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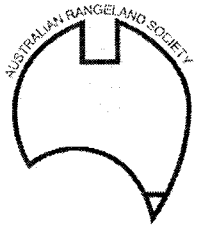

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'WOODY WEEDS' OF SEMI-ARID EASTERN AUSTRALIA AND PROSPECTS FOR CHANGE BY BURNING

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ABSTRACT

Relationships between the cover of grasses and of woody vegetation were determined in 1991 on four landforms in the Louth region of semi-arid eastern Australia and were found to differ between landforms. About 25% of Sandplains and Dunefields, 25% of Plains, 50% of Rolling Downs and Lowlands and 40% of Alluvial Plains sites needed shrub reduction treatment. One or two prescribed fires or similar treatments would be sufficient to restore the desired vegetation balance. The survey confirmed perceptions that shrub and tree cover is unacceptably high for pastoralism throughout much of the region.

INTRODUCTION

The vegetation of Australia's rangelands is dynamic and changing under pastoralism, especially in the semi-arid wooded grasslands of eastern Australia (Harrington *et al.* 1979). Here 'woody weeds' are increasing and palatable perennial grasses are declining in abundance. The change lowers the efficiency of pastoral enterprises.

There is much to learn about the relationships amongst grasses, shrubs and trees on various soils or landforms and their responses to management. The ratio of shrub and tree cover to grass cover increases when there are no fires, either because of deliberate suppression or lack of grass fuels (Hodgkinson and Harrington 1985). Before European settlement, shrub establishment and biomass were kept in check by frequent and extensive fires, started by lightning or by Aboriginal people and propagated by continuous and high grass cover. Competition from grasses suppresses the recruitment of shrubs, but since settlement, grazing by domestic and feral herbivores has reduced grass levels. Prescribed fire is the most cost-effective way of reducing shrub cover (Hodgkinson 1993).

We determined the cover and composition of perennial vegetation on different landforms throughout the Louth region of north-western New South Wales, and predicted the reduction in the canopy cover of woody vegetation after fire treatment(s).

METHODS

We surveyed a region which occupies 10,000 km^2 of western New South Wales and comprises 44 pastoral properties. Louth is the central town. We randomly selected survey sites within each of the four landforms and their component land units. Each survey site consisted of 9 sampling points laid out in a 25 m grid over an area of 50 × 50 m. Measurements and treatment of data are fully described elsewhere (Daly and Hodgkinson 1996).

RESULTS

Basal cover of perennial grasses ranged from 0 to 1.6% and woody vegetation canopy cover ranged from 0 to 32%. At each value of tree or shrub canopy cover we found a scatter of values for basal grass cover, from zero to an upper limit. Over all landforms, we found the most grass cover when woody canopy cover was between 0 and 10%.

On the Sandplains and Dunefields landform, there was most grass on those sites where the canopy cover of all woody vegetation was around 10%. The three-dimensional response surface for this

landform ($P < 0.001$, $r^2 = 0.61$) indicated that the maximum grass cover was at 20% tree canopy cover and at about 10% shrub canopy cover. There was less grass when only trees were present than when only shrubs were present at comparable canopy cover levels.

On Rolling Downs and Lowlands, the response surface ($P < 0.001$, $r^2 = 0.48$) indicated that grass cover almost disappeared when there was 10% or more woody vegetation cover. In contrast to the Sandplains and Dunefields, we found most basal grass cover at sites where the tree canopy cover was between 0 and 10% and where there were no shrubs. Basal cover of grasses appeared to be more suppressed by shrub canopies than by tree canopies.

On Plains we found little grass cover. The response surface ($P < 0.001$, $r^2 = 0.89$) indicated that most grasses grew where there were neither trees nor shrubs and grass cover fell to low levels when either tree or shrub cover reached about 10%.

On Alluvial Plains, some sites were on the treeless grasslands which had no woody vegetation, while there was little or no grass at sites on the wooded banks of the Darling River or other tributaries within the floodplain. Some sites had both grasses and woody vegetation, but the response surface ($P < 0.001$, $r^2 = 0.70$) indicated there was no clear relationship between grass cover and the canopy cover of either trees or shrubs.

Overall, woody canopy cover was acceptable, that is 5% or less, on 44% of the sites surveyed. We assumed pastoralism could be efficient there without any remedial treatment. At 21% of the other sites a single prescribed fire would be enough to reduce shrub and tree cover to acceptable levels. The remaining sites would need a follow-up treatment of either a second fire or a chemical application to reduce woody vegetation canopy cover down to 5%.

DISCUSSION

Although prospects are potentially good for modifying vegetation balance to benefit both pastoral production and biological diversity in the semi-arid wooded grasslands, it is not always easy to use fire and grazing pressure as management tools, for one or more reasons. Fuel to carry fire may rarely build up to an adequate level because of persistent grazing and/or high shrub densities. Small properties may not be big enough to rest some paddocks from grazing to build up grass or to be burnt. Pastoralists may not have sufficient economic security to invest in woody weed or grass management. Even if they have, they may not be convinced that they can use the methods available without risk of litigation (in the case of fire) or adverse change to their vegetation. Therefore, prospects of modifying wooded rangeland vegetation for the better will depend on close attention to legislative and legal arrangements and information transfer.

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