

Research note: Poplar box (*Eucalyptus populnea*) growth rates in thinned and intact woodlands in central Queensland

P.V. BACK¹, E.R. ANDERSON¹,
W.H. BURROWS¹ AND C. PLAYFORD
*Department of Primary Industries and Fisheries,
Rockhampton, Australia*

¹ Now retired from QDPI&F

Abstract

A 19-year data set, which highlights the rapid growth rate in basal area of trees in thinned plots compared with unthinned controls, is presented. These results support the contention that, following tree thinning, basal area of retained trees will increase more rapidly than that of trees on unthinned areas. Indications are that pre-thinning levels in tree basal area will again be reached before the cost of treatment can be recouped by increased pasture and livestock production.

Introduction

The killing of trees on grazing lands to increase grass growth for domestic livestock has been a common practice in Queensland since the early 1890s. Generally, some trees were also retained for shade or for later harvest as fencing timber or for milling. These retained trees also provided wildlife habitat. However, regrowth of trees over time negates the beneficial effects for pasture production which follow the clearing of trees. Various strategies for retaining trees on an area have been employed with the aim of extending the period before tree regrowth cancels out the benefits of clearing. Scanlan and Burrows (1990) showed that tree basal area is an important consideration as there is a strong negative exponential relationship between total tree basal area and pasture production for poplar box woodlands.

Therefore, the increase in basal area of retained trees after timber treatment is critical in determining how long the benefits from increased grass growth following the timber treatment will last. Penridge and Walker (1986) had earlier found that competition between individual poplar box trees was directly proportional to their girths and the proximity of the trees to each other.

In an endeavour to obtain information to clarify this picture, 2 treatments from a large trial examining the effects of various timber control techniques (see Back *et al.* 2009) were selected to study the growth rates of poplar box (*Eucalyptus populnea*) trees. These treatments were the Control (no timber treatment) and the Scattered tree treatment [80% of all trees (>7m tall) and all shrubs taller than waist high treated by stem-injection with Tordon Timber Control Herbicide® (a.i. 50g/L picloram plus 100g/L triclopyr). The 20% of untreated trees were left scattered as evenly as possible throughout the plot]. These will be referred to subsequently as Control and Thinned treatments.

Method

The experimental site was situated on 'Wandobah', a beef cattle grazing property in the Dingo area of central Queensland (23°36.4'S, 149°25.22'E). The woodland site was dominated by poplar box in association with Queensland blue gum (*E. tereticornis*), narrow-leaved ironbark (*E. crebra*), ghost gum (*Corymbia dallachiana*), bloodwood (*Corymbia clarksoniana*), scrub leopardwood (*Flindersia dissosperma*), bull oak (*Allocasuarina luehmannii*), vinetree (*Ventilago viminalis*) and ironwood (*Acacia excelsa*). Understorey woody species present included false sandalwood (*Eremophila mitchellii*), currant bush (*Carissa ovata*) and white-wood (*Atalaya hemiglauca*). The woody plants present on the trial site were regrowth following previous clearing by ringbarking in the 1920s and again in the 1950s.

Stainless steel band dendrometers, as described by Liming (1957), were fitted 150 cm above ground level to the trunks of 6 trees in each plot prior to treatment in 1987. There were 3 plots for each of the Control and Thinned treatments. The trees were selected to represent the size range of the trees present in the particular plot (Table 1). The dendrometers were examined annually in spring and the changes in circumferences recorded. Any adjustments needed to the dendrometers were also carried out at this time. These annual growth measurements were continued until 2006.

Results

The changes in girth measurements over time are shown in Figure 1. The trees in the Thinned plots grew faster than those in the Control plots in each year of the study. Some trees in the Control plots made negative growth, *i.e.*, their girth measurement was reduced, during the dry years

1993 (5 trees), 1994 (7 trees), 2001 (4 trees), 2004 (3 trees) and 2006 (4 trees). In the Thinned plots, only one tree recorded negative growth in 1993 and one in 2004. Overall there was a strong correlation between tree growth and rainfall (Figure 2).

Discussion

These results confirmed the earlier findings of Penridge and Walker (1986) that growth of trees was directly proportional to their proximity. The growth of retained trees (scattered over the landscape), following the thinning of woodlands to improve timber or pasture growth, was much greater than that of trees in untreated Control plots (or in trees retained in untreated clumps or strips – see Back *et al.* 2009). This would be a function of reduced competition for moisture and nutrients among trees in the Thinned treatment. While growth of trees on both thinned and unthinned areas was directly related to rain-

Table 1. Circumferences at 150 cm of trees fitted with dendrometers at the commencement of recording.

Plot	Rep 1		Rep 2		Rep 3	
	Scattered (cm)	Control (cm)	Scattered (cm)	Control (cm)	Scattered (cm)	Control (cm)
	36.7	33.9	19.8	27.3	34.5	22.4
	42.7	36.4	36.6	29.7	46.2	28.6
	47.0	39.0	37.7	37.5	50.3	43.3
	48.0	40.9	43.0	37.5	51.0	47.2
	55.3	48.8	59.7	59.5	89.0	57.2
	64.9	75.5	83.7	59.9	107.3	69.3
Mean	49.1	45.8	46.8	41.9	63.1	44.7

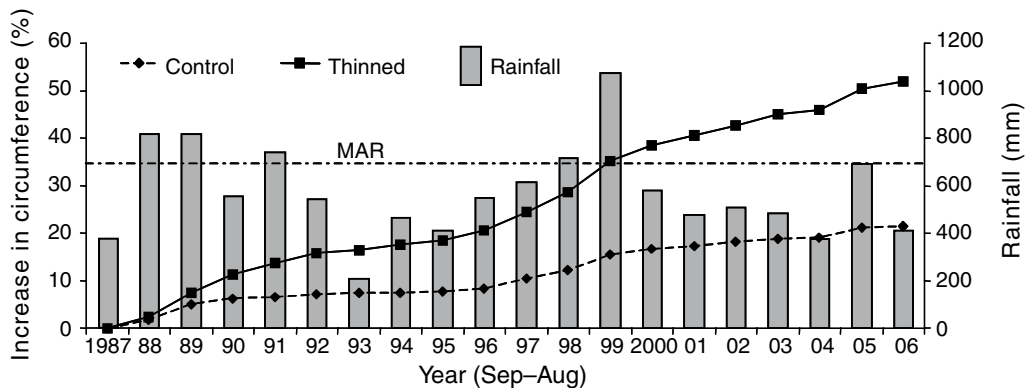


Figure 1. The cumulative increase (%) in circumference of poplar box trees over the initial reading for the Control (unthinned) and Thinned treatments. Annual rainfall (mm) is shown for the 12 months (September–August) prior to each annual (late August or early September) measurement. The district mean annual rainfall (MAR, 688 mm) is for Dingo (1897–2006).

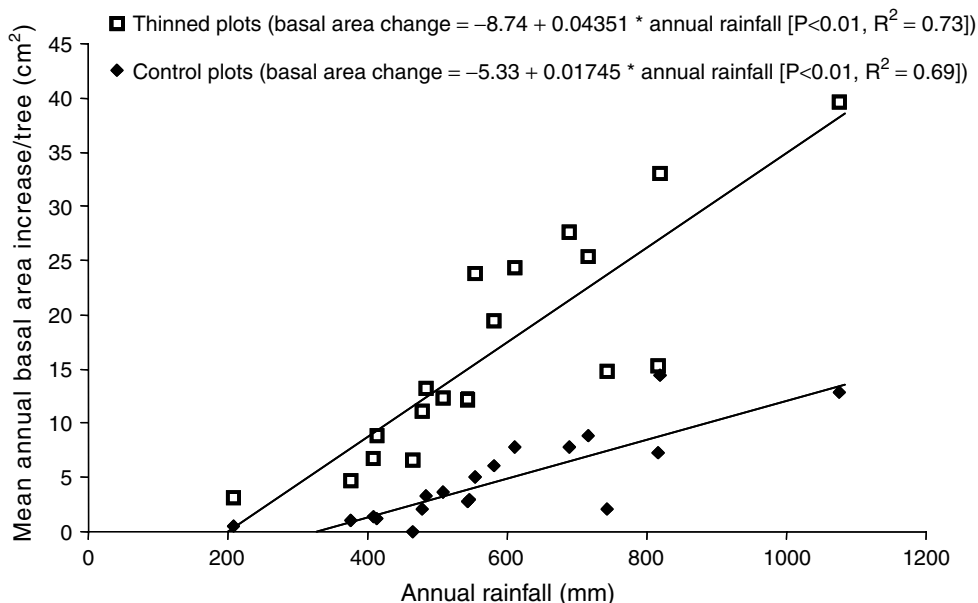


Figure 2. Relationship between annual rainfall and mean annual increase in tree basal area for the Control (unthinned) and Thinned stands of poplar box trees (Linear regression analysis).

fall, the responses were greater on the Thinned treatment, indicating that these trees were in a better position to respond to the additional moisture.

The rapid increase in basal area by retained trees in Thinned plots has serious implications for pasture growth under the trees. Scanlan and Burrows (1990) showed that there was a strong negative exponential relationship between tree basal area and potential pasture production in poplar box communities, as well as in many other Queensland woodlands (see Burrows 2002). Since a primary purpose of timber treatment in these woodlands is to increase pasture growth for livestock, the increase in pasture growth which follows treatment is reduced much more rapidly where trees are thinned (remaining trees are scattered) than where most of the area is totally cleared and clumps or strips (giving a similar total tree basal area to the thinned plots) are left untreated. Conversely, if the aim of timber treatment is to boost tree growth for subsequent harvesting, removal of inferior or undesirable species by thinning would boost the growth of the retained/preferred species or individual trees.

As well as being beneficial for extending benefits of increased pasture growth for longer, retaining trees in strips provides wildlife corridors, fire-breaks and windbreaks. Clearing strategies, which retain the same total basal area of trees in strips or clumps, also provide better woodland habitat for fauna than thinned woodland and extend the benefits of increased pasture growth from clearing for longer, compared with thinning.

References

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