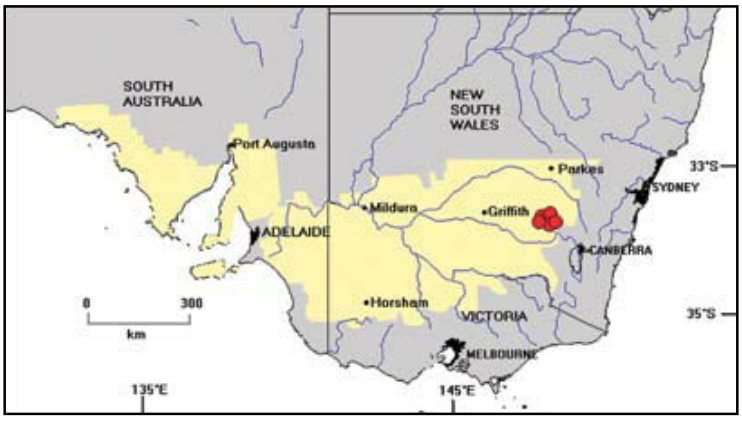
Acacia baileyana F. Muell.

Common Name

Cootamundra Wattle.

Habit



Map 9. Distribution of *A. baileyana*.

Large bushy shrubs or small trees commonly reaching 5–10 m high, typically freely branching from 1–2 m above the ground, less commonly with 2 or 3 main stems from ground level, plants in dense regrowth stands are somewhat spindly whereas in open sites they tend to be more robust with a more openly branched and spreading habit, main stems normally about 10–20 cm dbh (Maiden 1908b reports one exceptional tree as having a trunk diameter of about 60 cm!), boles and main stems straight to sub-straight; crown normally silvery blue-grey or blue-green in colour. Bark thin, smooth, grey or brown.

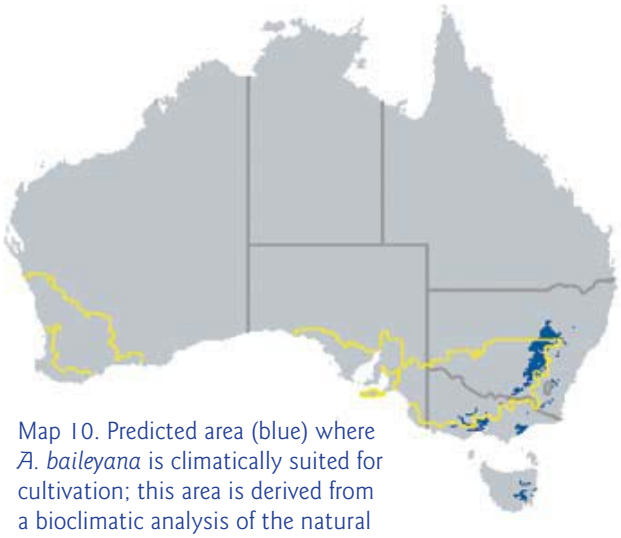
Cultivars with purple or yellow leaves, reddish new growth or prostrate form, are now available (Whibley & Symon 1992); these forms can be grown from cuttings (Simmons 1988).

Botanical descriptions and illustrations/photographs are provided by Maiden (1908b), Cunningham *et al.* (1981), Costermans (1981), Simmons (1988), Tame (1992), Whibley & Symon (1992), Tindale & Kodela (2001 & 2001a) and Kodela (2002).

Taxonomy

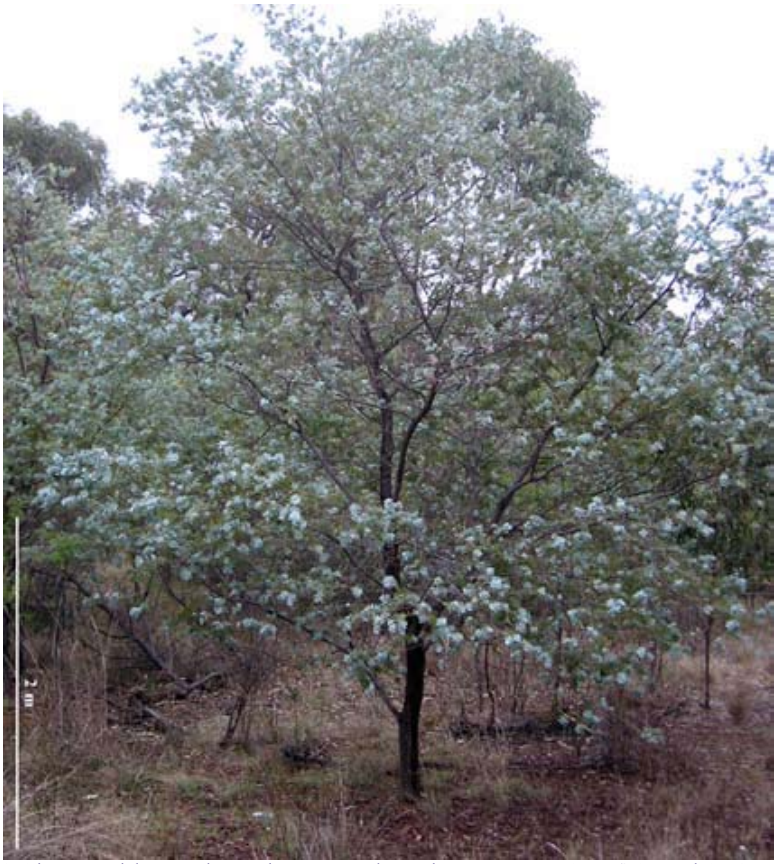
This species belongs to *Acacia* section *Botrycephalae*, a group of 44 mostly arborescent species characterized by having bipinnate adult foliage and flower heads normally arranged in elongated racemes (Orchard & Wilson 2001). These species predominate in temperate areas of eastern and southeastern Australia (Hnatiuk & Maslin 1988, Maslin & Pedley 1988). There are seven species of *Botrycephalae* detailed in this report, namely, *A. baileyana*, *A. dealbata* subsp. *dealbata*, *A. decurrens*, *A. filicifolia*, *A. leucoclada* subsp. *leucoclada*, *A. mearnsii* and *A. parramattensis*. A number of recent studies have suggested that species of section *Botrycephalae* are most closely related to certain racemose species of section *Phyllodineae* (foliage phyllodinous) from eastern Australia, see Maslin & Stirton (1998) and Maslin *et al.* (2003) for reviews. Of the phyllodinous species included in this report those having presumed closest affinities to species of *Botrycephalae* include *A. linearifolia*, *A. neriifolia* and *A. pycnantha*; members of the '*Acacia microbotrya* group' are not far removed from these species.

Acacia baileyana is known to hybridize with a number of its close relatives, especially *A. decurrens* (see **Genetics** below). A study by Tindale & Roux (1969) of flavonoid and condensed-tannin contents of the heartwood and bark of *Acacia* recognized four groups within section *Botrycephalae*; this study grouped *A. baileyana* and *A. dealbata* together.



Map 10. Predicted area (blue) where *A. baileyana* is climatically suited for cultivation; this area is derived from a bioclimatic analysis of the natural distribution (red circles, Map 9), see also Table 5. Target area shown in yellow.

Figure 4. *Acacia baileyana*



A (above) – Adolescent plant in dense regrowth stand near Temora, N.S.W. **B** (top right) – Stem dividing above ground level. **C** (bottom right) – Stem dividing at ground level. (Photos: B.R. Maslin)

D (above) – Mature plant in natural stand near Cootamundra, N.S.W. (Photo: B.R. Maslin). **E** (top right) – Section of stem (mature plant) showing pale-coloured wood. (Photo: B.R. Maslin). **F** (bottom right) – Branch showing prolific flowering & bluish bipinnate leaves. (Photo: M. O'Leary)

Distribution and habitat

This species has a very restricted natural distribution and is confined to the target area in the Temora–Stockingbal–Cootamundra district, New South Wales, a distance of just 50 km (Tindale & Kodela 2001: 224-225; see also notes by Cootamundra Landcare at www.cootamundra.nsw.gov.au/wattle.html). However, *A. baileyana* has been extensively planted as an ornamental outside its natural range, both within Australia and abroad, and in some places it has become naturalized (see under **Weed potential** below). In its natural habitat, *A. baileyana* grows in open woodland, in stony, hilly country, on clay or clay loams derived from granites and porphyries. Detailed ecological information is given in Hall & Turnbull (1979).

Flowering and fruiting

Flowers mostly between June and early September with individual trees flowering for only a few weeks (Boden 1969); Whibley & Symon (1992) report observations by L. Pryor of both early and late flowering variants. Flowering commences when plants are two years old (Morgan *et al*. 2002). Experiments conducted under controlled conditions showed that plants of this species require warm temperatures for bud formation (at or above a mean maximum of 18°C and a minimum of 13°C), and cool temperatures for flowering (at or below a mean maximum of 16°C and a minimum of 9°C) (Morgan & Sedgley 2002). Pods mature from October to January (Tindale & Kodela 2001).

Biological features

A fast-growing, frost resistant, fairly hardy species that prefers cool, higher rainfall areas. It is not especially long-lived. For example, when planted on dry and otherwise unfavourable sites it may commence to deteriorate at 10–12 years (Boland *et al*. 1984), although on better sites it may live longer, but probably rarely more than 30–40 years (Hall & Turnbull 1979). Whibley and Symon (1992) report that plants cultivated at the Waite Arboretum in Adelaide lived from 10–26 years with an average of 17 years for six trees. This species does not coppice to any extent or root sucker.

Detailed life history studies of *A. baileyana* are provided by Newman (1933, 1934 & 1934a) in which ecological, vegetative and reproductive phases were examined.

Genetics

As noted by Tindale & Kodela (2001) *A. baileyana* commonly hybridises with *A. decurrens* and occasionally with *A. dealbata*, *A. oshanesii*, *A. pubescens*, *A. spectabilis* and *A. leucoclada*; specimen label information of the NSW Herbarium suggests that it also hybridises with *A. parramattensis*; it is also recorded as hybridizing with *A. mearnsii* in cultivation in South Africa (see *A. mearnsii* for references). The hybrid with *A. decurrens* is referred to as *A.* x *nabonnandii* Nash in Jacobs & Pickard (1981) and is discussed by Cheel (1935). A study of breeding systems and reproductive biology by Morgan *et al*. (2002) showed *A. baileyana* to be outcrossing and highly self-incompatible.

Chromosome number: n = 13 (Newman 1933).

Cultivation

Pre-sowing germination treatments are given in Aveyard (1968). It is not suited to growing in arid areas or on limestone soils (Simmons 1988).

There is very little trial information available for this species. Ryan & Bell (1989) incorporated one seedlot of *A. baileyana* in two trials near Gympie, Queensland. At age 3.4 years the plants in one trial were 4.37 m tall with stem diameter at ground level measuring 9.8 cm while at the other they were 3.09 m tall with a 7.4 cm ground level diameter. By contrast, *A. decurrens* under trial in this same region attained similar growth dimensions when only 18 months of age. We observed *A. baileyana* under cultivation at the Burrendong Arboretum where it performed well in the absence

of supplementary watering; adolescent plants here (age unknown) were 5 m tall and developed single straight stems about 8 cm dbh. Burrendong Arboretum is located about 20 km due southeast of Wellington, just outside the target area near its north eastern corner (Wellington has a mean annual rainfall of 620 mm).

Pests and diseases

Whibley & Symon (1992) report that, based on records at the Adelaide Herbarium, the only mistletoe recorded on this species is *Amyema preissii*, a wire-leaved mistletoe which infests many species of *Acacia*.

Weed potential

Acacia baileyana is an environmental weed both within Australian and abroad. In certain areas, especially higher rainfall districts, the species has spread from garden plantings into surrounding areas. Within Australia invasive populations occur in parts of Western Australia, South Australia, Queensland, New South Wales and Victoria (Hall & Turnbull 1979; Tindale & Kodela 2001 provide maps of both the native and naturalized distributions); the species has also become naturalized in New Zealand (Webb *et al*. 1988) and South Africa (Henderson 2001, who provides a map of its distribution there). In South Africa *A. baileyana* is a Declared Invader (category 3) weed.

Morgan *et al*. (2002) showed that from a biological perspective, precocity and high flower numbers, resulting in high seed production, appear to be major factors for the weediness of *A. baileyana*. Under appropriate conditions seedlings establish in large numbers; fires and mechanical disturbance (e.g. along road verges and power lines, etc.) can increase the spread by stimulating mass germination. The dispersal of plants/seed by humans is an important factor in the weed success of this species.

Wood

Little information is available except that the wood is described by Hall & Turnbull (1979) as pale coloured, rather weak and not highly durable. Our limited field observations (one sample) show the wood to be pale coloured with an extensive development of white sapwood and a small amount of weakly coloured (light brownish) heartwood; this wood displayed substantial splitting upon drying due to shrinkage.

Utilisation

Wood

According to Anderson (1968) the wood of this species has little value other than possibly as a source of second-grade fuel. However, see under **Potential for crop development** below.

Land use and environmental

Grown in places as a wind break but its relatively short life span is regarded by Cunningham *et al*. (1981) as being a disadvantage when used for this purpose. It is regarded by Hall & Turnbull (1979) as useful for shade and shelter in suitable areas.

Fodder

Sheep and cattle are reported to eat the seedlings (Newman 1935), but it is not recognised as a species with any value as a source of fodder (Hall & Turnbull 1979).

Other uses

Acacia baileyana is extensively planted as an ornamental, both for its foliage and floral display. It is grown in temperate climates of New Zealand, South America, South Africa and southern Europe (Hall & Turnbull 1979). Experiments by Morgan & Sedgley (2002) suggest that temperature could be used to manipulate flowering for the commercial production of cut stems or pot plants at specific times of the year. This species produces an abundance of pollen and is a valuable source of pollen for bees in winter (Leigh, cited in Hall *et al*. 1972). All parts of the plant can be used to dye wool (Martin 1974).

Potential for crop development

Acacia baileyana is regarded as having only moderate prospects as a crop plant for high volume wood production It is ranked as a category 3 species (see Table 6). In appropriate environments Cootamundra Wattle is capable of producing fair quantities of woody biomass, the wood is pale coloured and is likely to have a low density (thus attractive for use in reconstituted wood products). In drier areas, however, it may not achieve acceptable levels of growth or wood production. Because the species is fast growing and neither coppices nor root suckers it would be suited for development as a phase crop. However, *A. baileyana* may flower and fruit from a very young age and this phenological precocity may result in the creation of a soil seed bank which could lead to it becoming a weed in adjacent or subsequent annual crops. An alternative management strategy might be to treat the young seedlings as a form of green manure.

The area predicted to be climatically suitable for the cultivation of *A. baileyana,* based on its natural climatic parameters, is shown in Map 10. This species has a very restricted natural distribution which extends over a distance of only about 50 km, within 536–610 mm/year rainfall zone (Hall *et al*. 1981). The bioclimatic analysis, however, suggests that within the target area *A. baileyana* would be capable of being cultivated on a wide range of upland sites in the 400–650 mm rainfall zone. The area projected by the bioclimatic analysis as having suitable growing conditions for *A. baileyana* is limited by the relatively low rainfall and short dry season experienced across its natural distribution. For example, the relatively large areas where the species is known in cultivation in South Australia and Western Australia have not been projected as suitable. This infers that *A. baileyana* is a good example of a species with high levels of climatic and ecological plasticity that enable it to grow in areas that differ from those of its restricted natural habitat.

An issue associated with any development of *A. baileyana* as a crop is its potential weediness. This could be a problem particular to the wetter areas of the target zone. *Acacia baileyana* produces large quantities of seed and regardless of whether or not seedlings are treated as green manure in cultivation this species has the potential of becoming an environmental weed. Therefore, caution is needed if any wide-scale use of *A. baileyana* is undertaken, and such use must be accompanied by a thorough weed risk assessment (see also discussion on weed reduction strategies under **Weed potential of *Acacia* in target area** in the introduction to this report).