



COMMERCIAL EUCALYPTS

Scion has been researching eucalypt species for over forty years, and developing breeding programmes and high quality seed for New Zealand forests.

UNIQUE BREEDING PROGRAMME

Scion has been actively breeding and researching three eucalypt species, in conjunction with Future Forests Research Ltd (FFR) and the Forest Owners' Association (FOA): *Eucalyptus fastigata*, *E. regnans* and *E. nitens*.

We also plan to further develop other eucalypt resources, which may include *E. muelleriana*, *E. saligna*, *E. delegatensis* and *E. pilularis*.

Genetics.

E. fastigata - breeding trials are currently in the second and third generation. The new breeding population has greatly reduced forking, and improved growth and form. Seed is available from seed orchards from 2014.

E. regnans - is entering the fourth generation following a 2014 assessment and breeding value estimation of the third generation population. Most of these trees are resistant to leader dieback and the fungal health problems that plagued earlier stands in the 1990s.

Current trial stands are looking to set growth records, with average heights of six metres in 30 months and best trees at over nine metres. The first seed crop is due in 2016.

E. nitens - is in the third generation with seed available. Orchard material will be assessed and culled for solid wood properties during 2014, based on growth stress and shrinkage.

Our unique breeding strategy ensures all clones in the archives are DNA 'fingerprinted'. The potential candidates for seed orchards from third generation trials have also been identified and fingerprinted to help limit inbreeding in future generations.



New flower crop on grafted *Eucalyptus fastigata* in the seed orchard

Site productivity and growth models. Productivity models have been developed for all three eucalypt species. The *Eucalyptus fastigata* model has been used as an on-line calculator (www.ffr.co.nz) and will be transitioned to the Forest Levy Growers' Trust or the Scion websites.

Silvicultural practices. Trees are fertilised after planting to supply nitrogen and phosphate. Recommended initial stocking is 1100 spha. Pulp crops require no further silviculture, but pruning is recommended to obtain clear wood even on self-pruning species like *E. globoidea* or *E. fastigata*. Pruning in dry weather will minimise rotting of branch stubs, and no more than 40% of the green crown should be removed at each lift. Pruning can extend over the first two logs or 10 metres.

Recommended final crop stocking is lower than radiata pine at 200 spha for a 25-30 year rotation, or 100 spha for large logs at a 50 year rotation. Thinning should be done in two stages: down to 500 spha at age six to remove runts and malformed trees; the final thin down to 200 at age 10.

Pests and diseases. Incidence varies between species, and this can be affected by genetics and siting. Our forest protection scientists support growers with pest and disease research and surveillance, mitigation and management tools.

Wood quality. This varies between eucalypt species. Some key properties are listed on www.nzwood.co.nz. Air-dry density of these three species is between 600 - 700 kg/m³ and MoE (modulus of elasticity) at between 13.2 and 15.6 GPa.

Wood processing. Some eucalypts are challenging to saw with recoveries of 40-50% green timber. Growth stresses can lead to log and timber splitting, and further loss can occur during drying due to timber shrinkage, checking and collapse.

Our research shows *E. fastigata*, *E. globoidea*, *E. muelleriana* and *E. pilularis* can potentially produce high quality timber on 25 year rotations. Pruning is required to improve visual and machine stress so a higher proportion of boards can be used in appearance and structural applications. Recoveries from the butt-logs have ranged from 49% to 67%.

www.scionresearch.com/services

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A stand of 30-year-old *Eucalyptus regnans*

Quarter-sawing and flat-sawing patterns are traditionally used to mitigate distortion and drying degrade:

Quarter-sawing: minimises surface and internal checking in drying collapse-prone species, and produces thicker boards. Conversely, it incurs greater losses in small diameter logs due to growth stress related distortion.

Flat-sawing: is faster and produces wider boards, and minimises the effects of growth stresses. Surface checking can occur in species with high shrinkage.

Markets. Most eucalypts in New Zealand are grown for short-fibre pulp. There are existing international markets for sawn timber for house framing, flooring and furniture, depending on the species' properties.

A new research programme. Scion is undertaking new research, in partnership with industry, to further investigate new processing methods, degrade losses during processing, and to breed and grow eucalypts for higher-value end products. This is due to start during 2014-15.

ABOUT SCION

Scion is a Crown Research Institute that specialises in research, science and technology development for the forestry, wood product and wood-derived materials and other biomaterial sectors. Scion's purpose is to create economic value and contribute to beneficial environmental and social outcomes for New Zealand.

We offer research and development services across the entire forestry value chain, including forest and climate change, forest health and biosecurity, rural fire research, forest management and tree improvement.

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