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POISON PLANTS OF WESTERN AUSTRALIA

YORK ROAD POISON and BOX POISON



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## POISON PLANTS OF WESTERN AUSTRALIA

The toxic species of the genera  
*Gastrolobium* and *Oxylobium*

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# YORK ROAD POISON and BOX POISON

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YORK ROAD poison and box poison are two of the most important members of the group of poison plants belonging to the genera *Gastrolobium* and *Oxylobium*—the toxic pea-flowered plants.

### YORK ROAD POISON (*Gastrolobium calycinum* Benth.)

YORK ROAD POISON derives its common name from the fact that in the early years of settlement many stock died from eating this plant while being driven along the road from Perth to York. Stock losses due to accidental grazing of this species are still not uncommon and the presence of even a single bush in a paddock can cause heavy stock losses.

The three main forms of York Road poison are the typical form, the broad-leaved form and the narrow-leaved form.

THE TYPICAL FORM, present in the Darling Range and extending southward to Katanning and beyond is found on heavy soils and usually associated with wandoo woodland. It is an erect shrub up to six feet high, with yellowish branches and grey-green leaves.

The leaves are in opposite pairs or in threes, lance-shaped or broader and have

a sharp point. The base of the leaf is indented like the apex of a heart. The leaves are from one to three inches long, leathery, rigid, net-veined and usually slightly curved outwards.

The flowers, which are borne on elongated flowering stalks (racemes) terminate the branchlets or arise from the upper leaf axils. They are relatively large, few in number and arranged in twos or threes along the stalk.

The calyx (cup-like structure in which the petals are carried) composed of the five fused sepals, is hairless and serves to distinguish this species from other toxic plants which possess hairs on the calyces. The botanical name, derived from the Latin, *calycinus*, meaning belonging to the calyx, is in allusion to the large calyx of this species.

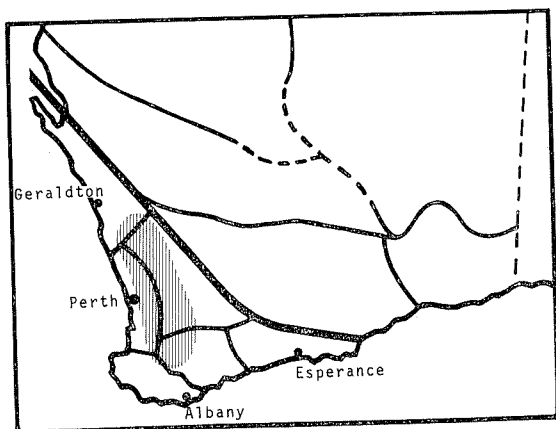
The thin almost transparent bracts which hide the flower buds are the largest of any of the species of *Gastrolobium* and may be up to half an inch long.





### YORK ROAD POISON

York Road poison (*Gastrolobium calycinum* Benth.) is found in an area roughly bounded by Gunyidi and Kalannie in the north, Katanning in the south and Quairading in the east. Three main forms of this species have been recognised. These are characterised by their relatively large flowers, smooth calyces, leaves which are round at the base and pointed at the apex, and stipules that are spine-like and present on the mature plant. York Road poison was very early recognised as a toxic species in Western Australia.



Distribution of York Road poison

The stipules (the hair-like structures arising from either side of the base of the leaf stalks) are firm, spine-like and spreading, and are present even when the leaves are mature.

**THE BROAD-LEAVED FORM** of York Road poison is found to the north of the distribution range of the typical form in the general area bounded by Gunyidi, Kalannie, Ballidu and Wannamal. In sandplain country it is usually associated with gravelly soils, whilst to the south-west of its range, near Mogumber and Wannamal, it is found in granite soil, usually among rocks.

The leaves of the broad-leaved form are almost circular in outline, and abruptly narrowed into a fine point.

The calyx, woolly white while in the bud stage, becomes hairless with age.

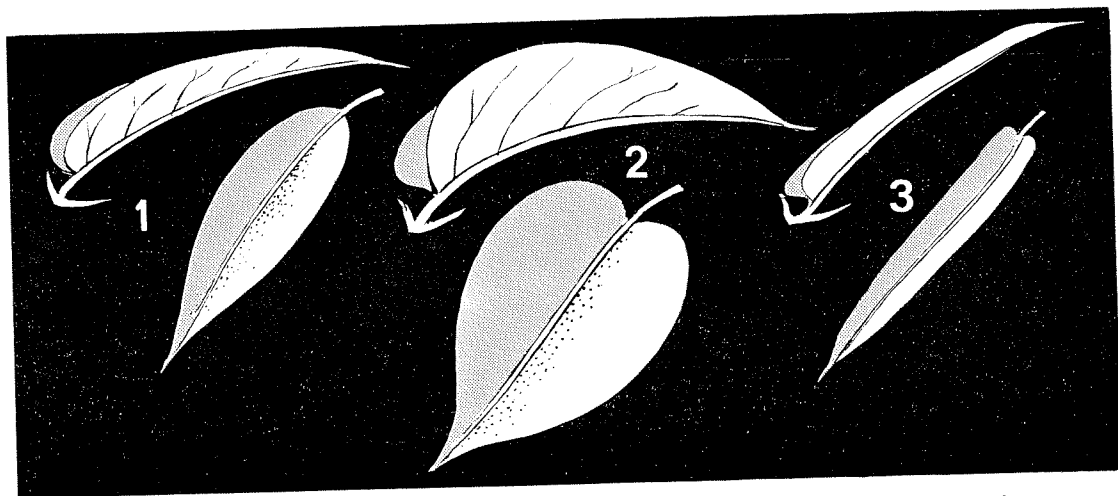
The leaves are indented at the base as in the typical form, and on older plants narrower leaves may be present.

**THE NARROW-LEAVED FORM**, found in the Cunderdin, Quairading and Greenhills, districts, is associated with granitic and gravelly soils. It was at one time treated as a separate species, under the name of *Gastrolobium saggitulatum* S. Moore, but intermediate forms suggest that it is only a form of York Road poison.

This form has narrow, very acute leaves, with a sharp point, and with the base of the leaf usually expanded.

Seedlings of all forms of York Road poison produce broad, almost round leaves, and it is only in mature plants that the forms described may be recognised.

All forms of York Road poison sucker from the rootstock when the plant is cut at ground level. An exception to this is a subform of the typical form which is found to the south and west of Northam. This sub-form, which is similar in all respects to the typical form, has a single upright stem and grows to five or six feet high. It is sometimes known as tree poison.



Typical leaves of the three main forms of York Road poison: 1.—Typical form; 2.—Broad-leaved form; 3.—Narrow-leaved form

## BOX POISON

(*Oxylobium parviflorum* Benth.)

BOX POISON, one of the most widely distributed poison plants in the agricultural areas of Western Australia, is also one of the most toxic. Stock deaths due to grazing this species are still quite common and losses of 200 sheep or more at a time have been recorded.

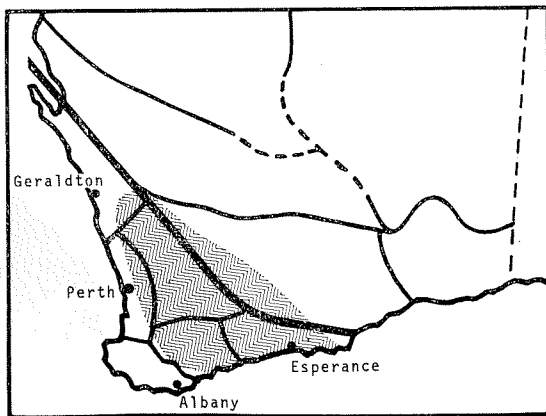
One farmer in an affected district recently estimated that poison plants killed 4,000 sheep and 100 head of cattle in one year. Most of these losses were thought to have been caused by box poison.

Four main forms of box poison may be recognised.

**THE TYPICAL FORM**, found over a wide area from Arrino in the north to Kataning in the south, and as far east as Merredin, is a compact shrub some six feet high with numerous erect branches.

The leaves, which are oblong to narrow-oblong, slightly wedge-shaped and frequently notched at the apex, are about one inch long and a quarter of an inch across. They are leathery in texture, dark green, shining and hairless on top, and paler and minutely and densely silky-haired underneath, with the margins somewhat rolled inwards on the underside. They are usually borne in opposite pairs along the stems or branchlets, but are sometimes so numerous that the regular arrangement is not obvious.

The flowers are smaller than those of most of the other toxic species. The



Distribution of box poison

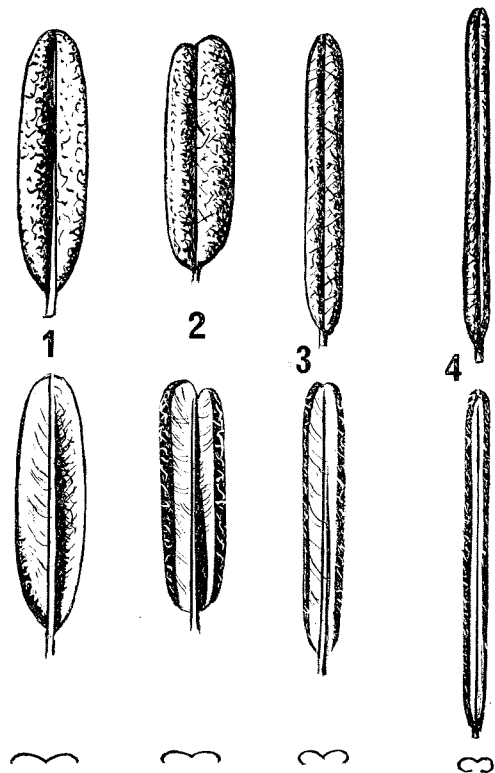
specific name, derived from the Latin, *parvus*, small, and *floris*, a flower, refers to the small flowers, which are orange-yellow, coloured with purple and red. They are borne in racemes which terminate the branchlets or arise from the axils of the upper leaves.

The stipules, unlike those of York Road poison, are small, while the calyx, also unlike that of York Road poison, is hairy and small in comparison.

The ovary contains four ovules.

**THE SECOND FORM OF BOX POISON**, found on the northern edge of the Esperance sand plain region has stems that are more ascending than erect, leaves rather broader than the typical form but with more revolute margins, and elongated racemes.

**THE THIRD FORM**, found in the Ravensthorpe district and westwards to the Fitzgerald River, has leaves somewhat



Leaves of the four main forms of box poison





### BOX POISON

Box poison (*Oxylobium parviflorum* Benth.) is found in an area roughly bounded by Arrino and Southern Cross in the north and Katanning and Esperance in the south. Four main forms of this species have been recognised. These are characterised by their shrub-like habit, leaves that are hairless above and silky-hairy beneath, and racemes that bear relatively small flowers. Box poison was early recognised as a toxic species and is one of the most hazardous of toxic plants found in Western Australia.



narrower than the typical form and with the margins so inrolled that the whole leaf appears almost to be a tube. The ovary contains six to eight ovules, and the pod is narrow. This form has been referred to as the variety *stenocarpum*, from the Greek, *stenos*, narrow, and *karpos*, fruit.

THE FOURTH FORM found in red loamy soils from Moorine Rock, southwards to Hyden and Lake King and eastwards to Salmon Gums and Grass Patch, has leaves that are very narrow and so inrolled that only the hairy midrib is evident on the underside. The upper surface has a curious wrinkled pattern. The axis of the racemes and the calyxes are densely hairy with spreading hairs. This form, sometimes referred to as Marlock poison, was at one time treated as a distinct species under the name of *Oxylobium revolutum* C. A. Gardn. and is at present known as the variety *revolutum*.

Box poison is usually associated with loamy clay, gravelly clay or sandy gravel, often on granite or quartzite ridges, slopes of ridges or on "breakaway" slopes, and on "crabhole" soils north of the Esperance sandplain region.

The type of vegetation with which box poison may be associated varies with the geographic location of the stand and includes wandoo, she-oak, mallet, wodjil, tamma and the various mallees.

## TOXICITY OF YORK ROAD AND BOX POISONS

Accounts of stock mortalities due to what was almost certainly York Road poison date back to 1837 when stock were lost while being driven along the road from Perth to York.

The first feeding trial with a leguminous plant to see if it was toxic to stock was undertaken with York Road poison, according to the description of the plant given by James Drummond, the botanist. Drummond undertook this trial at Balgarup in November, 1839, but the result was not reported.

A second feeding trial was undertaken at Williams, again with York Road poison according to Drummond's description (but which he called a *Dillwynia*, a non-toxic genus). This time it was reported that the

"healthy billy goat" fed with macerated fresh young material died in 14 hours, after "bawling for a period".

Both York Road poison and box poison were listed as toxic species by Drummond in 1842, and by Bentham in his second volume of "Flora Australiensis" published in 1864.

Attempts to isolate the toxic principle in both York Road poison and in box poison were started in 1895 by a Mr. S. S. Dougall. In 1896 Dougall reported that both species contained a glucoside or glucosides and an organic acid, either or both of which might be toxic to stock.

In 1899 a Dr. Rosselotty reported on the symptoms and post-mortem appearances caused by the administration of poison plants, including York Road poison and box poison, to animals. In 1900, Professor Stockman of the University of Glasgow, after chemical examination of the plants, came to the conclusion that the poison in both York Road poison and box poison was a substance belonging to the saponin series.

Between 1905 and 1906, Mr. E. A. Mann, working in collaboration with a Dr. Ince, claimed to have isolated the alkaloids cygnine from York Road poison and lobine from box poison. These substances, he claimed, produced toxic effects on experimental animals similar to those produced by the plants themselves. Later workers, using Mann's chemical methods, have failed to reproduce his results and have suggested that the toxic substances isolated by him were degradation products.

In 1934 an extensive investigation into the toxicity of the different species of poison plants found in Western Australia was carried out by Dr. H. W. Bennetts and Mr. C. A. Gardner. They found that both York Road and box poison were highly toxic to sheep.

Following the isolation and identification of the toxic principle, monofluoroacetic acid, in wall-flower poison by Mr. T. McEwan in Queensland, and almost simultaneously and independently in rock poison and its detection in box poison by Dr. J. R. Cannon in Western Australia in 1964, this substance was also found in York Road poison.

The sodium salt of this simple organic compound is the well known rabbit poison "1080".



Samples of air-dried plant material of York Road poison have been shown to contain up to 400 parts per million of "1080" equivalent. Box poison has been shown to contain up to 2,500 parts per million of this toxic compound.

At these levels of toxicity, using fresh green leaves some 6.6 oz of York Road poison or 1 oz. of box poison would be all that would be required to kill an adult sheep of about 110 lb. liveweight.

The amount of mono-fluoroacetic acid present in these toxic plants varies from season to season, from locality to locality or even from plant to plant within the one locality. For example, samples of box poison collected from several districts contained from 100-2,500 parts per million of "1080" equivalent. Within the one locality, in an area of one square chain, samples taken from 16 plots of box poison contained from 1,000-2,500 parts per million of the toxic substance.

As with other plants containing mono-fluoroacetic acid as their toxic principle, both York Road poison and box poison are most toxic when actively growing, for example, with the appearance of new shoots or suckers, or when in the flowering or fruiting stage. Other factors such as the fluoride availability in soils and the acidity or alkalinity of soils have a bearing on the amount of poison present in the plant.

York Road poison and box poison are usually considered to be least toxic when they are dormant—usually in late summer, provided the weather is dry.

It has been claimed that seedlings of both species may be grazed with safety if heavily stocked, provided the animals are not disturbed, that good feed is available in plentiful supply and that the weather remains dry for a considerable period, as during late summer. While there may be some truth in this claim, there still remains an element of danger, particularly if the seedlings are preferentially grazed by stock.

*Once an animal eats a lethal quantity of toxic material there is no effective remedial treatment for it, and the animal invariably dies.*

All domestic animals are highly susceptible to poisoning by these species, and the presence of a single bush in a paddock could provide a serious threat to grazing stock. Certain native marsupials and birds, such as the bronze-winged pigeon, are more resistant to this form of poisoning.

There are numerous cases on record where dogs and cats eating the entrails of these creatures have been poisoned, the symptoms described being similar to those shown by sheep and cattle poisoned by York Road poison or box poison.

The toxic principle, being a relatively stable substance, remains in the dried leaves of both York Road poison and box poison. On one occasion some 80 to 100 sheep died after eating dead bushes of box poison cut in November and blown into a paddock. The stock were turned into the paddock the following February when the losses occurred. Bushes that have been grubbed out should therefore be heaped and burnt rather than left where they may be eaten by stock.

## RECOMMENDATIONS

York Road poison and box poison, because of their extreme toxicity, their palatability to stock, and their wide distribution in the agricultural area, are two of the most serious native poison plant hazards found in Western Australia.

Farmers and graziers should learn to recognise the various forms of both species, as they occur in their particular districts, and to avoid exposing stock to these plants.

*The eradication of poison plants, right down to the last single bush, is essential before any area of land is utilised for stock-raising activities.*

To be certain of the identity of either species, specimens of suspected plants should be submitted to the Officer in Charge, Botany Branch, Department of Agriculture, Jarrah Road, South Perth for identification and comment.

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