PLANT POISONING for HORSES

PART 2

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CLINICAL SIGNS & RELATED POISONOUS PLANTS

Salivation-Inducing Plants

The excess of saliva will be involve by the organism to prevent the swallowing of saliva, liquid and food in case of: mouth injuries (traumatic, chemical or infectious), obstruction to the oesophagus, sharp point on teeth, inappropriate use of bits, vesicular stomatitis (which cause buccal ulcers) and membrane traumatisms. The following table 1 contains plants that will often lead to oral lesions resulting in excess of saliva, difficulty of feeding, diminution of feed intake. Sometime, plants with thorns, bristles, stinging hairs or sharp awns may cause skin trauma on all the digestion system membranes. Eye injury are also observed, specifically with the burdock for example.

Table 1 Mechanically injurious plant

Common name	Scientific name
Burdock bristle	*Arctium spp.*
Oat awns	*Avena sativa*
Thistles	*Cirsium spp.*
Barley awns	*Hordeum vulgare*
Prickly pear cactus	*Opuntia (littoralis) spp.*
Rye awns	*Secale cereale*
Bristle grasses, foxtails millet	*Setaria (italica) spp*
Needle, spear, or porcupine grass	*Stipa spp.*
Wheat awns	*Triticum aestivum*
Puncture vine, goat head	*Tribulus terrestris*
Stinging nettle	*Urtica spp.*

COLIC AND DIARRHEA-INDUCING PLANTS

Diagnosing plants-induced causes of colic or diarrhea is not that easy for many reasons. First of all, there is normally no apparent lesions in the gastrointestinal tract. Than, post-mortem analysis are not efficient to identify a poisoning plant in a proper way when they have been chew and taken by the digestive enzymes. In case of doubts or troubles, pay strong attention to your pasture to identify problematic plants in this case (Table 2).

Table 2 Colic and Diarrhea-Inducing Plants

Common name	Scientific name	Plant toxin	Symptoms
Foxglove	*Digitalis purpurea*	*Cardiac glycosides*	*Diarrhea, barf, shock, arrhythmia & death in less the 24 hours.*
Oleander	*Nerium oleander*		
Yellow oleander	*Thevetia peruviana*		
Halogeton	*Halogeton glomeratus*	*Oxalates*	*Diarrhea, rarely renal disease. Prolonged intake of small quantity leads to calcium deficiency.*
Shamrock, soursob, sorrel	*Oxalis spp.*		
Horse chestnut, buckeye	*Aesculus spp.*	*Aesculin Saponins*	*Muscle tremors and ataxia.*
Corn cockle	*Agrostemma githago*		
Pokeweed	*Phytolacca americana*	*Saponins & oxalates*	*Diarrhea*
Coffee or senna weed	*Cassia spp.*	*Anthraquinone*	
Oak	*Quercus spp.*	*Tannins in leaves, bark or acorns, especially when green*	*Hard, dark feces; later bloody diarrhea. Anorexia, depression. May have oral ulcers & choke signs. Liver and kidney damage. Plasma calcium increased & phosphor decreased.*
Field bindweed or morning glory	*Convolvulus arvensis*	*Tropane alkaloids*	*Bradycardia & dilated pupils.*
Laurel	*Kalmia spp. (angustifolia)*	*Grayanotoxins & arbutin*	*Salivation, defecation, depression and ataxia.*
Azaleas	*Rhododendron spp.*		
Mountain pieris	*Pieris spp.*		
Maleberry	*Lyonia spp.*		
Privets	*Ligustrum vulgare*	*Glycosides*	*Salivation & diarrhea*
Buttercup & anemone	*Ranunculus spp.*	*Protoanemonin*	
Hellebore	*Helleborus spp.*		
Marsh marigold	*Caltha palustris*		
Clematis, Traveller's Joy, Anemone Clematis	*Clematis spp. (C. vitalba, C. Montana)*		
Castor beans, wonderboon	*Ricinus communis*	*Lectins*	*Trembling, ataxia & diarrhea.*
Rosary peas	*Abrus precatorius*		
Black locust	*Robinia pseudoacacia*		
Nightshade & potato, Jimson weed (thorn apple)	*Solanum spp.*	*Hyoscyamine, solamine & hyocine with atropine . effects*	*Excitement the depression. Diarrhea & weakness.*
Tomato	*Lycopersicon spp.*		
Avocado (Guatemalan, not Mexican smooth-skin fruit variety	*Persea Americana*	*Unknown toxin. Flesh of ripe fruit not toxic.*	*Diarrhea, congestive heart failure, oedema of abdomen, head & lung. Death in less then 2 days.*
Persimmon	*Diospyros virginiana*	*Not toxic but may cause impaction.*	*Impaction colic.*
Mesquite	*Prosopis glandulosa*		

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PRIMARY PHOTODERMATITIS-INDUCING PLANTS

The ingestion of plants shown in Table 3 will involve photosensitization dermatitis resulting of photodynamic compounds accumulation in the skin. When the skin is then exposed to the sun, those compounds release a radiant energy which causes cellular necrosis that will call dermatitis. Arabian horses that are often incompletely pigmented are more subject and less protected to this kind of troubles. There is two types of photodermatitis depending the on the way the toxin will act in system. In the primary photodermatitis case, the toxins (photosensitive pigments) are absorbed and accumulate in the skin and will then be photo reactive. The secondary or hepatogenous photodermatitis, more common then the other, will not be located in the skin, but in the liver where they will cause damages. The diagnosis of this second one is often done to late as the photoreaction in this case is due to the accumulation of the phylloerythrin (chlorophyll by-product) in the blood. The phylloerythrin is a product that the liver is not able to eliminate; when it appear in the blood in concentration high enough to create photoreaction and skin necrosis, the liver disease is often irreversible.

Table 3 Primary Photodermatitis-Inducing Plants

Common name	Scientific name	Toxin	Symptoms
St. John's wort	*Hypericum perforatum*	*Hypericin*	*Primary photodermatitis*
Buckwheat	*Fagapyrum esculentum*	*Fagopyrin*	*Primary photodermatitis*
Spring parsley	*Cymopterus watsonii*	*Furocoumarins*	*Primary photodermatitis*
Bishop's weed	*Ammi majus*		
See Table 4 Hepatotoxic plants	*See Table 4 Hepatotoxic plants*	*Hepatotoxins*	*Secondary or hepatogenous photodermatitis. Liver disease.*

Table 4 Hepatotoxic plants (Liver disease-Inducing Plants)

Common name	Scientific name	Toxin
Ragwort, stinking willie, tansy ragwort	*Senecio spp. (ex. jacobaea)*	*Pyrrolizidine alkaloids*
Fiddleneck, tarweed	*Amsinckia spp.*	*Pyrrolizidine alkaloids*
Rattlepod, rattlebox	*Crotolaria spp.*	*Pyrrolizidine alkaloids*
Hound's tongue	*Cynoglossum officinale*	*Pyrrolizidine alkaloids*
Salvation Jane	*Echium lycopsis*	*Pyrrolizidine alkaloids*
Heliotrope, stickseed	*Heliotropium spp.*	*Pyrrolizidine alkaloids*
Creeping indigo	*Indigofera spicata*	*Indospicine*
Birdsville indigo	*Indigofera dominii*	*Indospicine*
Alsike clover pasture	*Trifolium hybridum*	*Probably a micotoxin*
Kleingrass pasture	*Panicum coloratum*	*Probably a micotoxin*

NEUROLOGICAL DISEASE-INDUCING PLANTS

Dressage competition, where are really often Arabian horses, is an activity that is strongly dependent on the nervous system. It is then of major concern to consider in table 5 that will give you an idea of the neurological disease-inducing plants. Those diseases are normally characterized by behavioural alterations, inability to take and chew food, ataxia, depression, convulsions and other physical abnormalities.

Table 5 Neurological disease-Inducing Plants

Common name	Scientific name	Plant Neuro-toxin	Food intake (FI) Salivation (S) Muscle tremor (MT)	Gait, Abnormal behaviour (Ab), Depression or weakness (D), Excitation (E)	Notes and Recovery (R)
Sagebrush	*Artemisia spp.*	*Monoterpenoids*	*Normal FI, no S, no MT*	*Forelimb ataxia & falling, small Ab, no D, no E*	*Sage smell on breath & feces, R: 1-2 weeks*
Locoweed	*Oxytropis and Astragalus spp.*	*Indolizidine alkaloids (IA)*	*Decreased FI, no S, no MT*	*Ataxia, falling, high steps, head bobbing, high Ab, moderate D, high E*	*Lymphocyte vacuoles, R: partial only*
Milkvetch	*Astragalus spp.*	*Nitroglycosides & IA*	*Can't eat, lot of S, No MT*	*Ataxia, posterior weakness, no Ab, low D, no E*	*Dyspnea, R: partial*
Yellow star thistle & Russian Knapweed	*Centaurea solstitialis C. or Acroptilon repens*	*Sesquiterpene lactone?*	*Decreased FI, no S, no MT*	*Possilbe circling & head tossing, small Ab, no D, no E*	*Abrupt onset of open mouth, tongue out, inability to prehend or chew feed, R: no*
Horsetail, marestail, horsebrush, or snake grass	*Equisetum spp.*	*Thiaminase*	*Normal FI, no S, ± MT*	*Posterior ataxia, reluctance to move, no Ab, low D, no E*	*Possible blindness, diarrhea , constipation*
Bracken fern	*Pteridum aquilinum*	*Thiaminase*	*Decreased FI, no S, no MT*	*Posterior ataxia, no Ab, moderate D, no E*	*Serum thiamin low & pyruvate high. R: yes with vitamin B1 injections*
Sensitive fern	*Onoclea sensibilis*				
White snakeroot	*Eupatorium rugosae*	*Tremetol*	*Decreased FI; difficulty swallowing & choking appearance, lot of S, high MT*	*Ataxia, no Ab, low D, no E*	*Patchy sweating, myocardial degeneration. R: recovery or death within a few days.*
Crofton weed, Jimmyweed or rayless goldenrod	*Eupatorium adenophorum*				
Burrow weed	*Haplopappus spp.*				
	Haplopappus tenuisectus				
Johnson grass	*Sorghum halepense*	*Cyanogenic glycosides*	*Normal FI, no S, no MT*	*Posterior ataxia; and sitting or falling when backed, no Ab, low D, no E.*	*Cystitis & dribble urine; bladder & possibly vulva, rectum & tail paralysis, rarely sudden death. R: yes early; later partial.*
Sudan grass	*Sorghum sudanense*				

LAMENESS AND MUSCLE WEAKNESS-INDUCING PLANTS

If lameness or muscle faintness are establish to be the major clinical signs, plants from Table 6 should be strongly considered.

Table 6 Lameness and muscle Weakness-Inducing Plants

Common name	Scientific name	Toxin	Predominant Clinical Effects
Black walnut	*Juglans nigra*	*In shaving & sawdust.*	*Laminitis, leg edema, colic, anorexia, depression and sometime dysnea.*
Hoary alyssum	*Berteroa incana*	*Unknown*	*Limb edema, fever, lamimitis*
Coffee weed or coffee sema	*Cassia occidentalis*	*High in seeds*	*Ataxia and sudden death*
Day-blooming jessamine	*Cestrum diurnum*	*Vitamin D-like*	*Chronic weight loss, generalized stiffness to important lameness and recumbency; hypercalcemia and calcinosis*
Golden oat grass	*Trisetum flavescens*	*Vitamin D-like*	
	Solanum malacoxylon		
Milkvetches	*Astragalus (24 spp.)*	*Selenium accumalor plants*	*Mane & tail hair brake off, stiff & tender gait, hoof rings & cracks, sometimes emaciation, anemia & cirrhosis.*
Golden weeds	*Haplopappus spp.*		
Woody asters	*Xylorrhiza glabriuscula*		
Prince's plume	*Stanleya pinnata*		
Many cultivated fields, alfalfa amd grasses grown on high selenium soils			
Five hooked bassia	*Bassia hyssopifolia*	*Oxalate-induced Calcium deficiency*	*Shifting leg lameness, bone tenderness & possible emaciation, loose teeth, respiratory noise & "big head".*
Halogeton	*Halogeton glomeratus*		
Greasewood	*Sarcobatus vermiculatus*		
Shamrock, soursob, sorrel	*Oxalis spp.*		
Red-rooted pigweed	*Amaranthus spp.*		
Purslane	*Portulaca oleraceae*		
Russian thistle, tumbleweed	*Salsola spp.*		
Sorrel, dock	*Rumex spp.*		
Rhubarb	*Rheum rhaponticum*		
Sugar beet	*Beta Vulgaris*		
Lambsquarter	*Chenopodium spp.*		
Bristle, foxtail grass	*Setaria spp.*		
Panic grasses	*Panicum spp.*		
Paspalum, Argentine & Dallis grasses	*Paspalum spp.*		
	Sporobolus spp.		
Buffel grass	*Cenchrus ciliaris*		
Signal grass, para grass	*Brachiaria spp.*		
Pangola grass	*Digitaria recumbens*		
Napier, mission grass	*Pennisetum spp.*		
Seteria grass	*Setaria sphacelata*		
Foxtail millet	*Setaria italica*		

ANEMIA-INDUCING PLANTS

Two different kinds of anemia can occur in horses eating plants written in Table 10 which are the ones caused by red cells haemolysis or the one by haemorrhaging. The ingestion of onions (Alliums spp.), red maple (Acer rubrum) leaves or phenothiazine toxicosis will be particularly associated with the anemia due to haemolysis and will be accompanied by haemoglobinuria and icterus. On the other hand, haemorrhaging anemia may occur with if the horse eat spoiled or moldy sweet clover hay.

Table 10 Anemia-Inducing Plants

Common name	Scientific name	Toxin	Major Effects
Garlic or Onions, wild & domestic	*Allium spp.*	*N-propyl disulfide in plants & bulbs.*	*There is a slow development of onion effects; smell of onion in breath of either onion or red maple; hematocrit 10-15%; hemoglobinuria, icterus, Heinz bodies, weakness; increased heart and respiratory rates.*
Red maple	*Acer rubrum*	*In bark & dry or wilted, but not green leaves.*	*Rapid development of red maple effects, increase AST, SDH & bilirubin.*
Sweet clover (if moldy)	*Melilotus spp.*	*Dicoumarol anticoagulant in moldy hay.*	*Haematomas; normal appetite, temperature & until terminal, pulse and respiratory rate; haemorrhaging; increased prothrombin & partial thromboplastin times.*

TERATOGENIC PLANTS

We call teratogenic plants that will involve problems in the physical development of a foetus. The teratogenic damage effect have been observed to be stronger it happens in first trimester pregnancy period. Chemical substances contains in those plants will easily cross the placenta and lead to foetal resorption, abortion, stillbirth and deformations. Table 11 will give you the basic teratogenic official plants for horses; while many other plants have been suspected like Sudan grass (Sorghum Sudanese) hay and Sorghum hybrids.

Table 11 Teratogenic Plants

Known teratogenic plants for horses	
Common name	*Scientific name*
Milkvetch, locoweed European or spotted	*Astragalus spp.*
Hemlock	*Conium maculatum*
Lupine	*Lupinus spp.*
Wild tree tobacco	*Nicotiana glauca*
Tobacco	*Nicotiana tabacum*
Hellebore	*Veratum eschscholtzii*
Sudan grass	*Sorghum Sudanese*
Suspected teratogenic plants for horses	
Akee	*Blighia sapida*
Autumn crocus	*Colchicum autumnale*
Cycad fern	*Cycadaceae spp.*
Jimson weed	*Datura stramonium*
Creeping indigo	*Indigofera spicata*
Wild pea	*Lathyrus spp.*
Mimosa	*Leucaena leucocephala*
Locoweed	*Oxytropis spp.*
Poppies	*Papaveraceae*
Wild black cherry	*Prunus serotina*
Groudsel	*Senecio spp.*
Periwinkle	*Vinca rosea*

Atropa belladonna

Hyoscyamus niger

SUDDEN DEATH-INDUCING PLANTS

Recognizing the first clinical signs and rapidly and then associated them with a poisoning plant founded in our area is the only small way to get out of it. The only chance we really get in this kind of situation is related with the fact that a horse will eat this kind of plant only in some specific cases. For example, if the horse have been posted in an overgrazed pasture with no other reminding food, it could be relatively easy to identify to poisoning plant. Some other reasons mentioned before are still valuable here to describe the situation, but the "take home message" is ACT QUICKLY in case of doubts and be aware of your pasture management and components

Table 12 Sudden Death-Inducing Plants

Common name	Scientific name	Toxin	Major Clinical Effects
Serviceberry or Saskatoon berry	*Amelanchier alnifolia*	*Cyanogenic glycosides in all the plant and especially elevated during growth & seed periods.*	*Bright red poisonous blood, dark red to cyanotic membranes, fast and difficult respiration, buccal frothing and large pupils. Tremors of muscles, ataxia, convulsions and sudden mortality in the minutes following the ingestion. Positive cyanide test on stomach, liver and/or muscle.*
Wild blue flax	*Linum spp.*		
Chokecherry	*Prunus virginiana*		
Elderberry	*Sambucus spp.*		
Johnson grass	*Sorghum halepense*		
Sudan grass, or broom or kafir corn	*Sorghum sudanense*		
Milkweed	*See Table 13*	*Green plants contains highest concentration of cardiac glycosides, but dry leaves more palatable & are toxic.*	*Colic, diarrhea sometime with blood, chewing, dyspnea, cardiac arrthymias & shock Tetany. Mortality within 24 hours after ingestion of small amount of plant.*
Foxglove	*Digitalis purpurea*		
Oleander	*Nerium oleander*		
Yellow oleander	*Thevetia peruviana*		
Be-still or lucky nut tree	*T. thevetioides*		
Lily of the valley	*Convallaria majalis*		
Dogbane or Indian hemp	*Apocynum cannabinum*		
Larkspur	*Delphinium spp.*	*Diterpenoid alkaloids elevated in green leaves and flowers. after ingesting the plant.*	*Excitable, stiff, base-wide stance, can't stand and could have colic. Death suddenly occurs in some hours*
Monkshood	*Aconitum spp.*		
Poison, European, or spotted hemlock	*Conium maculatum*	*Piperidine alkaloids high in high leaves and stems before fruits.*	*Salivation, colic, tremors, ataxia, dyspnea, cyanosis, coma and death after 2-3 hours of eating little quantity of plant.*
Water hemlock	*Cicuta spp.*	*Cicutoxin alkaloid in the entire plant, particularly in root.*	*Salivation, chewing, teeth grinding, large pupils, tremors, violent convulsions, respiratory paralysis & death following few hours of ingesting 0,2 kg or 1 root.*
Yew	*Taxus spp.*	*Taxine alkaloid in almost all the plant.*	*Stress, dyspnea, ataxia, diarrhea, bradycardia, convulsions & rapid mortality after eating some 0,5 kg of plant.*
Death camas	*Zigadenus spp.*	*Zigacine & zigadenine in all the plant, particularly the onion like bulbs.*	*Salivation, colic, weakness, ataxia & death following several days of ingesting 3,6- 4,6 kg of plant.*
Avocado (Guatemalan and not Mexican smooth-skin fruit variety)	*Persea americana*	*Unknown, but not in ripe fruit flesh.*	*Diarrhea, colic & congestive heart failure inducing oedema of abdomen, neck, head & lungs causing dyspnea & death in less then 2 days after the ingestion.*

Table 13 Common Toxic Milkweeds

Common name	Scientific Name	Toxicity (quantity of green plant as a percent of animal's body weight that is lethal)
Labriform milkweed	*Asclepias labrifornis*	*0.05*
Western whorled milkweed	*Asclepias subverticillata*	*0.2*
Easter whorled milkweed	*Asclepias verticillata*	*0.2*
Woolypod milkweed	*Asclepias eriocarpa*	*0.25*
Milkweed	*Asclepias asperula*	*1-2*
Plains or dwarf milkweed	*Asclepias pumila*	*1-2*
Swamp milkweed	*Asclepias incarnata*	*1-2*
Mexican whorled milkweed	*Asclepias mexicana*	*2*
Showy milkweed	*Asclepias speciosa*	*2-5*
Broad-leaf milkweed	*Asclepias latifolia*	*1*
Narrow-leafed milkweed	*Asclepias stenophylla*	*?*
Butterfly weed	*Asclepias tuberosa*	*?*
Milkweed	*Asclepias hirtella*	*?*
Antelope horn	*Asclepias viridis*	*?*

The toxic plants described should be considered and managed as all the other field infested non-toxic plants; a good, rigorous and regular control, by an agronomist or a biologist, accompanied by some good works on the pasture from regular work to, in the worst case, a total renewing of the field, can limit the development of unwanted flora.
If it's true that a potential intoxication depends on the ingested dose, it is then non logical to let a horse grass on a pasture infested by poisonous plant potentially toxics. It is particularly true if you don't know with precision the quantity of leaves, seeds and fruits that can cause problems. The major danger that we have to thing about is often not related to a sharp and strong poisoning, but the chronic one which is much more difficult to identify for a veterinarian in a first clinical examination.
At the end, there is not such to need to ring the emergency bell if the pasture is sporadically infested by Ranunculus sp. for example, which is really common in Europe. Of course, if beyond this one, there is enough hay of good quality, to permit the horse to avoid them and choose the best forage available; thing that he will anyway do by instinct in this condition. On the contrary, if the field mainly contains Ranunculus sp., the risk to get bad effects with consequences then grow up with the possibility for your horse to ingest a "sufficient" dose to reach this point. To get in touch with botanist, agronomist or biologist and use botanic manual to identify the principal poisonous species could help to manage your own situation. ❑


Taxus baccata


Veratrum


Pteridophyta


Senecio jacobata


Pteridium aquilinum


Solanum dulcamara


Datura stramonium


Galanthus nivalis



Crataegus monogyna