

Plant poisonings and mycotoxicoses of importance in horses in southern Africa

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ABSTRACT

Well-known plant poisonings such as 'dunsiekte' (seneciosis) and 'jaagsiekte' (crotalaria) of horses in southern Africa are briefly reviewed. Relatively unfamiliar mycotoxicoses such as stachybotryotoxicosis and perennial rye grass staggers and potentially occurring exotic intoxications such as equine nigropallidal encephalomalacia and ergot alkaloid poisoning are also discussed. This article is aimed at informing the southern African equine practitioner about probable poisonings that might occur locally in horses.

Key words: equine, horses, mycotoxicoses, plant poisoning, toxicity.

Botha C J, Naudé T W **Plant poisonings and mycotoxicoses of importance in horses in southern Africa.** *Journal of the South African Veterinary Association* (2002) 73(3): 91–97 (En.). Department of Paraclinical Sciences, Faculty of Veterinary Science, University of Pretoria, Private Bag X04, Onderstepoort, 0110 South Africa.

INTRODUCTION

In general horses, being fastidious feeders, are not as prone as ruminants to eating poisonous plants; for instance, it is well-known that horses can with safety utilise gifblaar (*Dichapetalum cymosum*)-infested camps where cattle would succumb. However, under conditions of feed shortage, they may also resort to eating poisonous plants. Stabled horses fed on hay and concentrates, not having access to natural grazing, are particularly prone to poisoning with hay contaminated by toxic plants. Well-known and lesser-known recorded poisonings of horses in southern Africa are briefly reviewed. Unrecorded poisonings and as yet undiagnosed, but likely to occur, exotic intoxications are also discussed. The various conditions are grouped according to the organs or systems in the body that they affect.

LIVER

Seneciosis

There are more than 250 *Senecio* species in South Africa of which *S. latifolius* and *S. retrorsus* are the most important. In South Africa the toxic varieties, containing pyrrolizidine alkaloids, have mainly an eastern distribution. Horses may ingest fresh plant material or *Senecio*-contaminated hay. This hepatotoxicosis manifests as either an acute or chronic

disease. Horses suffering from acute seneciosis exhibit dullness, icterus, petechial and ecchymotic haemorrhages on the mucous membranes, colic and anasarca. The protracted, chronic form of the disease, referred to as 'dunsiekte', is characterised by unthriftiness, depression (head hanging, drowsy, yawning), incoordinated gait (staggers), emaciation and occasionally icterus. The nervous involvement, which also manifests as excitation, is attributed to hepatic encephalopathy. Once affected, the prognosis is poor, and horses must therefore be prevented from eating *Senecio* plants either on the veld or in hay. A diagnosis is confirmed by the characteristic histopathological changes, especially in the liver^{7,17}.

Lupinosis

Lupins are predominantly cultivated in the Western Cape Province as a green compost and fodder crop. *Phomopsis leptostromiformis* is a phytopathogen of most lupin species that under favourable conditions grows saprophytically on the dead plant host (Fig. 1). The fungus *Phomopsis leptostromiformis* (= *Diaporthe toxica*) causes lupinosis when it parasitises various *Lupinus* species. The cyclic hexapeptide, phomopsin A, the principal toxin, is relatively stable⁷.

Lupinosis is a hepatotoxicosis of livestock, including horses, occurring in the winter rainfall area of South Africa. Sometimes farmers sow oats and lupins in the same field. When the plants are cut and baled, the thicker lupin stems stay moist

longer, thus promoting saprophytic growth of *P. leptostromiformis*. A number of horses have been poisoned after consuming such mouldy hay (D J Schneider, Regional Veterinary Laboratory, Stellenbosch, pers. comm., 1999). Horses suffering from acute lupinosis exhibit anorexia, colic, constipation, weakness and icterus. Mass loss is common in chronically affected animals⁷.

RESPIRATORY SYSTEM

Crotalaria

This respiratory affliction is caused mainly by *Crotalaria dura* and *C. globifera*, which also contain pyrrolizidine alkaloids. Both species occur mainly in KwaZulu-Natal. 'Jaagsiekte' in horses has been regarded as of only historical or academic importance, but recently 2 outbreaks in KwaZulu-Natal have been reported⁸. One outbreak was associated with the feeding of *Themeda* hay contaminated by *Crotalaria dura* while the other occurred in horses that had ingested fresh green plants (subsequently identified as *C. globifera* or *C. dura*) in a camp denuded of grass by drought and fire. This chronic, progressive respiratory disease is characterised by undulating fever, increased respiratory rate (polypnoea) and forced inspiration and expiration (dyspnoea). The most prominent necropsy findings reported were: pleural effusion (hydrothorax), severe pulmonary emphysema and hepatisation^{7, 8}. Clinically it may be confused with horse sickness and pneumonia. Histopathological findings can aid in making a diagnosis.

Ageratina adenophora (= *Eupatorium adenophorum*)

Ageratina adenophora (crofton weed) (Fig. 2), an alien invader of known toxicity, has recently been implicated as the cause of mortality in 3 horses in Zimbabwe (K van Laeren, Borrowdale Park Veterinary Hospital, Zimbabwe, pers. comm., 2000). This perennial weed is also present in South Africa (Fig. 3) where in the winter months it grows up to 2 m in height. Horses are the only species affected by consumption of crofton weed as the plant

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Received: March 2002. Accepted: May 2002.

is palatable to them and they eat it readily. After a few weeks of grazing on the flowering plant, animals are observed to cough frequently. This is quickly followed by reduced exercise tolerance and signs of chronic emphysema. In severely affected animals there may be rales on auscultation and fluid in the pleural sacs. This is followed by depression and death. On necropsy, marked interstitial and subpleural fibrosis and frequently multiple abscesses, thrombosis, and/or cavitation are noticeable¹⁶.

The widespread, seriously invading trifold weed (paraffienbos), *Chromolaena odorata* (= *Eupatorium odoratum*) should, because it is closely related to crofton weed, also be regarded with suspicion.

NERVOUS SYSTEM

Leucoencephalomalacia (LEM)

Fusarium verticillioides (= *F. moniliforme*), is a common saprophytic cob rot fungus on maize. It has a pinkish mycelium, especially conspicuous where cobs are damaged by insects⁷. The mycotoxin, fumonisin B₁ causes LEM by altering sphingolipid synthesis¹. Leucoencephalomalacia (LEM) is a fatal neuromycotoxicosis of equidae characterised by focal liquifactive necrosis of the cerebral white matter⁷. Fumonisin B₁ has also been implicated in the aetiology of anterior enteritis in equines¹⁵.

This fungal infection of maize is especially prevalent in wet seasons after droughts. In South Africa, outbreaks occurred where horses had access to mouldy cobs that remained on the land after hand harvesting or following ingestion of infected cracked maize kernels, ground maize and maize chaff. Several outbreaks in equidae have been encountered especially in the maize producing area of South Africa where animals were fed on grossly contaminated material. Most maize is infected, but this is of no significance as gross infection is needed for material to be toxic.

After a latent period of a week or more clinical signs of LEM usually appear abruptly and the course of the disease is short. Clinical signs vary depending on the extent and siting of the lesions in the cerebrum. Changes in temperament (apathy, agitation, frenzy), hypersensitivity, posterior weakness, locomotory disturbances (ataxia, abnormally short steps, goose-stepping gait, brushing, stumbling) pushing and colliding with objects have been reported. Paralysis of the lips, tongue and deglutition muscles have often been observed and icterus may be present. Terminal convulsions are often seen and the horses are usually eutha-

nased in this phase for humane reasons⁷.

At necropsy the brain may be oedematous and yellowish swollen areas that fluctuate on palpation may be present. Macroscopical or microscopical examination of coronal sections of the fixed brain will reveal focal areas of liquifactive necrosis and haemorrhage in the subcortical white matter of the cerebrum. Sometimes damage to the liver may also be evident⁷.

Cynanchum poisoning

Cynanchum ellipticum (monkey rope) is a slender, robust climber which, although mainly confined to coastal bush, also occurs inland in wooded valleys. Various glycosides ('cynanchosides') have been isolated from the *Cynanchum* species⁷. Ingestion of this plant by horses results in a nervous syndrome. Affected horses may rock backwards and forwards, appear to suffer from laminitis and frequently lie down (M Terblanche, private practitioner, Port Elizabeth, pers. comm., 2001). Typically ruminants are hypersensitive and undergo episodes of convulsions followed by protracted paresis/paralysis⁷. When removed timeously from infested camps animals usually recover. Treatment is symptomatic and supportive.

Annual ryegrass toxicosis (ARGT)

Various *Lolium* spp. containing bacterial galls in their seed heads may induce ARGT in livestock, including horses. *Rathayibacter toxicus* produces corynetoxins which are responsible for the neurological signs⁹. In South Africa, the condition occurs mainly in the winter rainfall area of the Western Cape Province. Following introduction as a pasture grass, the different *Lolium* species have spread and hybridised and are now troublesome weeds on disturbed ground, in orchards, vineyards, fallow lands, next to roads, etc¹³. There is a latent period of 4–16 days before clinical signs are seen. The signs may be precipitated by disturbing or exercising the animals, especially in mild cases. Hypersensitivity, muscular twitching, locomotory disturbances (unsteady, high-stepping gait) and substantial mortalities have been reported^{7,13}. Treatment is symptomatic and supportive, using sedatives such as xylazine (Rompun, Bayer AH) and detomidine (Domosedan, Novartis AH).

Perennial ryegrass staggers

Perennial ryegrass staggers is caused by lolitrems produced by the endophytic fungus *Neotyphodium* (= *Acremonium*) *lolii*^{16,22}. Only 1 suspected outbreak involving horses in South Africa has been reported (A van Halderen, M Denkhaus, private practitioners, pers. comm., 1997).

They observed mild posterior paresis and ataxia in mares grazing in a paddock seeded with *Lolium perenne* (perennial ryegrass) on a farm near Somerset West in the Western Cape Province. The mares recovered following removal from the particular paddock.

Stringhalt

Odd incidents of suspected stringhalt in South Africa have come to our attention. *Hypochaeris radicata* (hairy wild lettuce, flatweed) is a cosmopolitan weed (Fig. 4) that occurs throughout South Africa and resembles the common dandelion (*Taraxacum officinale*), except that the flower stems tend to branch. There is circumstantial evidence that this plant or fungi associated with this weed induces stringhalt in horses in the USA, Australia and New Zealand. This locomotory disorder appears in late summer or autumn, usually following a dry summer resulting in sparse grazing and when this weed is abundant in the paddocks. Although axonal degeneration is present, horses generally recover, albeit over an extended period (several months to years), when removed from the particular pastures¹⁵.

Nigropallidal encephalomalacia

Continuous consumption of *Centaurea solstitialis* (yellow centaurea, in the USA referred to as yellow star thistle) (Figs 5, 6) and *C. repens*, which has purple to pink flowers, (Russian centaurea; Russian knapweed in the USA) induce a nervous disorder known as equine nigropallidal encephalomalacia (ENE) in the USA, Argentina and Australia¹⁶. Both are exotic plants introduced into the 3 Cape provinces, where they generally grow in weedy paddocks or fallow fields. As far as can be ascertained, this condition has not been diagnosed in South Africa.

Poisoning with *Centaurea* species is apparently restricted to horses ingesting large quantities of plant material over a period. Clinical signs of toxicity appear suddenly. Drowsiness, difficulty in eating and drinking and aimless wandering with the muzzle to the ground or total inactivity have been described. The horses have particular difficulty in swallowing, which is ascribed to impairment of neural activity of the 5th, 7th and 12th cranial nerves. In the USA the common name 'chewing disease' is apt. Affected horses generally die of starvation or dehydration¹⁶.

Lesions are commonly found in any of the following 4 sites in the brain: the globus pallidus and substantia nigra of the left and right sides (Fig. 7). The toxic principle(s) of *Centaurea* species, although



Fig. 1: *Phomopsis leptostromiformis* infection of lupine pods and seeds.



Fig. 2: *Ageratina adenophora* (crofton weed) (courtesy of S Nesor, Agricultural Research Council, Pretoria).

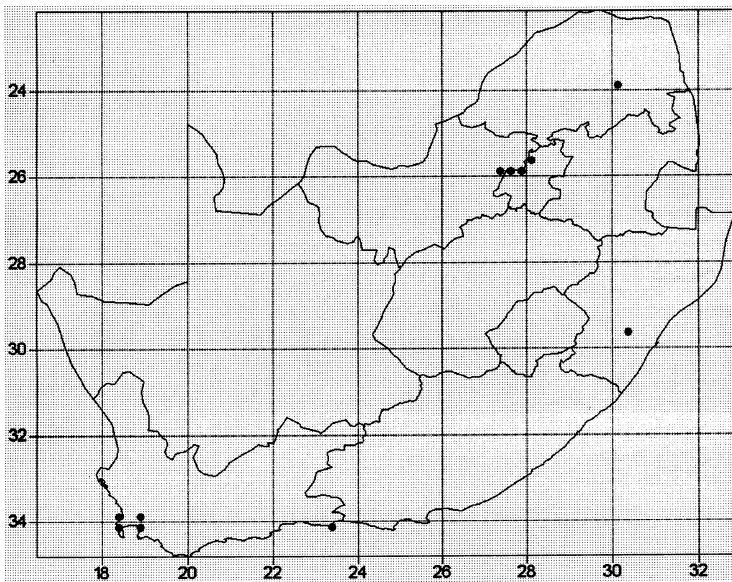


Fig. 3: Distribution of *Ageratina adenophora* (courtesy of L Henderson, National Botanical Institute, Pretoria).



Fig. 4: *Hypochoeris radicata* (hairy wild lettuce) (courtesy of B van Wyk, University of Pretoria).



Fig. 5: *Centaurea solstitialis* (yellow centaurea) (courtesy of R Poppenga, University of Pennsylvania).



Fig. 6: Yellow star thistle (courtesy of R Poppenga, University of Pennsylvania).

not yet identified, are believed to be sesquiterpene lactones^{1,6}.

Sorghum cystitis/ataxia syndrome

Sorghum spp. can accumulate toxic concentrations of cyanogenic glycosides. Grazing especially of young, rapidly growing plants for extended periods (an average of 8 weeks) may result in a sorghum cystitis/ataxia syndrome⁶. In plants, cyanide (CN⁻) is present in the form of cyanogenic glycosides. After hydrolysis, the CN⁻ is detoxified by rhodanese (sulphur transferase) to the relatively safe thiocyanate (SCN⁻). In the absence of sufficient sulphur donation, a relatively minor detoxification pathway is followed to cyanate (OCN⁻) which is neurotoxic and is suspected of causing Nigerian nutritional ataxic neuropathy (tropical ataxic myeloneuropathy), the casava-related neurodegenerative disease of humans^{2,19}.

During 1997 a horse was hospitalised at the Faculty of Veterinary Science, Onderstepoort, after grazing in a *Sorghum* field. The horse presented with ataxia, hind limb paresis and cystitis, a syndrome well described in the literature⁶. Loss of nerve function to the hind limbs and bladder was encountered, resulting in inflammation of the bladder. Bladder paralysis results in overfilling and constant leaking of urine which may, in mares, scald the hind limbs. Bladder infection is a common sequel. The animals had a normal clinical appearance, but stumbled and/or fell when exercised. Affected animals may be unable to back-up and complete paralysis of the hind limbs may develop⁶.

No satisfactory treatment is available. Nerve regeneration or recovery is not complete. Horses that survive should not be worked or ridden. Grazing of *Sorghum* pastures for extended periods should be avoided. The syndrome, however, does not develop following consumption of dry hay⁶.

ALIMENTARY TRACT

***Datura* poisoning**

Datura stramonium and *D. ferox* are the most important species. These introduced, annual weeds occur throughout South Africa on disturbed soil, being especially troublesome in cultivated lands with annual crops. Horses are very susceptible and poisoning may occur following ingestion of a concentrate containing *Datura* seed. During combine-harvesting, grain such as maize may be contaminated with *Datura* seeds. Having the same specific gravity (SG) as grain, it is difficult to separate *Datura* seeds from

grain. Hay may also be contaminated with *Datura* plant material. Recently, young *Datura* cut, dried and baled with annual grasses, such as tef, was found to be as toxic as the seeds (T W Naudé, C J Botha, R Gerber, Faculty of Veterinary Science, Onderstepoort, and S de Kock, SA Jockey Club, unpubl. obs., 2000). These weeds contain the parasympholytic alkaloids, hyoscyamine (atropine) and hyoscine (scopolamine)⁷, which induce intestinal stasis and ileus of the gut resulting in outbreaks of severe, intractable impaction colic as the dominant sign of intoxication in horses.

***Ornithogalum* poisoning**

Ornithogalum thyrsoides (chinkerinchee or star of Bethlehem) is endemic to the winter rainfall area of the Western Cape Province, where it usually occurs in damp places such as in marshes or near streams. The plant can also occur in open veld if the rainfall is adequate. As chinkerinchee is a popular cultivated flower, poisoning of stock often results from plants or bulbs discarded as garden waste in the veld. Dried chinkerinchee in hay or fresh in fodder often causes poisoning. Cholestan glycosides have been isolated from this species²⁰. It is extremely toxic, as little as 8 flower heads may kill a horse! Horses exhibit anorexia, depression (drowsiness) and severe, persistent, watery diarrhoea⁷.

***Robinia pseudoacacia* poisoning**

Robinia pseudoacacia (black locust), an introduced invader (Figs 8, 9), is a frost-resistant tree occurring throughout South Africa. However, poisoning has to date not been recorded here, although it is a well-known syndrome abroad. Intoxication follows after grazing of young sprouts, or nibbling of bark by horses tethered to trees or chewing bark off fence posts. Horses may also be exposed to pruned or fallen branches. The toxic principle is robin, a toxalbumin or plant lectin similar to ricin, and the toxic dose is relatively low⁶.

Clinical signs may develop 1–2 h after ingestion. The following clinical signs have been recorded: anorexia, stupor, depression, weakness with posterior paralysis, laminitis, coldness of the extremities, mydriasis, dyspnoea, weak, irregular pulse and diarrhoea (which may contain blood)⁶.

Avoid using black locust tree trunks with intact bark as fence posts and provide adequate forage in early spring to prevent horses from grazing young sprouts. For treatment, activated charcoal followed by a saline purgative could be administered and electrolyte fluid therapy is indicated. Several days to

weeks are required for complete recuperation; even longer if the animal has laminitis⁶.

Stomatitis due to grass seed awns

The annual nuisance weed grass, *Setaria verticillata* (burr bristle grass, klits setaria), occurs widely in South Africa and the seed awns commonly get entangled in the coat of pets. In an attempt to remove the awns, dogs groom themselves by mouth and the severely retro-barbed seed awns, of up to 1 cm in length, may lodge in the buccal mucous membrane and may migrate deeply into the underlying soft tissues, causing severe irritation and possibly secondary infection. Grass seed awns may also result in painful oral ulcers in horses, which can be confused with some equine viral diseases (F Galey, University of Wyoming, pers. comm., 2002).

CARDIOVASCULAR SYSTEM

Avocado poisoning

Three avocado (*Persea americana*) races are recognised, of which the Guatemalan race is potentially the most poisonous. Popular cultivars such as Hass, Fuerte and Nabal are all examples of the Guatemalan race. An unidentified cardiotoxin and persin (which induces a non-infectious mastitis and agalactia in lactating females), are responsible for the clinical syndrome¹¹. Relatively large quantities of plant material need to be ingested for poisoning to occur. Although the ripe fruit is eaten by humans, several cases of cardiac poisoning of animals by avocado leaves, green fruit, seed or bark, have been reported locally. Horses have also been poisoned in South Africa after consuming leaves.

Signs associated with heart failure such as respiratory distress, coughing, increased respiratory and heart rates, cardiac arrhythmias, anasarca of the ventral neck and brisket and cyanotic mucous membranes have been recorded. In horses, severe oedematous swelling of the head (masseter region, eyelids, tongue) has also been reported. Other clinical signs include anorexia, general weakness and recumbency⁴. An important differential diagnosis in horses that should be excluded is ionophore poisoning. To avoid poisoning, horses must be prevented from gaining access to avocado groves or pruned branches.

Cardiac glycoside poisoning

Plants such as *Nerium oleander* (oleander) and *Thevetia peruviana* (yellow oleander) contain highly toxic cardenolides. These exotic shrubs are popular garden

plants and may be planted next to horse stables or as ornamentals adjacent to the paddock. For a variety of reasons horses may nibble on twigs of these shrubs or even desiccated leaves and garden trimmings may accidentally be fed to them. Intoxication has also been reported where horses were exposed to *Eragrostis* hay and lucerne contaminated with 'tulp' (N Fourie, Onderstepoort Veterinary Institute, pers. comm., 1996). 'Tulp' (*Homeria* and *Moraea* species) contains bufadienolide cardiac glycosides. Cardiac glycosides inhibit Na⁺/K⁺ATPase resulting in transmembrane ion gradient disturbances. Animals may die peracutely from cardiac arrhythmia or refuse contaminated feed, tremble, exhibit signs of colic, become weak and develop diarrhoea. Various cardiac rhythm disturbances, including atrioventricular dissociation have been reported^{3,7}.

REPRODUCTIVE SYSTEM

Ergot alkaloid poisoning

Summer syndrome (= hyperthermia) in cattle is a relatively recent intoxication reported from the Western Cape Province. The outbreak in cattle was associated with the feeding of barley screenings (broken and undersized barley and grass seeds) from breweries, which were heavily contaminated with ergots from annual ryegrass (*Lolium* spp.) seed heads. *Claviceps purpurea* (a fungus) infects the seed heads of many grasses, including annual ryegrass, and grain. A hard brown-black, elongated, sclerotium (ergot), which replaces the seed, contains the toxic principles. In grain the sclerotia are often confused with rodent faeces¹⁴.

More recently outbreaks on the Highveld were associated with the feeding of maize silage or tef hay contaminated with *Cyperus esculentus* (yellow nutsedge, 'geeluintjie'). The nut sedge, contained numerous sclerotia (ergots) of the fungus *Claviceps cyperi* (Fig. 10). These ergots were also brown-black in colour, but significantly smaller than those produced by *Claviceps purpurea*¹⁰. Ergots contain various ergot alkaloids of which ergotamine and ergocryptine are the most important.

Fescue toxicosis in horses in the USA, another form of ergot alkaloid poisoning, is associated with reproductive problems in mares grazing tall fescue. *Festuca elatior* (= *F. arundinacea*) (Kentucky 31, 'swenkgas') (Fig. 11) is infected by an endophyte *Neotyphodium* (= *Acremonium*) *coenophialum* that also produces ergot alkaloids, in particular ergovaline¹⁸. This grass is popular in South Africa as it is green in winter and thousands of hectares of a variety

(Iewag) originating from Harrismith in the Free State have been established all over South Africa. Recently an outbreak of typical 'fescue foot' (necrosis of the tail tip and hooves) was diagnosed in Brahman cattle grazing this pasture in mid winter near Standerton. The grass contained 1700–8170 ppb ergovaline (200–400 ppb is regarded as of toxicological significance). In addition the seed was ergotised, presumably by *Claviceps purpurea*, and contained 1000 ppb of the usual ergot alkaloids. As the endophyte infection is spread through seed, chances are that toxic fescue may be widespread in the country. (C J Botha and T W Naudé, unpubl. obs., 2001).

The equine practitioner should be aware of this potential intoxication which may result from tef contaminated with ergotised nutsedge as the following reproductive difficulties, as listed by the Oregon Tall Fescue Commission, have been attributed to fescue toxicosis.

- Abortions – Abortions often occur with mares grazing fescue, usually in late gestation near the normal foaling date.
- Prolonged gestation – mares grazing fescue may carry a foal for 370 days or more as opposed to the normal average of around 336.
- Dystocia – The excessive size of foals born after prolonged gestation often causes foaling problems.
- Thickened placenta – Abnormally thick and/or tough placentas are frequently associated with mares grazing fescue.
- Foal deaths – Foals, which are large due to the long gestation period, often die before or during parturition. Many foal deaths result from dystocia problems.
- Retained placenta – Retained placentas can occur in mares grazing fescue. Associated problems (i.e. uterine infection, laminitis, septicaemia) can cause infertility.
- Agalactia – Mares that have been grazing fescue are likely to produce little or no milk as ergot alkaloids cause a precipitous drop in prolactin. This results in starvation and weak foals. Colostrum production, and thus the transfer of antibody protection to the foal, may or may not be affected.
- Mare mortality – Dystocia caused by large foals, and complications associated with retained placentas, sometimes result in death of mares.
- Difficulty in anticipating birth – Mares often do not exhibit the normal visual signs of impending birth. There may be little or no udder development, swelling of the vulva, or other signs that birth is imminent.
Avoid feeding screenings or contaminated hay. Consider removing mares

from infested tall fescue in late gestation. Annual grasses, such as tef, are particularly prone to nutsedge infestation. Dopamine-receptor blockers such as domperidone and phenothiazine tranquillisers could possibly be used to alleviate the clinical signs¹⁸.

SKIN

Stachybotryotoxicosis

The fungus *Stachybotrys atra* produces trichothecenes. Two recent outbreaks of putative stachybotryotoxicosis (trichothecene intoxication) in horses have been brought to our attention. Stabled horses in the Western Cape Province developed necrosis around the nostrils and fetlocks. Examination of the bedding in the stables revealed that the wheat straw was colonised by *Stachybotrys atra* (D J Schneider, Regional Veterinary Laboratory, Stellenbosch, pers. comm., 1996). In another incident, horses stabled at the Bloemfontein show exhibited a mucopurulent nasal discharge, lesions (eczema) on the muzzle and slightly swollen heads. Again the bedding was contaminated with the fungus (J P J Joubert, Onderstepoort Veterinary Institute, pers. comm., 1999).

Photosensitivity

In South Africa, secondary photosensitisation is a common syndrome of ruminants. Although far less frequent in horses, the condition has been suspected of occurring in southern Africa. In the USA, secondary photosensitivity has been reported in horses grazing in a clover/lucerne pasture parasitised by the fungus *Cymodothea trifolii*¹².

In addition, primary photosensitivity induced by *Hypericum* species and *Ammi majus* (lace flower) may also occur⁷.

Sour grasses

Schmidtia kalahariensis (Fig. 12) and to a lesser extent *Enneapogon cenchroides* ('suurgrasse') secrete microscopic droplets of an irritant acid during active growth. The former occurs in the Kalahari region of Botswana and Namibia, whereas the latter has a wide distribution. Dense stands of these pioneer, annual grasses may occur and are usually avoided by livestock during the acid secretory growth stage. Preliminary investigations revealed that unidentified organic acids can be extracted from the grasses and separated by paper chromatography. Three components (1 in a high concentration and 2 at much lower levels) were present in *S. kalahariensis* and 2 at much lower concentrations in *E. cenchroides*²¹. These grasses cause severe irritation of the skin of the face and distal limbs.

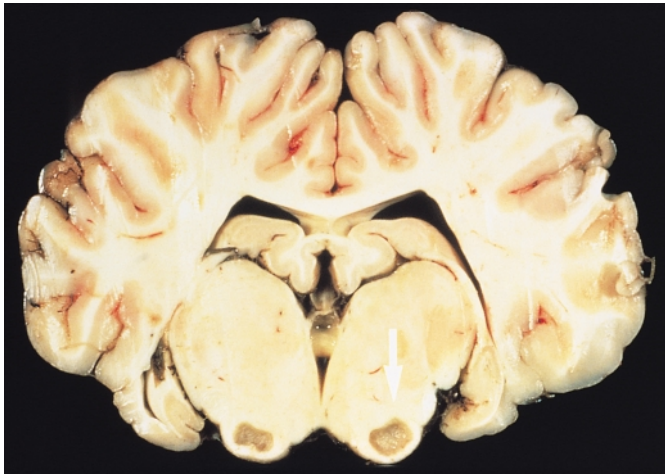


Fig. 7: **Nigropallidal encephalomalacia** (courtesy of R Poppenga, University of Pennsylvania).



Fig. 8: ***Robinia pseudoacacia*** (black locust).



Fig. 9: Flowers of ***Robinia pseudoacacia***.



Fig. 10: ***Cyperus esculentus*** (yellow nutsedge, 'geeluintjie') containing a sclerotium (ergot) of the fungus ***Claviceps cyperi***.



Fig. 11: ***Festuca elatior*** (tall fescue, swenkgras).



Fig. 12: ***Schmidtia kalahariensis*** (sour grass, suurgras).

Dermatitis, eczema and alopecia around the muzzle and lower limbs can develop in horses grazing in camps where these grasses are very abundant (P Basson & R Grant, State Veterinarians, Namibia, pers. comm., 1990).

CONCLUSIONS

Although plant poisonings and mycotoxicoses are not as common in equines as in ruminants, intoxications should always be considered in differential diagnoses in equines, as a number of these poisoning syndromes occur locally. Several plants known to induce poisoning abroad are present in southern Africa and cognisance should be taken of them as potential sources of poisoning.

ACKNOWLEDGEMENTS

We thank the South African Veterinary Foundation and the Equine Practitioners Group of the South African Veterinary Association for financial contributions that enabled colour reproduction of photographs in this review.

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