Abortion Inducing Toxicants (9-Aug-1999)

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Chapter Sections

*Pinus* - Pines

- Loblolly Pine - *Pinus taeda* L.
- Broomweed (*Gutierrezia Microcephala*: *Xanthocephalum* spp.)
- *Cupressus Macrocarpa* - Monterey Cypress
- *Juniperus communis* - Juniper
- *Iva Augustifolia* - Sumpweed

Additional Toxicants

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**Pinus - Pines**

*Pinus ponderosa* - Western yellow pine, ponderosa pine

*Pinus contorta* - Lodgepole pine

*Pinus taeda* - Loblolly pine

<table>
<thead>
<tr>
<th>Major Species</th>
<th>Usual Time of Abortion</th>
<th>Other Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle, sheep</td>
<td>Less than 2 days to 2 weeks after initial exposure</td>
<td>Single feeding may cause abortion</td>
</tr>
</tbody>
</table>

Images

- Ponderosa Pine, *Pinus ponderosa*. Source: Cornell University, Poisonous Plants Informational Database (www.anisci.cornell.edu/plants/index.html). - To view this image in full size go to the IVIS website at www.ivis.org . -
- Western yellow pine, ponderosa pine, *Pinus ponderosa* - Google Image Search. - To view this image in full size go to the IVIS website at www.ivis.org . -
- Lodgepole pine, *Pinus contorta* - Google Image Search. - To view this image in full size go to the IVIS website at www.ivis.org . -
- Loblolly pine, *Pinus taeda* - Google Image Search. - To view this image in full size go to the IVIS website at www.ivis.org . -

**Class** - Conopsida (Gymnosperms)

*Pinus taeda* (Loblolly pine) is a light-reddish barked tree. The needles are in bundles of 2 or 3 and it grows in the South East of United States. Needles used for bedding were reported to be lethal to cattle that ate them.

**Ponderosa Pine**

**Description**

Yellowish-green needles, 7 - 11 inches long in groups of 3. Subterminal, ovoid cones, 2 1/2 - 6 inches long.
Habitat

East of the Cascade Mountains; California to British Columbia, east to Idaho and Rocky Mountains; South Dakota; Western Canada. Dominant forest member of coniferous forests at moderate elevations.

Toxic Principle

- Isocupressic acid is the primary abortifacient compound. Also, two derivatives, acetyl- and succinyl-isocupressic acid which also occur in pine needles are hydrolyzed in the rumen to form isocupressic acid.
- Toxin present in green and dried needles and is water soluble.
- Anti-estrogenic activity suggested from lab animal studies.

Susceptible Species

- Cattle; sheep less susceptible; deer and cattle from pine-free areas are reportedly more likely to be affected.
- Experimentally, mice are susceptible.

Toxicity

- Cattle.
  - Cattle browsing on needles and buds of this pine are predisposed to abortion.
  - During winter, cattle may consume fallen needles even when other forage is available (January through April).
  - 2.5 - 3 kg of fresh pine needles per head per day produced 75% still-births or weak calves which died shortly after birth. Many of these were premature.
  - A water soluble substance depresses uterine weight.
  - Pelleted pine needles lose their toxicity.
  - Pregnant cattle may abort after eating a single feeding of pine needles.

Signs

- Mice: abortion often killing the dam.
- Cattle.
  - **Last trimester, abortions** are seen in late fall, winter, and early spring.
  - Abortions are most likely to occur when cattle are under stress. Animal's condition is a big factor in determining individual susceptibility.
  - Cows show depression and dullness prior to abortion.
  - Impending abortion may be signaled by edema of the vulva and udder.
  - Abortion usually occurs 2 days after pine needles have been fed but may occur up to 2 weeks after removed from source.
  - **Retained placentas**, manual removal is associated with excessive hemorrhage and often is unsuccessful.
  - Live born calves are weak.
  - Parturition may be characterized by weak uterine contractions, incomplete dilation of the cervix and uterine hemorrhage. Metritis may occur.
  - Live aborted calves have poor viability.
  - Death in cows can occur prior to or after abortions, especially without treatment for secondary complications.

Lesions

- Unborn calves that die in early stages of pregnancy can be resorbed by the mother.
- Aborted fetuses (may die in utero) may have necrosis of the proximal renal tubules and moderate thickening of the interlobular septae in the lungs, pulmonary congestion and hemoglobin breakdown.
- Cows may exhibit ecchymotic hemorrhage on the peritoneum, pleura and viscera with an edematous uterine wall.

Diagnosis

Identification of *Pinus ponderosa*, evidence of consumption during gestation, and appropriate clinical signs.
Treatment

Remove animal from access to plant.

Prevention

- Suspend lumbering operations when bred cattle are present. The latter part of gestation seems to be the dangerous period, although some evidence suggests that the early part of gestation seems to be the dangerous period and simply goes unreported.
- Keep pregnant cows off ranges that include ponderosa pine trees.

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Loblolly Pine - *Pinus taeda L.*

**Other Name** - Old-field Pine.

**Growth Form** - Large tree sometimes over 125 feet tall; trunk diameter up to 2 feet; crown rounded.

**Bark** - Reddish-brown, divided into irregular plates.

**Twigs** - Slender, brown, becoming roughened.

**Leaves** - Needles in clusters of 3 or occasionally 2, stiff, up to 9 inches long, light green.

**Flowers** - Staminate crowded into several yellow spikes up to 1/2 inch long; pistillate crowded into 1 to several yellow clusters.

**Fruit** - Cones ovoid to oblong, mostly straight, up to 6 inches long, each scale compromising the cone with a short, sharp prickle; seeds rounded, up to 1/4 inch long, with a wing up to 1 inch long.

**Wood** - Weak, brittle, coarse-grained, yellow-brown.

**Uses** - Pulpwood, construction.

**Habitat** - Planted in plantations in Illinois, rarely escaped.

**Range** - New Jersey to Tennessee, south across Arkansas to eastern Texas, east to central Florida; not native in Illinois.

**Distinguishing Features** - The Loblolly Pine is distinguished by its stiff, long needles usually in clusters of 3 and by its long cones. It is similar to Shortleaf Pine but has longer needles and cones.
**Broomweed (Gutierrezia Microcephala = Xanthocephalum spp.)**

*G. microcephala* - Broomweed, perennial snakeweed, slinkweed, turpentineweed.

*G. sarothrae*

**Synonym** - *Xanthocephalum* spp.

**Family** - Compositae

**Images**

- Broom Snakeweed (*Gutierrezia sarothrae*) - U.S. G.S. Northern Prairie Wildlife Research Center. - To view this image in full size go to the IVIS website at www.ivis.org . -
- Broomweed, perennial snakeweed, slinkweed, turpentineweed, *Gutierrezia microcephala* - Google Image Search. - To view this image in full size go to the IVIS website at www.ivis.org . -
- Broom snakeweed, *Gutierrezia sarothrae* - Google Image Search. - To view this image in full size go to the IVIS website at www.ivis.org . -

**Description**

- Densely branched, perennial, resinous shrub.
- Up to 2 feet tall.
- Main stems woody, leafless below, with numerous herbaceous, leafy branches above.
- Branches are ascending, ridged.
- Leaves are numerous, alternate, linear, narrow, 1 - 3 mm wide and 3/4 - 2 inches long.
- Early in growing season - bright green and aromatic late in season, is tan to grey-brown.
- Flowers are in very small composite heads, 5 - 7 mm in diameter, produced singly or in clusters at tips of numerous branchlets, especially at the upper periphery of the plant.
- Rays are yellow, with 4 or 5 per head; there are 1 - 3 disc flowers per head.

**Habitat**

Dry range and desert from Texas to California, north to Colorado and Idaho, south to Mexico. Its presence indicates improper grazing practices.

**Toxic Principle**

- Oxygenated flavonol methyl esters and diterpenoid acids have been implicated recently as the toxic agents responsible for the reproductive effects of *Gutierrezia*.
- Saponins extracted from this plant and injected have caused signs and lesions similar to those associated with ingestion; including abortion.

**Susceptible Species**

- Sheep, cattle, goats, swine and rabbits.
- In 1988, annual losses to the livestock industry in Texas and New Mexico due to this plant were estimated at 40 million/year.
Toxicity

More of a problem when actively growing on sandy soils. Poisoning usually when overgrazing has forced animals to eat *Gutierrezia*.

Signs

- Abortion documented in cattle, swine and rabbits. In cattle, abortion may occur as early as 7 days or after 117 days of feeding.
- Calves may be born early and therefore underweight with poor survival rates.
- Retained placentas frequently occur.
- Occasionally the placenta is passed in part, but the calf is retained.
- Cows sometimes die.
- Low level exposure may cause vulvar swelling and premature udder development.
- In swine, abortion is the most sensitive sign. Natural cases have occurred in pastures dense with *Gutierrezia*.
- Animals with acute toxicosis (less often seen) may develop nasal discharge, listlessness, anorexia, rough coat, diarrhea or constipation.
- Mucus in feces may be observed in addition to vaginal discharge, hematuria and death. Crusting and sloughing of nasal mucosa on occasion.

Lesions

- Gastroenteritis, mild to severe.
- Hydropic degeneration and necrosis in the liver, icterus.
- Toxic nephrosis and necrosis in kidneys.
- Uterine edema, hydrops of fetal membranes in some cases.
**Cupressus Macrocarpa - Monterey Cypress**

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<tr>
<th>Major Species</th>
<th>Usual Time of Abortion</th>
<th>Other Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle</td>
<td>2 - 8 weeks before term</td>
<td>Premature births, stillbirth</td>
</tr>
</tbody>
</table>

**Synonym** - Macrocarpa

**Images**
- Monterey Cypress, *Cupressus macrocarpa* - Google Image Search. - To view this image in full size go to the IVIS website at www.ivis.org . -

**Distribution**
- Problems reported in Monterey peninsula of California and New Zealand.

**Toxic Principle**
- Isocupressic acid.

**Susceptible Species**
- Cattle.

**Signs**
- Premature births, stillbirths and abortions 2 - 8 weeks prior to term.
- Severe straining, weakness, ataxia, death.
- Maternal cotyledons enlarged with fetal membranes firmly adhered to them.
- Retained placentas.

**Management**
- Antihistamines (promethazine HCl) to reduce cotyledonary swelling.
- Avoid access to cut cypress foliage.

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**Juniperus communis - Juniper**

**Synonyms** - Juniper, Cedar

**Images**
- Eastern Red Cedar (*Juniperus virginiana* L.) - U.S. G.S. Northern Prairie Wildlife Research Center. - To view this image in full size go to the IVIS website at www.ivis.org . -
- Juniper, *Juniperus* spp. - Google Image Search. - To view this image in full size go to the IVIS website at www.ivis.org . -

**Distribution**
- Some junipers are high elevation plants (e.g., *J. communis*) whereas others are widespread.
Susceptible Species

Presumably cattle and sheep.

Signs

Abortion and retained placenta are likely in poisoned dams, but poisoning is only poorly documented despite the high concentration of isocupressic acid in some junipers.

Management

Avoid exposure.

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*Iva augustifolia* - Sumpweed

<table>
<thead>
<tr>
<th>Major Species</th>
<th>Usual Time of Abortion</th>
<th>Other Considerations</th>
<th>Full Table for Abortion Inducing Toxicants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle</td>
<td>Third trimester</td>
<td>Abortion; possible early mammary gland development</td>
<td></td>
</tr>
</tbody>
</table>

Synonyms - Narrowleaf sumpweed, marshelder sumpweed

Images


Description

- Height - Up to 1.2 m tall.
- Leaves - Lanceolate, are opposite below and alternate above; 2 - 8 mm wide and 2 - 4 cm long.
- Flowers - Heads are inconspicuous.

Habitat

- Reported to be a problem in the western United States.
- In moist, disturbed areas.

Toxicity

Seedling stage appears to be most hazardous. Signs may be seen after several weeks of ingestion.

Susceptible Species

Reported in cattle.

Signs

- **Abortion** in the last half of gestation.
- Precocious mammary development and in some cases milk production occurs.
### Additional Toxicants

<table>
<thead>
<tr>
<th>Specific Agents</th>
<th>Major Species</th>
<th>Usual Time of Onset</th>
<th>Usual Duration (if survives)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subterranean clover (Trifolium subterranean) (See Estrogenic Toxicants)</td>
<td>Cattle</td>
<td>Third trimester</td>
<td>Abortion; possible early mammary gland development</td>
</tr>
<tr>
<td>Locoweed (Astragalus)</td>
<td></td>
<td></td>
<td>(See Toxicants that Cause Mixed Effects on the CNS)</td>
</tr>
<tr>
<td>Lupine (Lupinus)</td>
<td></td>
<td></td>
<td>(See Toxicants with Nicotinic Effects)</td>
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<tr>
<td>Hybrid Sudan (Sorghum spp.)</td>
<td></td>
<td></td>
<td>(See Toxicants that Cause Paralysis, and Methemoglobin Producers)</td>
</tr>
<tr>
<td>Lead (See Toxicants with Mixed Effects on the Central Nervous System)</td>
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<td></td>
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<tr>
<td>Nitrate</td>
<td></td>
<td></td>
<td>(See Methemoglobin Producers)</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td></td>
<td></td>
<td>(See Toxicants that Inhibit the Function of Respiratory Pigments)</td>
</tr>
<tr>
<td>Corticosteroids</td>
<td></td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>Phenothiazine</td>
<td></td>
<td></td>
<td>(See Toxicants that Cause Skin Damage by Primary Photosensitization)</td>
</tr>
<tr>
<td>Halogenated dioxins and related compounds; includes highly chlorinated naphthalene</td>
<td></td>
<td></td>
<td>(See Other Organic Compounds)</td>
</tr>
<tr>
<td>Vitamin A-D injectable</td>
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<tr>
<td>Vitamin E and Selenium (MuSe)</td>
<td></td>
<td></td>
<td>-</td>
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</tbody>
</table>

- Subterranean clover (*Trifolium*) (See Estrogenic Toxicants)
- Locoweed (*Astragalus*) (See Toxicants that Cause Mixed Effects on the CNS)
- Lupine (*Lupinus*) (See Toxicants with Nicotinic Effects)
- Hybrid Sudan (*Sorghum spp.*) (See Toxicants that Cause Paralysis and Methemoglobin Producers)
- Lead (See Toxicants with Mixed Effects on the Central Nervous System)
- Phenothiazine (See Toxicants that Cause Skin Damage by Primary Photosensitization)

### References

**Pinus - Pines**


**Broomweed (*Gutierrezia Microcephala: Xanthocephalum spp.*)**


**Juniperus Communis - Juniper**


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