

PRESS RELEASE

Subject: Economic and genetic gain continue to improve over time for *P. radiata*

Date: 15 June 2016

The Southern Tree Breeding Association Inc. (STBA) has recently completed a new genetic analysis (run) for the national *Pinus radiata* tree improvement program using TREEPLAN. Each run builds on previous analyses by including new measurement data gathered from new and existing trees in genetic trials across Australia. This evaluation allows us to identify new selections and improve the accuracy of prediction for use in breeding and deployment.

Genetic values for clearfall harvest age characteristics of growth (MAI), form (SWEEP and BRANCH size) and wood properties (STIFFNESS) are produced for each tree. Economic indices (based on various production systems and end use processing) are used to quantify the net present value of each tree against all other trees. Growers can then compare the genetic and economic worth of trees (and seedlots) depending upon their particular production and processing objectives.

For example:

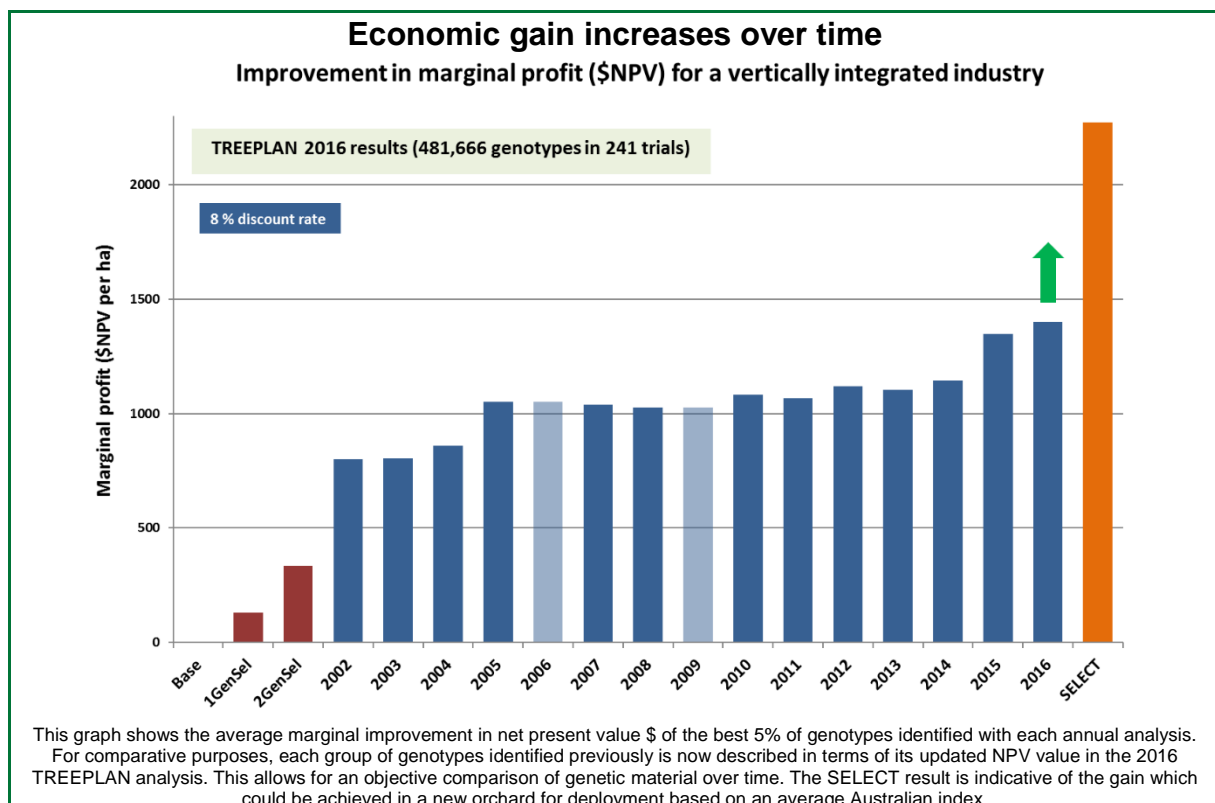
The value of gain in:	MAI growth (MAI m ³ /ha/yr)	plus	STIFFNESS (GPa)	plus
	reduced BRANCH size (cm)	plus	reduced SWEEP (mm/m)	equals
\$NPV	marginal increase in net present value by using seed from this tree relative to base line trees			

The integrated approach provides efficiencies as the national database allows TREEPLAN to use all historical and new information in a single industry wide multivariate genetic analysis. Growers can compare genetic potential on an “apples vs apples” basis to optimise selection of material for plantation establishment.

TREEPLAN statistics for this run	Trials	Genotypes	Measured traits
Total number included:	241	481,666	34
Number of objective traits: 4 (with MAI on a regional basis, BRANCH size, STIFFNESS and SWEEP)			
	Trials	Individual genotypes	Measurements
Size of <i>P. radiata</i> database:	429	904,283	15.7 million
Total DATAPLAN database size	2177	5 m genotypes	99 million

The STBA (established in 1983) is the national body which manages the Australian tree improvement programs for Radiata pine (*P. radiata*) and Blue gum (*E. globulus*). STBA is a not-for-profit cooperative and our members collectively contribute resources to maximise the genetic quality and value of the plantation resource.

TREEPLAN software has been jointly developed for use in the forest industry by STBA, AGBU (a joint institute of the University of New England and Industry and Investment NSW) and PlantPlan Genetics.



The results indicate a high and competitive return (10-14%) on investment through membership fees can be achieved.

PRESS RELEASE *continued*

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The table below shows the average performance of each generation for each trait as well as the average trait values of the best 5% of trees (24,083 trees) selected for a single trait. For example, the best 5% of trees for MAI (volume) alone would have an average predicted increase in volume production of 3.21 m³/ha/yr (14% more than base productivity) but only deliver a marginal improvement in economic value (profit) of \$725 due to trade offs in other traits. The SELECT orchard result is indicative of the gain which could be achieved in a new orchard based on an average Australian index.

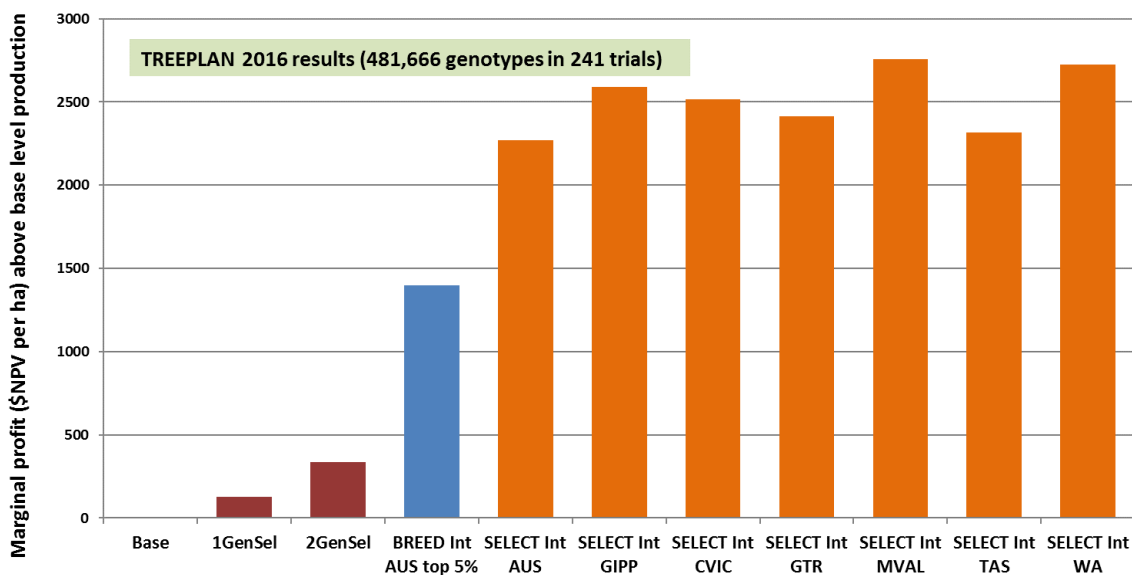
Marginal gain (or loss) in selecting various groups of genotypes based on generation, the national multi-trait index or independent traits.

	INDEX	MAI (volume)		STIFFNESS		BRANCH SIZE		SWEEP	
<i>Base productivity* and units</i>	<i>NPV \$/ha</i>	<i>22.6 m³/ha/yr</i>		<i>11.3 GPa</i>		<i>5.5 cm (lower is better)</i>		<i>10.5 mm/m (lower is better)</i>	
Baseline genotypes	0	0	-	0	-	0	-	0	-
Overall mean (481,666 trees)	173	0.40	2%	-0.35	-3%	-0.48	-9%	-0.72	-7%
1G Selections (1137 trees) [^]	129	0.50	2%	-0.47	-4%	-0.47	-9%	-0.70	-7%
2G Selections (855 trees) [^]	335	0.72	3%	-0.38	-3%	-0.58	-11%	-1.22	-12%
Top 5% for NPV\$	1399	1.61	7%	0.78	7%	-1.00	-18%	-1.34	-13%
Top 5% for MAI	725	3.21	14%	-0.87	-8%	-0.60	-11%	-1.53	-15%
Top 5% for STIFFNESS	973	-0.49	-2%	1.44	13%	-0.60	-11%	-0.31	-3%
Top 5% for BRANCH	808	0.87	4%	-0.28	-2%	-1.38	-25%	-1.72	-16%
Top 5% for SWEEP	510	1.37	6%	-0.90	-8%	-0.91	-17%	-2.82	-27%
SELECT Orchard	2,271	1.55	7%	2.23	20%	-1.10	-20%	-1.54	-15%

* Base Productivity is an average commercial performance indicator used in developing TREEPLAN Genetic Values for *Pinus radiata*.
[^] 1G and 2G trees selected using breeding values reported in STBA TR92-02 and TR92-04.

Deployment gains are more targeted

The following graph is indicative of the additional marginal improvement in NPV\$ available when deploying STBA genetic material. National and regional orchards (SELECT – orange) are compared with the average NPV\$ of the generations and the best 5% of genotypes identified for breeding purposes (BREED - blue). The breeding program must retain diversity and targets national objectives, whereas seed producers and forest growers can increase selection intensity and focus more on regional performance. For example, despite the national breeding program delivering a marginal improvement of NPV\$1399, a new orchard for the Green Triangle Region (SELECT Int. GTR) could deliver a marginal gain of NPV\$2415. The marginal gains are shown using an 8% discount rate. Individual results will vary depending upon the production model assumed by growers.



For more information see the STBA web site (www.stba.com.au) or contact the General Manager, Dr Tony McRae (tmcrae@stba.com.au) or Business Manager, Peter Cunningham (pcunningham@stba.com.au).