Plant toxicities in Australian native mammals

**Fact sheet**

**Introductory statement**

A variety of native and introduced plant species may cause toxicities in Australian native mammals. Toxicity is mainly through ingestion and herbivorous host species are most likely affected. Reports of toxicity have increased in recent years, in particular mass events affecting large grazing species such as kangaroos and wombats (Boardman 2019).

Historically, little attention has been paid to plant poisonings in wildlife. Plant poisonings of wildlife may be difficult to detect and diagnose with both “obvious” acute or chronic effects, and also more subtle effects, easily missed. Histopathological investigation of affected animals is an important tool in gaining more information on the likely causes of disease in free-ranging wildlife (Steventon et al. 2018). Common effects of plant toxicities include liver disease, gastrointestinal disease, neurological disease, renal disease and skin disease. Subtle and chronic effects include reproductive impairment, growth retardation, weight loss, changes in coat etc (Fowler 1983).

Many free-ranging species have developed strategies to cope with plant toxins, including avoidance, dilution, degradation and detoxification. Factors which interfere with these natural processes may predispose animals to toxicity (Fowler 1983). Despite historical underreporting, there is almost certainly a true increase in incidence of plant toxicities in native wildlife in Australia in the past decade. Factors contributing to the increased incidence of toxic plant ingestion include extensive and prolonged drought, the dominance of degraded pastures with particular species of introduced plants and the opportunistic dominance of grasslands by invasive plant species, especially those that can adapt rapidly to changes of climate e.g. break of a drought. Predisposing illness may make individual more likely to ingest toxic plants, and less able to cope with the toxic impact (Steventon et al. 2018).

Table 1 summarises information on important plant toxicities reported in Australian mammals. Additional information is provided on some toxins. Chapter 19 “Plant and other toxicoses” in Current therapy in Medicine of Australian Mammals” (Vogelnest and Portas 2019) and Chapter 32 “Disease caused by exogenous toxins in terrestrial mammals” in “Pathology of Australian Native Wildlife” (Ladds 2009b) provide further information.
**Table 1:** Some reported plant toxicities in Australian native mammals

<table>
<thead>
<tr>
<th>Toxic agent</th>
<th>Plant</th>
<th>Host species affected</th>
<th>Regions reported</th>
<th>Clinical signs</th>
<th>Pathological changes</th>
<th>Epidemiological information</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phalaris toxic alkaloids</td>
<td><em>Phalaris spp.</em> (presumed)</td>
<td>EG kangaroos</td>
<td>South-east Australia</td>
<td>Ataxia, head tremors, collapse</td>
<td>Changes throughout brain, kidneys and heart; intracytoplasmic granules</td>
<td>See further notes below</td>
<td>Bacci et al. (2014) Fowler (1983)</td>
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<td></td>
<td></td>
<td>Red kangaroos (<em>M. rufus</em>)</td>
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<td></td>
<td></td>
<td>Red-necked wallabies (<em>M. rufogriseus</em>)</td>
<td>Tasmania</td>
<td>Neurological, weight loss</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Pyrrolizidine alkaloid</td>
<td><em>Heliotropium europaeum</em> (presumed)</td>
<td>Southern hairy-nosed wombat (<em>Lasiorhinus latifrons</em>)</td>
<td>South Australia</td>
<td>Hair loss, dermatitis,</td>
<td>Liver disease</td>
<td>See further notes below</td>
<td>Woolford et al. (2014)</td>
</tr>
<tr>
<td>?</td>
<td>Red kangaroo</td>
<td>-</td>
<td>-</td>
<td>Consistent with liver disease</td>
<td>Hepatosis</td>
<td>See grazing toxic plants</td>
<td>Fowler (1983)</td>
</tr>
<tr>
<td>Senecio jacobaea (ragwort)</td>
<td><em>Pygmy possum</em> (<em>Cercartetus spp.</em>)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Hepatosis</td>
<td>Presume from honey containing toxic compounds</td>
<td>Ladds (2009a)</td>
</tr>
<tr>
<td>Fluoroacetate</td>
<td><em>Gastrolobium spp.</em> and <em>Oxylobium spp.</em></td>
<td>Many mammalian species. Some more susceptible</td>
<td>SW Western Australia (in native plants)</td>
<td>Tremors, convulsions death</td>
<td>Non-specific changes due to heart failure</td>
<td>Non-adapted or recently introduced individuals. Endemic populations have innate resistance.</td>
<td>Fowler (1983); see also Ladds (2009a).</td>
</tr>
<tr>
<td>Toxic agent</td>
<td>Plant</td>
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<tr>
<td>Oxalates</td>
<td>Eucalypts</td>
<td>Koala</td>
<td>South Australia</td>
<td>Kidney disease</td>
<td>Crystals and damage to renal cells</td>
<td>See further notes below</td>
<td>Speight et al. (2013); (2019a; 2019b)</td>
</tr>
<tr>
<td>Cyanide</td>
<td>Eucalypts</td>
<td>Koala</td>
<td>Unknown</td>
<td>-</td>
<td>-</td>
<td>Eating unfamiliar species</td>
<td>Fowler (1983), quoting Everist (1974); Ladds (2009a)</td>
</tr>
<tr>
<td>Cholestatic poisons from Lantana</td>
<td>Lantana camara</td>
<td>Red kangaroos (captive)</td>
<td>Overseas (captive)</td>
<td>Anorexia, lethargy, depression, jaundice, skin disease, death</td>
<td>Hepatosis, secondary photosensitisation and skin changes</td>
<td>Lantana present in hay ingested by affected animals</td>
<td>Johnson and Jensen (1998)</td>
</tr>
</tbody>
</table>
**Pyrrolizidine alkaloid hepatosis**

This is also a threat to grazing livestock. In SHN wombats, it is likely that ingestion of the unpalatable plants occurred due to inexperience of animals (the plants emerged as young animals were weaned) and decreased availability of preferred plant material in a degraded environment. Lack of long term pasture management may also be a contributing factor (Boardman 2019).

**Chronic phalaris toxicity**

Perennial phalaris grass toxicity (aka Canary grass) is a problem in grazing livestock as well as wildlife in SE Australia. There may be seasonal variations in toxins (Boardman 2019).

**Steroid saponin toxicity**

Animals exhibited photophobia and shade-seeking behaviours. The pasture was dominated by invasive species and there had been a prolonged period of drought followed by rains allowing introduced weeds and grasses to dominate the pasture mix (Steventon et al. 2018).

**Oxalate toxicity**

The aetiology of oxalate nephrosis in koalas in some areas of Australia (Mt Lofty Ranges, SA) appears complex. There is no clear link to increased levels of oxalates in the vegetation in these areas compared to other areas, where incidence of oxalate nephrosis in koalas is much lower. There is no clear difference in the activity of oxalate-degrading gut bacteria of these populations compared to others with lower levels of the disease (Speight et al. 2013; Speight et al. 2019b). The hot dry summers in SA, with lower levels of plant hydration and less free-standing water sources, may be a contributing factor (Speight et al. 2019a). Further work is occurring to better understand this syndrome.

**Surveillance**

Wildlife disease surveillance in Australia is coordinated by Wildlife Health Australia. The National Wildlife Health Information System (eWHIS) captures information from a variety of sources including Australian government agencies, zoo and wildlife parks, wildlife carers, universities and members of the public. Coordinators in each of Australia’s States and Territories report monthly on significant wildlife cases identified in their jurisdictions. eWHIS contains numerous reports of plant toxicity events in wildlife, mostly of phalaris toxicity in large macropod species in Victoria, Tasmania and South Australia. NOTE: access to information contained within the National Wildlife Health Information System dataset is by application. Please contact admin@wildlifehealthaustralia.com.au.

**Conclusions**

Reports of plant toxicities are increasing in native mammals. It may be difficult to detect signs of toxicity and determining the plant which caused the toxic changes can be extremely difficult. Disease consistent with plant toxicity should be thoroughly investigated in free-living wildlife. Further work is required to better understand which plants may be toxic to wildlife species, and the factors which may drive wildlife to consume these plants. It is likely that anthropogenic climate change will continue to drive opportunities for toxic plant ingestion by native species in Australia.
Acknowledgements

We are extremely grateful to the many people who had input into this fact sheet and would specifically like to thank Wayne Boardman who wrote the chapter in "Current therapy in Medicine of Australian mammals" from which some of this information is drawn.

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References


Speight K, Houston-Francis M, Mohammadi-Dehchesmeh M, Ebrahimie E, Saputra S, Trott DJ (2019b) Oxalate-degrading bacteria, including Oxalobacter formigenes, colonise the gastrointestinal tract of healthy koalas (Phascolarctos cinereus) and those with oxalate nephrosis. Australian Veterinary Journal 97, 166-170.


To provide feedback on this fact sheet

We are interested in hearing from anyone with information on this condition in Australia, including laboratory reports, historical datasets or survey results that could be added to the National Wildlife Health Information System. If you can help, please contact us at admin@wildlifehealthaustralia.com.au.

Wildlife Health Australia would be very grateful for any feedback on this fact sheet. Please provide detailed comments or suggestions to admin@wildlifehealthaustralia.com.au. We would also like to hear from you if you have a particular area of expertise and would like to produce a fact sheet (or sheets) for the network (or update current sheets). A small amount of funding is available to facilitate this.

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