

## RESEARCH BRIEF 18

# Performance of plantation poplar on the Rakaia River in Mid-Canterbury



View into the mixed clone poplar plantation, Rakaia River.

This research brief reports on the performance of poplar clones in a trial established in 1990 by Environment Canterbury on the banks of the Rakaia River. The trial was to compare the performance of five New Zealand-bred poplar clones, with the ‘Veronese’ (*Populus deltoides* × *P. nigra*) poplar clone.

The trial was planted as a plantation block at a close spacing of 3 × 3 m (1111 stems/hectare) and remained unthinned. The New Zealand-bred poplar clones included in the trial were: ‘Argyle’ and ‘Pakaraka’ (*P. deltoides* × *P. nigra*), ‘Crownsnest’ (*P. deltoides* × *P. nigra* × *P. nigra*), ‘Kawa’ (*P. deltoides* × *P. yunnanensis*), and ‘Toa’ (*P. deltoides* × *P. nigra* × *P. yunnanensis*) (Table 1).



A ‘Veronese’ poplar plantation destined for timber production.



**Figure 1. Location of the poplar trial (marked by orange lines) near Dobsons Ferry Road on the south bank of the Rakaia River in mid-Canterbury**

The trial is located on berm land on the lower reaches of the Rakaia River, approximately six kilometres from the river mouth, and is subject to periodic flooding (Figure 1). The rainfall in this coastal area of the Canterbury plains is low, at ~600 mm/year, and is distributed evenly throughout the year on

average, but in summer it is well short of the potential evapotranspiration demand, so there are regular summer soil water deficits. The area is windy by New Zealand standards, with mean wind speeds above 15 km/hour, and prevailing winds from the north-east and south-west.

Clone	Register No.	Parentage	No. of trees planted
'Argyle'	NZ 5015	<i>P. deltoides</i> × <i>P. nigra</i> 'Italica'	174
'Pakaraka'	NZ 5013	<i>P. deltoides</i> × <i>P. nigra</i> 'Italica'	176
'Veronese'	PN 870	<i>P. deltoides</i> × <i>P. nigra</i>	49
'Crowsnest'	NZ 5010	<i>P. deltoides</i> × <i>P. nigra</i> 'Luisa Avanzo' × <i>P. nigra</i> 'Italica'	177
'Kawa'	NZ 5006	<i>P. deltoides</i> × <i>P. yunnanensis</i>	175
'Toa'	NZ 5007	<i>P. deltoides</i> × <i>P. nigra</i> × <i>P. yunnanensis</i>	170

Table 1. Poplar clones evaluated in the poplar and willow trial on the Rakaia River, Mid-Canterbury.

The trees in the trial were measured for survival, growth and stem form at 24 years old.

### Tree management

The trees in the trial were not thinned or form pruned and there was no grazing by stock in the trial, so there was a high incidence of forked and multiple stems, despite the close spacing of the trees. The 'Argyle' (20%) and 'Pakaraka' (13%) poplar clones had a higher incidence, and the 'Toa' (4%) and 'Kawa' (0%) poplar clones had a low incidence, of forked and multiple stems in the trial.

### Survival

At age 24 years the 'Argyle', 'Pakaraka' and 'Toa' poplar clones had the best survival (59-64%), with lower survival for the 'Crownsnest' poplar clone (43%), and poor survival for the 'Veronese' (22%) and 'Kawa' (16%) poplar clones (Table 2).

### Diameter growth

The 'Toa' poplar clone had the best diameter growth in the trial, with the 'Argyle' and 'Pakaraka' poplar clones and the surviving trees of the 'Veronese' and 'Kawa' poplar clones also having good diameter growth at age 24 years (Table 2). The diameter growth was much slower for the 'Crownsnest' poplar clone.

Clone	% Alive		DBH (cm)	Height (m)	Overtopped (%)	Stem sweep (%)	Multiple stems (%)
	Blocks A + B	Block A					
Year	1992	2014	2014	2014	2014	2014	2014
'Argyle'	96	59	31.1 bc	29.4 c	19	24	20
'Pakaraka'	98	61	30.9 bc	28.3 c	9	21	13
'Veronese'	90	22	30.1 bc	24.8 a	0	0	9
'Crownsnest'	90	43	22.8 a	25.7 ab	37	4	8
'Kawa'	82	16	29.7 bc	25.8 ab	32	11	0
'Toa'	90	64	33.5 c	27.9 bc	6	5	4

Table 2. Tree survival, diameter at breast height (DBH), height, stem sweep, and overtopped trees for the poplar clones at age 24 years on the Rakaia River. Average values of DBH and height followed by the same letter do not differ significantly ( $p > 0.05$ ).

### Height growth of the poplar clones

The 'Argyle', 'Pakaraka' and 'Toa' poplar clones had greater height growth at age 24 years, with slower height growth for the 'Kawa', 'Crownsnest', and 'Veronese' poplar clones (Table 2). The relationship between diameter and height was weak.

The tree height measurements of the poplar clones did not include overtopped trees, with crowns that were suppressed by the surrounding trees. These comprised 6 to 19% of the 'Argyle', 'Pakaraka', and 'Toa' trees, but more than 30% of the 'Crownsnest' and 'Kawa' trees (Table 2). There were no overtopped trees among the small number of 'Veronese' trees in the trial, because of the small number of surrounding trees (Figure 3).



Pruning plantation poplar improves quality and quantity of useable timber.



### Summary

The 'Toa' poplar clone was the best performing clone in the trial, with good tree survival, diameter and height growth, and stem form. The 'Argyle' and 'Pakaraka' poplar clones also performed well, but had a high incidence of stem sweep and multiple-stemmed trees. The 'Veronese', 'Kawa' and 'Crownsnest' poplar clones had poorer survival, with the 'Kawa' and 'Crownsnest' poplar clones not able to compete with the other clones in the trial.

A series of videos on tree management by pollarding and pruning can be viewed by visiting [poplarandwillow.org.nz](http://poplarandwillow.org.nz) or by using or clicking on the links here.



[bit.ly/poplars-willows-videos](http://bit.ly/poplars-willows-videos)

### For more information

This is one in a series of research briefs about Poplars and Willows that can be found at [poplarandwillow.org.nz](http://poplarandwillow.org.nz)  
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