POISONOUS PLANTS OF COLORADO

L. W. Durrell and Geo. H. Glover

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*On leave, 1926-1927.
POISONOUS PLANTS OF COLORADO

L. W. DURRELL AND GEO. H. GLOVER

Over 19 million acres of agricultural land in Colorado are devoted to grazing, while 10 million additional acres within the national forests are grazed each year. Within this vast area grow a number of species of poisonous plants which are of special economic significance because of their injury to stock.

It is the purpose of this bulletin to describe the more important of these poisonous plants of the state that they may be recognized and areas infested with them avoided. Available knowledge concerning the poisonous properties of the plants is also given with remedial measures where these are known.

How to Send in Poisonous Plants for Identification

When sending in poisonous plants to the department of Botany for identification the following points should be observed:

1. Send a whole plant when possible—roots, leaves, stems and flowers, also fruit or seed when available. Identification is seldom possible from leaves or roots alone. Fragmentary samples are at best unsatisfactory and are often useless.

2. Select good specimens that are representative of the pests you are inquiring about.

3. Wrap in several thicknesses of moist newspaper, several more of dry wrapping paper, and if possible enclose in a pasteboard box, and send by mail. If the sample is too large to be mailed in one piece, cut it into several convenient lengths.

4. It will be helpful if a description of the place and manner of growth of the sample is also sent.

The department of Botany will gladly inform you of the name of your specimens. Address all samples and inquiries to

DEPARTMENT OF BOTANY,
Colorado Agricultural College,
Fort Collins, Colorado.
Range Management Determines Losses From Poisonous Plants

Overgrazing is either a direct or contributing cause of stock poisoning. This is the natural consequence of the eating off of the more palatable plants. Poisonous plants in general are not palatable and are eaten only under stress of necessity. Under conditions of over-grazing the grasses and other more tasteful plants are cropped to destruction, especially where too early use is made of the range and the poisonous plants, where present, over-run the range. Animals run on such over-grazed areas, especially in dry seasons, find little to feed on but poisonous species of plants.

The relation between the scarcity of food and losses from eating poisonous plants cannot be too forcibly emphasized. A number of plants ordinarily not considered poisonous, such as the fetid marigold (Dysodia papposa) and broom weed (Gutterizia sarothrae) under these condition may cause injury.

Larkspur and Milkweed poisoning is most likely to occur either during seasons of drought and short feed or on over-grazed areas. In either case the poisonous plants are the most conspicuous and attract the animal. Under similar conditions water hemlock roots are pulled up and eaten when ordinarily with plenty of forage they would not be touched.

Avoid Range When Plants Are Most Poisonous

Some plants are more poisonous at certain times and under certain conditions than at others and care in use of range at these times may avoid injury. Thus, common death camas is a spring plant which dries up after blossoming and disappears. Most cases of sheep poisoning from death camas occur in May and June when the plants grow in advance of the grasses and are eaten to exclusion of other plants.

The seeds of the lupines are especially poisonous and greatest harm comes from these plants late in summer when pods are full of seed. The seeds mature late in summer and most cases of lupine poisoning occur at that time. Lupine-infested areas should then be avoided. As the seeds frequently fail to mature in dry seasons there is in such years less chance for damage.

The low larkspurs are spring plants and in lower elevations disappear by July. If cattle are kept from ranges covered with them until July there is little danger of loss. The tall larkspurs blossom later and do not die till frost. After blossoming, however, they have lost much of their poisonous property. In general, the Colorado ranges are safe from larkspur poisoning by the middle of July. Larkspurs are also most poisonous when the leaves are wet from dew, rain or snow.
Rotation and Allotment in Use of Range

Some of the poisonous plants affect certain classes of animals and not others. Thus larkspur is most injurious to cattle; death camas to sheep; sneezeweed is harmful to sheep but not to horses.

Many losses may be prevented by placing upon the range those animals that will not be harmed by such poisonous plants as may grow there; thus larkspur ranges are available for horses and sheep.

Care in Driving or Bedding Animals

If animals are bedded for several nights in the same place they are liable to eat anything near the bedding ground. As the good food is exhausted, poisonous plants, if present, may be eaten. Where poisonous plants are growing it is safer to take a new bedding ground every night. This is not only advantageous in preventing poisoning but in preserving and maintaining forage, and preventing over-grazing.

The same principle applies to fixed drive-ways. These should be eliminated. Constant cropping of the palatable plants along such trails tends toward the increase of unpalatable kinds which in many cases are poisonous. Generally speaking, cattle and sheep should be drifted when moved from one pasture to another. A hurried animal grabs at food not ordinarily eaten and in this way it often eats poisonous plants. Animals taken directly from cars or pens are often hungry for green food and eat poisonous plants not ordinarily touched. Further, animals strange to a range are more liable to poisoning than native stock.

Eradication of Poisonous Weeds

The eradication of poisonous plants on the range is difficult. The application of chemicals such as sodium arsenite, salt or cyanamid are effective on small patches of weeds but are not applicable to large areas. Some of the chemicals used for killing weeds are dangerous because of their poisonous properties. Salt has been most generally used and is effective on such plants as brakeferns.

Close herding of animals, not injured by the poisonous weed, may be used to keep down the injurious species but is not very effective.

Destruction by digging, tho laborious, has proved the most satisfactory method of destroying weeds. The Forest Service has for a number of years been successfully grubbing out larkspur in the Colorado forest ranges. Areas of larkspur or water hemlock constituting poison areas can be cleaned up in this way. It is impracticable on the other hand, because of their great numbers, to eradicate death camas, lupines or sneezeweed in this manner.
PLANTS CAUSING MECHANICAL INJURY

Several grasses are common in Colorado which though not poisonous cause considerable injury to stock. These grasses are armed with spines or awns that get into the tongues and gums of the animals eating them, causing inflammation or ulcers.

**Sand Bur** (*Cenchrus tribuloides*). — The common sand bur (Fig. 1a) is an annual grass with long prostrate stems. The characteristic features of the plant is the spiny covering surrounding the seeds. The spines of this bur-like structure are stout and barbed. It is found growing throughout the lower altitudes in Colorado in sandy places. The seed matures July to September.

**Poverty Grass** or **Three-awned Grass** (*Aristida longiseta*). — A tufted grass (Fig. 1D) common to plains regions, growing about one foot tall. It is one of the chief grasses of the eastern plains section of the state. It is prevalent in over-grazed areas. The chief characteristics of this grass is the three-pointed beard or awn that tips the end of the mature seed.

**Porcupine Grass** (*Stipa spartea*) and **Needle Grass** (*Stipa comata*). — These two species of grasses are common to many sections of Colorado. They are tufted perennials. Each grain bears a long
beard or awn (Fig. 1C) which is twisted at the end and is very hygroscopic, twisting up in dry weather and untwisting in wet weather. The base of this grain is sharp pointed and covered with barbs. The seed of these grasses often work into the mouth parts of animals causing ulceration and also work into the hair or wool and the skin producing irritation.

**Wild Oats** (*Avena fatua*).—This is an annual plant resembling cultivated oats. It has long, slender stems usually taller than cultivated oats with which it is found growing. The grain is tipped with a long, bent awn and is covered with barb-like hairs at the base. Its action is like that of the needle grass and porcupine grass.

**Downy Brome Grass** (*Bromus tectorum*).—This grass is a short annual, usually growing about one foot tall. The leaves of the plant are soft and hairy and the flowering heads are slender and drooping. At maturity the plant becomes purplish in color. The plant is an introduced one, growing along roads and fences and in waste places. The long beards (Fig. 1E) frequently cause serious injury by getting under the teeth of animals causing inflammation and even loss of the teeth.

**Wild Barley or Squirrel-tail Grass** (*Hordeum jubatum*).—This grass is an annual or short-lived perennial. It grows six inches to two feet tall in bunches that become purple or silvery at maturity. The grass is common in low, wet places at the edges of ponds or swamps. It is found throughout the state up to 9000 feet elevation. The flowering head is about four inches long and equipped with long awns (Fig. 1B). The green plant can be eaten by stock but when mature the long beards cause injury. Mowing several times a season is necessary to prevent seeding.
POISONOUS HERBACEOUS PLANTS

There are a large number of poisonous herbaceous plants native to Colorado. These will be taken up alphabetically according to their common name.

Aconite (Monkshood)

Description.—Plant 3 to 6 feet tall, leaves and stems more or less hairy or stickly. Leaves large, cut into a number of segments (resembles larkspur leaf). Flowers blue to white, characterized by a hood-like cap. Fruit pod 3-parted, resembling pod of larkspur. Frequently confused with larkspur.

Where Found.—Chiefly in wet meadows and open woods in western part of state at altitude of 7,000 to 10,000 feet. Plants grow sparsely, not as prevalent as larkspur.

When Plant Appears.—Early summer to frost.

Poisonous Parts of Plant.—Chiefly seeds and roots.

Poisonous Period.—Most poisonous just before flowering.

Poisonous Principle.—Aconitin and aconin.

Animals Affected.—Sheep and horses most affected. Plants not much eaten and so sparse that they are of little importance in poisoning stock.

Symptoms of Poisoning.—Muscular weakness, irregular and labored breathing, weak pulse, bloating, belching, constant attempt at swallowing, pupils contracted or dilated.
Remedial Measures.—No specific antidote known. Inhala­tions of ammonia, camphor or sulfuric ether and hypodermic in­jections of digitalin or atropine stimulate breathing and tend to overcome the depression of the heart.

Arrow Grass

Other Common Names.—Sour grass, goose grass.

Description.—Plant with dark green leaves growing in clumps 6 to 12 inches tall. The leaves are somewhat glass-like but round, not flat as grass leaves. Flower stalks are slender and 12 to 30 inches long. Flowers very small and greenish, ar­ranged closely along the long flower stalk. Other species found in state, Trighlochin palustris.

Where Found.—Along the edges of sloughs espe­cially in wet salty places.

When Plant Appears. —Perennial, comes up early in spring.

Poisonous Parts of Plant.—Leaves have been shown to be poisonous both dry and green.

Poisonous Period.—Bel­ieved to be poisonous at any period of growth. Most effective on hungry animals.

Poisonous Principle. — Thought to be prussic acid. Prussic acid in com­bination to the amount of .02 to .6 per cent has been found in this plant.

Animals Affected.— Sheep and cattle.

Symptoms of Poison­ing. — Abnormal breath­ing, open mouth, jerking of muscles, convulsions.

Preventive Measures.—Avoid wet pastures where abundance of arrow grass is growing.

Remedial Measures.—Time between first appearance of symp­toms and death is too short to permit of treatment.
Death Camas

Other Common Names.—Poison sage, swamp camas, alkali grass, poison onion.

Description.—Camas is a perennial herb growing 4 to 18 inches tall, has grass-like leaves arising from a deep-seated bulb. Flowers yellowish-white, borne in close clusters at top of tall stalk. Plant often mistaken for wild onion, but has no odor.

Other Species in State.—Zygadenus elegans, scarcer and found in high altitudes.

Where Found.—On sandy plains as well as in foothills. Chiefly in moist, low places.

When Plant Appears.—In early spring before grass is well started. Flowers bloom by last of May after which the plants die down.

Poisonous Parts of Plant.—All parts poisonous.

Quantity of Plant Required to Poison.—One-half to two pounds.

Poisonous Period.—Poisonous throughout the life of the plant. Animals most generally poisoned by camas just before the plant blooms, especially where forage is scarce.

Poisonous Principle.—Zygadene.

Animals Affected.—Sheep more frequently poisoned than cattle or horses, due perhaps to the method of grazing.

Symptoms of Poisoning.—Frothing at the mouth, vomiting, exhaustion, rapid breathing, convulsions, death if large amounts are eaten. With small amounts animals may recover. Lambs may be affected from milk of ewes poisoned from eating camas.

Remedial Measures.—No reliable remedy. Potassium permanganate, 5 grains, alum sulphate 5 grains, in water and given as a drench is recommended as an antidote for sheep. Increase these amounts to 15 grains each for horses and 30 grains each for cattle. Chemicals can be kept in capsules ready for use.
Horse Tails or Scouring Rush

Description.—A green, erect perennial plant growing from 6 inches to 2 feet tall. There are 2 common species, one bushy and low growing (*Equisetum arvensis*) (Figs. 5A and B) and the other tall and slender, grass-like (*Equisetum laevigatum*) (Fig. 5C). The plants are characterized by their straight, leafless jointed stems, which are very brittle and harsh due to the large amount of silica in the tissue.

Where Found.—Common along stream banks and in damp meadows.

When Plant Appears.—From early spring until late fall.

Poisonous Parts of Plant.—All parts are poisonous, especially in dry hay. Hay with more than 25 per cent *Equisetum* especially dangerous.

Poisonous Principle.—Not known.

Animals Affected.—Chiefly horses, young animals especially susceptible.

Symptoms of Poisoning.—Unthriftiness, horses become thin, tremble, muscles waste; after 2 or 3 weeks if continued feeding on badly infested hay, animal loses use of limbs, staggers, extremities get cold; animal suffers from cold during winter. Symptoms are slow to appear.

Remedial Measures.—Stop feeding horsetail hay. Give one dose of physic, one quart of raw linseed oil; or an ounce of aloes, follow this by powdered Nux Vomica, 1 teaspoonful three times daily in feed.

Horsetail or Scouring Rush, *Equisetum arvensis*

A.—Vegetative stalk of *Equisetum arvensis*
B.—Fruiting stalks of *Equisetum arvensis*
C.—Tall Scouring Rush or Horsetail *Equisetum laevigatum*
Loco

Description.—White loco (*Aragallus albiflorus*). Perennial plant growing from a semi-woody root, leaves numerous and silky. Flowers white and pea-like in short clusters. Not considered injurious. Purple loco (*Aragallus lambertii*) (Fig. 6). Perennial, very short stem, leaves numerous arising apparently from the surface of the ground. Flowers purple to white. Wooly loco (*Astragalus mollisimus*). Much like the other locos, leaves covered with dense silky hairs.

Where Found. — Throughout the plains section.

When Plant Appears. — Early in the spring, blooming in May.

Injurious Parts of Plants. — All parts.

Injurious Period. — Injurious at any time.

Poisonous Principle. — Not known. Malnutrition or starvation possibly the cause.

Animals Affected. — Chiefly horses.

Quantity of Plant to Injure. — Large amount eaten over long period necessary to poison.

Symptoms of Injury. — Effects of loco slow. Several weeks before action takes place. Animals may acquire habit of eating loco plants. Acute symptoms, loss of flesh, irregularity of gait, erratic actions, incoordination.

Remedial Measures. — Eating of loco weed usually follows scarcity of forage. Remove animals from infested areas and feed on good ration. No antidote has been found. Affected animals should be given a physic. Fowler's solution of arsenic mixed with grain to be given as a tonic twice daily.
Lupines

Other Common Names.—Silver lupine, wild bean, blue bean.

Description.—Perennial plant 1 to 2 feet tall, growing in clumps. Flowers pea-like, blue to creamy. Pods silvery, hairy.

Where Found.—Plant grows at lower altitudes, more luxuriantly along streams, ditches and hillsides where there is seepage water.

When Plant Appears.—Early in May blooming in June.

Poisonous Parts of Plants.—Seed and pods. Plants remain green late and are eaten late in the season, danger then from seed and pods. Hay containing lupines is dangerous.

Poisonous Period.—Any time after formation of seed pods.

Poisonous Principle.—Lupinin, lupinidin and lupinotoxin.

Animals Affected.—Chiefly sheep. Other animals may be affected when a quantity of plants are eaten. Not much eaten when grass is available.

Symptoms of Poisoning.—Poisoning in acute cases is accompanied by cerebral congestion and great mental excitement. Animals become frenzied, violent spasms, in fatal cases death in convulsions. Chronic lupine poisoning more common, associated with liver disorder and jaundice.

Remedial Measures.—No specific remedy known. Avoid feeding lupines either on the range or in hay. If taken early, potassium permanganate may be effective as a chemical antidote in acute cases. After the poison has been absorbed the physiological effects may be counteracted by morphine and other sedatives.

Quantity of Plant Required to Poison.—Amounts from 7 to 24 pounds per hundred-weight necessary to poison horses. From ½ to 1 pound per hundred-weight in some cases reported causing death in sheep.
Purple Larkspur

Other Common Names.—Nelson’s larkspur, low larkspur. Stavesacre.

Description.—The purple larkspur is a perennial, growing 1 to 2 feet tall, leaves are divided into a number of narrow segments. Flowers blue, prolonged into a spur behind. This species is one of the low larkspurs, differentiated from the tall larkspurs by size, tall larkspur growing 1 to 5 feet tall with broad leaves not divided as finely as the low larkspur.

Where Found.—Low larkspur on open hillsides and parks, 4,000 to 10,000 feet altitude. Tall larkspur on forest ranges 8,000 to 11,000 feet.

When Plant Appears.—Low larkspur appears early in spring, dying down after flowering, first part of June in the lower altitudes. Tall larkspur appears in the middle of June, the time of flowering depending upon altitude. Tops remain alive until frost.

Poisonous Parts of Plant.—All parts of the plant poisonous.

Poisonous Principle.—Delphinin, which has a paralytic action on the heart and respiration. Other poisons present are delphisin, delphinoidin, and staphisagrin.
Symptoms of Poisoning.—Staggering when walking, falling, bloating, nausea, salivation, frequent swallowing, quivering of muscles. Death in convulsions. Differs from camas poisoning by paralysis without loss of consciousness.

Preventive Measures. — Grubbing out patches of larkspur most effective and complete eradication can be attained in three years. Avoid range where larkspur grows during spring and early summer. Pasture larkspur-infested ranges with sheep or horses early in the season, when plant is most dangerous.

Remedial Measures.—Hypodermic injection of physostigmin salicylate 1 gr., pilocarpin hydrochlorid 2 grs., strychnine $\frac{1}{2}$ grain, has experimentally proved very effective. Keep animals quiet, turn head up-hill, puncture if badly bloated, but do not bleed.
Sneezeweed

Other Common Names.—“Sunflower,” “Yellow weed.”

Description.—A perennial growing 1 to 3 feet high, one to several stems. When young the plant is often hairy, later smooth. Flowers are borne in clusters of one to several, orange colored with brownish centers. A composite, seeds are numerous and hairy.

Other Species. — False sunflower (*Helenium autumnale*).

Where Found. — In mountainous parts of the state, 7,000 to 12,000 feet elevation.

Poisonous Parts of Plant. — All parts poisonous. Dried plants less poisonous than green ones.

Quantity of Plants to Poison.—Poison accumulative, approximately 2 pounds per day for 20 days necessary to produce illness.

Poisonous Principle. — Dugalin, a toxic glucoside.

Animals Affected. — Chiefly sheep and cattle.

Symptoms of Poisoning. — Most prominent symptoms are general depression, coughing, weakness, irregular pulse, frothing at the mouth, more or less chronic vomiting (spewing). Death is not accompanied by convulsions.

Remedial Measures.—No medical remedy known. Extermination of the plant not practicable. Care must be used in grazing on infested range keeping animals from eating the plants.
Sorghum*

Other Common Name.—Cane.

Description.—Sorghum is an annual cultivated grass growing 4 to 8 feet tall and bearing large dense heads.

Other Different Species.—Johnson grass (*Andropogon hal-
apense*), Sudan grass (*Holcus suda nensis*). Other closely related varieties are kaffir, milo, feterita, durra, etc., all of this group of plants should be fed with caution as they may be poisonous under certain conditions.

Where Found.—Cultivated crop thruout eastern and southeastern part of state.

Poisonous Parts of Plant.—Leaves and stems.

Poisonous Period.—When fed green especially in a wilted or frosted condition in August and September just before frost; second growth plants and those stunted by drought are especially poisonous.

Poisonous Principle.—Prussic acid. Plants contain .002 per cent to .0037 per cent of the weight of the green plant. Combines with the hemoglobin in the blood to form a stable compound, cyan-hemoglobin.

Quantity of Plants Requested to Poison.—Under favorable conditions for development of poison, small quantities of the sorghum are injurious. The action of the prussic acid is very rapid, death occurring in a few minutes after eating. If the animal lives 30 minutes it may recover.

Animals Affected.—Cattle, sheep and goats chiefly.

Symptoms of Poisoning.—Small doses, dilation of pupils, paralysis of the tongue, secretion of saliva, muscular twitching, paralysis. Odor of prussic acid on the breath like odor of almonds.

Remedial Measures.—Wash out stomach with stomach pump. One to three ounces of ether diluted with water and given by drench is effective. Fresh air stimulates breathing. As prussic acid has a tendency to unite with organic substance, corn syrup or milk acts as an antidote. Recommend antidote to be kept on hand—can be made as follows: In a long-necked quart bottle put 1 pint of water and 1 ounce of sodium carbonate. In a second bottle 1 pint of water and ½ ounce iron sulphate. When used mix the two in the long-necked bottle and pour down animal’s throat.

Preventive Measures.—As sorghum poisoning acts so rapidly it is seldom that remedial measures can be used. Keeping animals away from green fodder and feeding sorghum only as well-cured hay are the best preventive measures.

*Andropogon sorghum.
Water Hemlock

Other Common Names.—Cowbane, poison hemlock.

Description.—Stout perennial 3 to 7 feet tall. The stem is hollow, smooth and green. The plant has a characteristic bunch of thick, spindle-shaped roots which contain a yellow secretion. They are further characterized by being divided internally into chambers by cross partitions. The leaves are large and divided, the lower leaf less divided than the upper leaves. The plant is readily confused...
with the cow parsnip \((Heracleum lanatum)\) and with the common wild parsnip \((Pastinaca sativa)\). The flowers are borne in white, umbrella-like clusters; the seeds are small. Differs from similar plants particularly by the cross partitions in the roots.

**Where Found.**—Thruout the state, 4,000 to 8,000 feet elevation. Along streams and ditch banks and in wet swampy places.

**When Plant Appears.**—Early in the spring, flowering in June to July.

**Poisonous Parts of Plant.**—Chiefly roots, a piece as large as a walnut is fatal to a cow or horse. Tops of young plants also dangerous.

**Poisonous Principle.**—Cicutoxin.

**Animals Affected.**—All classes of stock. Many cases of poisoning in people, mistaking it for wild garden parsnip.

**Symptoms of Poisoning.**—Acute abdominal pain, excitement, violent convulsions, spasmodic contraction of the muscles of the abdomen. An animal in great agony may beat its head violently on the ground. Spasms increase until animal becomes unconscious and dies.

**Remedial Measures.**—Poison so active that the animal may die in 15 minutes, usually before treatment can be given. Potassium permanganate. \((\frac{1}{2} \text{ to 1 dram completely dissolved in a quart of warm water, one dose for a horse of cow})\) might be tried. A quart of raw linseed oil for large animals. Morphine and chloral hydrate are indicated.
White Hellebore*

Other Common Name.—False hellebore.

Description.—A perennial plant arising from thick root stocks, 2 to 7 feet high. Leaves large and very broad with prominent parallel veins. Flower stalk tall. Flowers whitish, divided in six segments.

Where Found.—Not abundant in Colorado. Found in few localities in the western part of the state, 6,500 to 12,500 feet altitude.

When Plant Appears.—Early spring.

Poisonous Parts of Plant.—All parts considered poisonous, the seed especially poisonous.

Poisonous Principle.—Veratrin.

Animals Affected.—Plant acrid and bitter, not readily eaten by stock. Palatable to sheep after frost, when they eat it without apparent injury. Chickens have been known to be killed by eating seed.

Symptoms of Poisoning.—Depression of heart action and respiration. General paralysis, attempted vomiting, colic, shallow breathing, skin becomes cold, muscular tremors. Fatal doses produce convulsions and death.

Remedial Measures.—Tannic acid in alcohol, antidote. Hypodermic injections of strychnine or atropin to stimulate heart. Raw linseed oil may be given to relieve local irritation.

*Veratrum speciosum.
Whorled Milkweed

Description.—Perennial plant 1 to 2 feet tall, growing from a horizontal root-stock (Fig. A). Leaves narrow, in whorls, at joints of stem. Flowers greenish-white in spreading umbrella-like clusters. Seeds borne in cigar-shaped pods (Fig. C), tufts of silky hairs attached to seed. The whorled milkweed differs from the non-poison-

Other Species in State.—The low whorled milkweed (Asclepias pumila) (Fig. B). This species grows 3 to 8 inches tall.
**Where Found.**—In southern part of the state, thru the Arkansas Valley and in the foothills and plains south of Pueblo; also in southwestern part of state. Along roadsides, ditch banks and waterholes. *Asclepias pumila* is found in overgrazed pastures, in plains and foothills.

**When Plant Appears.**—Latter part of May and first of June. Blossoms first two weeks in July.

**Poisonous Parts of Plant.**—All above-ground portions.

*A. pumila* about \( \frac{1}{3} \) as poisonous as *A. galioides*.

**Quantity of Plants Required to Poison.**—*A. galioides*, 2 pounds per hundred-weight of animal. *A. pumila* .7 to 2.1 pounds per hundred-weight of animal.

**Poisonous Period.**—Poisonous at all times. Especially where forage is scarce. This is particularly true of *A. pumila* which is found on over-grazed pastures. The tall whorled milkweed is poisonous also as dried hay.

**Poisonous Principle.**—A toxic glucoside.

**Animals Affected.**—Sheep, cattle and horses.

**Symptoms of Poisoning.**—Dullness, followed by comatose state manifest 14 to 17 hours after feeding. Characteristic weakness of hind quarters, staggering. This is followed by convulsions at intervals until death. The heart beat is very rapid at first, rapidly becoming weaker. Pupils of the eyes dilated. Average period of sickness before death, *A. galioides* 4 hours; *A. pumila*, 48 hours.

**Preventive Measures.**—No specific antidote as yet known. Keep stock away from whorled milkweed patches. Eradication by digging advisable where patches of the weed are small. All the roots must be destroyed as it will send up new shoots if fragments of root are left in soil. The plants have an unpleasant taste and are not usually eaten by stock unless forage is scarce, such as in dry pastures or where plants may protrude thru the snow.
Woody Aster

Description.—This is a daisy-like plant three to six inches tall with white flowers with yellow centers. The plant grows from a strong woody root more or less branched at the surface of the ground, giving the plant a tufted appearance.

Where Found.—In northern Colorado in denuded or saline soils. Frequently found about lakes and ponds.

When Plant Appears.—Begins to leaf out about the first of May and blossom about June first.

Poisonous Parts of Plant.—All parts above ground.

Poisonous Period.—From the showing of the first leaves to the end of blossoming period.

Poisonous Principle. — Not known.

Animals Affected.—Sheep.

Symptoms of Poisoning. — Weakness of muscles of legs, animal falls down, weakening of muscles in the neck, quick pulse that later becomes weak, rise in temperature, labored breathing. Animal generally bloated, frequently bloody froth comes from the mouth and nose. Before death, complete prostration and unconsciousness. Death ensues from four hours to three or four days.

Preventive Measures.—No specific remedy known. Keep animals away from patches of asters.
Fungi

**Ergot.**—Ergot is commonly found on rye (Fig. A) and a number of native grasses (Fig. B). When fed to stock in large quantities serious injury results. The ergot can be recognized on the grain or grass heads as large, black, horny kernels. These are fungus growths and contain a poison "ergotin." Ergot poisoning may be acute if large amounts are eaten or the effect may be slow and accumulative where small amounts are eaten continually. The poison causes blood clotting in the small capillaries in the extremities of the animal, resulting ultimately in gangrene of the hoofs, or other parts. The poison also causes abortion. Animals recover if put on good feed in the early stage of the disease. Ergoty grass in native hay is particularly dangerous. Where ergoty grain is fed the ergot kernels can be floated off from the grain by dipping into 25 per cent salt solution.

**Corn Molds.**—Mouldy corn, particularly in silage, has frequently been reputed to cause stock poisoning. Corn in silos which are not tight may become moulded near cracks or joints in the silo. These superficial moulds sometimes cause scouring in animals eating such silage. Poisoning from mouldy corn is still a debatable question, as experiments do not indicate serious injury.

**Smut.**—Corn and different grain crops are subject to smut. These species of smut are sometimes suspected of causing poisoning. Experimental work, however, shows that large quantities of this smut can be eaten by animals without serious effect.
Plants Occasionally Poisonous or Suspected of Being Poisonous

Algae.—Green algae form the so-called scum on ponds and watering tanks. They are thought to be injurious to stock altho no definite evidence to this effect is known. They can easily be destroyed by a small amount of copper in the water. Copper sulphate or blue vitriol, 1 part in a million in the water is sufficient to kill them.

Black Locust (*Robinia pseudoacacia*).—A tree or tall shrub bearing white pea-like flowers in clusters, sometimes planted for windbreaks or shade. Bark and shoots of this plant are considered poisonous to stock.

Buckbean or Yellow Wild Pea (*Thermopsis divaricarpa*).—A tall perennial with three-parted leaves, and large yellow pea-like flowers. Found growing in dense patches along banks of streams 5,000 to 11,000 feet altitude. Blooms early in the spring. Suspected of being poisonous.

Buttercup (*Ranunculus sp.*).—Low-growing plants found around streams and edges of ponds. Several species of *Ranunculus* are considered poisonous. Thought to contain aconitin or delphinin. They produce colic and spasms in stock eating them.

Cattails (*Typha latifolia*).—Common cattail of the swamps, suspected of being poisonous.

Cockle bur (*Xanthium echinatum*).—An annual, stout-branching plant producing spiny burs. A weed in waste places, at road-sides in low altitudes. Plant contains a poisonous glucocide and in the seedling stage may be poisonous to hogs.

Cow cockle (*Saponaria vaccaria*).—A pink-flowered plant common to grain fields. Seed introduced as an impurity in grain. Contains the poisonous substance saponin which has the ability of destroying red blood corpuscles of animals eating it.

Darnel (*Lolium temulentum*).—The grain of this grass is poisonous. The plant sometimes is found as an impurity of grass seed or grain. Poisonous properties due to a microscopic fungus within the seed.

Ferns.—Brakefern (*Pteridium aquilinum*) is considered poisonous green and in hay. It can be eradicated from pastures by salt. Ferns are not common in Colorado.

Indian hemp (*Apocynum androsaemifolium*) and Small Dogbane (*Apocynum androsaemifolium*) are both found throughout our range and are looked upon with suspicion as being poisonous.

Jimson weed (*Datura stramonium*).—Rather stout plant 1 to 4 feet high with showy white tubular flowers and large oval prickly seed pods. Grows in waste places at low altitudes. Contains the poison alkaloids atropine and hyoscyamin. Rarely eaten by animals.
Milky vetch. — A leguminous plant common to Rocky Mountain region. Considered to be poisonous to sheep.

Nightshade. — The black nightshade and three-flowered nightshade are short bushy plants common to gardens and cultivated fields. They contain the poison solanin, but are not important as poisonous plants as stock rarely, if ever, eat them.

Rattlebox (Crotalaria sagittalis). — A hairy annual, 3 to 18 inches high with simple undivided leaves and yellow pea-like flowers. Contains a poison of unknown composition, found in leaves and seeds. Cattle and horses sometimes are killed by eating it in hay. Symptoms of disease like loco.

Snow-on-the-mountain (Euphorbia marginata) (Fig. 17). — A bright green, erect annual, 1 to 4 feet high. Upper leaves with white margins. Plant contains a milky acid juice. It is frequently found in over-grazed pastures, along roadsides and waste places. Generally considered poisonous.

Wild Cherry (Prunus sp.) (Fig. 14). — Leaves of the common wild cherry are poisonous, especially when dry or partially wilted. They contain, under such conditions, prussic acid. Animals should be prevented from browsing on the leaves of this plant. (See Sorghum for prussic acid poisoning.)
Greasewood (*Sarcobatus vermiculatus*).—Shrub 2 to 3 feet high with stiff rigid branches frequently spiny, bark smooth and white. Leaves narrow, thick, from 1 to 2 inches long, pale green color. Flowers small, inconspicuous and greenish. Plant grows in dry alkali flats. It is strongly suspected of being poisonous at times.

**Juniper** (*Juniperus communis*).—Oil from berries of Juniper yield a poison. There are four species of Juniper in the state including the above-mentioned species. They are regarded with suspicion but no authentic cases of poisoning are recorded.

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**Poison Ivy or Poison Oak** (*Rhus rydbergii*) (Fig. 15).—This is sometimes known as three-leaved ivy. A low shrub plant about 1 to 2 feet high. Unlike the eastern ivy it does not climb nor creep. Grows in rather moist places and is poisonous to the touch. Of little significance as far as stock poisoning is concerned.
Scrub Oak.—There are a number of species of scrub oak in Colorado. They are small trees or shrubs, usually growing in dense clumps in the foothills. They are known to be poisonous tho but a small percentage of the animals browsing on them are usually affected. Most injury is in the spring when the young leaves are attractive and other forage scarce. Some cases of so-called oak poisoning are no doubt caused from eating larkspur growing about the clumps of oak.

Colorado Rubber Plant. *Hymenoxys floribunda* (Fig. 16).—Small, bushy plant, arising from a thick woody stalk, about a foot tall. Leaves very narrow and divided, found in dry soil at elevations from 4,000 to 10,000 feet. The plant is not known to contain any poison tho several cases of poisoning of sheep due to the weed have been reported from the southwestern part of the state. It is thought that the injurious effects are due to impaction or mechanical injury.