Impact of number of stems retained per stool on harvester productivity and fuel consumption in *Eucalyptus globulus* second rotation coppiced plantations in south-west Western Australia

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Overview

- Background – eucalypt plantations in Australia
- Description of site and study
- Results
- Conclusions
- Further research

Background

- Australia has over 900,000ha of eucalypt plantations
- Most are grown on a 10 year rotation for export wood chips
- Major species is *Eucalyptus globulus*

Background

- *E. globulus* coppices readily after felling
- Coppice re-establishment is cheaper than re-planting
- Coppice can be thinned at age two or left unthinned. Thinning is mostly done manually by chainsaw

Background

- In Australia, *E. globulus* plantations are being re-established by planting, or coppice thinned to a single stem, 2 - 3 dominant stems or unthinned

- *However, little is known of the impacts of coppice on mechanical harvesting*

ANU training video

Study coppice treatments

Unthinned

Two stems

Single stem

Study site description

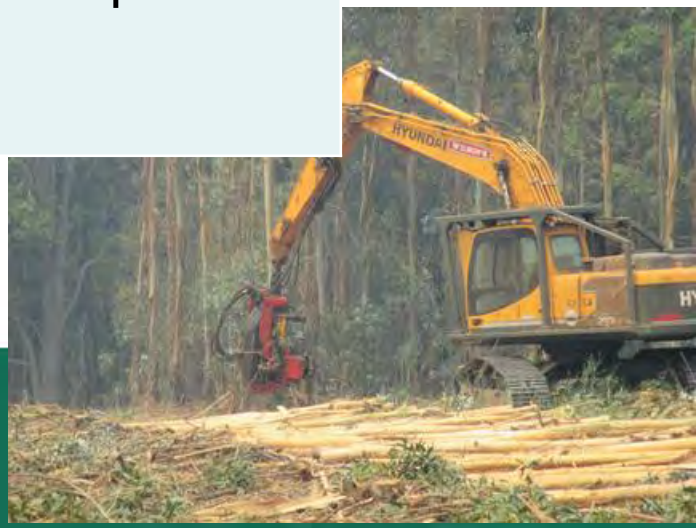
Characteristic	Treatment		
	Single stem	Two stems	Unthinned
Mean stem number per stool	1	1.5	3.1
Stems per hectare	848	1200	2745
Stools per hectare	848	800	864
Mean stem DBHOB (mm)	167	127	105
Mean stem height (m)	20.4	15.7	15.0
Mean stem volume (m^3)	0.21	0.09	0.06
Volume per hectare (m^3/ha)	175	107	174

Study description

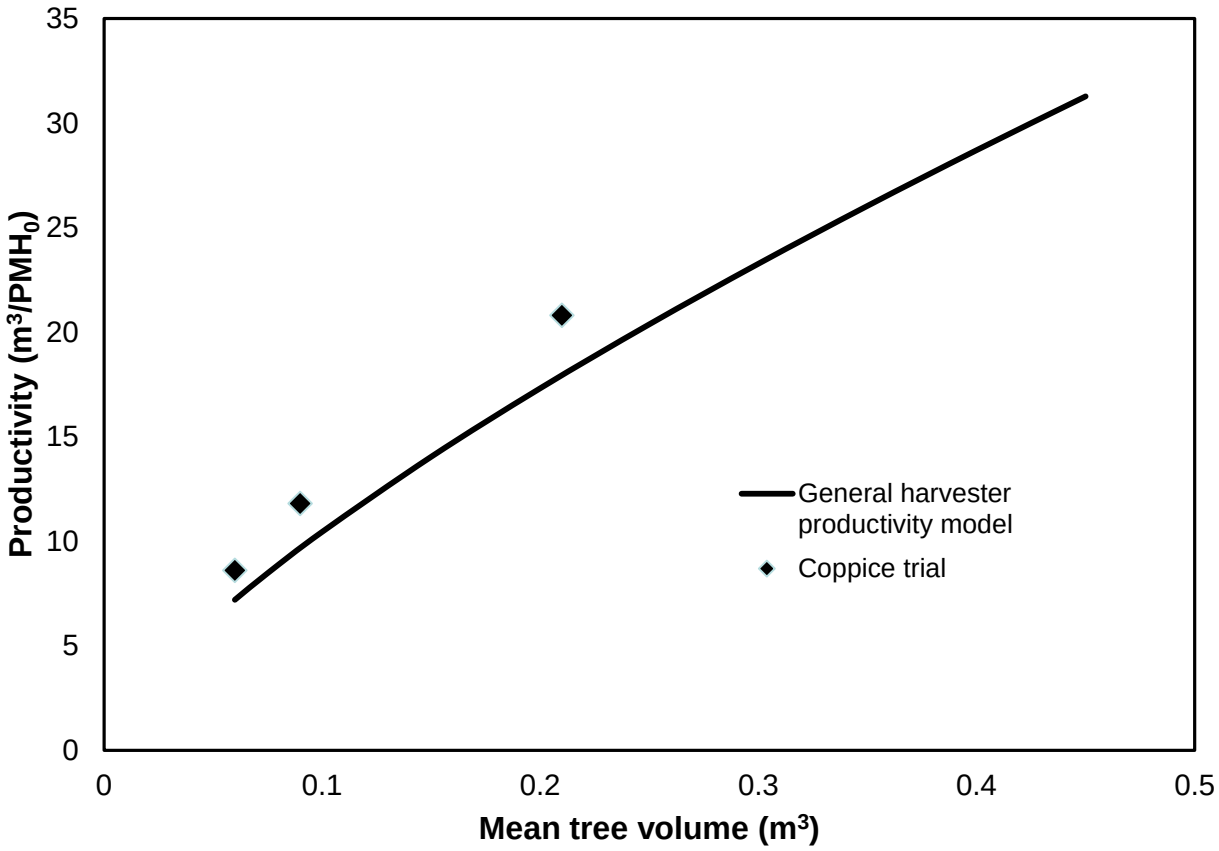
- Harvester: Hyundai 210LC-9 excavator base with an SP 591LX harvesting head
- Experienced operator
- Felling, debarking and processing each stem to ~4.6m logs at the stump
- Felling across a 3 row face
- Forwarder (JD1410D) was not studied

Study description

Studied	Methodology
Productivity	Time and piece counts
Cycle and elemental times	Digital video recordings
Fuel consumption	Top up fuel tank to same level on shift completion

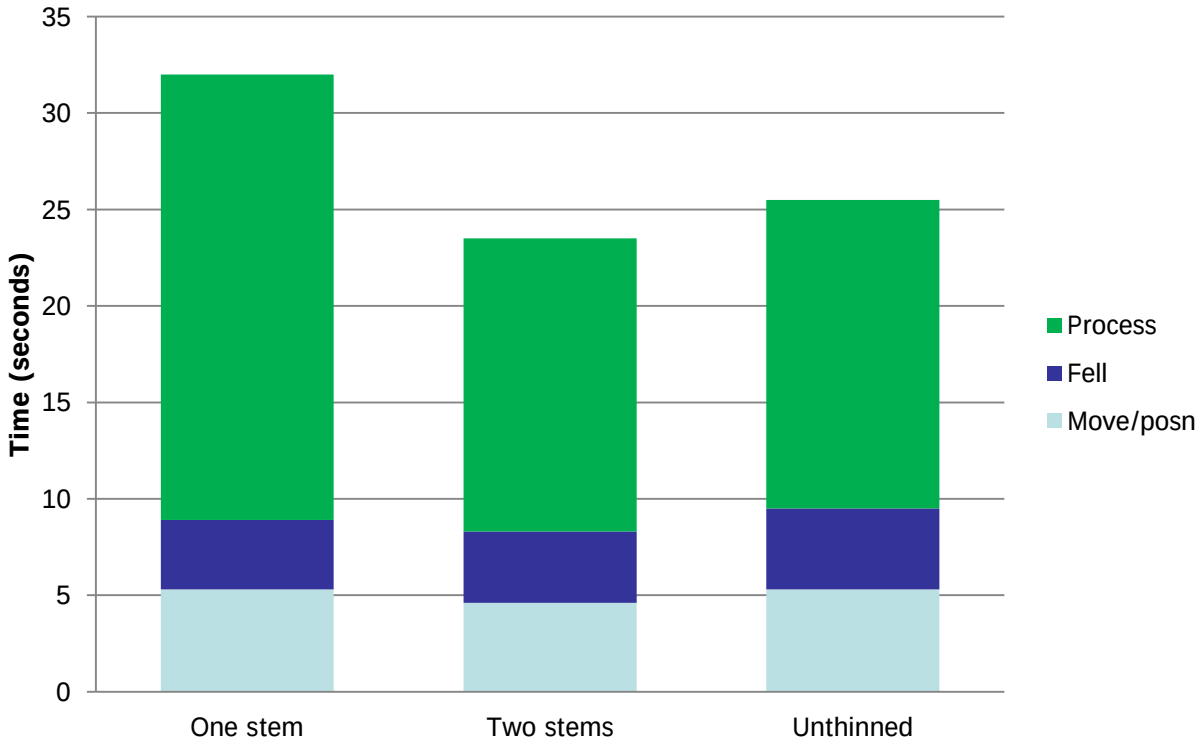


Results - Productivity



- Suggests the major harvester productivity driver was stem volume

Results – cycle / elemental times



Fuel consumption

Treatment	Harvester fuel consumption	
	l/PMH$_0$	l/m^3
Single stem	32.4	1.6
Two stems	27.1	2.3
Unthinned	28.0	3.3

Conclusions

- Cycle time & productivity differences mostly reflected stem size differences
- Significant differences between moving/positioning & felling times were too small to impact cycle times
- Fuel consumption was higher than expected. The highest fuel consumption was in the single stem treatment & may have reflected the lower sph and larger stems

Further research

- Conduct harvesting trials on further coppice sites
- Study the impact of coppice on a forwarder
- Compare harvester / forwarder system with feller-buncher / skidder / infield chipper system
- Compare full rotation costs between coppice treatments
- Compare wood and chip properties and wood yield/ha between coppice treatments and planted stands

Acknowledgements

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Thank-you