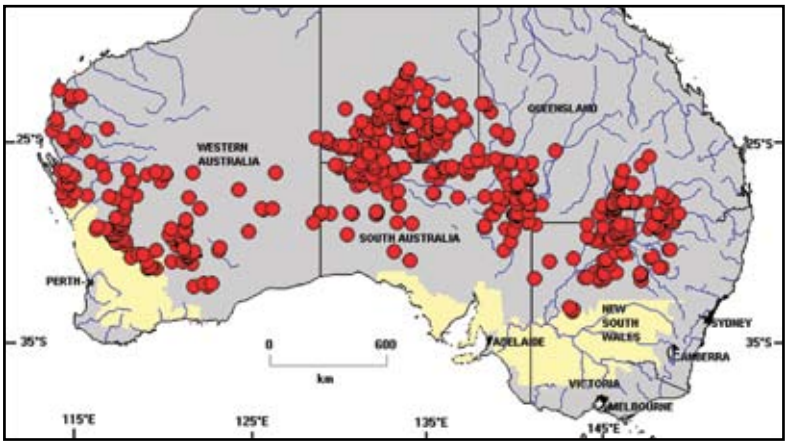
Acacia murrayana F. Muell. ex Benth.

Common Names

Colony Wattle, Murray's Wattle, Sandplain Wattle, Powder Bark Wattle, Fire Wattle.



Map 43. Distribution of *A. murrayana*.

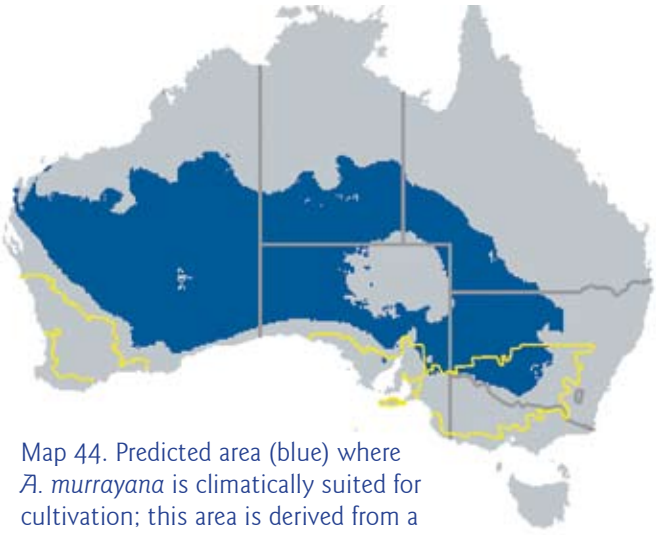
Habit

Large shrubs or trees 2–6 (–8) m, single- or multi-stemmed from the base, main stems straight or sometimes rather crooked and with dbh to about 10–20 cm (note: few measurements made therefore needs confirming), commonly suckering to form clonal thickets; crowns bushy and often wide-spreading 3–8 m across. Bark smooth becoming fissured on trunks and main branches with age, grey or brown with a distinctive powdery white bloom (pruinose) at least when young.

Botanical descriptions and illustrations/photographs are provided by Cunningham *et al.* (1981), Turnbull (1986), Whibley & Symon (1992), Tame (1992), Mitchell & Wilcox (1994), Doran & Turnbull (1997), Maslin *et al.* (1998), Maslin (2001 & 2001a) and Kodela (2002); see also descriptions by Pedley (1980).

Taxonomy

Acacia murrayana is referable to *Acacia* section *Phyllodineae,* a diverse, and probably artificial, group of about 408 species (Maslin 2001) which are characterized by having '1-nerved' phyllodes and flowers arranged in globular heads (see Maslin & Stirton 1998 and Maslin 2001 for discussion). Species of section *Phyllodineae* are widespread in Australia with the main centres of richness located in temperate and adjacent semiarid areas of eastern, southeastern and southwestern Australia; species number greatly decline in the arid zone and in northern tropical/subtropical areas (Hnatiuk & Maslin 1988 and Maslin & Pedley 1988).



Map 44. Predicted area (blue) where *A. murrayana* is climatically suited for cultivation; this area is derived from a bioclimatic analysis of the natural distribution (red circles, Map 43), see also Table 5. Target area shown in yellow.

Acacia murrayana, together with four close relatives (*A. gelasina*, *A. pachyacra*, *A. praelongata* and *A. subrigida*) comprise the informal '*Acacia murrayana* group' (see Maslin 1995 for discussion); only *A. murrayana* itself is included in this report. This species is not far removed taxonomically from *A. victoriae* (see species profile below).

Within *A. murrayana there* is marked variation in phyllode size and colour between plants from different areas and future studies may show the need to recognize new taxa to accommodate at least the two main phyllode forms (i.e. plants with narrow, green phyllodes are common in Queensland; elsewhere phyllodes are normally wider and pruinose). According to Maslin *et al.* (1998)

Figure 21. *Acacia murrayana*

A – Adult plants in Flinders Range, S.A. (Photo: Anonymous, ex herb. Adelaide)

B – Young stems (white pruinose). (Photo: J. Simmons)

C – Mature (papery) pods. (Photo: B.R. Maslin)

D – Adolescent plant showing bushy growth habit. (Photo: B.R. Maslin)

E – Branch showing golden heads (in racemes). (Photo: B.R. Maslin)

F – 2 year old plants in trials at Morawa, W.A. (Photo: J. Carslake)

provenance variation in economic characters is also likely to be great, given the extensive natural distribution and occurrence on different soil types of this species.

Distribution and habitat

Widely distributed in the arid and semi-arid zones of Australia where it extends from the central-west coast of Western Australia eastwards through all mainland states (except Victoria) to the western margin of the Great Divide near Mitchell (Queensland) and Narrabri (New South Wales). This species only just reaches the target area in northern wheatbelt of Western Australia and the western plains of New South Wales. *Acacia murrayana* is one of only four species in this report that occur in both the eastern and westen target areas (the other three are *A. cyclops, A. hakeoides* and *A. victoriae*). Over its extensive range *A. murrayana* occurs predominantly on deep red sands but it may also occur on clay loams. It favours well-drained sites with access to run-on water such as the base of dunes, road verges and stream levees. It is tolerant of alkaline soils according to Elliot and Jones (1982) but results from glasshouse trials suggest that it is relatively salt-sensitive (Aswathappa *et al.* 1987). Further details on its ecology are given in Doran & Turnbull (1997), Cunningham *et al.* (1981) and Whibley & Symon (1992).

Flowering and fruiting

The main flowering period is from August to November (but will vary within this range depending upon geographic location) with pods maturing several months later, between November and January (Maslin *et al.* 1998). Plants flower profusely, commencing at an early age (e.g. 17 months, Ryan & Bell 1989). *Acacia murrayana* produces heavy pod crops during favourable seasons; however, in south western Queensland at least parrots are reported to remove much of the seed prior to maturity (Allen 1949). The pods may be rapidly harvested by shaking/threshing.

Biological features

An adaptable, fast-growing species with life-span of about 10–25 years, during which time in its natural habitat it rarely produces a trunk with a diameter over 10 cm (Maconochie 1982). It is highly fire-tolerant and drought-adapted according to Latz (1995), however Maconochie (1982) and Kube (1987) note that it is not especially drought-tolerant. It forms colonies from subsurface adventitious sprouts often a considerable distance from the parent plant. Established plants resprout readily after wildfires from epicormic buds in the relatively thick bark at the stem base, or from stem and major roots (Hodgkinson 1982). The growth pattern is distinctly seasonal with the main vegetative growth during spring (Maconochie 1973) and it loses many of its phyllodes in winter (Cunningham *et al.* 1981). It is relatively salt-sensitive (Aswathappa *et al.* 1987). The above information is taken largely from Doran & Turnbull (1997) and Maslin *et al.* (1998).

Toxicity

Webb (1948) reports that *A. murrayana* is suspected of causing sheep deaths in Queensland.

Cultivation

Field observations suggest that *A. murrayana* is an adaptable species capable of rapid growth when planted on favourable sites. As discussed by Maslin *et al.* (1998) *A. murrayana* should grow successfully in a wide range of well-drained soils (acid to alkaline sands, loams and texture-contrast types) in low-rainfall areas (<500–600 mm/yr) across southern Australia. Waterlogged sites should be avoided, but supplementary watering/irrigation can be expected to enhance longevity and fruiting in very low rainfall areas (< 250–300 mm/yr). *Acacia murrayana* was found to be relatively salt-sensitive in a salt tolerance trial based on testing glasshouse-grown seedlots (Aswathappa *et al.* 1987).

The following information on silviculture is taken mostly from Doran & Turnbull (1997) and Maslin *et al.* (1998), unless otherwise indicated.

Establishment

There are 19 900 viable seeds/kg and these have a thick testa that requires one of the routine treatments to break seedcoat dormancy (e.g. 1 minute immersion in boiling water). Germination rate averages 70%.

Declining stands can be regenerated either by coppicing and/or shallow ploughing to stimulate root-suckering. It responds to pruning after flowering according to Elliot and Jones (1982); pruning to one main stem which would facilitate mechanical harvesting.

Growth and survival

Reports of performance are variable and this is most likely due to some planting on inappropriate sites. In the Northern Territory at Alice Springs, *A. murrayana* grew reasonably quickly while rainfall was above average (390 mm/year) but plant health rapidly declined during dry periods (<150 mm/year). At 10 years it had grown into a multi-stemmed tree, 6 m tall with 3–4 stems of approximately 10 cm dbh (Kube 1987). The species exhibited low survival and comparatively slow growth in more humid climates (> 1000 mm/yr) in south-eastern Queensland (Ryan & Bell 1989) but showed early promise on coarse-textured soils near Longreach (Ryan & Bell 1991). It gave poor survival and growth to two years of age in southern Africa (Gwaze 1989, Maghembe & Prins 1994) and has shown poor survival and growth in dry tropical Africa (at Sarkin Hatsi, Burkina Faso, Harwood 1993). Plants grew moderately quickly in trial plantings at the Central Arid Zone Research Institute, Jodhpur (Rajasthan, India), but died prematurely during drought conditions (Thomson 1987).

Trials

Assessment trials of this species were recently established in plots on farmland at various locations in south-western Australia by the "Search" project (see Acknowledgements). At age 22 months plants of the best performing provenance of *A. murrayana* showed an average survival of 62% and an average height of 99 cm. The 'best' plot was located on a downslope site with heavy soil in northern Avon Wheatbelt IBRA region, with plants averaging 197 cm high.

Weed potential

Acacia murrayana has not been recorded as causing serious environmental weed problems, despite the fact that it produces large quantities of seed and has root-suckering ability. It can form sucker-induced thickets with the young trees often a considerable distance from the parent plant (Cunningham *et al.* 1981).

Wood

Basic density values ranged from 522 kg/m^3 to 850 kg/m^3 (mean 692 kg/m^3) based on analyses of 22 wood samples by CALM's NHT-supported 'Search' project (unpublished data). Note: this study preferentially sampled young and adolescent plants. Ilic *et al.* (2000) gives the air-dry density before reconditioning as 603 kg/m^3 (note: this value was erroneously listed in the basic density column in this work).

Utilisation

Wood

Highly suitable for fuelwood and charcoal (Thomson *et al.* 1994). The suckering habit will assist the management of this species for fuel. The small size of the stems will restrict the use of the wood to turnery articles and small round wood uses (Doran & Turnbull 1997).

Human food

Acacia murrayana is one of the most promising species suggested by Maslin *et al.* (1998) for trialing in southern Australia as a source of seed for human food. Maslin *et al.* (1998) provide summary of macronutrient composition of seeds. In the past, seed and gum of *A. murrayana* was a food source for Central Australian Aborigines (Latz 1995, House & Harwood 1992).

Land use and environmental

This species has potential for use in revegetation of arid and semi-arid areas. It is well-suited for providing windbreaks, visual screens and shade and shelter for stock and wildlife. Because it commonly suckers it has good potential for providing soil stabilisation.

Fodder

Although Central Australia plants of this species are reported to contain high levels of protein and phosphorus and reasonably low levels of fibre, they are only lightly grazed by cattle in that area (Chippendale and Jephcott 1963). According to Cunningham *et al.* (1981) in western New South Wales the foliage of this species is seldom browsed. Similarly Allen (1949) and Mitchell & Wilcox (1994) report that the phyllodes are rarely consumed by stock, but the pods are sought after. Dry matter digestibility of foliage was assessed by Vercoe (1989) as being below maintenance levels for livestock.

Other uses

It flowers profusely and may prove useful for ornamental purposes and as a pollen source for bees (Doran & Turnbull 1997).

Potential for crop development

Acacia murrayana appears to have some prospects as a crop plant for high volume wood production. It is ranked as a category 2–3 species and would be best suited to development as a phase crop, and perhaps also as a coppice crop (Table 6). This adaptable species is capable of rapid growth when planted on favourable sites and should be suitable for cultivation in low-rainfall areas across southern Australia. *Acacia murrayana* tolerates a wide range of well-drained soils (waterlogged and saline sites should be avoided) and although it is drought-adapted it is not overly drought tolerant. Therefore, it remains to be seen if growth rates and survival decline under cultivation as profiles dry out; this is particularly relevant to the drier inland areas of the target zone. This species develops a good growth form (amenable to mechanical harvesting) and produces quite reasonable amounts of woody biomass. Wood density values are seemingly variable, however, at the lower end they are within the range that make them attractive for reconstituted wood products. In terms of wood biomass production *A. murrayana* would be out-competed by species such as *A. salicina* and *A. stenophylla* which occur within its geographic range. A potential constraint with respect to developing *A. murrayana* as a phase crop is its reported ability to flower at an early age. If this precocity results in pod set it may lead to the creation of a soil seed bank that may cause weed problems in adjacent or subsequent annual crops (on the other hand seedling regeneration may possibly be treated as a form of green manure). One way of avoiding soil seed build up is to harvest plants prior to them producing appreciable pod crops, however, plants will need to have developed sufficient woody biomass by that time for this to be viable. Although *A. murrayana* it is capable of resprouting from the base it is uncertain that such regrowth will be sufficiently vigorous to sustain the species as a coppice crop. The propensity for *A. murrayana* to vigorously root-sucker in nature may or may not be advantageous in cultivation, it depends whether or not this attribute is required (or expressed) for the system in which it is placed. It would be expected though that vigorous suckering would present particular difficulties for managing this species as a phase crop. Seed production for human food is a secondary product that may be derived from this species (it is similar to its close relative, *A. victoriae*, in this regard but *A. murrayana* has the advantage of having a better growth form and is less spiny).

The area predicted to be climatically suitable for the cultivation of *A. murrayana,* based on its natural climatic parameters, is shown in Map 44. This analysis indicates that *A. murrayana* has the potential to be cultivated in areas that receive less than 500 mm rainfall in the uniform and summer rainfall zones. This prediction reflects the fact that there are no known populations of this species that occur naturally in the winter rainfall zone. Nevertheless, trials are warranted to assess if this species has the potential to be cultivated in winter rainfall zones of the target areas. Based on the current climatic analysis the best cultivation potential for *A. murrayana* is on the western plains of New South Wales in the less than 500 mm rainfall zone. Wherever it is cultivated *A. murrayana* is likely to perform best on deep sandy soils where access to ground water is possible. There are many unknowns regarding provenance variation, silviculture and management of this species, and comprehensive research is warranted before its potential for biomass production can be properly assessed.