

Toxic Plants in the San Joaquin Valley and surrounding area

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(Theresa Becchetti presenting)

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Grazing Behavior

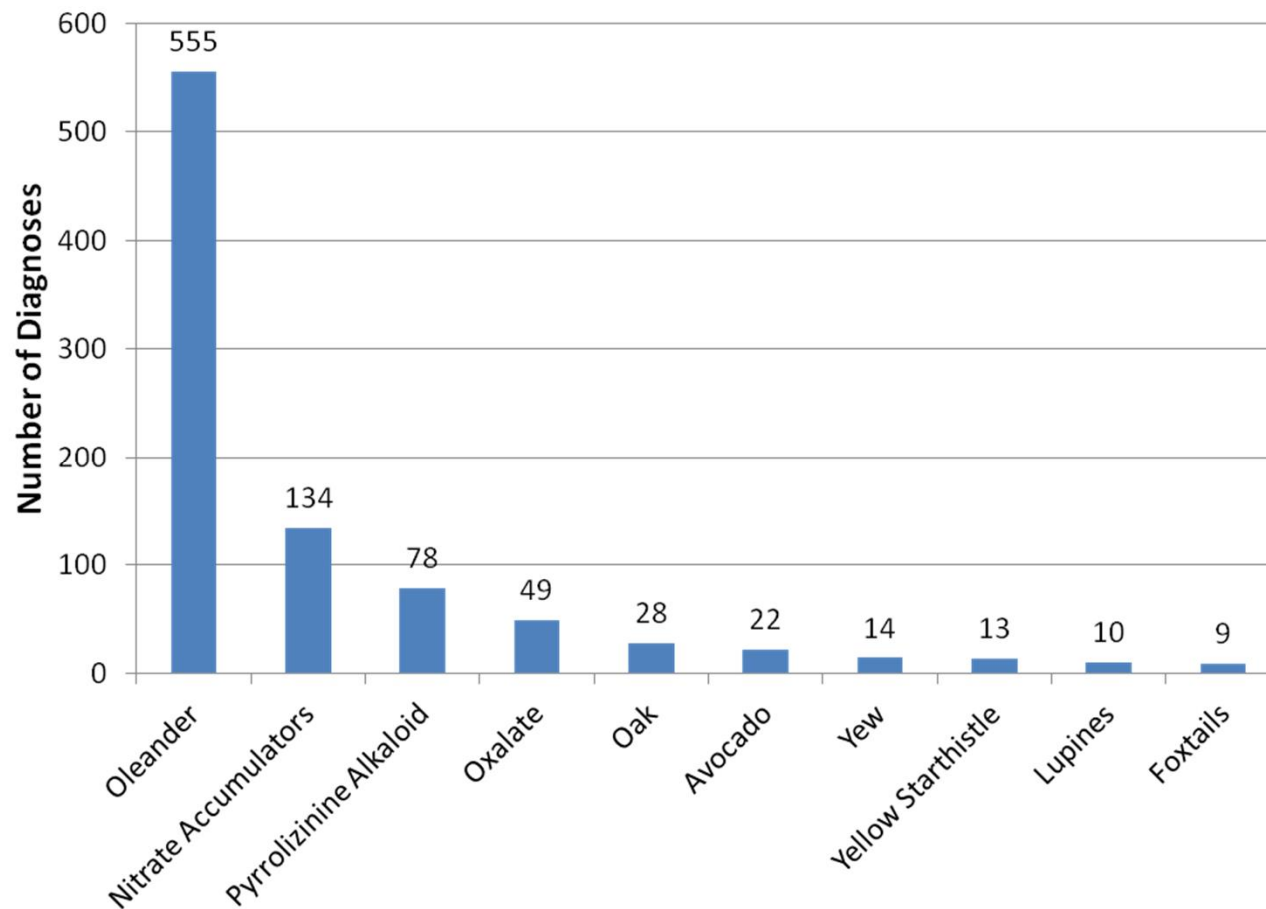
- “ How do livestock learn what to eat?
- “ Most animals avoid toxic plants
- “ Usually, an animal must be very hungry before it will eat a toxic plant
- “ There are exceptions to every rule. Some animals get curious



Overview of Plant Toxins

- “ Toxic plants contain a number of different toxins that can affect an animal including:
 - . Nitrates/Nitrites
 - . Pyrrolizidine Alkaloids and other Alkaloids
 - . Tannins
 - . Cyanide
 - . Oxalates
 - . Thiaminase
 - . and more...
- “ Each toxin produces a different response in the animal
 - . Varies by species
 - . Can vary based on plant consumed, plant parts, amount consumed, weight of individual and time of year

Recorded Livestock Poisonings (17+ years) Vet School Lab Data



Chokecherry (*Prunus virginiana*)



- ” Toxin – Cyanide
- ” Species affected – Cattle, Sheep, Horses, Goats and Humans
- ” Habitat – Along streams, in damp places and in woody, brushy areas
- ” Symptoms
 - Sudden death
 - Salivation
 - Heavy Breathing
- ” Wilted leaves are toxic and any plant cuttings should be removed from areas where livestock graze

J. E. (Jed) and Bonnie McClellan © California Academy of Sciences

Cocklebur

(*Xanthium strumarium* and *spinosum*)

- “ Toxin – Glycosides
- “ Species affected – Cattle, sheep, horses, pigs, goats, and humans
- “ Habitat – Disturbed, moist places
- “ Symptoms
 - . Sudden death
 - . Staggering/weakness
 - . Coma
- “ Toxic compound concentrated in germinating plants. Livestock most often poisoned though consumption of contaminated hay or grains



Curly Dock (*Rumex crispus*)



- ” Toxin – Oxalates, Nitrates
- ” Species affected – Cattle and sheep, horses to some extent
- ” Habitat – common in irrigated pastures and other moist areas
- ” Symptoms
 - . Sudden death
 - . Salivation
 - . Incoordination
- ” No effective treatment, symptoms can appear within 5 hours of consumption

Death Camas (*Toxicoscordion* spp.)

- ” Toxin – Alkaloids
- ” Species affected – Cattle, sheep, horses, goats, and humans
- ” Habitat – moist, grassy places
- ” Symptoms
 - Sudden death
 - Excess salivation
 - Staggering
- ” Toxicity varies with stage of growth
- ” Member of the lily family



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Dogbane/Indian Hemp (*Apocynum* spp.)



- ” Toxin – Cardiac glycosides
- ” Species affected – Cattle, sheep, horses and goats
- ” Habitat – Moist areas
- ” Symptoms
 - Sudden death
 - Diarrhea
- ” Plants are generally only consumed when dried in hay because they are bitter
- ” Toxins are similar to those found in Oleander

Fiddleneck (*Amsinckia* spp.)



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- ” Toxin – Pyrrolizidine alkaloids
- ” Species affected – Cattle, sheep, horses and goats
- ” Habitat – Sandy, open places
- ” Symptoms
 - Weight loss
 - Inappetance
- ” “Nutlet” seeds and dried plant material is most toxic, any fiddleneck in hay is a concern
- ” Sheep and goats are generally less affected than cattle and horses

Foxtail (*Hordeum* or *Setaria* spp.)

- “ Causes physical damage to mouth and surrounding areas
- “ Species affected – Cattle, sheep, horses, and goats
- “ Symptoms – Ulcerations and lesions in mouth, tongue, gums, and eyes
- “ Often causes problems when found in contaminated hay
- “ Horses most often affected



Horsetail (*Equisetum* spp.)

- ” Toxin: Thiaminase
- ” Species affected: Horses, occasionally cattle and sheep
- ” Habitat: Moist areas
- ” Symptoms:
 - . Depression
 - . Unsteady gait/incoordination
 - . Weakness
 - . Seizures
- ” Can be treated by administering Thiamine
- ” All parts of the plant are toxic, fresh and dried



Klamathweed/St. John's Wort (*Hypericum perforatum*)

- “ Contains a toxin that results in photosensitization
- “ Species affected include cattle, sheep, horses, goats, humans
 - Generally only unpigmented skin is affected
- “ Symptoms – sunburn of lips, mouth, face...any body part that touches the plant and is unpigmented
- “ Newly shorn sheep are especially susceptible

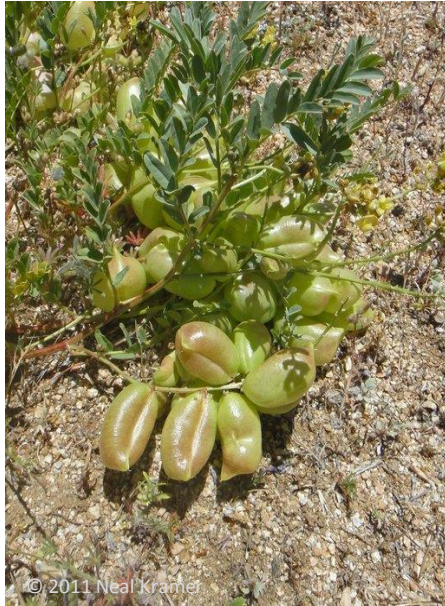


Larkspur (*Delphinium* spp.)

- “ Toxins – Alkaloids
- “ Species affected – Cattle, sheep, and goats. Cattle are most susceptible
- “ Habitat
 - . Tall Larkspur – Moist areas
 - . Low Larkspur – Dry, open areas
- “ Symptoms
 - . Incoordination, staggering
 - . Bloat
- “ Goats affected by Tall Larkspur (3 – 7' tall)



Locoweed/Milkvetch (*Astragalus* spp.)



- ” Toxin – Alkaloids; Selenium
- ” Species affected – Cattle, sheep, horses, and goats
- ” Habitat – Dry, open places
- ” Symptoms
 - . Excitability
 - . Difficulty eating
- ” So called “locoweed” because animals act a bit crazy
- ” Plant is toxic at all stages of growth, different species can be more toxic than others
- ” Excess intake can cause selenium toxicity

Lupine (*Lupinus* spp.)



- “ Toxin – Alkaloids
- “ Species affected – Cattle, sheep, and goats most commonly
- “ Habitat – Poor soils, dry sites
- “ Symptoms
 - . Birth defects
 - . Abortion
 - . Seizures
- “ Toxicity of the plant varies by species
- “ Toxins concentrated in seeds

Milkweed (*Asclepias* spp.)

- “ Toxin – Cardiac glycosides
- “ Species affected – Cattle, sheep, horses, goats and humans
- “ Habitat – Dry places at <7,000 ft
- “ Symptoms
 - . Depression and weakness
 - . Dilation of pupils
 - . Seizures
- “ Only 3 species of milkweed are toxic:
 - . *A. eriocarpa* (woollypod)
 - . *A. speciosa* (showy)
 - . *A. fascicularis* (Mexican Whorled)



Nightshades (*Solanum* spp.)



- ” Toxin – Alkaloids
- ” Species affected – Cattle, sheep, horses, goats, and humans
- ” Habitat – Variable
- ” Symptoms
 - . Gastrointestinal upset
 - . Drowsiness
 - . Weakness
- ” Toxicity varies from species to species, seasonally, and within each plant. For example, unripe berries are more toxic than ripe berries.

Oaks (*Quercus* spp.)

- ” Toxin – Tannins
- ” Species affected – Cattle, sheep, goats, and humans
- ” Habitat – Variable
- ” Symptoms
 - Sudden death
 - Bloody diarrhea
 - Kidney failure
- ” Goats have a tannin-binding protein in their saliva that allows them to tolerate twice as much tannin as cattle



Oleander (Nerium spp.)



- ” Toxin – Cardiac Glycosides
- ” Species affected – Cattle, sheep, horses, goats, and humans
- ” Drought and insect resistant
- ” Symptoms
 - . Sudden death
 - . Depression
 - . Diarrhea
- ” Clippings are the primary cause of poisonings
- ” 5 – 10 medium sized leaves can be lethal to a horse or cow
- ” Toxicity remains when dry

Poison Hemlock (*Conium maculatum*)

- ” Toxin – Coniine (alkaloids)
- ” Species affected – Cattle, sheep, horses, goats, and humans
- ” Habitat – Low areas, dry or moist, <5,000 ft
- ” Symptoms
 - . Birth defects
 - . Nervousness
 - . Weakness
- ” Used to put Socrates to death
- ” Loses toxicity when dry



Ponderosa Pine (*Pinus Ponderosa*)

- “ Toxin: Isocupressic acid
- “ Species affected: Cattle and Sheep
- “ Symptoms:
 - . Late-term abortion
- “ Toxin present in pine needles
- “ Condition coined “Pine-needle abortion”
- “ Abortion rates highly variable
- “ Must be consumed over at least three days



Ragwort and Groundsel (*Senecio* spp.)



- ” Toxin – Pyrrolizidine alkaloids
- ” Species affected – Cattle, sheep, horses, goats, and humans
- ” Habitat – Variable
- ” Symptoms
 - Chronic appetite loss
 - Weight loss
- ” Sheep and goats are not as affected as cattle and horses
- ” Plants are poisonous both fresh and dried

Toyon (*Heteromeles arbutifolia*)

- “ Toxin – Cyanide
- “ Species affected – Cattle, sheep, horses, goats, and humans
- “ Habitat – Chaparral, Oak, and Conifer woodlands
- “ Symptoms
 - . Sudden death
 - . Salivation
 - . Heavy breathing
- “ Toyon poisoning has killed goats that were offered fresh clippings



Yellow Starthistle (*Centaurea solstitialis*)



- ” Toxin: Lactones
- ” Species affected: Horses
- ” Habitat: Varied
- ” Symptoms:
 - . Weight loss
 - . Abnormal curling of lips
 - . Yawning
- ” Invasive weed – takes over and forms monocultures
- ” Related to Russian Knapweed

Water hemlock

(*Cicuta douglasii* and *maculata*)

- “ Toxin – Alcohols
- “ Species affected – All classes of livestock and humans
- “ Habitat – Wet, marshy places and along streams
- “ Symptoms
 - . Sudden death
 - . Muscle spasms
 - . Severe convulsions
- “ Among the most poisonous plants in North America
- “ All parts of the plant are poisonous



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Other Examples

- " Aconite (*Aconitum* spp.)
- " Angel's trumpet (*Brugmansia* spp.)
- " Apple, crabapple (*Malus* spp.)
- " Autumn crocus (*Colchium autumnale*)
- " Belladonna (*Atropa belladonna*)
- " Black henbane (*Hysocyamus niger*)
- " Black locust (*Robinia pseudoacacia*)
- " Bushman's poison (*Acokanthera* spp.)
- " Cardinal flower (*Lobelia* spp.)
- " Castor bean (*Ricinus communis*)
- " Cestrum, Jessamine (*Cestrum* spp.)
- " Checkered lily (*Fritillaria meleagris*)
- " Chinaberry (*Melia azedarach*)
- " Chinese lantern (*Physalis* spp.)
- " Climbing lily (*Gloriosa* spp.)
- " Coral tree (*Erythrina* spp.)
- " Daphne (*Daphne* spp.)
- " Echinium (*Echinium vulgare*)
- " European mistletoe (*Viscum album*)
- " Foxglove (*Digitalis purpurea*)
- " Glory lily (*Gloriosa* spp.)
- " Groundcherry (*Physalis* spp.)
- " Heather (*Calluna vulgaris*)
- " Heliotrope (*Heliotropum arborescens*)
- " Honeybush (*Melianthus* spp.)
- " Japanese pieris (*Pieris japonica*)
- " Jequirity bean (*Abrus precatorius*)
- " Lantana (*Lantana camara*)
- " Lenten rose (*Heliozorus* spp.)
- " Lily-of-the-valley (*Convallaria majalis*)
- " Lobelia (*Lobelia* spp.)
- " Loquat (*Eriobotrya japonica*)
- " Love-lies-bleeding (*Amaranthus caudatus*)
- " May apple (*Podophyllum peltatum*)
- " Myrtle (*Vinca* spp.)
- " Yew (*Taxus* spp.)

Control Measures

- “ Mechanical
 - . Mowing/cutting
 - . Tillage
 - . Hand pulling
- “ Fire
- “ Biological
- “ Grazing
 - . Yellow starthistle and goats
- “ Herbicides



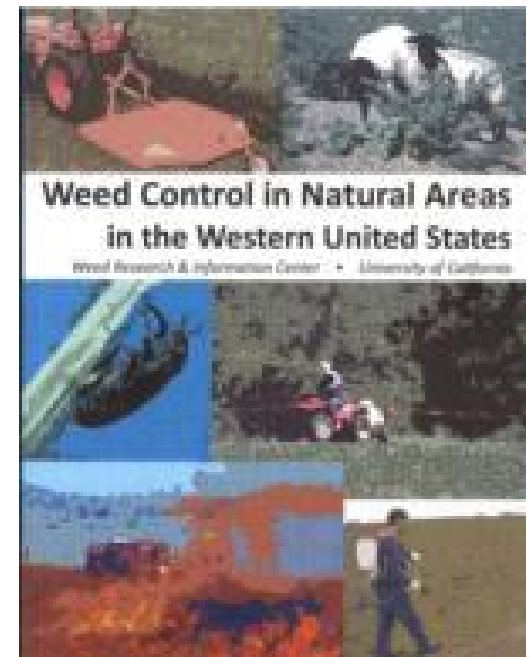
Control Measures - Herbicides

“ Weed Control in Natural Areas in the Western United States, DiTomaso et al., 2013

- . Available through Cal-IPC

Shrubs and Woody Plants - apply to foliage, stem or cut stem
(varies by species and herbicide)

- . 2,4-D
- . Glyphosate (Roundup, etc.; non-selective)
- . Imazapyr (Habitat, Arsenal, etc.)
- . Triclopyr (Garlon, etc.)
- . Aminopyralid (Milestone)
- . Dicamba
- . Hexazinone (Velpar)



Control Measures – Herbicides,

Broadleaf Species cont.

- . Pre-emergent
 - ” Hexazinone (Velpar; non-selective)
 - ” Rimsulfuron (Matrix; broad spectrum)
- . Post-emergent
 - ” 2,4-D
 - ” Glyphosate (Roundup; non-selective)
 - ” Dicamba (Clarity, etc.)
 - ” Paraquat (non-selective)
- . Pre and Post-emergent
 - ” Aminopyralid (Milestone)
 - ” Chlorsulfuron (Telar)
 - ” Clopyralid (Transline, etc.)
 - ” Imazapyr (Arsenal, Habitat, etc.; broad spectrum)

Helpful Websites

- “ <http://cekern.ucanr.edu/Livestock/>
- “ <http://anrcatalog.ucdavis.edu/PastureRange/8398.aspx>
- “ <http://www.ars.usda.gov/Services/docs.htm?docid=12140>
- “ http://ucanr.edu/sites/poisonous_safe_plants
- “ <http://www.calpoison.org/>
- “ <http://wric.ucdavis.edu/>

Thank You!

Questions?