

UK interest grows in Eucalyptus silviculture

Eucalypts address many of the concerns of today's commercial forestry sector, says **Bryan Elliott**

Eucalypts have been a focus of recent attention in the UK being fast growing exotic hardwoods that have the ability to produce quality wood which is entirely suitable for the supply of woody biomass over a short-term rotation of around 20 years. Eucalyptus species are being considered as species that will produce wood at a high annual yield and meeting industry concerns over climate cycling and the risk of growing traditional forestry species because of new pests and diseases. Some of the Eucalyptus tree species also have potential as timber species and with specific silvicultural strategies in place, could provide an alternative to productive exotic conifer species in southern England.

Species

Suitable species that are considered for planting in various climatic zones in UK are sourced from Australian regions that have temperate climates experiencing cold winters either to the mountains of Tasmania, or the sub-alpine parts of the Great Dividing Range in Victoria and New South Wales.

Eucalyptus glaucescens has proved to be the most popular planted species over recent years due to its exceptional cold tolerance, its general unpalatability to deer and its adaptability to diverse site types. Provenances of Guthega and Mt. Victoria are the preferred seed source. *E. glaucescens* has been successfully established throughout Wales, Midlands and Scotland with annual yields in the region of 25m³/ha/annum.

Throughout the southern part of Britain *E nitens* and *E denticulata* are two similar species that are well suited to temperate climates with cool, wet winters. With good planting procedures in place and timed spraying interventions, these two species will command world class growth rates. Basic Wood Density is in the region of 480 to 530 kg/m³. Permanent sample plots on the award winning Treworder Plantation in Cornwall show yields more than 30m³/ha/annum. In September 2017, the average tree height was 10.1m and the average DBH is 10.2cm at 40 months. As the stocking density is quite high at 2000sph, canopy closure was achieved at around 18 months. As light competition has now become

critical, at the age of 47 months a felling licence has been applied for.

Other Eucalyptus species are important in the opportunities that each possess to meet UK climatic and site characteristics. *E rodwayi* (Swamp peppermint) has a low site nutrient requirement and an extensive rooting ability which translates to land reclamation and shelterbelt qualities. As well there is *E johnstonii* and *E dalrympleana* that have characteristics that support establishment on waterlogged sites. Species that have significant cold temperature tolerances throughout UK are *E subcrenulata*, *E gunnii*, *E parvula*, *E nitida*, *E coccifera* and *E urnigera*. Timber producing species that will flourish on protected sites through southern England are *E delegatensis* and *E fastigata*.

Silviculture

Eucalyptus respond well to intensive silviculture and will produce trees of a size and quality suitable for biomass supply from rotations of ten years. Excellent young stands have been established on short rotation forestry (SRF) principles throughout UK, but not all recent plantings have been successful. However, there has been little evidence of cold-damage to well-established young trees that have canopy closure, which is consistent with the winters in the most recent period being relatively mild; the failures of establishing various Eucalyptus species are mainly due to poor weed control, and subsequently browsing.

With cold tolerance adaptation of various Eucalyptus species, the key factors are air temperature, the degree of hardening that has occurred and cool, but not freezing soil temperatures. The historic occurrence and frequency of absolute minimum temperatures in any location appears to be a reasonable guide to the Eucalyptus species that may be grown at that location. The hardiest species can be expected to survive short periods of screen temperatures of -15°C in their first winter with little damage.

Eucalypts benefit from some sort of soil cultivation, as an imbalance develops between stem growth and root development and instability can result. Tree guards with a larger cross-sectional area and stakes are important to support the early growth response of the tree canopy when planted out. Spring planting using plugs are the best option as it is critical to avoid any frost incidence when small and the trees are always growing so all roots can be considered vulnerable. Planting spacing is in the region of 1600 stems



Top: *E nitens*, aged 7 years, Dartington Agroforestry

Above: entire room constructed and panelled with *E saligna*, Wellington NZ.



Above: *E nitens*, aged 21 years, 2.5m³ average tree size, standing at 1500m³/ha, ready for clearfelling, Southwood Export, Southland NZ, Jan 2018

per hectare as tree competition will soon become an important silvicultural consideration. Poor weed control during the months following planting leads to poor establishment, slow growth and low survival. Tree height following summer weed control will be in the region of 1.5 to 2.5m for the following winter which will encourage the development of a plantation microclimate. Second year rotations will benefit

from nutrient balancing with intimate fertilising.

Eucalypts in Britain have been relatively free of pests and diseases. Some serious insect pests have become present in southern Europe, though biocontrol measures are proving effective. Britain's cooler climate may mitigate their impact if they do reach our shores, though it is unlikely that we would have extensive plantings to facilitate their spread. Eucalypts seem to be unaffected by grey squirrels or voles. The impact of deer browsing is dependent upon location and Eucalyptus species, and as these trees grow all year round, often the only growing leaf matter is Eucalyptus, even though the leaves are not very palatable. A lack of weed control over summer will limit the expected potential tree height in the following winter to an acceptable browsing height for deer. Lovely.

Water availability (due to both rainfall and soil water-holding capacity) was the largest determinant of yield in Eucalyptus. By contrast yield was little influenced by altitude or average temperature.

There are more imaginative approaches to planting Eucalyptus with substantial sections of new plantings carried out in Brazil with broad bands of native plants planted alongside quick rotations of pulp quality Eucalyptus species. This has created the benefit of microclimate stability and establishment potential for fragile native plants that will in the long-term encourage vast habitat corridors throughout the shorter timber productive life of the plantation. This philosophy would work in UK situations with the benefits of an almost immediate canopy supporting and nourishing sections of native broadleaf planting. Our prime native broadleaves (and Douglas fir) would establish and grow better with a nurse crop creating an over-storey microclimate, rather than as commonly, an open field filled with native broadleaves that struggle.

Summary

With the uncertainties posted by climate cycling and new pests and diseases, the prospects of growing trees on much shorter rotations than the norm in Britain, is a requirement posted by the industry to meet biomass wood supply demands on current and planned CHP Installations. The rapid early growth of eucalypts, the substantial Basic Density and the relatively quick reduction in moisture content, makes them suitable to this application. Planting to date has been on a small scale, though with an increase in silvicultural understanding through suitable establishment and protection alongside the matching of suitable species (and specific provenances) appropriate to particular locations will encourage commercially driven opportunities.

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