



DIVERSIFIED SPECIES TECHNICAL NOTE

Number: DSTN-034
Date: September 2012

Assessment of *E. regnans* Tree Height at Kaingaroa Cpt. 333

Summary

The third generation *Eucalyptus regnans* progeny trial growing in Kaingaroa forest was assessed for height growth aged 30 months. Tree health and survival was good apart from some wind toppling. Growth was excellent, with an average tree height of 6.2 metres at 30 months. No particular provenance trends were detected. Height growth was variable across the trial in part due to the sheltering effect of an adjacent stand of radiata pine.

Trees growing next to windrows had more space and had a competitive advantage. Attempts were made to remove the differences in height growth due to environmental factors using spatial analysis. A full list of estimated breeding values for each family and the best individual from each family are provided. In a few years time the trees will be assessed for tree form, before the final selections are made to take forward to form the next generation.

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Introduction

The trial was planted from seed collected from selections made in the second generation *E. regnans* trial in Kaingaroa Cpt. 1194, where the trees had been devastated by dieback caused by leaf fungi. The trial is an incomplete block design, 3 incomplete blocks per replicate, 30 replicates of single-tree plots of approximately 90 families and one control seedlot.

Tree height was measured in decimetres using height poles. A list of family means can be found in Appendix 2. Tree growth has been spectacular (Figure 1) with the average height of all trees 6.2 metres, at two and a half years old. The fastest growth was in the most sheltered part of the trial near the large radiata pine on the southwest side, where average height is around 7 metres and some trees around 9 metres. The weeds are also an indicator of site quality and were growing best in this area with the tutu being particularly vigorous and some bracken fern emerging. Diameter growth is around one centimetre per metre of height, so the trees are very slender for their height compared to radiata pine.

Very little browsing by paropsis was seen, although a couple of gum emperor moth cocoons were found. A handful of the smallest

trees had some sort of leader dieback and 'sick' foliage, but trees in poor health were rare. Some leaders were smashed out, presumably by the strong winds experienced in March 2012, and generally occurred where trees had forked. Incidence of forking was low (4.5%), while survival was high (95.6%).



Figure 1: Height growth of *E. regnans* growing in Kaingaroa aged 30 months.



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There had been some toppling shortly after planting and some trees have substantial buttswamp. The recent strong winds of a month ago have also brought some trees down. Pigs have done some substantial digging, mainly around decaying radiata pine stumps in their search for huhu grubs. The root systems of some trees have been exposed / damaged by pig-rooting.

Analysis

Eucalyptus species can be effected by micro site changes, for this reason (where significant) data was analysed spatially to remove as much of the micro site variation as possible. Genetic parameters and breeding values were estimated (Appendix 3) for traits using mixed model equations (Appendix 1) that were solved using the software package ASReml-R.

Discussion of Results

The best family (code 74) was 6.8 metres tall, while the worst was 4.9 metres. Survival was excellent, with the poorest survival being 25 out of 30 trees planted. No particular provenance trends were apparent, nor was there any indication that the third generation families originally planted at Wiltstown were doing better than second generation families that were imported from Australia.

There was variable height growth across the trial. A height gradient exists across the trial from right to left (Figure 2). The right-most region of the trial had the tallest trees due to being sheltered by a mature stand of radiata pine. The replicates were set out perpendicular to this environmental gradient so much of the variation in tree height across the trial will be accounted for by replicates. The top and bottom edges of the trial (Figure 2) border forest roads and have seen higher compaction upon removal of the previous radiata pine crop likely accounting for the reduced height growth in these regions of the trial.

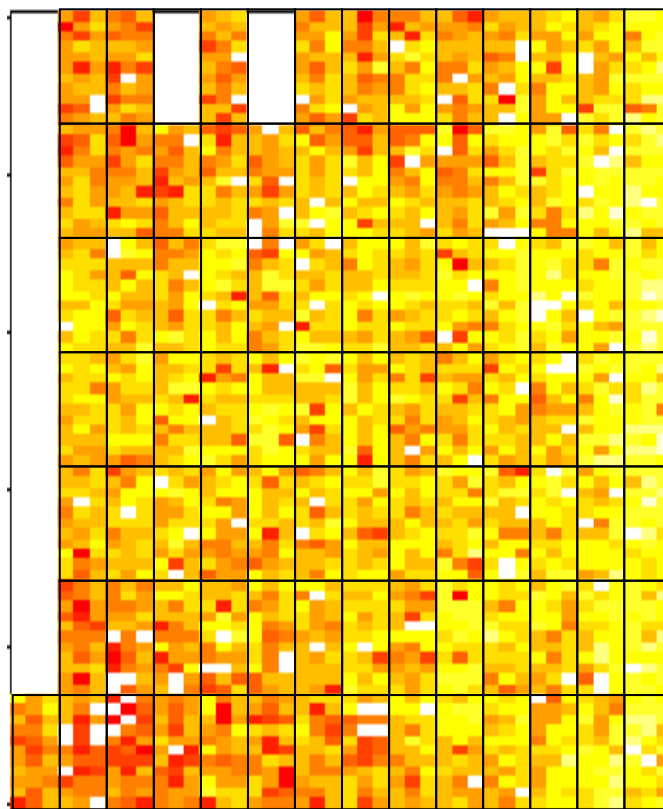


Figure 2: Raw height data, white boxes indicate missing trees, red boxes smallest trees and yellow boxes largest trees. Block boundaries (3 trees by 11) are indicated by the overlain grid.

The more subtle and concerning variation in tree height growth was the apparent difference in tree height between the windrow edges and the middle row of trees growing in each replicate. The two outer rows of each replicate that border a windrow where slash has been gathered appeared to be taller due to the greater growing space compared to the row growing in the middle of each replicate. The worry being that replicate edge trees with their growth advantage may not fully be accounted for by the trial design impacting upon the estimation of breeding values. Spatial analysis was conducted in an attempt to account for this trial layout effect resulting from the original land preparation. The residuals from the spatial analysis (Figure 3A) clearly show a replicate row effect with the middle row of every replicate having a lower residual variance. Row was fitted as a fixed effect in the model (Appendix 1 – Model 4) to try



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and remove unwanted variation between rows from the analysis (Figure 3B).

A list of parental breeding values for height estimated using model 4 (Appendix 1) are in Appendix 3. Breeding values are an estimate of the genetic merit for each tree for each trait. The trees are large enough to select from based on the current height assessment. Some trees may be producing seed now, but it is likely to be at

least another two years before any large scale collection can be made. Before selecting the final trees for the next generation of the breeding cycle it would be prudent to assess tree straightness and form. The best individual of each parent is also provided (Appendix 3), so that scion material can be collected from the best individual from the better families present in the trial to form a seed orchard.

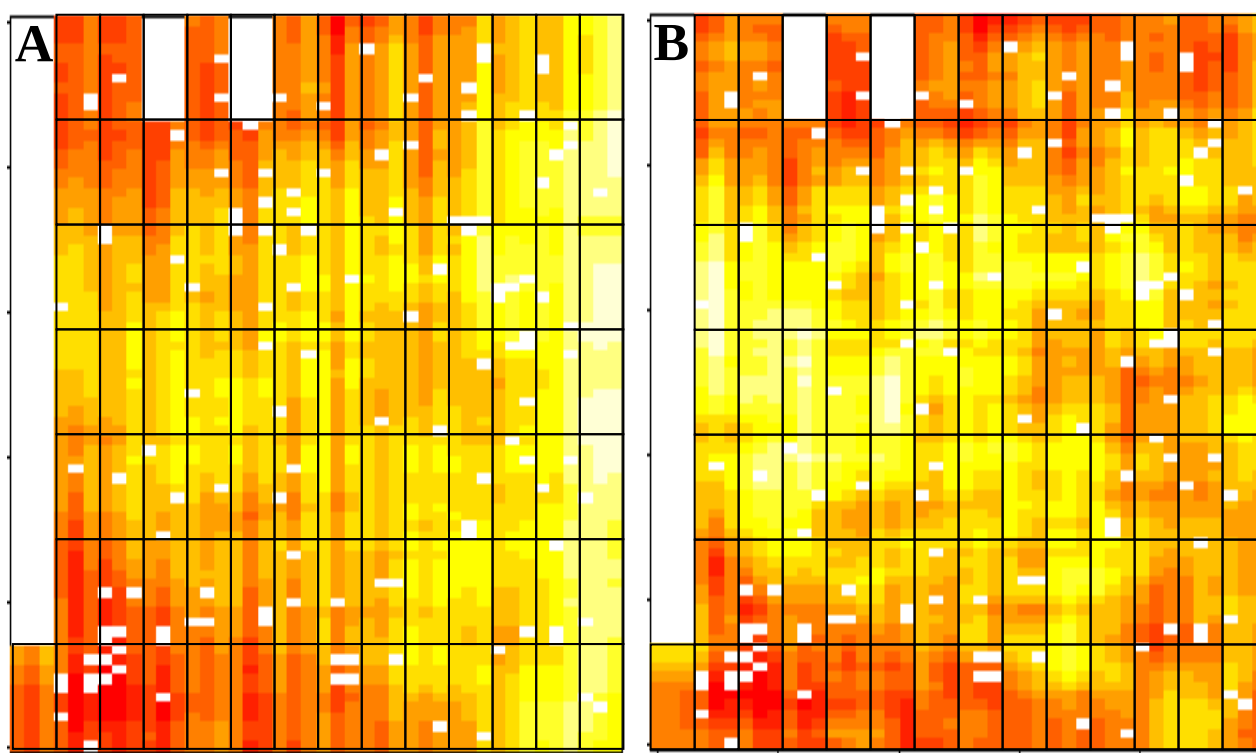


Figure 3: Plotted residuals following spatial analysis (A), displaying the linear residual variation due to the windrow effect. Row was fitted as a fixed effect (B), removing much of the linear residual variation. White boxes indicate missing trees, red boxes smallest residual and yellow boxes greatest residual. Block boundaries (3 trees by 11) are indicated by the overlain grid.

References

Stovold, G.T., Low, C.D., Dungey, H.S. (2010) A development plan for *Eucalyptus regnans* in New Zealand. FFR Report No. FFR- DS032



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Appendix 1. Variance components individual heritabilities and log likelihoods of models fitted to height data

	Model 1		Model 2		Model 3		Model 4	
	Incomplete block		AR1 x AR1		AR1 x AR1 + units		AR1 x AR1 + units !f Row	
Component	Var.	SE	Var.	SE	Var.	SE	Var.	SE
Tree	22.32	5.23	28.79	6.23	21.51	4.88	21.40	4.85
Replicate	37.67	11.72	37.18	11.51	3.31	2.92	4.23	3.17
Rep.Block	17.07	3.68	13.29	3.47	2.00	1.60	1.59	1.62
Residual	78.72	4.88	76.80	5.64	74.23	13.58	37.24	6.33
Row			0.33	0.03	0.97	0.01	0.90	0.02
Column			0.11	0.03	0.80	0.03	0.74	0.04
Units					61.56	4.54	58.70	4.59
h^2_i	0.22		0.27		0.26		0.27	
LogL	-8050.2		-7973.5		-7904.6		-7814.9	

Note. The basic model used was as follows; $y = Xb + Z_1a + Z_2r + Z_3r.b + e$ where y is the vector of individual-tree observations on a trait, b is a vector of fixed effects (i.e., mean (and in the case of the final model used row)), a is a vector of random additive genetic effects of individual genotypes, r is a vector of random replicate effects, $r.b$ is the random interaction between replicate and block, and e is a vector of random residual effects. X , Z_1 , Z_2 and Z_3 are known incidence matrices relating the observations in y to effects in b , a , r and $r.b$ respectively. Row and column were added to the design, placing each tree in a grid enabling trees to be analysed spatially.

Appendix 2. Age 30 months, family means arranged by descending height

code	planted	No. Trees	survival%	Height (decimetres)			%forked	provenance
				mean	min	max		
74	30	30	100	68.8	40	91	0.07	Strzelecki, ex Aus. Seed
80	30	30	100	66.4	45	86	0.03	Strzelecki, ex Aus. Seed
100	30	29	97	66.1	38	83	0.10	Strzelecki, ex APM select
18	30	29	97	66.0	34	82	0.07	Mt Erica, ex Wiltsdown
71	30	29	97	66.0	50	95	0.14	Strzelecki, ex Aus. Seed
25	30	29	97	65.8	45	84	0.00	Lismore, ex Wiltsdown
68	30	27	90	65.7	35	82	0.00	Moogara, ex Aus. Seed centre
76	30	29	97	65.6	46	84	0.07	Strzelecki, ex Aus. Seed
44	30	29	97	65.5	40	83	0.03	Kinleith, ex Wiltsdown
47	30	28	93	65.5	39	81	0.04	Dipton, ex Wiltsdown
34	30	29	97	65.2	45	86	0.03	Tokoroa, ex Wiltsdown
63	30	29	97	65.0	44	85	0.00	Strzelecki, ex Aus. Seed
1	31	30	97	64.9	36	81	0.03	Kallista, ex Wiltsdown
33	30	26	87	64.7	46	82	0.04	Taihape, ex Wiltsdown
3	30	29	97	64.7	27	84	0.03	Taihape, ex Wiltsdown
82	30	28	93	64.6	49	80	0.04	Strzelecki, ex Aus. Seed



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code	planted	No. Trees	survival%	Height (decimetres)			%forked	provenance
30	29	28	97	64.5	31	82	0.11	Narbethong, ex Wiltsdown
5	30	29	97	64.5	45	85	0.10	Wilsons, ex Wiltsdown
95	30	29	97	64.4	41	81	0.03	Strzelecki, ex APM select
52	30	26	87	64.4	38	80	0.00	Strzelecki, ex Aus. Seed
64	30	30	100	64.4	48	79	0.00	Strzelecki, ex Aus. Seed
99	30	30	100	64.2	30	85	0.00	Strzelecki, ex APM select
102	30	27	90	64.1	30	76	0.04	Strzelecki, ex APM select
23	30	28	93	64.0	28	80	0.04	Lismore, ex Wiltsdown
51	30	28	93	63.9	35	76	0.00	Strzelecki, ex Aus. Seed
53	30	29	97	63.8	31	82	0.00	Strzelecki, ex Aus. Seed
92	30	29	97	63.6	30	81	0.07	Strzelecki, ex APM select
7	30	29	97	63.4	29	77	0.00	Ellendale, ex Wiltsdown
65	30	30	100	63.3	39	77	0.00	Strzelecki, ex Aus. Seed
72	30	27	90	63.1	31	87	0.00	Strzelecki, ex Aus. Seed
29	30	28	93	63.1	41	80	0.11	Lisle, TAS, ex Wiltsdown
45	30	30	100	63.1	39	81	0.00	Kinleith, ex Wiltsdown
24	30	30	100	63.1	39	89	0.00	Lismore, ex Wiltsdown
13	30	29	97	62.7	28	79	0.00	Strzelecki, ex Wiltsdown
43	30	28	93	62.7	30	85	0.00	Kinleith, ex Wiltsdown
89	30	30	100	62.7	39	80	0.10	TAS, ex APM selection
86	30	30	100	62.6	40	78	0.07	TAS, ex APM selection
59	30	27	90	62.6	20	90	0.04	Strzelecki, ex Aus. Seed
42	30	30	100	62.6	18	84	0.00	Atiamuri, ex Wiltsdown
70	30	30	100	62.5	30	78	0.07	Strzelecki, ex Aus. Seed
200	30	30	100	62.1	41	78	0.10	
16	30	28	93	62.0	41	80	0.04	Strzelecki, ex Wiltsdown
26	30	29	97	62.0	38	88	0.07	Strzelecki, ex Wiltsdown
46	31	31	100	62.0	32	80	0.00	Dipton, ex Wiltsdown
54	30	28	93	61.9	23	78	0.04	Strzelecki, ex Aus. Seed
101	30	28	93	61.8	31	78	0.00	Strzelecki, ex APM select
9	30	30	100	61.6	40	80	0.13	Ellendale, ex Wiltsdown
6	30	29	97	61.6	31	83	0.07	Wilsons, ex Wiltsdown
32	30	29	97	61.6	45	78	0.00	Tokoroa, ex Wiltsdown
19	30	25	83	61.5	42	84	0.04	Mt Erica, ex Wiltsdown
69	30	30	100	61.5	23	80	0.10	Moogara, ex Aus. Seed centre
81	30	28	93	61.4	36	78	0.07	Strzelecki, ex Aus. Seed
67	30	29	97	61.4	31	86	0.00	Moogara, ex Aus. Seed centre
60	30	30	100	61.3	40	78	0.07	Strzelecki, ex Aus. Seed
41	30	29	97	61.2	37	80	0.00	Atiamuri, ex Wiltsdown
88	30	28	93	61.2	27	81	0.11	Strzelecki, ex APM select
103	30	28	93	61.2	35	84	0.07	Strzelecki, ex APM select
11	29	29	100	61.2	45	85	0.00	Mt Erica, ex Wiltsdown
14	30	28	93	61.1	32	74	0.11	Strzelecki, ex Wiltsdown
87	30	29	97	61.1	27	91	0.17	Strzelecki, ex APM select
50	30	30	100	61.1	25	80	0.00	Strzelecki, ex Aus. Seed
58	30	30	100	61.1	28	82	0.00	Strzelecki, ex Aus. Seed
93	30	29	97	61.1	34	83	0.14	Strzelecki, ex APM select



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27	30	28	93	61.0	22	80	0.00	Narbethong, ex Wiltsdown
31	30	28	93	61.0	31	79	0.00	Tokoroa, ex Wiltsdown
35	31	30	97	60.9	26	80	0.07	Styx, TAS, ex Wiltsdown
55	30	28	93	60.8	39	82	0.04	Strzelecki, ex Aus. Seed
22	30	30	100	60.8	25	78	0.00	Tokoroa, ex Wiltsdown
97	30	28	93	60.7	25	84	0.04	Strzelecki, ex APM select
56	30	28	93	60.7	39	82	0.04	Strzelecki, ex Aus. Seed
37	30	30	100	60.6	24	81	0.07	Ellendale, ex Wiltsdown
40	30	29	97	60.4	31	85	0.03	Mt Erica, ex Wiltsdown
85	30	29	97	60.4	22	85	0.03	Strzelecki, ex APM select
84	30	27	90	60.3	33	90	0.00	Strzelecki, ex APM select
8	30	30	100	60.2	26	90	0.03	Ellendale, ex Wiltsdown
78	30	28	93	60.0	33	83	0.04	Strzelecki, ex Aus. Seed
66	30	26	87	59.9	20	81	0.00	Moogara, ex Aus. Seed centre
17	30	30	100	59.6	32	90	0.13	Mt Erica, ex Wiltsdown
21	30	29	97	59.6	23	80	0.10	Rangiwahia, ex Wiltsdown
12	30	29	97	59.5	20	80	0.07	Strzelecki, ex Wiltsdown
91	30	28	93	59.3	28	76	0.11	Strzelecki, ex APM select
10	30	29	97	59.2	24	75	0.00	Strzelecki, ex Wiltsdown
28	30	29	97	59.2	26	84	0.03	Rotoehu, ex Wiltsdown
57	30	30	100	59.1	32	80	0.10	Strzelecki, ex Aus. Seed
15	30	30	100	58.9	26	81	0.00	Strzelecki, ex Wiltsdown
20	30	28	93	58.6	39	74	0.04	Lismore, ex Wiltsdown
4	30	28	93	58.5	30	85	0.04	Strzelecki, ex Wiltsdown
36	30	29	97	58.4	20	83	0.07	Ellendale, ex Wiltsdown
77	30	29	97	57.9	25	81	0.03	Strzelecki, ex Aus. Seed
90	30	28	93	57.9	25	80	0.04	Strzelecki, ex APM select
62	30	26	87	57.8	24	84	0.04	Strzelecki, ex Aus. Seed
73	30	30	100	57.3	29	80	0.00	Strzelecki, ex Aus. Seed
2	30	28	93	57.3	31	82	0.07	Levendale ex Wiltsdown
75	30	27	90	57.2	29	80	0.15	Strzelecki, ex Aus. Seed
83	30	28	93	56.4	29	79	0.11	Strzelecki, ex APM select
61	30	29	97	56.1	31	85	0.03	Strzelecki, ex Aus. Seed
96	29	28	97	55.6	22	87	0.04	Strzelecki, ex APM select
38	30	25	83	50.0	22	85	0.00	Tokoroa, ex Wiltsdown
79	30	28	93	49.3	20	80	0.04	Strzelecki, ex Aus. Seed



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Appendix 3. Parental breeding values and the best individual breeding value per parent

FCIn	Code	Parent BV	SE	Best ind. BV	SE	Tree	Rep	Provenance
891365	74	8.69	2.75	6.93	3.79	21	28	Strzelecki, ex Aus. Seed
891387	80	5.93	2.75	6.74	3.78	9	11	Strzelecki, ex Aus. Seed
891457	63	5.54	2.78	5.38	3.79	13	25	Strzelecki, ex Aus. Seed
890186	47	5.41	2.81	5.15	3.79	2	18	Dipton, ex Wiltsdown
891354	71	5.41	2.22	5.94	3.72	13	25	Strzelecki, ex Aus. Seed
886053	24	5.10	2.18	6.22	3.72	5	24	Lismore, ex Wiltsdown
890087	33	5.01	2.88	6.81	3.80	26	14	Taihape, ex Wiltsdown
886049	23	4.79	2.81	5.67	3.79	31	21	Lismore, ex Wiltsdown
890089	34	4.40	2.78	4.72	3.78	17	20	Tokoroa, ex Wiltsdown
891550	100	4.37	2.78	4.81	3.79	12	17	Strzelecki, ex APM select
886009	3	4.27	2.78	4.91	3.78	24	21	Taihape, ex Wiltsdown
891380	76	4.19	2.78	6.07	3.79	31	10	Strzelecki, ex Aus. Seed
891438	59	4.01	2.84	6.39	3.79	20	12	Strzelecki, ex Aus. Seed
891427	52	3.83	2.87	5.53	3.80	23	22	Strzelecki, ex Aus. Seed
891459	64	3.76	2.75	4.71	3.79	7	21	Strzelecki, ex Aus. Seed
890181	43	3.51	2.21	6.26	3.73	4	21	Kinleith, ex Wiltsdown
886001	1	3.07	2.75	4.56	3.78	7	9	Kallista, ex Wiltsdown
891417	51	3.05	2.81	5.08	3.79	2	15	Strzelecki, ex Aus. Seed
891104	68	2.96	2.84	3.64	3.79	21	14	Moogara, ex Aus. Seed centre
891539	95	2.86	2.78	4.75	3.78	23	24	Strzelecki, ex APM select
891397	82	2.70	2.81	4.94	3.79	18	15	Strzelecki, ex Aus. Seed
891353	70	2.45	2.75	3.66	3.78	7	21	Strzelecki, ex Aus. Seed
886011	5	2.36	2.20	6.10	3.74	31	24	Wilsons, ex Wiltsdown
886033	13	2.26	2.77	4.25	3.78	1	14	Strzelecki, ex Wiltsdown
890103	42	2.19	2.75	3.90	3.78	9	25	Atiamuri, ex Wiltsdown
891431	54	2.19	2.81	3.55	3.79	13	22	Strzelecki, ex Aus. Seed
891435	56	2.18	2.81	3.63	3.79	33	7	Strzelecki, ex Aus. Seed
890078	30	2.10	2.81	3.35	3.79	32	23	Narbethong, ex Wiltsdown
891430	53	2.06	2.78	4.42	3.79	16	21	Strzelecki, ex Aus. Seed
890182	45	1.82	2.75	4.28	3.78	19	25	Kinleith, ex Wiltsdown
891466	65	1.71	2.75	3.77	3.78	7	27	Strzelecki, ex Aus. Seed
891521	89	1.69	2.75	4.07	3.78	26	19	TAS, ex APM selection
891548	99	1.65	2.75	4.73	3.78	14	21	Strzelecki, ex APM select
886041	18	1.51	2.25	3.97	3.72	17	14	Mt Erica, ex Wiltsdown
891530	92	1.44	2.78	3.07	3.79	26	7	Strzelecki, ex APM select
891523	102	1.42	2.84	2.86	3.80	6	19	Strzelecki, ex APM select
890084	31	1.01	2.81	2.95	3.79	26	5	Tokoroa, ex Wiltsdown
890076	29	0.95	2.81	2.49	3.79	17	18	Lisle, TAS, ex Wiltsdown
891513	86	0.92	2.75	3.26	3.78	12	26	TAS, ex APM selection



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891508	85	0.89	2.78	4.97	3.78	23	20	Strzelecki, ex APM select
886031	11	0.80	2.78	3.16	3.79	16	6	Mt Erica, ex Wiltsdown
890185	46	0.79	2.72	3.07	3.78	26	26	Dipton, ex Wiltsdown
891514	87	0.72	2.78	4.01	3.78	2	4	Strzelecki, ex APM select
890100	41	0.70	2.78	2.84	3.79	30	10	Atiamuri, ex Wiltsdown
891389	81	0.62	2.81	2.63	3.79	5	23	Strzelecki, ex Aus. Seed
890074	27	0.56	2.81	3.03	3.79	28	17	Narbethong, ex Wiltsdown
890085	32	0.24	2.78	3.99	3.79	20	14	Tokoroa, ex Wiltsdown
891411	50	0.22	2.75	2.89	3.78	32	27	Strzelecki, ex Aus. Seed
891437	58	0.02	2.75	3.51	3.78	18	22	Strzelecki, ex Aus. Seed
886037	16	-0.02	2.79	1.98	3.79	16	19	Strzelecki, ex Wiltsdown
891489	67	-0.07	2.78	2.94	3.79	14	22	Moogara, ex Aus. Seed centre
890073	26	-0.30	2.78	1.77	3.78	17	15	Strzelecki, ex Wiltsdown
890092	35	-0.36	2.75	2.81	3.79	1	28	Styx, TAS, ex Wiltsdown
886023	9	-0.39	2.75	2.41	3.79	28	3	Ellendale, ex Wiltsdown
886022	8	-0.64	2.74	2.88	3.78	23	28	Ellendale, ex Witsdown
891313	69	-0.71	2.75	2.29	3.78	23	26	Moogara, ex Aus. Seed centre
891518	103	-0.73	2.81	3.05	3.79	17	11	Strzelecki, ex APM select
886017	7	-0.80	2.77	1.83	3.78	22	21	Ellendale, ex Wiltsdown
891517	88	-0.90	2.81	2.53	3.79	19	26	Strzelecki, ex APM select
890098	40	-1.09	2.78	2.80	3.79	1	16	Mt Erica, ex Wiltsdown
886044	21	-1.37	2.78	1.93	3.79	1	22	Rangiwahia, ex Wiltsdown
891451	62	-1.41	2.87	2.31	3.79	14	18	Strzelecki, ex Aus. Seed
891446	60	-1.47	2.75	2.07	3.78	30	28	Strzelecki, ex Aus. Seed
886030	10	-1.67	2.78	2.76	3.79	7	29	Strzelecki, ex Wiltsdown
886032	12	-1.68	2.79	2.27	3.78	17	13	Strzelecki, ex Wiltsdown
891381	77	-1.70	2.78	1.62	3.78	16	18	Strzelecki, ex Aus. Seed
890075	28	-1.74	2.77	1.54	3.78	17	24	Rotoehu, ex Wiltsdown
891532	93	-1.79	2.78	2.07	3.79	27	8	Strzelecki, ex APM select
886048	22	-1.84	2.75	1.88	3.78	5	20	Tokoroa, ex Wiltsdown
886040	17	-2.20	2.75	2.39	3.78	21	4	Mt Erica, ex Wiltsdown
891545	97	-2.20	2.81	2.48	3.79	26	8	Strzelecki, ex APM select
886036	15	-2.32	2.74	1.44	3.78	4	6	Strzelecki, ex Wiltsdown
891383	78	-2.45	2.81	2.32	3.79	22	5	Strzelecki, ex Aus. Seed
891474	66	-2.47	2.88	1.06	3.80	19	17	Moogara, ex Aus. Seed centre
886010	4	-2.48	2.82	2.49	3.79	16	6	Strzelecki, ex Wiltsdown
891505	84	-2.55	2.84	1.55	3.79	30	22	Strzelecki, ex APM select
891554	101	-2.71	2.81	1.75	3.79	17	15	Strzelecki, ex APM select
886042	20	-2.90	2.81	1.23	3.80	19	26	Lismore, ex Wiltsdown
890093	36	-2.97	2.79	1.88	3.79	11	3	Ellendale, ex Wiltsdown
891433	55	-3.00	2.81	0.66	3.79	27	4	Strzelecki, ex Aus. Seed



DIVERSIFIED SPECIES TECHNICAL NOTE

Number: DSTN-034
Date: September 2012

FCIn	Code	Parent BV	SE	Best ind. BV	SE	Tree	Rep	Provenance
886035	14	-3.09	2.79	1.15	3.79	24	27	Strzelecki, ex Wiltsdown
891370	75	-3.21	2.84	2.98	3.79	11	25	Strzelecki, ex Aus. Seed
891503	83	-3.88	2.81	0.54	3.79	24	15	Strzelecki, ex APM select
891529	91	-4.28	2.81	0.41	3.79	25	18	Strzelecki, ex APM select
891448	61	-4.83	2.78	0.05	3.78	20	12	Strzelecki, ex Aus. Seed
890094	37	-4.94	2.75	-0.12	3.78	15	13	Ellendale, ex Wiltsdown
891436	57	-5.01	2.75	0.74	3.78	20	26	Strzelecki, ex Aus. Seed
891364	73	-5.10	2.75	0.40	3.78	31	18	Strzelecki, ex Aus. Seed
891525	90	-5.52	2.82	-0.05	3.80	30	28	Strzelecki, ex APM select
886005	2	-5.98	2.81	-0.39	3.79	6	30	Levendale ex Wiltsdown
891544	96	-6.16	2.81	0.38	3.79	7	5	Strzelecki, ex APM select
891386	79	-14.40	2.81	-4.52	3.79	9	16	Strzelecki, ex Aus. Seed
890095	38	-14.85	2.91	-3.90	3.81	19	3	Tokoroa, ex Wiltsdown