetite, reluctance to follow rest of herd. Followed by slight drooling and white froth on mouth and lips. Then loss of balance, incoordination, and muscular spasms especially in hind legs. May lie down and stand up repeatedly. Lungs filled with blood, dark red or purple rather than normal pink.

Remedies.....Calcium carbonate fed prior to entering infested area. It has been found cheap, easy to pellet with alfalfa, harmless to the animal, and when fed prior to or with the halogeton, it is effective.

Preventatives....Herd away from infested areas. Halogeton is sensitive to competition from a perennial plant cover. Range management that will allow recovery of the native perennials, supplemented by successful seedings of suitable areas, is the most practical.

REFERENCE

Anderson, E. William 1956 Review on poisonous and injurious range plants (mimeo) USDA Soil Conservation Service, Portland, Oregon 97205 (15 pg).