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# MULGA REGENERATION AT KOONAMORE

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## ABSTRACT

*The T.G.B. Osborn Vegetation Reserve at Koonamore now has 70 years of records of vegetation change on its permanent quadrats and photopoints. On one of these a stand of mulga (Acacia aneura) has senesced and almost died. For 50 years, no seedling regeneration was recorded on the quadrat, but since 1978 dramatic regeneration has occurred. This correlates with exceptional rains in the mid 1970s, but also with vigorous rabbit control on the Reserve since 1970.*

## INTRODUCTION

### The T.G.B. Osborn Vegetation Reserve

The Reserve was founded in 1925 on Koonamore Station, 400 km NE of Adelaide. A badly degraded site was chosen for a long-term study of regeneration after the removal of grazing pressure. An area of 390 ha was fenced to exclude rabbits and sheep, and permanent quadrats, photopoints and transect-lines established. After early intensive work, annual working parties continued, so that fairly complete records have been kept for 70 years. This is one of the longest studies of its type anywhere in the world.

### Rabbit Control

The Reserve was fenced with rabbit netting, but rabbits have never been eradicated despite many attempts. In early years warrens were poisoned and blocked, or ploughed in, but rabbit numbers were high again in 1938-40, 1947-48 and 1952-53 (Hall *et al.* 1964). Myxomatosis has helped control the population since the mid 1950s. In 1970, 1080 poison was laid, and repeated in 1975, followed this time by systematic warren fumigation with Phostoxin, and hand filling of holes to minimise disturbance. Since then the Reserve has been inspected annually, and all active holes counted, poisoned and filled. We have not been able to wipe out all rabbits, but the number of holes has declined to about 5 per km<sup>2</sup> since 1984.

### Mulga (*Acacia aneura*)

In the Koonamore area mulga occurs in isolated stands on sandy soils. Further north it grows more densely (Hall *et al.* 1964, Cunningham and Walker 1973). In its southern range mulga appears to be declining, and there has been much concern about its lack of regeneration (Crisp 1978). It appears to need heavy summer and winter rains to set seed, followed by further heavy rains for seedling establishment. The status of mulga stands on the Reserve is discussed by Hall *et al.* (1964) and Crisp (1978). When the Reserve was fenced all mulgas were probably well over 100 years old. Hence there had been no regeneration since sheep were introduced in 1862 and rabbits arrived in the early 1880s. Hall *et al.* (1964) report that no mulga seedlings survived, to 1962, unless in fenced enclosures. Crisp (1978) recorded many seedlings by 1975, which must have germinated since 1970 when rabbit control resumed. Record rains in 1973-75 probably produced most of these, but some may have established after high rainfall in 1971.

This report is an update of the history of the mulga stand on the 100 × 100 m Quadrat 200, showing developments in the population since the seedling establishment of the early 1970s.

## METHODS

Data presented come from the Q200 charts. Originally, plant positions were mapped with indications of canopy size, but no plant dimensions. Since 1981 height and canopy diameters have been measured on all young plants. There are two photopoints; examples from one of these are shown on the poster.

## RESULTS

### Deaths

Of the 26 trees in the original stand, one died between 1946-56. Four deaths had occurred by 1968 and canopies were thinning. However, by 1978 nine more trees had died, and by 1987 all but six were dead and the rest were senescent, with only a few live branches. The stand had almost died out over about 20 years. Evidently an even-aged stand, the trees apparently had a very similar life-span.

### Recruitment

Crisp's record of regeneration between 1968 and 1974 did not include Q200. The quadrat was read in 1968, when there was no change, and again in 1978, when 34 new seedlings were present. Unfortunately this 10-year gap spanned the period in which rabbit control resumed, and also the record rains of 1973-75. In subsequent years the number of seedlings has increased from 34 in 1978 to 89 in 1995. Most of the increase occurred by 1981. Small mulga seedlings are hard to find, especially if grass and herbage cover is thick, and numbers have undoubtedly varied because of this. Probably several small seedlings were missed in 1978. However there seems to have been only a small recruitment in response to high rains in 1987-90, or 1992.

## DISCUSSION

In sharp contrast to earlier recruitment episodes, very few seedling deaths have been recorded since 1978. Consequently, the age structure of this mulga stand has changed dramatically from that reported by Crisp in 1975. The most obvious explanation is rabbit suppression. They have not been eliminated, but numbers have evidently been so low that seedlings have not been grazed, even in dry seasons.

The other major grazer is the kangaroo. Variation in kangaroo numbers can be estimated from regular counts of droppings along transects inside and outside the Reserve. Numbers peaked in about 1980, then declined to a roughly steady level until 1992, when they rose again. Hence young mulgas established in spite of exceptionally high kangaroo numbers in 1980 and before. Evidently kangaroos do not graze mulga seedlings.

The dramatic response to rainfall and rabbit restriction in the 1970s is also shown in the populations of other tree and shrub species on the Reserve. The Reserve vegetation is changing strikingly. High rainfall events plus rabbit suppression has allowed dramatic regeneration in an area where very little change in numbers of trees and large shrubs had occurred for 50 years after the removal of sheep.

## ACKNOWLEDGEMENTS

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