
Supplementary Material 1:

Species descriptions and sample details

Associated paper: Assessing a Bayesian approach for detecting exotic hybrids between
plantation and native eucalypts

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Eucalyptus camaldulensis (subgenus *Symphyomyrtus*, section *Exsertaria*, series *Rostratae*).

Eucalyptus camaldulensis is the most naturally widespread eucalypt species, and one of the most widely cultivated outside Australia [1]. It is a common, often dominant, water course and flood plain tree covering a range of climatic zones across continental Australia [Fig. 1; 2]. There are seven recognised subspecies that are more-or-less geographically structured, and intergrade populations are known to occur where the distributions meet [2]. Generally *E. camaldulensis* is a large tree with smooth bark, seven flowered inflorescences and has fruit with an ascending disc and very exert valves [2]. There is considerable variation in leaf and bud morphology across the seven subspecies, but distinctively, all have yellow-brown double-coated seeds [2]. The species is common around *E. globulus* plantations in western Victoria and the Green Triangle. In this area the natural distribution of *E. camaldulensis* is highly fragmented, with remnant populations often occurring directly adjacent to, and embedded within *E. globulus* plantations. Of the 97 *E. camaldulensis* DNA samples used in this study 92 were from Butcher *et al.* (2009), and cover the full geographic range of the species; an additional two samples were collected from open pollinated progeny collected from trees within the plantation zone in the Green Triangle, two samples were collected from Currency Creek Arboretum (CCA), with one sample sourced from existing collections from Petford in Queensland.

Eucalyptus cypellocarpa (subgenus *Symphyomyrtus*, section *Maidenaria*, series *Globulares*, subseries *Remanentes*)

Eucalyptus cypellocarpa is common and widespread in coastal and inland ranges from northern New South Wales, south to eastern and central Victoria, with outlying populations in the Grampians and Otway Ranges in western Victoria [2]. It is typically a tall wet forest tree to 65m, and also occasionally occurs as a mallee at the extremes of its range [2]. It has smooth bark, long lanceolate leaves and inflorescences are in umbels of seven with buds and fruit often having a longitudinal ridge. The juvenile foliage is striking, with large opposite sessile leaves on square to winged stems [2], and can resemble the juvenile foliage of *E. globulus* and *E. nitens*. In fact the three species are all occur in the same series [2], and given their similar juvenile characteristics, hybrids between these three species would be difficult to detect based on juvenile morphology. *Eucalyptus cypellocarpa* and *E. globulus* naturally co-occur and hybrids between the two have been reported [3, 4]. *Eucalyptus cypellocarpa* occurs in the vicinity of industrial *E. globulus* plantations mainly in the Strzelecki Ranges in Gippsland Victoria, where it is a common component of native forests adjacent to plantations. Ninety-eight individuals from 26 populations across the range of *E. cypellocarpa* were sampled in this study. Leaf tissue and herbarium specimens were collected from three to five individuals per population.

Eucalyptus globulus (subgenus *Symphyomyrtus*, section *Maidenaria*, series *Globulares*, subseries *Euglobulares*)

Eucalyptus globulus is common in coastal and sub-coastal and inland forests bellow 700m in eastern Tasmania, southern Victoria and the Bass Strait Islands with outlying populations in western Tasmania [2]. The species is often tall (up to 90 m) and has smooth bark, large falcate leaves and usually single budded influences [occasionally in 3s; 5] that are large, warty and ribbed [2]. The juvenile foliage is conspicuous with large sessile opposite and highly glaucous leaves on square and winged stems [2]. This characteristic juvenile foliage has been exploited as morphological marker for identifying juvenile hybrid seedlings involving *E. globulus* [6, 7]. It is one the most economically important temperate hardwood species in the world and is widely planted across southern mainland Australia in industrial plantations [8, 9]. *Eucalyptus globulus* plantations occur within its native range in Gippsland and south-eastern Tasmania (Fig. 1). Of the 87 *E. globulus* DNA samples used in this study, 79 were provided by Hudson [10], and cover the full geographic range of the species. The remaining eight samples were sourced from existing UTAS collections.

Eucalyptus nitens (subgenus *Symphyomyrtus*, section *Maidenaria*, series *Globulares*, subseries *Remanentes*)

Eucalyptus nitens has a disjunct natural distribution occurring in scattered populations in highland wet forests in Victoria and New South Wales [2]. It is a tall tree (to 70 m) with mainly smooth bark, glossy green lanceolate to falcate leaves, small buds in umbels of seven that are angular [2]. *Eucalyptus nitens* has not been as widely cultivated as *E. globulus*, but is particularly important in Tasmania where its superior frost resistance is exploited at high altitudes [8, 11, 12]. Like *E. globulus* the juvenile foliage is conspicuous with large sessile opposite and glaucous leaves on square and winged stems, but *E. nitens* juveniles can be distinguished from *E. globulus* by their fused apical buds [2]. The species does not naturally occur within the main *E. globulus* planting zone but *E. nitens* plantations do occur within the native distribution of *E. globulus* and *E. cypellocarpa* in Gippsland and *E. ovata*, *E. viminalis* and *E. globulus* Tasmania. The 94 *E. nitens* DNA samples used in this study were provided by Hudson [10], and cover the full geographic range of the species.

Eucalyptus ovata (subgenus *Symphyomyrtus*, section *Maidenaria*, series *Foveolatae*)

Eucalyptus ovata is widespread and common in poorly drained sites across south-eastern Australia, from Kangaroo Island in the west to the Southern Tablelands of New South Wales in the east, and south to Tasmania [2]. It is a small to medium sized tree (6 -25 m) that is sometimes multi-stemmed. The bark can be smooth throughout or have loose rough slabs extending up the trunk [2]. Buds are in umbels of seven, adult leaves are lanceolate to ovate, and juvenile leaves are petiolate and alternate by node four to six [2]. There are two subspecies recognised, the widespread subsp. *ovata* and subsp. *grandiflora* which has larger buds and fruit and prominent oil glands in the adult leaves, and is restricted to far south-west Victoria and the south-east tip of South Australia [13]. *Eucalyptus ovata* co-occurs with *E. globulus* in Tasmania and Victoria and naturally occurring hybrids between the species were among the first recognised in *Eucalyptus* [14]. The species is also very common in plantation landscapes, especially in the Green Triangle, where it commonly occurs as remnant forest patches adjacent to and embedded within *E. globulus* plantations [Fig. 1; 6]. Of the 100 *E. ovata* DNA samples used in this study, 83 were provided by Marthick [15], which covered the full range of the species, and 17 additional samples were collected from populations within the plantation zone in the Green Triangle and Gippsland in Victoria.

Eucalyptus viminalis (subgenus *Symphyomyrtus*, section *Maidenaria*, series *Viminalis*, subseries *Lanceolatae*)

Eucalyptus viminalis is widespread in wet or seasonally wet sites across south eastern Australia from the Eyre Peninsula through South Australia, Victoria, Tasmania, and extending as far north as the Northern Tablelands of New South Wales [2]. It is a tree with incredible variation in form, from a small coastal mallee to a tall forest tree to 90 m [2]. The bark is smooth and white with a persistent stoking of rough bark at the base, sometimes extending up the trunk. The inflorescences are in threes or sevens (see below), adult leaves are lanceolate to falcate, while juvenile leaves are lanceolate opposite and sessile for many pairs [2]. There are four subspecies, of which two (subsp. *viminalis* and subsp. *cygnetensis*) are common in the *E. globulus* plantation zone in south-eastern mainland Australia [Fig. 1; 2]. Subspecies *cygnetensis* occurs mainly in South Australia and south-western Victoria and has fruits usually in sevens, with rough bark extending further up the trunk than subspecies *viminalis* [2]. *Eucalyptus viminalis* naturally co-occurs with *E. globulus* and occasional hybrids have been reported between the two species [16]. Of the 89 *E. viminalis* DNA samples used in this study, 87 were from Marthick [15] and covered most of the species range including the main plantation growing areas. An additional two samples were also collected from Tinderbox in southeast Tasmania.

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