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EXPLANATION OF PLATE

*Crotalaria retusa* L.  
A—Habit showing flowers and pods.  
B—A broad leaf from flower part of plant.  
C—Flowers.  
D—Calyx.  
E—Pods.  
F—Seed.  
(G and D natural size; all others half natural size.)  
Gogo, Fitzroy River, April, 1951.

C.A. GARDNER
1952.
THE WEDGE-LEAVED RATTLEPOD
(Crotalaria retusa L.)
A Poison Plant of Tropical Australia
By C. A. GARDNER, Government Botanist

DURING the last two years, work has been in progress near Fitzroy Crossing (West Kimberley) upon an investigation to determine the cause of Kimberley Horse Disease, commonly known as "Walkabout Disease." The investigations are still in progress, and the findings when completed, will be published elsewhere, but the discovery that Crotalaria retusa L. is a cause—and probably the major cause—of this disease is of considerable importance. Because of this it is considered advisable to assist pastoralists to recognise the plant and by providing information on its habit, occurrence and distribution, to enable them to take steps to minimise losses during the coming season.

Crotalaria retusa was examined by Greshoff in the Botanic Gardens at Buitenzorg in 1890, and found to contain a toxic alkaloid. This was later confirmed in the United States of America in 1939, when the alkaloid was found to be monocrotaline.

Earlier than this, in 1884, an allied species (Crotalaria sagittalis L.) was reported as the cause of "Missouri River Bottom Disease" which resulted in death among horses.

Since then, other species have been shown to be toxic, notably C. spectabilis Roth. from the United States of America, where it causes heavy losses among horses and cattle, as well as being toxic to pigs and fowls. Here again the alkaloid is monocrotaline, as in C retusa. The Sunn Hemp (C. juncea L.) is toxic to sheep in South Africa, and this species is not uncommon along some of the watercourses in Kimberley.

Other toxic species are Crotalaria dura Wood and Evans (toxic to horses); C. Burkeana Benth. (toxic to cattle), and C. Grantiana Harv., these three being native to South Africa.

The alkaloids involved are monocrotaline, dicrotaline and grantianine, all of which probably have retronecine as a basic unit. Retronecine, which is known to be present in C. retusa and C. spectabilis and also in several species of Senecio ("Ragwort"), is known to cause damage to the liver cells and is usually slow in action.

The presence of Crotalaria retusa in considerable abundance in certain areas in Kimberley appears to be of great economic importance in view of the heavy losses in horses which have been sustained on the holdings in which the plant is most common, and it is hoped that the accompanying plates will be of value in assisting in the identification of this plant.

GENERAL NOTES
Crotalaria retusa is an annual plant. It germinates with the early summer rains of December or January, and
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owing to the hardness of its seeds, requires considerable moisture for successful germination. Because of this, the first seedlings will usually be found in depressions, wheeltracks and other spots where water lies for some time after showers. The plant is therefore likely to be most common during those seasons which open with good rains, and in which a good season is experienced. In dry seasons the germination even if good, may not be followed by active growth, since, under dry conditions the plants wilt and die. Such was the case along the Fitzroy River in early 1952, when feeding trials had to be curtailed owing to the inadequacy of supplies.

With suitable opening rains, followed by fairly frequent falls, the seeds germinate and the plants grow freely, and when young are eaten avidly by horses during this season of rapid growth. Later, when the plants are mature, especially when in flower and pod, they are avoided by horses and stock generally.

The plant attains an average height of two or three feet, but plants of four feet are not uncommon. The stems are dark green and more or less ribbed longitudinally, and the leaves are a deep green in colour on their upper surfaces, but paler underneath, with short silky hairs lying against the leaf-surface.

The pea-shaped flowers are rather large, and a strong clear yellow in colour, or with reddish streaks on the standard, and sometimes chocolate-brown on the back. There are usually 12 to 20 flowers in the “spike”. The plant flowers in April as a rule, and the flowers are succeeded by pods which are characteristic.

In Crotalaria retusa the pods are one to one and a half inches long, and inflated, on short stalks, stalked at the base, and standing upwards and outwards from the stem in a manner which is I think peculiar to this species in Kimberley. The pod is blunt at the end, with a short hook formed from the remains of the style. The seeds,
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several in number are yellowish, kidney-shaped, and cause the pod to rattle when pod and seeds are quite ripe, hence the name “rattlepod”, from the Greek krotalon—a rattle or castanet.

The plant is not evenly distributed. In the course of the botanical surveys made, it was soon discovered that Kimberley Horse Disease was peculiar to areas in which the horse or spell paddocks were adjacent to streams or had streams passing through them—in other words where stock had access to watercourses, usually of considerable size. The Crotalaria was most abundant on the larger streams with low banks which were overflowed by early summer rains, such as the Fitzroy River near Fitzroy Crossing, the Lennard River, portions of the Ord River and the Adcock and Hann Rivers. Horse paddocks not so situated, such as those at Moola Bulla, Louisa Downs and Blina were free from Kimberley Horse Disease.

At Moola Bulla the horse paddocks are clustered around Mount Barrett, in high country with small, short watercourses. There is no Crotalaria retusa there, but had the horse paddocks been further west along the upper reaches of the Margaret River, where this plant occurs in small numbers, some losses might have been experienced. Similarly at Louisa Downs, where the horse paddock is away from the Margaret River, the losses which have been experienced from Walkabout Disease may be attributed to the presence of horses which had been turned out in spell paddocks on the river flats in the early wet season. This is true also of Christmas Creek, while at Blina, where no case has been reported, there are no watercourses in the horse paddock.

At the same time it must be remembered that horses dying in April may have received their lethal dosage in December or January, or some part of it perhaps during the previous season, so that in all cases of losses, some history of the animals is necessary. Along the middle reaches of the Fitzroy and Margaret Rivers, as well as the middle and lower reaches of the Ord River, losses have been very heavy, for example, at Gogo, Carlton Hill, and Lissadell. Here Crotalaria retusa occurs abundantly, and such spots are characteristic for the occurrence of the plant and the disease. In no single instance where the disease has occurred have I found a horse paddock free of Crotalaria retusa unless it was shown that the horse or horses affected had been in country where the plant was in active growth while the animal was there.

The plant is not necessarily abundant all along the same stream, for example, while common on the Gogo side of the Margaret River, it is seldom found on the northern bank at Fossil Downs. The only difference between the two appears to be in the geology of the soils.

Other examples of affected areas are those of the Hann, Adcock and Barker Rivers, Fletcher’s Creek near Mount Hart, and Fletcher’s Creek near Turkey Creek, as well as the Turner River and Turkey Creek. I have not found the plant on higher ground than that which is subject to the average seasonal floods. It is most abundant in the river soils where the river gum (Eucalyptus camaldulensis) grows, and where the river plain white gum, “carbeen”, or “ghost gum” (Eucalyptus papuana) occurs. It is not usually common in coolabah country except on the actual banks of the streams, for it does not appear to favour the heavy clay soils, and it rarely occurs in bloodwood (E. dichro- maphloia) country except on the lower Ord River flats.

The range of Crotalaria retusa in Western Australia extends from the north coast southwards to the Fitzroy River and its tributaries—including Christmas Creek. It is fairly common along the Glenelg, Prince Regent and Isdell Rivers, and is found along the Durack River and the upper courses and tributaries of the Hann and King Edward Rivers.

After producing and liberating its seeds the plant dies. This occurs usually in May, June or early July.


PREVENTION

The losses which have occurred have been investigated with reference to horse paddocks only. It appears that most, if not all the damage is caused in the period from December to early March, when the horses are usually in the spell paddocks, and the plants are young and palatable. I have already referred to the common occurrence of horse paddocks adjacent to streams, and to the heavy losses sustained in a number of these where the *Crotalaria* is abundant, while in those in which it is comparatively scarce, such as Fossil Downs, Mount Amherst, Kimberley Downs and others, losses are infrequent. On properties in which the horse paddocks are on higher ground away from the *Crotalaria*, losses appear to be unknown or the areas are said to be entirely free from Kimberley Horse Disease.

Control measures employing the destruction of the plant are entirely out of the question because of the extensive areas involved even in the smaller horse paddocks. The occurrence of the plants among the grasses; the fact that the plants are eaten freely from the seedling stage until well towards maturity, and the wide distribution of seeds by flood waters make eradication difficult or impossible and in any case the destruction of the plants would be a constantly recurring annual treatment.

It is suggested, however, that losses may be avoided by fencing off the areas in which *Crotalaria retusa* occurs, especially the river frontages of horse paddocks, or by establishing new horse paddocks in the higher bloodwood or spinifex areas above the low-lying river levels which are the peculiar home of *Crotalaria retusa*.

Pastoralists are advised to familiarise themselves with the appearance of the plant by a study of the illustrations accompanying this article and to check suspected plants with these and with the printed description.

Some ideas of the distribution of the plants in horse paddocks should then be possible. The history of horse losses should be checked, remembering that losses would tend to be light in dry seasons and heaviest in the good pastoral seasons when rains have been frequent and plentiful.

Where losses have occurred and *Crotalaria retusa* does not appear to be present in the horse paddocks, check other locations on which the horses have been running for several months prior to death, as the effects of eating the plant might not become apparent for some time.

OTHER SPECIES

There are from 13 to 15 other species of *Crotalaria* in the Kimberley Division, some of them being rare while others...
are quite common. One species (Crotalaria trifoliastrix) is even more widely distributed than C. retusa. Just how far these other species are implicated in Kimberley Horse Disease is not known at present but, with the one exception quoted above, the other species do not have the general distribution on river frontages.

**BOTANICAL DESCRIPTION**

An annual plant usually 18-36 inches tall, but occasionally attaining a height of four feet or more, with an upright stem and branches which are fluted or ribbed, and green in the younger parts.

Leaves mostly opposite or scattered, erect or spreading, simple, on short stalks with two caducous stipules at the base, the leaf one and a half to three inches in length, oblong to wedge-shaped or narrowly elliptical, rarely broadly obovate, obtuse, with usually a small indentation at the top (retuse) and a minute point in the notch or at the obtuse end, dark green and slightly rough on the upper surface, paler underneath with short silky hairs which are pressed against the surface of the leaf (these hairs more conspicuous in the younger than the adult plant).

Flowers in terminal loose racemes of usually about 12-20 blossoms on short spreading stalks, each stalk with a very small bract at the base, and two smaller bracteoles about the middle, but caducous (falling early). Calyx green, 5-lobed, the two upper lobes the longest and somewhat spreading, the three lower short and approximate. Corolla pea-shaped, clear yellow in colour, or sometimes suffused with brick red, or with short reddish radiating lines, sometimes chocolate-brown on the back of the standard, the standard erect and notched, the wings smaller and ear-shaped, the keel also shorter than the standard, and terminating in an acute erect beak-like point. The stamens are ten in number, united about half way up into a sheath open on the upper side, the anthers alternately narrow and smaller and broader.

The pod if oblong in shape, without any hairs, often one and a half inches long, broadened upwards, blunt or rounded at the extremity with a short beak-like point, brown or purplish-brown when ripe, very turgid or inflated, the base of the style remaining as a terminal hook. Seeds usually 8-15, yellow kidney-shaped, hard and shining.

Native to the tropical regions of the Earth, and found in America, Africa, Asia and Northern Australia. The generic name Crotalaria is derived from the Greek Krotalon—a rattle or castanet, in reference to the ripe seed rattling in the inflated pods of most species; retusa refers to the small indentation at the top of the typical leaf.