Poisonous Native Plants and Noxious Weeds

Dr. Tony Knight
College of Veterinary Medicine & Biomedical Sciences
Colorado State University
What is the most poisonous plant based upon the quantity of toxin necessary to fatally poison an animal or person?

Castor Bean – *Ricinus communis*
Factors predisposing plant poisoning

Lack of adequate forage
Time of year
Drought
Adaptation to new plants
Snow cover
How great a risk is there in this pasture?
“It is the dose that makes the poison”
(Peracelsus 1555)
Variation in susceptibility to plant poisoning
‘The dose makes the poison’
Invasive and Noxious Weeds of Montana

**Acroptilon repens**
Cardaria draba
Centaurea diffusa
**Centaurea solstitialis**
Centaurea maculosa
Chondrilla juncea
Cirsium arvense
Convolvulus arvensis
Crupina vulgaris
**Cynoglossum officinale**
Euphorbia esula
Hieracium aurantiacum
Hieracium spp.

**Iris pseudacorus**
Isatis tinctorum
Lepidium latifolium
Chrysanthemum leucanthemum
Linaria dalmatica
Linaria vulgaris
Lythrum spp.
Myrophyllum spicatum
Potentilla recta
Ranunculus acris
**Senecio jacobea**
Tamarix sp.
Tanacetum vulgare
Poisonous Native Plants

To name but a few...

• Locoweeds
• Larkspur
• Veratrum
• Death camas
• Sage
• Ponderosa
• Snakeweed
• Water hemlock
What is the most poisonous Native Plant in Montana?

Water Hemlock
*Cicuta maculata*
Water Hemlock
*Cicuta spp.*
Water Hemlock
\textit{(Cicuta maculata)}

4 species Indigenous to North America

Marshy habitat

Root is the most toxic

Poisonous to all animals
Water Hemlock Roots (Cicuta maculata)

Cicutoxin $\text{C}_{17}\text{H}_{22}\text{O}$

- Blocks ion channels
- Inhibits GABA
- Violent Convulsant

$2\text{gm/kg b.w lethal}$
Poison Hemlock
Conium maculatum
Poison Hemlock
Conium maculatum

Biennial noxious weed
Coniine alkaloid
Neurotoxic
Teratogenic

Lethal dose >0.5% of b.w.
Foothills Death Camas
Zigadenus paniculatus
Meadow Death camas
Zigadenus venenosus
Mountain or Elegant Death Camas
Zigadenus elegans
Milkweeds

(*Asclepias* spp.)
Milkweeds
Asclepiadaceae

Asclepias speciosa
Whorled Milkweed
Asclepias subverticillata

Showy Milkweed
Asclepias speciosa
Dwarf milkweed
Asclepias pumilla

- Throughout North America
- Narrow leafed species, most toxic
- Principal Toxin: Cardenolides
  Digitalis-like glycosides
- All animals susceptible
- >2%. toxic
- Toxic in hay

Dwarf milkweed
Asclepias pumilla
Photosensitization
Unpigmented skin

UV Light
St John’s wort
*Hypericum perforatum*

A Noxious Weed of the North Western States

Other Primary Photosensitizers

Buckwheat (*Fagopyrum esculentum*)
Spring parsley (*Cymnopteris spp.*)
Secondary photosensitivity
- Poor prognosis
  80% liver damaged
Hounds tongue
(Cynoglossum officinale)

Pyrrolizidine alkaloids

Noxious Weed
Hounds Tongue
*Cynoglossum officinale*
Senecio, groundsel

Pyrrolizidine alkaloids
Pyrrolizidine Alkaloids 

Liver 

Phyloerythrin 

Unpigmented skin 

Secondary Photosensitization
Treatment
White locoweed
Oxytropis sericea

Purple locoweed
Oxytropis lambertii
Endophyte Embellisia spp.

Swainsonine

Endophyte Embellisia spp.
Embellisia spp.
Two-grooved Milk Vetch
Astragalus bisulcatus
Russian Knapweed
Acroptilon repens

Affects only horses. Inability to bite off and chew food.
Russian Knapweed
*Acroptilon repens*

Spotted Knapweed - *Centaurea maculata*
Russian Knapweed
Acroptilon repens

Affects only horses.
Inability to bite-off and chew food.
Must eat 50-60% body weight
Irreversible brain damage
Yellow star thistle
*Centaurea solstitialis*

Noxious annual weed
Present in most States
Affects horses only, causing inability to prehend and chew food.
Irreversible brain lesions
Sudden onset of signs:
Inability to bite-off and chew food
Can swallow.
No treatment

‘Chewing Disease’
Nigropallidalencephalomalacia
Delphinium glaucescens
Delphinium. geyeri

D. nuttallianum

D. barbeyi
Larkspur Poisoning

Diterpenoid alkaloids

Most toxic pre-flowering

Tall larkspurs most poisonous

Cattle < horses < sheep

Death due to paralysis and rumen bloat
Larkspur Poisoning

Sudden death
Staggering gait
Bloat
Respiratory failure
Larkspur Control

Herbicides
Picloram (Tordon)
Metsulfuron (Escort)

Biological controls
Black Henbane
*Hyoscyamus niger*
Black Henbane
Hyoscyamus niger

- Noxious biennial weed
- Toxic alkaloids
- Clinical Signs
  - Intestinal stasis
  - Colic
  - Dilated pupils
  - Respiratory failure
  - Halucinations-Seizures
Leafy Spurge

*Euphorbia esula*

(*Tithymalus uralensis*)

- Noxious invasive weed
- Perennial
- Spreads via roots and seed

Toxins – diterpenoid esters

- Skin irritant
- Unpalatable to cattle/horses
- Sheep & goats graze it well
Selenium Toxicity

Selenium-rich soils

Selenium Toxicity
Prince’s plume
Stanleya pinnata
Woody Aster
*Xylorrhiza gabriuscula*

Obligate selenium accumulator
Two-grooved Milkvetch

- Selenium accumulator - a Se indicator plant
- Locoism
Selenium toxicity

Se displaces S in the formation of the keratin, the major protein of hoof and hair.
Chronic selenium poisoning
“Alkali Disease”
Chronic Selenium Toxicity

Courtesy Connee Quin
Prevention of Chronic Se Poisoning

Ensure adequate Copper in the ration and/or mineral supplement.

Provide Sulfur in the diet

Alfalfa
References

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* A Guide to Plant Poisoning of Animals in North America
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  J. Stubbendieck, M.J. Coffin, L.M. Landholt
* Weeds of the West
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** http://southcampus.colostate.edu/poisonous_plants
Noxious Weeds

Leafy Spurge – *Euphorbia esula*

Montana Noxious Weed List
A Guide to Plant Poisoning of Animals in North America

A. P. Knight & R. G. Walter

Teton New Media
P.O. Box 4833
Jackson
Wyoming 83001-9965
Toll free 877 306 9793

WWW/southcampus.colostate.edu/poisonous_plants
Questions?