Cyanogenic Glycosides

Cyanogenic glycosides are present in many plants and are converted to hydrogen cyanide or prussic acid when plant cells are damaged. The concentration of cyanogenic glycosides within a plant is variable: growth stage, moisture and time of day can all influence plant cyanogenic glycosides levels. Fertilization and herbicide application can increase cyanogenic glycoside concentrations. Chronic cyanide poisoning from eating sublethal doses over time causes loss of nerve function. Acute cyanide poisoning causes sudden death. Care should be taken to remove the plants containing cyanogenic glycosides from pastures.

Common Pasture Plants Affecting the Nervous System	
Acroptilon repens	Russian knapweed
Apocynum cannabinum	Hemp dogbane
Centaurea solstitialis	Yellow star thistle
Cicuta douglasii	Western water hemlock
Conium maculatum	Poison hemlock
Daucus carota	Wild carrot
Delphinium spp.	Larkspur
Prunus spp.	Black cherry & Chokecherry
Trifolium spp.	Clover
Triglochin spp.	Arrowgrass

Oregon State University OSU Extension Service

Provided by Karin Neff, Andy Hulting, Mylen Bohle and David Hannaway

Russian Knapweed, *Acroptilon repens*

Identification: Creeping perennial with erect, branched stems from one to three feet. Young stems are softly pubescent. Lower leaves with toothed margins. Upper leaves with entire margins and stiff hairs. Lavender flowers in thistle-like heads with papery, spineless bracts. Whiteish seeds and papus remain in seed heads.
Habitat: Cultivated fields, pastures and roadsides
Animals Affected: Horses
Toxin Family: Sesquiterpene lactones (neurotoxin)
Other: Causes the formation of lesions and eventually affects horses' ability to chew ("Chewing disease"). An increased tonicity of facial muscles causes horses to have a wooden expression. A lack of coordination of chewing muscles can cause frothy saliva, resembling rabies. Symptoms are very similar to yellow star thistle, but it appears Russian knapweed is more toxic, requiring a shorter feeding period to cause disease.

Oregon State University OSU Extension Service

Provided by Karin Neff, Andy Hulting, Mylen Bohle and David Hannaway

Hemp Dogbane, *Apocynum cannabinum*

Identification: Perennial, growing up to six feet. Leaves opposite or whorled, oblong and entire. Stems often red and exude milky sap. Small white-ish flowers arranged in clusters at branch ends. Fruit is a long (3-8 inches), narrow pendulous pod, hanging in pairs, reddish-brown at maturity. Seeds have tufts of hair, similar to milkweed.
Habitat: Roadsides, waste areas, open spaces and non-cultivated agricultural lands; along streams and irrigation ditches
Animals Affected: Especially horses
Toxin family: Dogbane contains the glycosides apocynin and cymarin in the milky sap (resin), contained in all plant parts.
Other: Can cause cyanogenic glycoside poisoning. Livestock are rarely poisoned by dogbane, and will eat it only when lacking other forages.

Oregon State University OSU Extension Service

Provided by Karin Neff, Andy Hulting, Mylen Bohle and David Hannaway

Yellow Star Thistle, *Centaurea solstitalis*

Identification: Two- to Three-foot annual; flowers July-August. Rigid branching stems covered with cottony hairs. Lobed basal leaves. Stem leaves entire and covered with cottony hair. Yellow flowers; single at branch ends and with 3/4" thorny bracts. Germinates fall and spring.
Habitat: Grasslands, rangelands, pasture, crop edges, roadsides and disturbed areas
Animals Affected: Horses
Toxin Family: Neurotoxins
Other: Horses get "Chewing Disease" (inability to chew). Plant is toxic when green and dried and horses will develop a preferential liking for the plant. Horses must eat large quantities for toxins take effect. The plant is not toxic to sheep or cattle, which can be used for control.

Oregon State University OSU Extension Service

Provided by Karin Neff, Andy Hulting, Mylen Bohle and David Hannaway

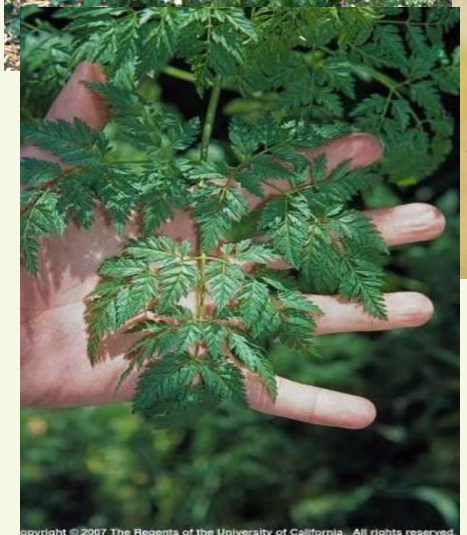
Western Water Hemlock, *Cicuta douglasii*

Identification: Perennial up to 2 meters tall. Stems with purple blotches. Stems are hairless and hollow, with compartments near the base. Alternate compound leaves, leaflets with toothy margins. Flowers in white-greenish umbrella-shaped umbels
Habitat: Shallow ponds, swamps and marshes, irrigation ditches.
Animals Affected: Humans and all livestock, but primarily cattle
Toxin Family: Cicutoxin (a neurotoxin) contained in all plant parts: leaves and stems highly toxic in spring, decreasing as plant matures. Root is especially toxic always.
Other: Causes rapid onset of muscle tremors and convulsions. Death occurs within hours of consumption. **One of the most poisonous plants in N. America; removal of Western water hemlock from pastures should be a priority.** Plants are generally easily removed by pulling and should be burned. Plants should be removed before setting seed, as that is their primary reproductive tactic. Spraying can increase palatability before plant dies.

Oregon State University OSU Extension Service

Provided by Karin Neff, Andy Hulting, Mylen Bohle and David Hannaway

Poison Hemlock, *Conium maculatum*



Identification: Three- to seven-foot biennial. Blooms early summer. Erect hollow branching stems, alternate leaves, pinnately dissected and fern-like. Flowers in compound, flat-top umbel. Enlarged taproot. Reproduces prolifically by seed.
Habitat: Waste areas, roadways, ditches, pastures and edges of cultivated fields
Animals Affected: Humans and all livestock
Toxin Family: Piperdine alkaloids (neurotoxins); all plant parts are poisonous.
Other: Causes repertory failure and paralysis, leading to coma and death. Can cause skeletal defects in calves if eaten in small amounts by pregnant cows. Strong odor prevents palatability unless no other forage available.

Oregon State University OSU Extension Service

Provided by Karin Neff, Andy Hulting, Mylen Bohle and David Hannaway

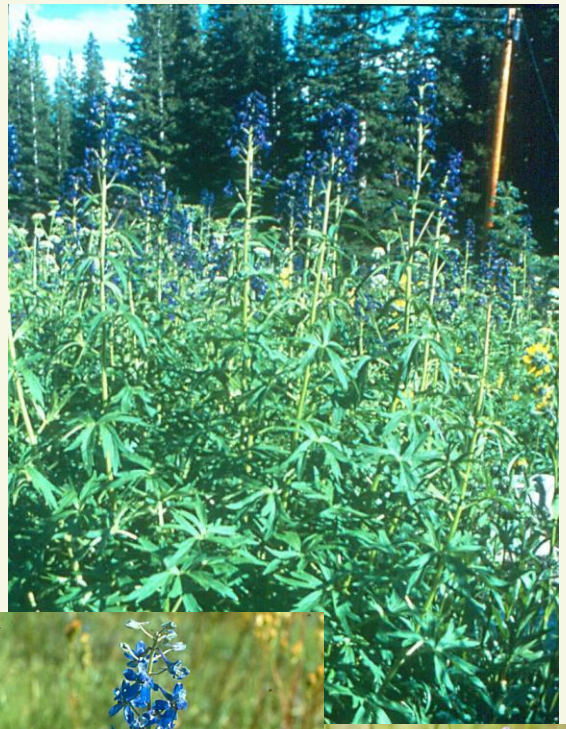
Wild Carrot, *Daucus carota*

Identification: Two- to four-foot biennial. Remains a rosette the first year, and flowers the second. Stems are erect and hollow, with stiff hairs. Leaves are alternate, stalked near base and sessile above; twice-pinnately compound with short hairs. Tiny white flowers grow in flat-topped umbels. Strong carrot odor.
Habitat: Roadsides, pastures, waste areas
Animals Affected: All livestock
Toxin Family: Neurotoxin, photosensitization
Other: Toxic only if large quantities are eaten. May be a skin irritant also. Graze infested areas only if abundant forage is available or late in the season and avoid grazing during the “toxic window”.

Oregon State University OSU Extension Service

Provided by Karin Neff, Andy Hulting, Mylen Bohle and David Hannaway

Larkspurs, *Delphinium* spp.



Identification: At least 60 species exist in the West, from Alaska to Mexico. It is best to assume all are toxic. Generally, palmately-lobed leaves clustered around base. Hollow stems. Showy flowers, generally blue to purple with distinct, prominent spur; produced on terminal, erect racemes.

Habitat: Pastures, rangeland

Animals Affected: especially cattle, horses and sheep affected if consume vast quantities and are under stress.

Toxin Family: Diterpenoid alkaloids Most toxic early in the season, and young leaves are palatable.

Other: Tall larkspur becomes more palatable once stem elongates and flowers are produced (toxin is reduced later in the season, though seeds remain highly toxic). A “toxic window” occurs between stem elongation and seed set – plants are palatable and still toxic. Low larkspurs are most palatable early in the spring, when they are most toxic. By the time low larkspur flowers, there is enough other forage to reduce cattle’s interest. Poisoning leads to muscle weakness and paralysis. Rapid bloating in cattle, often they fall down with head pointed downhill. Death is rapid. Graze infested areas only if abundant forage is available or late in the season and avoid grazing during the “toxic window”. **Larkspurs cause more fatalities of cattle in the western US than any other native plant.**

Oregon State University OSU Extension Service

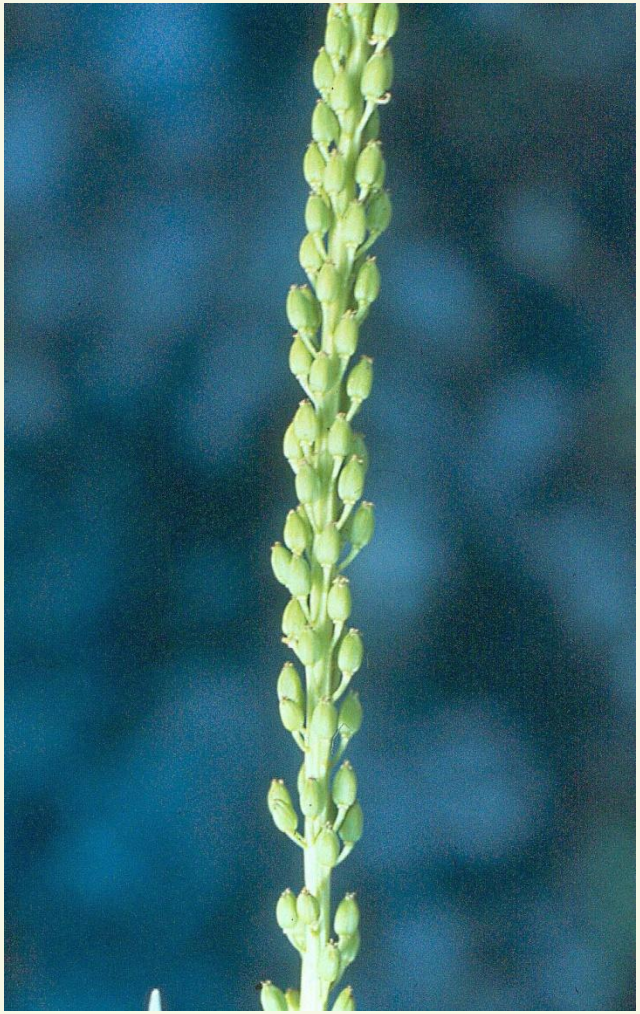
Provided by Karin Neff, Andy Hulting, Mylen Bohle and David Hannaway

Black Cherry & Chokecherry, *Prunus* spp.

Prunus serotina –Black cherry
Identification: Woody shrub or small tree with gray bark and obvious horizontal lenticels. Leaves are dark green and shiny above, paler below and are finely serrated, oblong to lance-shaped, with very small inconspicuous glands on petiole. Leaves usually have a dense yellowish-brown, sometimes white pubescence along mid-rib. Small white flowers in drooping raceme. Edible dark purple to black fruits (seeds are toxic).
Prunus virginiana –Chokecherry
Identification: Woody shrub or small tree with gray bark and obvious lenticels. Leaves ovate, finely toothed and rounded at the tip with glands on the petiole. Inflorescence is a cylindrical raceme of white, fragrant flowers. Edible dark purple to black fruits (seeds are toxic).
Habitat: Forest edges, clearings, draws
Animals Affected: Ruminants
Toxin Family: Cyanogenic glycosides found in seed and leaves, bark and shoots.
Other: Causes cyanide poisoning. Largest succulent leaves are most toxic. Wilted leaves and new growth are also highly toxic. Do not plant near animal enclosures.

Oregon State University OSU Extension Service
Provided by Karin Neff, Andy Hulting, Mylen Bohle and David Hannaway

Arrowgrass, Triglochin spp.



Identification: Succulent, fleshy perennial “grass-like” plant. Long, linear basal leaves. Small inconspicuous greenish white flowers in a terminal pediceled raceme, appearing as an unbranched flower spike. Fruit a 3-6 celled golden pod that splits when mature.
Habitat: Marshes, wet alkaline areas, native meadows, irrigated pasture
Animals Affected: Primarily cattle and sheep
Toxin Family: Cyanogenic glycosides
Other: Symptoms include respiratory failure. All plant parts are toxic when green. Toxins are especially concentrated in the leaves under drought conditions and early spring. Fresh hay is toxic, but loses toxicity with increased storage. Highly palatable.

Oregon State University OSU Extension Service

Provided by Karin Neff, Andy Hulting, Mylen Bohle and David Hannaway