



# Toxic Plants in Agricultural Systems in PR and USVI

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# Defenses

- *Mechanical defenses:* Plants have many external structural defenses that discourage herbivory. Depending on the herbivore's physical characteristics (i.e. size and defensive armor), plant structural defenses on stems and leaves can deter, injure, or kill the grazer.
- *Chemical defenses:* Many plants produce secondary metabolites, known as allelochemicals, that influence the behavior, growth, or survival of herbivores. These chemical defenses can act as repellents or toxins to herbivores, or reduce plant digestibility.

# Toxic substances

## ALKALOIDS

Alkaloids are complex compounds containing Nitrogen (N) that form salts with acids. In most cases poisonous alkaloids produce a strong physiological reaction in animals, primarily through the nervous system. These poisons may produce violent acute or chronic reactions.

Alkaloids are derived from various amino acids. Over 3000 known alkaloids exist, examples include nicotine, caffeine, morphine, cocaine, colchicine, ergolines, strychnine, and quinine.

# OXALATES

- Salts

Formed by Ca and Mg crystals. These do not dissolve.

- Consumption of oxalates (for example, the grazing of animals on oxalate-containing plants) may result in kidney disease or even death due to oxalate poisoning.

# Oxalates in some food

- Spinach, cooked, 1/2 cup, 750 mg
- Potato, Idaho white, baked, 1 medium, 64 mg
- Milk chocolate bar, 1 bar (1.02 oz), 34 mg
- Orange, edible portion, 1 medium, 24 mg
- Concord grapes, 1/2 cup, 13 mg
- Cranberry juice, 1/2 cup (4 oz), 6 mg

Ref. Resnick, Martin I.; Pak, Charles Y. C. (1990). Urolithiasis, A Medical and Surgical Reference. W.B. Saunders Company. p. 158. ISBN 0-7216-2439-1.

# GLUCOSIDES

Cyanogenic glycosides are stored in inactive forms in plant vacuoles. They become toxic when herbivores eat the plant and break cell membranes allowing the glycosides to come into contact with enzymes in the cytoplasm releasing hydrogen cyanide which blocks cellular respiration.

Animals poisoned by HCN die of asphyxiation because HCN blocks the release of oxygen from red blood cells to tissue cells. Cattle are most susceptible and upon absorption of toxic amounts of HCN death follows in a few minutes to an hour or so. Important hydrocyanic-acid producing plants in CB include **Johnsongrass**.

Can cause gastroenteritis, salivation, diarrhea, and irritation of the mouth.

# NITRATES

Nitrate poisoning is a condition which may affect ruminants consuming certain forages or water that contain an excessive amount of nitrate.

- Under normal conditions, nitrate ingested by ruminant livestock, like cattle, sheep and goats, is converted to ammonia and then bacterial protein in the rumen by bacteria.
- Nitrate is converted to nitrite faster than nitrite is converted to ammonia. Consequently, when higher than normal amounts of nitrate are consumed, an accumulation of nitrite may occur in the rumen. Nitrite then will be absorbed into the bloodstream and will convert hemoglobin to methemoglobin, which is unable to transport oxygen. Thus, when an animal dies from nitrate poisoning, it is due to a lack of oxygen.

# Photosensitive substances

Photosensitivity is an abnormal skin reaction to direct sunlight exposure. Reactions are characterized by severe inflammation of the skin with depigmentation and ulceration.





# ORGANIC ACIDS

## Tannin and Oxalic acid

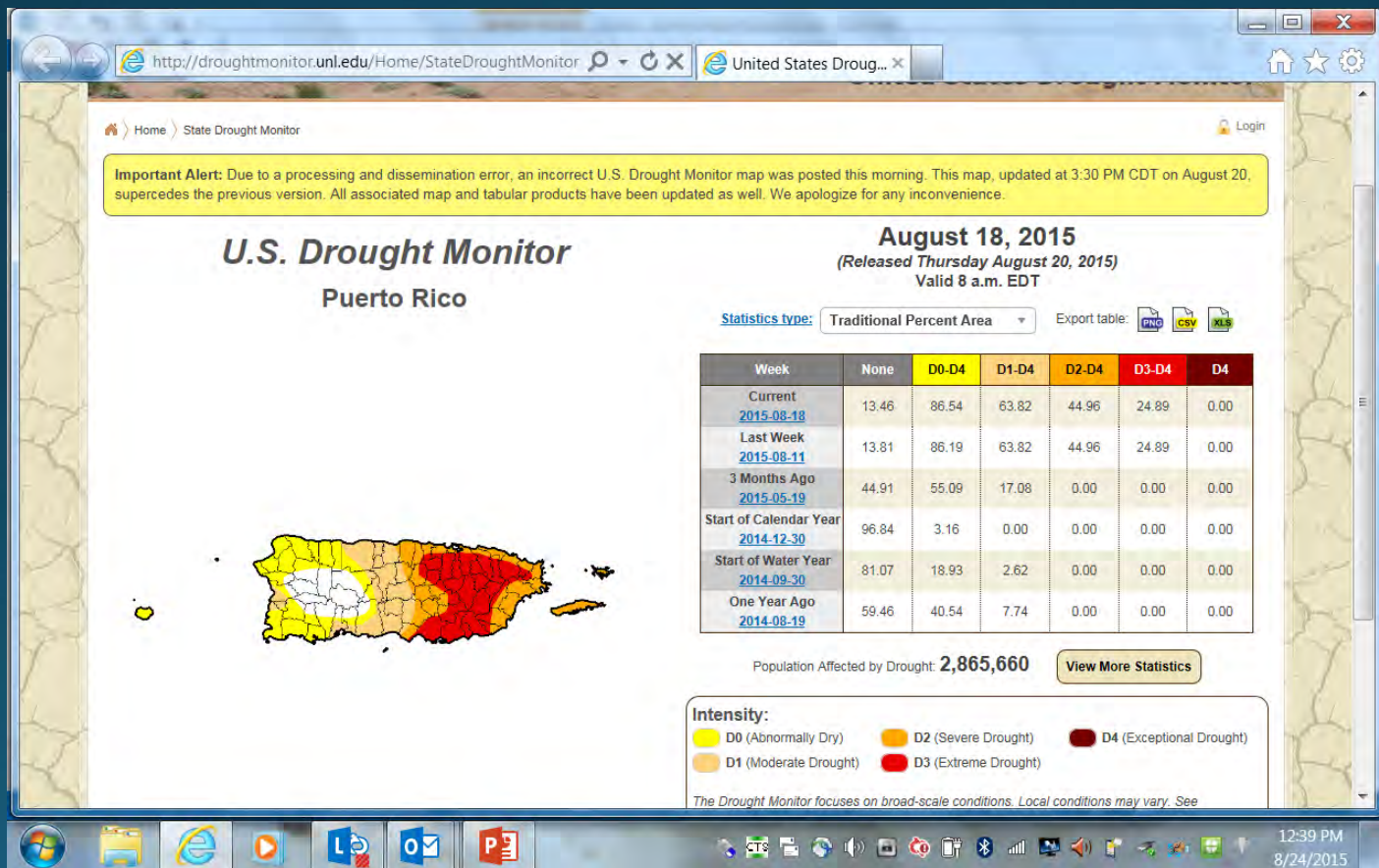
The tannin compounds are widely distributed in many species of plants, where they play a role in protection from predation, and perhaps also as pesticides, and in plant growth regulation.

Oxalic acid is the most common poison in the organic acid group. This acid often produces colic, depression, coma and eventually death due to kidney failure. High calcium diets seems to prevent oxalic acid poisoning.

# RESINS

- Resins and resinoids affect both nerve and muscular tissues. The symptoms of resin poisoning are varied. The **milkweeds** are good examples of poisonous plants containing toxic resins.
- **Milkweed** is poisonous at all stages of growth, even after maturity, and when put up in hay.

Hunger and nutritional deficiency may increase animal ingestion. Drought conditions may also increase toxic vegetation ingestion.





## *Abrus precatorius* L.

Common names: peronía, ojos de cangrejo, rosarypea, crab's eye, jumbée beads

Family: *Fabaceae*

Damage: Alkaloids

Affected: cattle, horses, sheep, goats, humans.





*Asclepias curassavica* L.

Common names:

Algodoncillo, platanillo,  
bastard ipecac, blood  
flower, red milkweed

Family: *Apocynaceae*

Damage: Glucosides and  
photosensitivity.

Affected: sheep, goats,  
cattle and horses.

Dead in 1 - 3 days.



*A. curassavica*



*Amaranthus* spp.

Common names: blero,  
bledo, amaranth,  
pigweed

Family: *Amaranthaceae*

Damage: Nitrates.  
Most livestock.



## *Argemone mexicana* L.

Common names: cardo santo, mexican prickly poppy, yellow thistle, prickly poppy

Family: *Papaveraceae*

**Medicinal.**

Damage: Laborers, cattle, horses, birds.

Traditional Veterinary Practice in Africa. 1994. Nsekuye Bizimana. Germany.







***Calotropis procera* (Ait.) Ait.f.**

Common name: Algodón de seda, fruta bomba, mudar, tula, giant milkweed, roostertree

Family: *Asclepiadaceae*

Damage: Resins

Sheep, goats, cattle.

Important to Monarch butterfly cycle.



*Calotropis procera*



## *Crotalaria retusa* L.

Common name: Matraca,  
cascabelillo, sonajuelas,  
rattleweed

Family: *Fabaceae*

Damage: alkaloids. Sheep,  
cattle, horses, birds.



Toxicon. 2010 Jan;55(1):28-32. doi:

10.1016/j.toxicon.2009.06.028. Epub 2009 Jul 2

CROTALARIA POISONING IN LIVESTOCK AND  
POULTRY.

William L. Sippel. Article first published online: 15 DEC  
2006

DOI: 10.1111/j.1749-6632.1964.tb53123.x



***Comocladia glabra* (J.A. Shultes) Spreng.**

Common name: Carrasco, Guao, Maidenplum

Family: *Anacardiaceae*

Damage: caustic, poisonous sap from the foliage and bark of this shrub can cause a reaction similar to poison ivy in some persons. It can last several hours. [http://www.fs.usda.gov/detail/elyunque/learning/nature-science/?cid=fsbdev3\\_043011](http://www.fs.usda.gov/detail/elyunque/learning/nature-science/?cid=fsbdev3_043011)



*Hippomane mancinella* L.

Common name: manzanillo,  
manchioneel

Family: *Euphorbiaceae*



Damage: Intense itching or  
burning sensation occurs  
within an hour and is  
followed by painful  
erythema, vesicles, bullae or  
pustulae.



*Leucaena leucocephala* (Lam.)  
Dewit.

Common name: zarcilla,  
tamarindillo, tan tan

Family: *Fabaceae*.

Damage: aminoacid- mimosine.

Hair loss and abortion in mares.

*Leucaena leucocephala*





***Mimosa casta* L.**

Common name: zarsa,  
graceful mimosa,  
climbing mimosa

Family: *Fabaceae*

Damage: mechanical-  
spines







*Mimosa pigra* L., (*M. pellita*)

Common name:  
moriviví gigante, black  
mimosa



Family: *Fabaceae*

Damage: mechanical -  
spines



*M. pigra*



*M. pigra*



*M. pigra*



***Rottboellia cochinchinensis***  
(L.) Clayton

Common name: yerba  
picante/caminadora,  
itchgrass

Family: *Poaceae* (Grass)

Damage: skin irritation due  
to silica crystals covering  
the leaf sheath.



*Rottboellia cochinchinensis*;  
inflorescence and sheath



## *Solanum torvum* Sw.

Common name: berenjena  
cimarrona

Family: *Solanaceae*

### Medicinal.

<http://tropical.theferns.info/viewtropical.php?id=Solanum+torvum>

Damage: mechanical- spines.  
Steroids may damage the  
fetus.

*Solanum torvum*







*Solanum torvum*



*Solanum elaeagnifolium* Cav.

Common name: trompillo,  
bull nettle, silverleaf  
nightshade

Family: *Solanaceae*

Damage: alkaloids. *Economic Botany*, J. W.  
Boyd, D. S. Murray and R. J. Tyrl . Vol. 38, No. 2 (Apr. - Jun., 1984),  
pp. 210-217



*Stizolobium pruriens* (L.)  
Medik.

Common name: Pica-pica,  
Cow-itch

Family: *Fabaceae*

**Medicinal.**

Damage: Alkaloids and  
glucoside. Skin irritation.



*Tragia volubilis* L.

Common name:  
Pringamosa, Stinging vine,  
stinging nettle

Medicinal.

Family: *Euphorbiaceae*

Damage: skin irritation.



*T. volubilis*



***Momordica charantia* L.**

Common name:  
cundeamor, wild balsam  
apple

Family: *Cucurbitaceae*

**Medicinal.**

Damage: glucosides. May  
cause, bleeding, abortion.



## *Urera baccifera* (L.) Gaud-Boupré

Common name: ortiga brava, scratchbush

Family: *Urticaceae*

**Medicinal: antibacterial. anemia.**

Antimicrobial activity of extracts obtained from *Urera baccifera* (L.) Gaudich. *Advances in Life Sciences*, p- ISSN: 2163-1387 e-ISSN: 2163-1395. 2012; 2(5): 139-143 .doi: 10.5923/j.als.20120205.03

[http://sisav.valledelcauca.gov.co/CADENAS\\_PDF/AROMATICAS/v14.pdf](http://sisav.valledelcauca.gov.co/CADENAS_PDF/AROMATICAS/v14.pdf)

Damage:

Formic acid:  
Permanent  
damage to  
eyes.

Stomach pain,  
skin burn.



*U. baccifera*





***Vachellia farnesiana* (L.) Wight & Arn.**

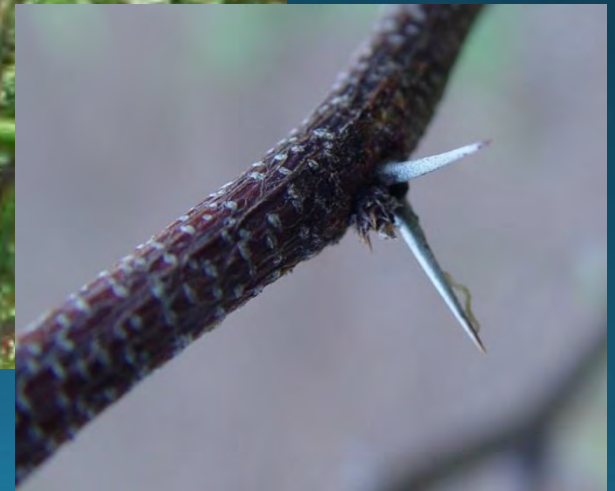
Syn: *Acacia farnesiana* (L.) Willd.

Common name: aroma, rayo, sweet acasia, casha, cashia

Family: *Fabaceae*

Thorny shrub.

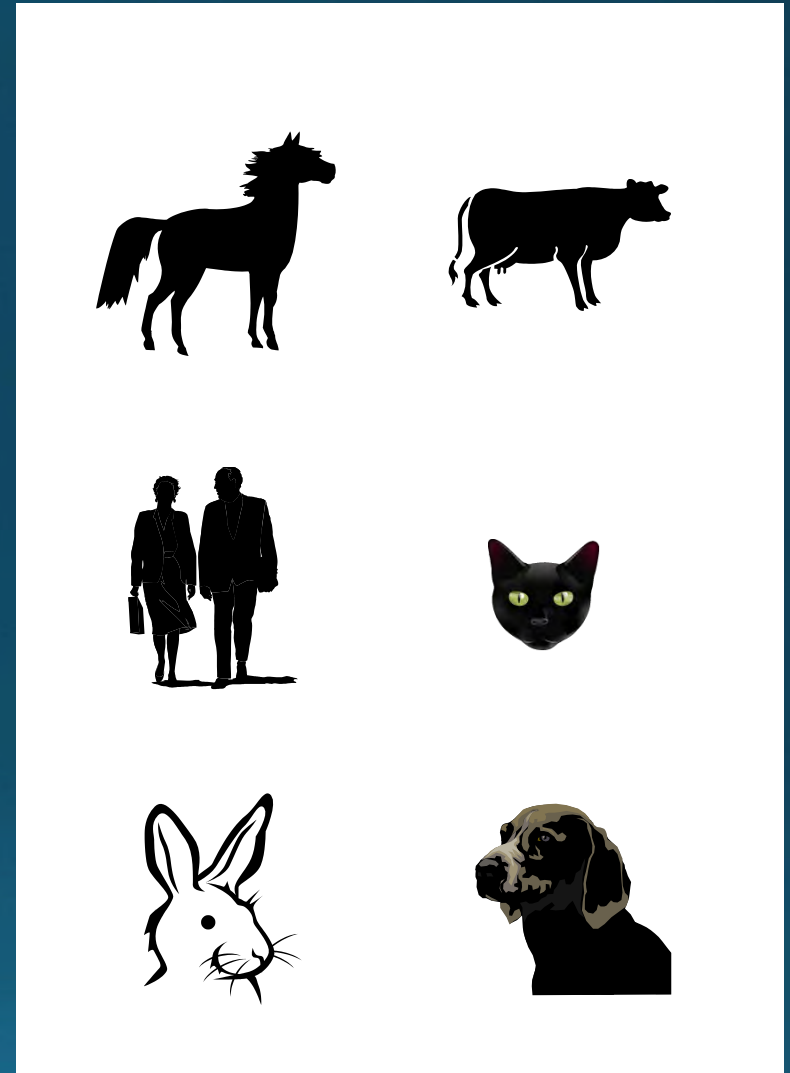
Damage: spines



*Vachellia farnesiana*



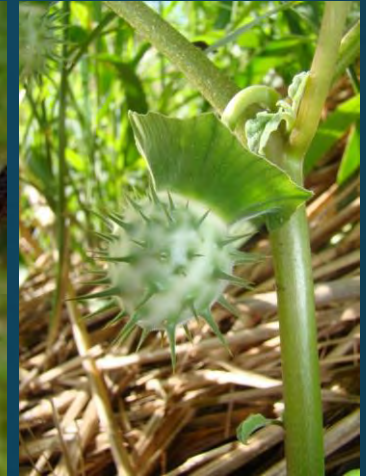
*Vachellia farnesiana*



***Dieffenbachia seguine*** : dumbcane, rábano. Fam: *Araceaceas*. Oxalates; Damage: oxalate crystals



*D. stramonium*



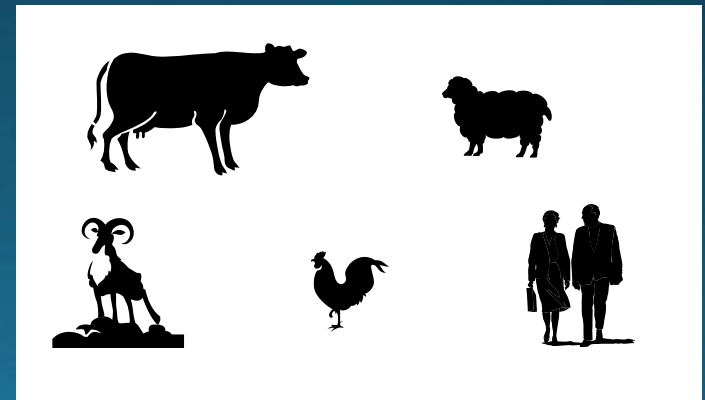
*D. innoxia*

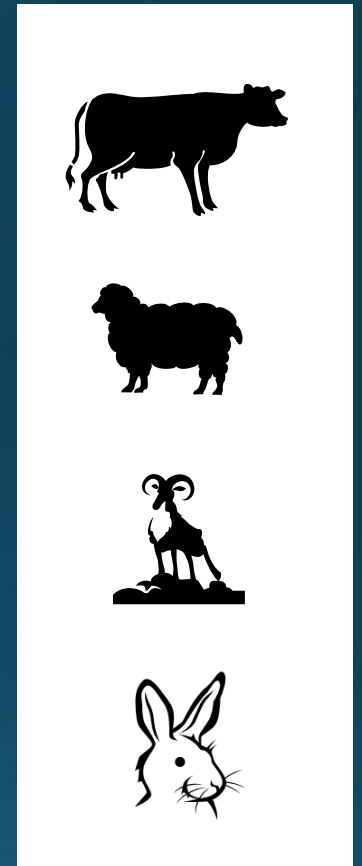
Fruit: capsule

- ***Datura stramonium*** L. (stimulus)\*

- ***Datura innoxia*** Mill. (delirium)\*\*: belladona (mujer bonita), chamíscio, jimson weed (Jamestown weed). (Family: *Solanaceae*), (Toxics: alkaloids; atropine, isocyanine, scopolamine)

- Hyperirritability, vision, delirium\*\*, violence, coma, hallucination, sexual stimulus, dead.





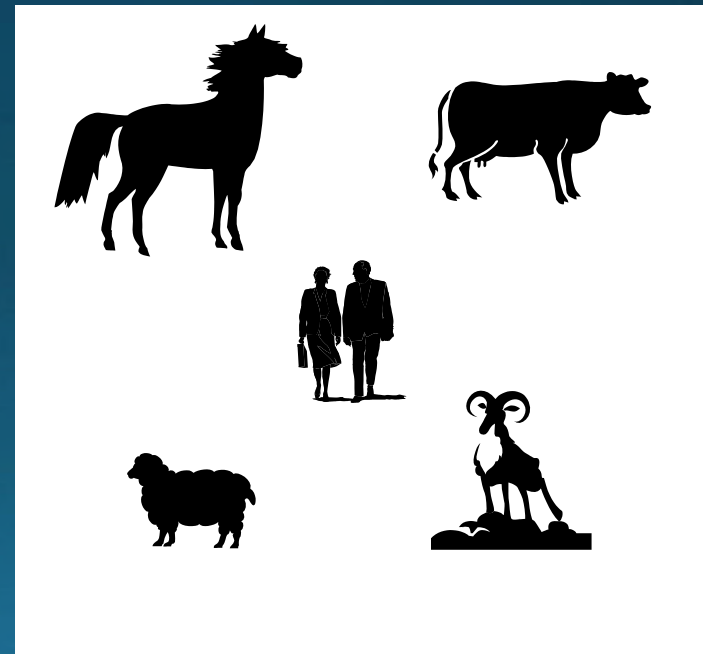
***Lantana camara* L.:** cariaquillo, yellow and red sage (Family: *Verbenaceae*) (Toxic: Alkaloids y Photo-coumarines);

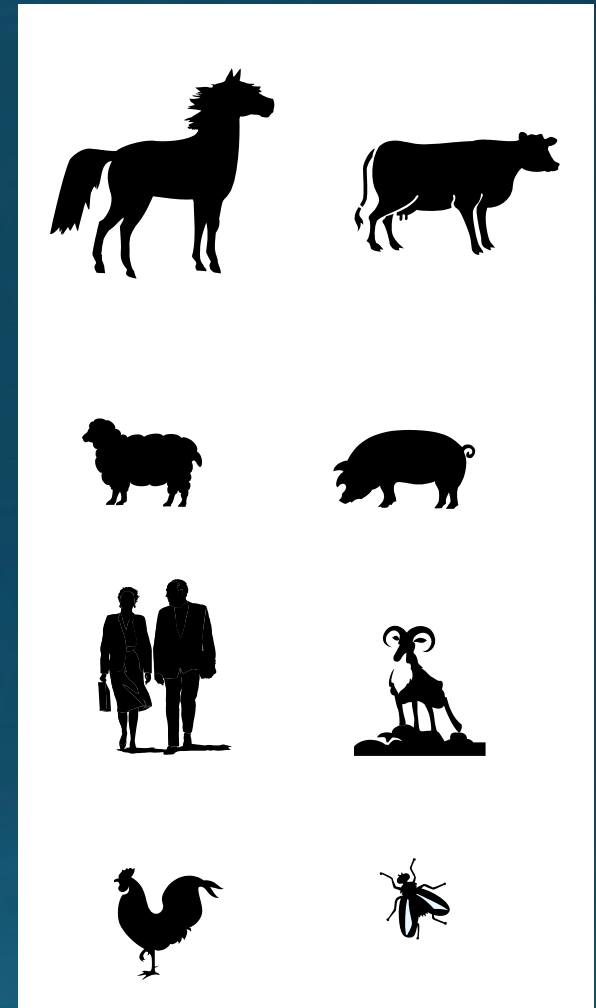
• Vomits, diarrhea, debilitate, lethargy, cardiac arrest, dead. (Poisonous Plant and Animals of Florida and the Caribbean, 1997. David Nellis)

***Solanum americanum* Miller.**

Mata gallina, yerba mora, Black night shade. (Family; *Solanaceae*) Toxic: Alkaloids)

Apathy, salivation, tremors, debilitate, paralyses, prostration, colics.





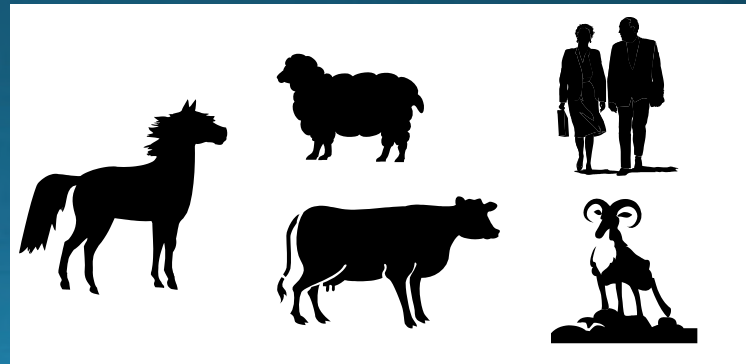
***Ricinus communis*** L., (higuereta, ricino, castor bean, castor oil plant, Palma Christi (Family: *Euphorbiaceae*) Toxic: Alkaloids;

• Anorexic, nausea, vomits, diarrhea, debilitate, thirst, blindness, muscular spasms, dead.





***Hippobroma longiflora*** (L.) G. Don  
(tibey blanco , cypril). (Family: *Lobeliaceae*) Toxic:  
Alkaloids. Damage: eye irritation, blindness,  
convulsions.

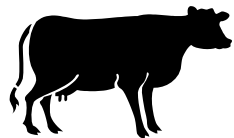
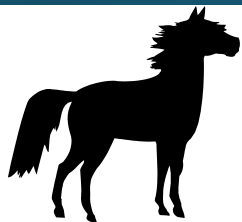


***Nerium oleander* L.**, (alelí, oleander) (Family: *Apocynaceae*)

Toxics: Alkaloids & Glucosides. **Symptoms:** Vomits, Nauseas, Bloody Diarrhea, Confusion, Debilitate, cardiac arrest. All the plant parts. (Acute Cardiac Toxicity of Nerium Oleander/Indicum Poisoning (Kaner) Poisoning. Ibraheem Khan, Chandra Kant, Anil Sanwaria, and Lokesh Meena)(<http://alfalfa.ucdavis.edu/+symposium/proceedings/2008/o8-51.pdf>)



[www.wellgrowhorti.com](http://www.wellgrowhorti.com)



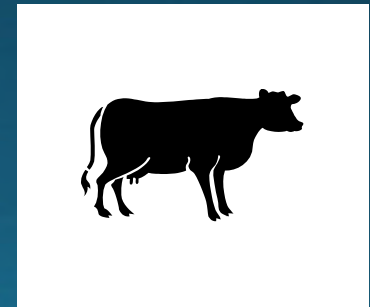


***Petiveria alliacea* L.**

(anamú, congo root, garlic weed, guinea hen weed, gully root).

- Family: *Phytolaccaceae*
- Toxic: Glucosides. Nitrate poisoning in cattle.

<http://www.ansci.cornell.edu/plants/medicinal/anamu.html>.



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[http://www.myworldhut.com/products/Anamu-Herb-\(Petiveria-Alliacea\)-Bulk.html](http://www.myworldhut.com/products/Anamu-Herb-(Petiveria-Alliacea)-Bulk.html)



**Zamia** spp: (marunguey, Zamia). (Family: *Cycadaceae*). Toxic: Glucosides

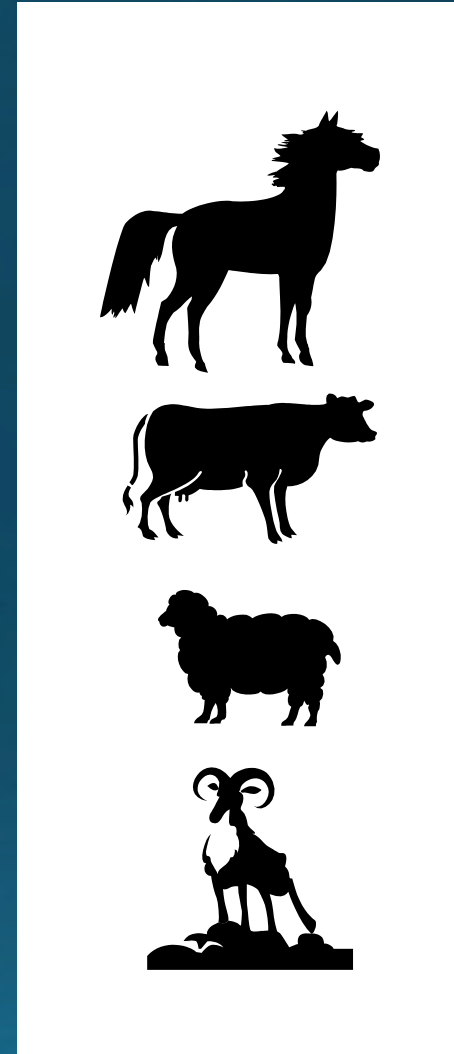


## *Sorghum halepense* L. Pers.

(yerba Johnson, Johnson grass) Family: *Poaceae*

- Toxic: Glucosides, Nitrates.
- Damage: HCN. Eyes and nose congestion. Debility and tremors, photosensitivity. In horses: incoordination, birth defects, abortions.

Cynthia Gaskill, DVM, PhD, Clinical veterinary toxicology.  
University of Kentucky Veterinary Diagnostic Laboratory



Rhizome



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