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# NATIVE WOODY WEEDS ARE A RELATIVE RATHER THAN AN ABSOLUTE PHENOMENON: THE NEED FOR A SYNECOLOGICAL APPROACH TO MANAGEMENT

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## ABSTRACT

A 32,000 km<sup>2</sup> area in eastern South Australia was selected as representing a range of arid land topography and vegetation and was surveyed to locate populations of perennial species at sites of differing intensity of grazing by sheep. Most plant species showed negative absolute regeneration responses to sheep grazing, and none were found to have significantly increased regeneration under grazing. Hence the apparent increase in certain shrubs reputed to be woody weeds is a relative effect of selective grazing on the whole vegetation. Attempts to control such species are therefore not likely to be successful, and may merely exacerbate the problem. Regeneration of some native tree and shrub species was significantly reduced to such critical levels that it appears that these species will eventually become locally extinct in sheep-grazed areas. A land-use system which includes a network of reserves ungrazed by sheep will be required to achieve ecological sustainability and conserve a range of grazing-susceptible trees and shrubs.

## INTRODUCTION

Certain native species are reputed to be capable of increasing in rangelands to the point where they cause a management problem; these are often known as 'woody weeds'. Native plants cited as increasers include *Acacia aneura*, *A. nyssophylla*, *A. victoriae*, *Callitris columellaris*, *Cassia artemisioides*, *C. nemophila platypoda*, *Dodonaea viscosa*, *Eremophila duttonii*, *E. sturtii*, and *Nitraria billardierei* (Dixon 1892, Harrington 1979, Booth 1987). Attempts have been made to control encroaching native shrubs by clearing and poisoning, but these have generally proved unsuccessful and uneconomic. This study seeks to identify which of a suite of woody plants are increasing or decreasing in the chenopod shrubland landscape of eastern South Australia in response to grazing by sheep.

## METHODS

Forty-eight species occurring at 960 sites which were either moderately to heavily grazed by sheep (5 km or less from a watering point) or lightly or non-grazed (more than 5 km from a watering point) were surveyed. For each population, at least 50 individuals were scored into nine life-stage classes (Gatsuk *et al.* 1980). Regeneration success was determined by calculating the proportion of individuals of early maturity (stage 4) within the mature population (stages 4 - 9). Juveniles (stages 1 - 3) are still susceptible to grazing and it is not certain that they will contribute to long-term regeneration. I calculated that 17% was the minimum successful regeneration for long-term population maintenance assuming that individuals pass through the life-stages approaching an even rate.

## RESULTS

Of the 48 species, a very high proportion (39) showed absolute decreases in regeneration under grazing, six of which were statistically significant. Of these six, three were regenerating at borderline levels at grazed sites (*Acacia aneura* 15.1%, *Myoporum platycarpum* 19.1% and *Rhagodia spinescens* 16.1%), while three were regenerating at or below critical levels (*Cassia nemophila coriacea* 7.7%, *C. nemophila platypoda* 13% and *Alectryon oleifolius* 1.2%).

Twenty-two of the 39 decreaser species have regeneration levels at or below 17% at grazed sites. These 22 included most of the dominant chenopod species forming the vegetation, which showed

borderline levels of regeneration: *Atriplex vesicaria* (14%), *Maireana sedifolia* (16.1%), *M. astrotricha* (11.8%) and *Rhagodia spinescens* (16.1%). *Maireana pyramidata* (30.4%) was the only exception among the chenopod shrubs, and with an increasing trend under grazing appeared to be regenerating successfully.

Only nine species showed an absolute increase in regeneration in response to grazing: *Acacia carnei*, *A. oswaldii*, *Chenopodium nitrariaceum*, *Eucalyptus camaldulensis*, *E. largiflorens*, *E. socialis*, *Hakea leucoptera*, *Maireana pyramidata* and *Rhagodia parabolica*, none of which was significant. All of the increaser species had regeneration rates under grazing well above 17%. None of the reputed 'woody weed' species showed increaser behaviour.

## DISCUSSION

The high proportion of trees and shrubs showing decreaser tendencies within 5 km of watering points indicates that species capable of increasing under anything other than extremely light grazing pressure are very uncommon. This indicates that the vegetation response to all but extremely light sheep grazing is an overall reduction in cover by trees and shrubs - deforestation. Critically low regeneration levels under grazing in many of these species may not be sufficient to maintain populations in the long term.

None of the native 'woody weed' species showed increases. Any apparent increases are probably relative responses only, where certain species are decreasing at less rapid rates than others, and hence occupying a greater proportion of the remaining vegetation. Therefore, the solution to perceived native 'woody weed' infestations will not be achieved by controlling individual species by mechanical or chemical means. More holistic management practices which are closely aligned to the ecology of the whole vegetation will be required (Jacoby 1985).

Regeneration of the dominant chenopod shrub species apart from *Maireana pyramidata* appears borderline within 5 km of watering points. Careful management, possibly including resting from grazing, will be required to maintain bush cover, prevent soil erosion and achieve sustainability. Several species such as *Alectryon oleifolius* and both subspecies of *Cassia nemophila* are extremely sensitive to grazing and will probably become extinct in areas grazed by sheep. These will require special management in the form of off-park reserves.

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