Measurement results of the 1982 eucalypt species trial at the Mount Gambier Airport

Introduction

The trial was established by CSIRO Forestry and Forest Products, Mount Gambier on the grounds of Grant District Council's Mount Gambier Airport in 1982 (Blackmore et al, 2002). The site consists of low undulating sandy rises whose soil is classified according to the Australian Soil Classification Isabell (2002) as bleached, vertic, subplastic, yellow, chromosol. The site is adjacent to the Mount Gambier Meteorological Station where the long term rainfall averages 710 mm per year. An adjacent pine plantation is considered SQ II on the South Australian rating of site quality (SQ I (high) to SQ VII (low)) (Lewis et al. 1976).

Six eucalypt species were selected for the trial that were identified as the fastest growing species at eighteen months after planting from an earlier 1979 eucalypt trial at the site (Blackmore et al, 2002). These species were *Eucalyptus globulus*, *Eucalyptus nitens*, *Eucalyptus obliqua*, *Eucalyptus regnans, Eucalyptus sieberi* and *Eucalyptus viminalis*. The nursery raised seedlings were planted in 49 tree plots of 7 rows of 7 trees with a spacing of 3 m between rows and trees (Blackmore et al, 2002). There was incomplete replication of three blocks resulting in the eastern and western plots containing less than 7 rows and no buffer surrounding the trial (see Figure 1). Weed control was minimised during the first 2 years and there were no further silvicultural inputs (Blackmore et al, 2002).

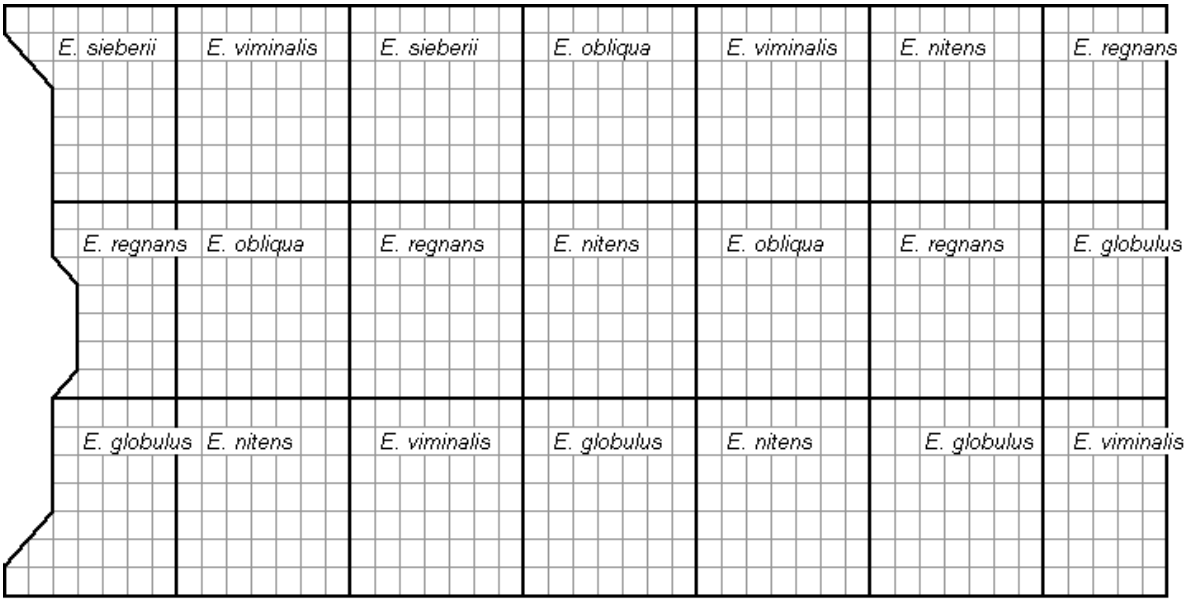

Figure 1 Plot layout of 1982 eucalyptus trial at Mount Gambier airport. Note that each square represents a planted tree and the black lines represent the edge of the plots.

Method

The trial was thinned in October 1997 to assess the sawing and drying of thinnings (Blackmore et al, 2002). Measurements of diameter over bark at breast height (DBHOB) and tree height were recorded prior to thinning and the means for each species reported by Blackmore et al, 2002. Blackmore et al (2002) noted that *E. sieberi* was of very poor form with a large proportion of the trees being multi stemmed whereas the other species were of

good form. *E. sieberi* was therefore omitted and measurements recorded from the other five species in the trial.

In May and June 2009 DBHOB and tree height measurements were recorded for the trial. Due to layout issues a one tree buffer was incorporated around the trial to account for an edge effect. These measurements were removed and the plot sizes altered accordingly. Mean DBHOB and heights were calculated for each species and stocking counts and total volumes for each plot calculated using the cone formula, volume = $1/3 \times \pi \times (DBHOB/2)^2 \times$ Height.

Results and Discussion

Mean DBHOB and height from 1997 when the trees were 15.5 years old along with means from 2009 when the trees were 27 years old are listed in Table 1 and displayed in Figure 2.

The measurements in 1997 when the trees were 15.5 years old indicate that the species with the largest mean diameter as *E. regnans* followed by *E. obliqua* and *E. nitens*. *E. nitens* at 27 years old is the species with the largest mean DBHOB, followed by *E. regnans* with both of these species over 40 cm DBHOB (Table 1). *E. viminalis* had the smallest DBHOB at age 15.5 years, but at 27 years old is the third ranked species for DBHOB.

Table 1 Height and diameter measurements from 1997 and 2009 of five of the eucalypt species in the trial.

	DBHOB (cm)		Height (m)	
Species	**1997**	**2009**	**1997**	**2009**
E. globulus	27.6	36.8	31.8	38.2
E. nitens	29.1	43.6	31.3	40.3
E. obliqua	30.8	37.0	29.9	34.7
E. regnans	32.4	41.7	29.2	39.1
E. viminalis	25.6	38.4	28.2	35.9

E. globulus and *E. nitens* were ranked highest for mean height at age 15.5 years, however at age 27 years *E. nitens* is now the tallest species averaging over 40 metres (Table 1). *E. regnans* and *E. globulus* were ranked second and third for mean height at 27 years.

Figure 2 indicates that *E. nitens* and *E. regnans* are the best performing species for growth traits at 27 years followed by *E. viminalis* and *E. globulus. E. obliqua* despite high mean diameter and height measurements at age 15.5 years has performed poorly over the last decade.

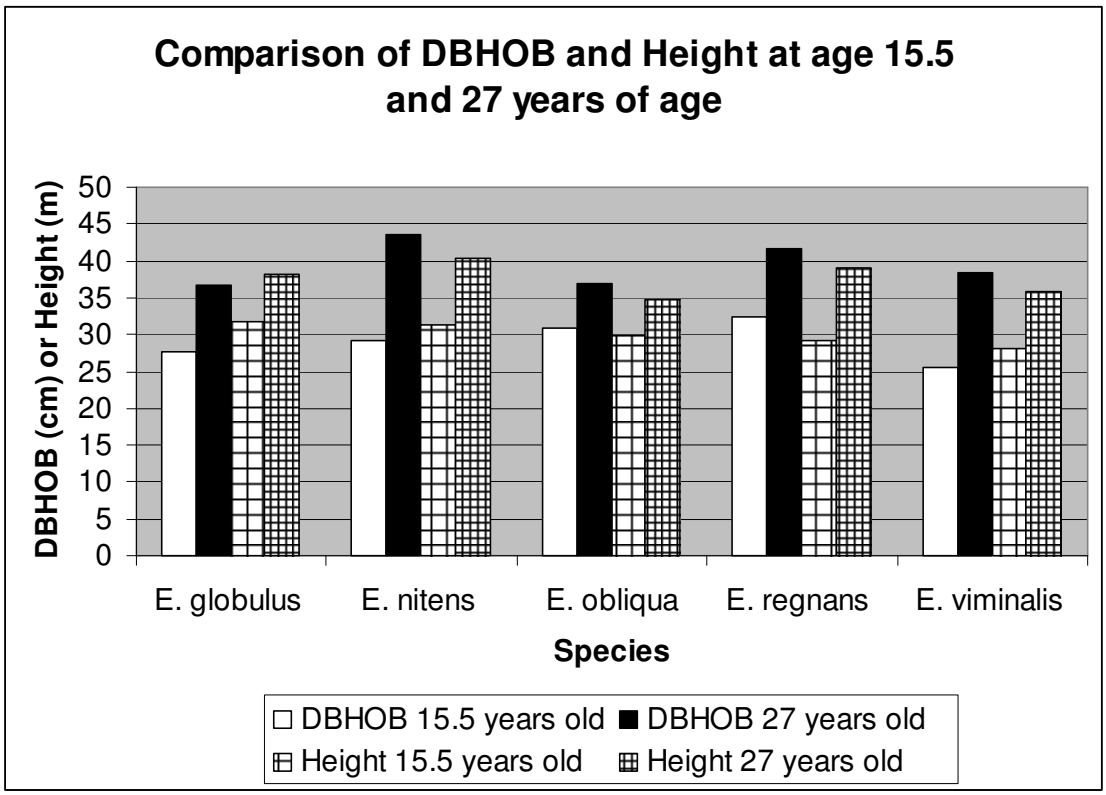

Figure 2 Diameter at Breast Height Over Bark and Height mean measurements for the five eucalypts species at age 15.5 and 27.

The volumes and stockings for each plot from the 27 year old measurements were evaluated to determine if there were any significant differences between the species. An ANOVA of the stockings and volumes indicated no significant difference between the species. The probability of there being no significant difference in stocking was 0.34 so not significant at the 95 percent confidence limit. This is important as it indicates that stocking did not have a significant impact on the volume result. The probability of there being no significant difference in volume was 0.45.

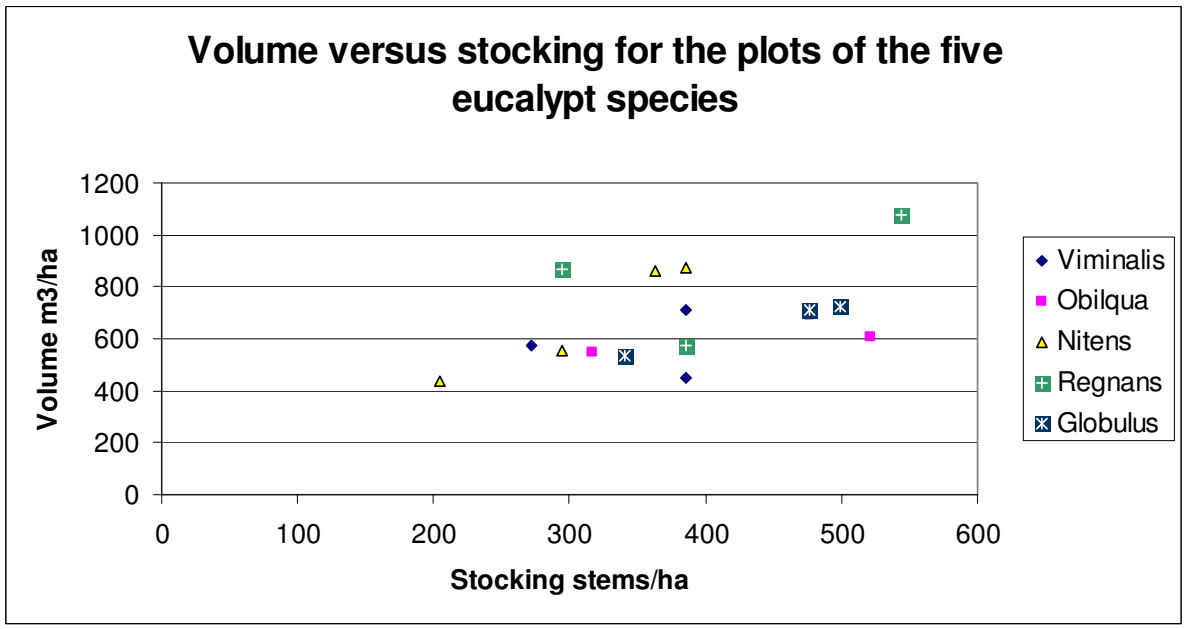

Figure 3 Relationship between volume and stocking for the plots of the five eucalypt species

A scatter graph of the relationship between stocking and volume for the plots of the five species is presented in Figure 3. It highlights that the limited replication of the trial has restricted the conclusions with respect to volume production comparisons between individual species and trends of volume production with changes in stocking. These stocking and volume figures are presented in Table 2 and highlight the large range in both plot stocking and volume for species. The mean plot volume is greatest for *E. regnans* although this is in part due to the largest plot volume of over 1000m^3. This particular plot also has the highest stocking and is located in the lowest point in the landscape.

Table 2 Stocking (in stems/ha) and volume (in m^3/ha) for the plots of the five eucalypt species with totals at the bottom. Please note that *E. nitens* had four suitable plots instead of three in the trial.

E. globulus		***E. nitens***		***E. obliqua***		***E. regnans***		***E. viminalis***	
Stocking	Volume	Stocking	Volume	Stocking	Volume	Stocking	Volume	Stocking	Volume
476	711	295	557	476	694	295	868	385	709
499	723	385	876	317	546	385	574	272	572
340	536	204	438	522	604	544	1077	385	449
		363	859						
438	657	312	683	438	615	408	840	348	576

There are two important sources of variation. The silvicultural thinning in 1997 did not thin the plots down to the same basal area or stems per hectare and it was done to select trees that would produce suitable logs for a sawing and drying trial. Secondly, the site is on a sand ridge with plots located at differing locations on this ridge with no buffer and minimal replication. Also no other sites were planted.

Conclusion

The trial does not provide evidence of which of the five species; *E. globulus*, *E. nitens*, *E.obliqua*, *E. regnans,* and *E. viminalis* performs significantly better at the age of 27 years at this particular site. However, this work indicates that on similar sites with similar growing conditions eucalypt species such as *E. nitens* and *E. regnans* will perform at least as well as *E. globulus.*

References

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