

FILE NOTE

Subject: *E. argophloia* Age-10-year Measurement
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Introduction

E. argophloia has a very limited distribution in south-eastern Queensland. It produces a durable timber with attractive red-brown heartwood and is known to be frost hardy and resistant to drought. The NZDFI breeding strategy identified this species as a potential hybrid parent with *E. bosistoana*. A breeding programme with this species was initiated by Queensland DPI in 1997. NZDFI obtained individual family seedlots from their clonal seed orchard.

<i>Provenance</i>	<i>Latitude</i>	<i>Longitude</i>	<i>Altitude (m ASL)</i>	<i>Mean annual rainfall (mm)</i>
Burncluith	-26.578	150.767	310	673

A mixed seedlot of 42 parents collected from the Narromine SSO was supplied by CSIRO and was included with the 18 family seedlots to establish a small progeny test at 3 locations in 2011.

The trial is a single tree plot design and most families were replicated 52 times across the site. There are 20 trees per plot and spacing is 2.4 m between rows and 1.8 m within the rows. The seedlings were raised in containers by Dean Satchell in Northland.

The trial site located in Ngaumu Forest, Wairarapa had poor survival due to poor drainage and has been abandoned. The second site planted on the Dillon property located in the Waihopai Valley, Marlborough has good survival but growth is very slow. The third site is on the Cuddon property on the outskirts of Blenheim and this trial has good growth and survival overall.

This site was measured for height and survival in 2013, and a PSP plot was installed. There is a gradient of growth and form up the slope, trees at the mid slope having better growth and form. The DBH and survival was recorded in April 2016 and 20% of trees marked for thinning.

176 Wood samples were collected from an early thinning of the trial and were processed using the rapid splitting test for growth-strain, green and dry density, volumetric shrinkage and dry acoustic velocity (Davies, 2016). Samples taken from the base of 36 felled trees showed heartwood. The ethanol soluble extractive content in the heartwood of these trees ranged between 2.33 and 18.85%.

Many of the same families in this trial were planted at Murray's Nursery located at Woodville and measured for growth strain at age 2 years. (Altaner, 2019)

Foliage samples have been collected for DNA analysis by Seoljong Kim, a PhD student at UoC who is researching the genomic and taxonomic differences between the two closely related species, *E. argophloia* and *E. bosistoana*.

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Age 10-year measurement

In September 2021 a growth and form measurement were completed across all blocks in the trial. The NZDFI straightness and form assessment scale was not used in this instance to describe these traits and diameter at breast height (DBH) was measured. Each tree was given a score 1 = acceptable, 0 = unacceptable for straightness and form. Tree heights were measured in the 12 blocks of the PSP. The PSP is located mid slope and excludes trees that are influenced by exposure at the ridge top. The trial has continued to retain good crown health however there is no evidence of floral development.

The data was analysed to calculate the average values of diameter and height for each family. The number of trees that were used in the dataset is shown in Table 1.

Family	No. Trees DBH	No. Trees Height
401	41	14
402	34	7
403	28	7
404	33	8
405	15	3
406	27	7
407	30	9
408	37	8
410	23	7
411	40	11
413	31	4
414	28	8
415	31	8
416	46	10
417	36	9
418	29	6
419	20	3
420	32	7
995	52	13

Table 1. No. of trees measured per family.

The scatter graph in Figure 1 identifies six families that are above average for tree diameter and height. Figure 2 shows the percentage of stems that were recorded as acceptable for straightness and form. Family 413 is a consistent standout in both figures.

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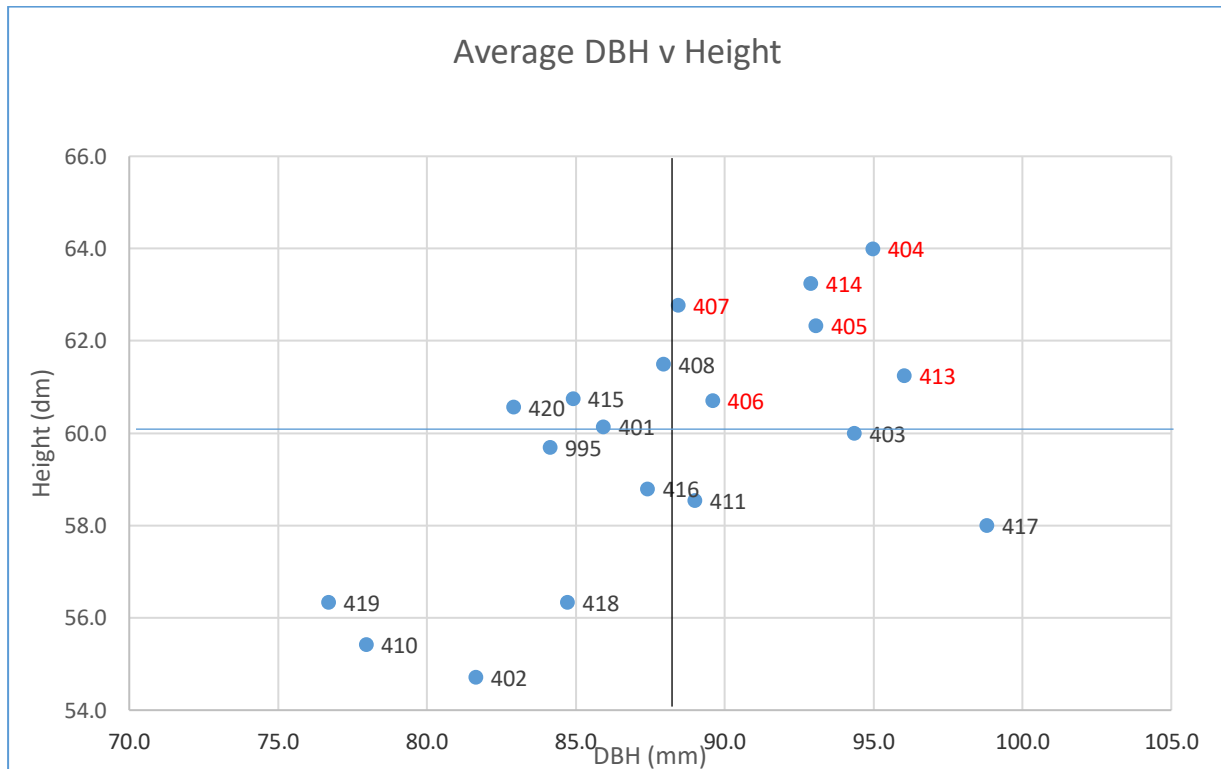


Figure 1. Relationship between family averages for diameter and height. The dissecting lines indicate the average trait values.

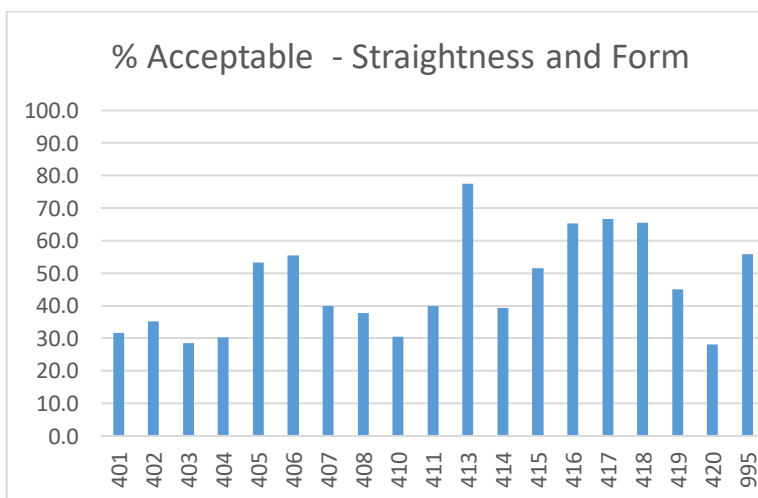


Figure 2. Percentage of acceptable stems for each family.

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Figure 3. *E. argophloia* progeny trial at Cuddon property, Marlborough.

Conclusion and Recommendations

This is a very small sample of families for a breeding population and cannot be used to calculate trait heritabilities, exploit between-family variation or select for multiple traits. These results are a simplistic evaluation of the families growing in the trial. Until flowering occurs among the trees there is no basis for progressing the progeny either as a pure species or as a hybrid with *E. bosistoana*.

The trial will require a further thinning and trees were marked for removal during the growth and form measurement. A sample of trees per family will be cored to evaluate heartwood formation and for chemical analysis. The minimum number of sample trees with heartwood per family is 8 to obtain a reliable statistic, therefore 12 trees per family are selected for coring to achieve this. The diameter of the trees is still small, ranging from 34mm to 152mm, the median is 87mm. The number of trees per family range from 15 to 46 (excluding the mixed family seedlot, 995). So as to have the maximum number of trees available for coring this must precede the thinning operation to ensure that enough trees of each family are cored.

At this stage therefore, coring and thinning will be delayed 12-18 months to allow for further diameter growth.

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References

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