

Re-colonisation patterns of native plants in cultivation paddocks at Gunnedah, NSW

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Revegetation of cultivation paddocks at the Gunnedah Resource Centre, just south of Gunnedah, has provided an opportunity to examine the patterns of re-colonisation of native plants. In 1991, a direct seeding trial of native tree and shrub species was undertaken at Gunnedah Resource Centre. The results from this (extremely poor eucalypt and successful acacia establishment) prompted initiation of another trial in 1993 where a combination of planting tubestock of mainly eucalypts and direct seeding of understorey species, mainly acacias, was undertaken. The methodology used was similar to planning and planting a long fallow crop, using zero till techniques to store soil moisture, as well as deep tipping for the tubestock. Additional trial sites were established on the Centre in 1995, 1998, 2001 and 2003. The methodology and planting patterns were refined and improved during this timeframe. Crucial to the success of these trials was the need to control exotic weeds, particularly broadleaf weeds. To do this, chemical control using a shrouded boom was employed. Initially glyphosate was used but this had the disadvantage of killing all vegetation including native species. More recently, in 2001, low volatile 2-4D amine has been used which controls the broadleaf weeds and enhances re-colonisation of grass species, which are mostly native. The vegetation of these sites

was compared with that of a previously cleared site in which white box (*Eucalyptus albens*) were planted in 1948-49 and an area of remnant white box woodland. The sites were more fully described by Wilson *et al.* (2002).

Methods

One large (20 by 20 m) plot was surveyed in each of the 7 sites (i.e. sites planted in 2003, 2001, 1998, 1995, 1993 and 1948-9 and the remnant woodland). All vascular plant species and an estimate of their percent foliage cover were recorded. For this paper, direct-seeded or planted plants were excluded from the count to focus attention on the species that had colonised the sites naturally.

Results

A total of 116 species of naturally occurring plants were recorded in the sites, including 81 native and 35 exotic species (including 1 species that was native to Australia but did not naturally occur in the region). Native grasses returned to the sites relatively quickly and the 2001 site had more grass species (both native and exotic) than any other site (Table 1). However, the number of species of other herbaceous species, as well as the ratio of numbers of native to exotic

Table 1. Numbers of exotic and native species with various life forms found in each 20 by 20 m plot

Lifeform class	Site planted to trees and left to regenerate in						Remnant
	2003	2001	1998	1995	1993	1948-9	Woodland
	<i>Exotic species</i>						
Grasses	2	6	0	4	2	1	0
Other herbaceous species	5	15	11	11	12	5	2
Shrubs	0	0	0	0	1	1	0
Trees (excluding those planted)	0	0	0	1	1	0	0
Total	7	21	11	16	16	7	2
	<i>Native species</i>						
Grasses	2	15	12	10	11	7	11
Other herbaceous species	1	8	12	11	13	12	19
Mistletoe	0	0	1	0	1	0	0
Shrubs (including a woody twiner)	0	0	2	5	3	5	13
Trees (excluding those planted)	0	0	0	1	0	1	1
Total	3	23	27	27	28	25	44

species, increased with increased time since cultivation and was greatest in the remnant woodland site. The remnant woodland also differed from the planted sites in terms of diversity of native shrubs and in the diversity of particular groups of plants. For example, the woodland contained 3 species of native twining legumes, whereas there was only 1 record of 1 native twining legume from the other 6 sites.

Discussion

The results show that it is possible for a diversity of native grasses to recolonise a previously cropped site relatively quickly, but unassisted re-colonisation of a diversity of species from other life-forms of native plants may take much longer. However, the results need to be treated with some caution because they are only based on 1 set of unreplicated plots and site characteristics such as soil type, micro-relief and drainage and proximity to sources of native plant seed vary between the sites. In particular, the remnant woodland had more skeletal soils and greater slopes than the other sites and was part of a large area of native vegetation. These factors could account for, say, the greater diversity of native shrubs and the relative absence of exotic plants. The herbicide treatment of the regeneration plots may have contributed to the lack of diversity of native herbs, but controlling the exotic broad-leaved weeds was

found to be essential for the initial establishment of native grasses as well as planted and direct-seeded native trees and shrubs. The use of 2-4D amine rather than glyphosate to treat weeds in the paddock planted in 2001 could have contributed to the greater diversity of grasses found at that site. The management approach, with reliance on herbicides, was primarily designed to assist the establishment of planted and direct-seeded trees and shrubs. If the intention had only been to facilitate re-colonisation by native grasses associated herbaceous plants then other management options, such as strategic grazing to reduce weed abundance, would have been worth testing.

Additional sites will be established in the future and this will offer opportunities for continued observation and site comparison.

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References

- Wilson B, Eyears-Chaddock M, Martin W, Lemon J (2002) Soil Changes under "habitat reconstruction" sites near Gunnedah, New South Wales. *Ecological Management and Restoration* 3, 68-70.