Phomopsis infection of lupin seed

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Early reports of lupinosis in Western Australia implicated infected stems and leaves of the sandplain or W.A. blue lupin (Lupinus cosentinii) as the main source of toxicity.

After the introduction of low alkaloid varieties of L. angustifolius, lupinosis continued to occur on stubbles but random testing of seeds showed only very low levels of Phomopsis leptostromiformis infection.

However in 1976, scientists at the University of Western Australia who were evaluating the use of an all lupin seed ration for drought-feeding sheep encountered lupinosis in one of their trials. Seven per cent of the seed used was found to be infected by Phomopsis, just over twice the highest figure previously reported in this State. As a result, the Department of Agriculture decided to investigate the extent of Phomopsis infection of lupin seed.

A six-year state-wide survey found that Phomopsis infection of seed was increasing and that the incidence was greater in the high rainfall zones. All commercial varieties tested were equally susceptible to infection when grown in the high, medium and low rainfall zones.
Discoloured lupin seed, some with fungal growth.

Phomopsis infection inside the lupin seed pod.

Phomopsis infection on the outside of the seed pod.

**Seed infection**

Seed is infected when the *Phomopsis* fungus infects the young pods. Seasons with late rainfall usually predispose seed to infection.

Seed infected by *Phomopsis* may appear normal (asymptomatic infection), or it may have a discoloured seed coat (symptomatic infection) which varies from light yellow to dark reddish-brown. Sometimes fungal growth may be seen on the seed coat. Investigation has shown that asymptotically infected seed contains negligible quantities of toxin, but discoloured seed may be equally as toxic as lupin stubbles.

Although discoloured seeds can contain high levels of toxin, the proportion of such seed within the harvested crop or feed mixture is so low that livestock are not at risk of lupinosus under normal feeding practices. In the University of Western Australia trial referred to previously, sheep fed a diet consisting wholly of lupin seed only showed signs of lupinosus after several months. Other livestock are many times less susceptible to the lupinosus toxins than sheep, with pigs most unlikely to be affected.

The presence of discoloured seed can affect the marketability of lupins and Co-operative Bulk Handling have set a receival limit of 3 per cent for discoloured, shrivelled and distorted seed.

As well, lupin seed has a future as a legume for human consumption. The presence of more than a trace of discoloured seed for this market would not be acceptable.

**Reducing the proportion of toxic seed in feed**

The amount of infected seed in a crop can be minimised by management practices.

A survey of the 1984-85 lupin harvest found no discoloured seed in samples from crops that were sown as far away as possible from last years and the previous years lupin stubbles. Discoloured seed, however, was detected in samples from crops sown within 500 metres of such stubbles. The risk of seed infection can be greatly reduced by not planting lupins within 500 metres of one and two year old stubbles.

Discoloured seed is lighter than white seed and can be fairly readily separated from it. After harvesting, almost all discoloured seed can be removed by commercial grading processes.

**Controlling infection**

The ultimate solution to *Phomopsis* infection of lupin seed lies with the lupin varieties being developed by the Department of Agriculture for resistance to stem infection. Preliminary observations have shown that the best of those varieties have resistance to pod and seed infection. (See ‘Phomopsis-resistant lupins—breakthrough towards the control of lupinosus’ on page 43.)

**Further reading**


