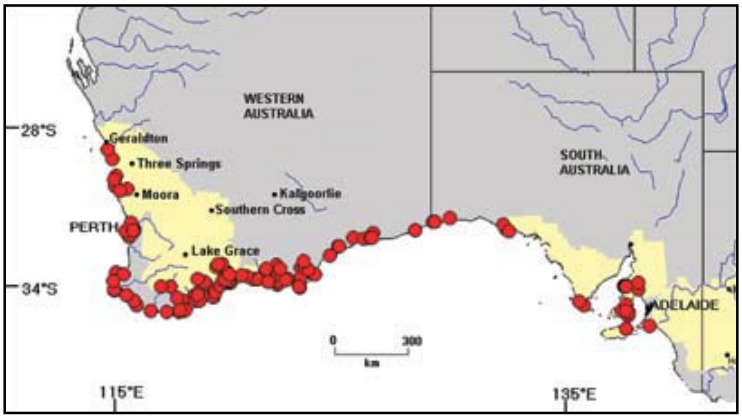
Acacia cyclops Cunn. ex Don

Common Names

Western Coastal Wattle, Rooikrans (South Africa).



Map 13. Distribution of *A. cyclops* .

Habit

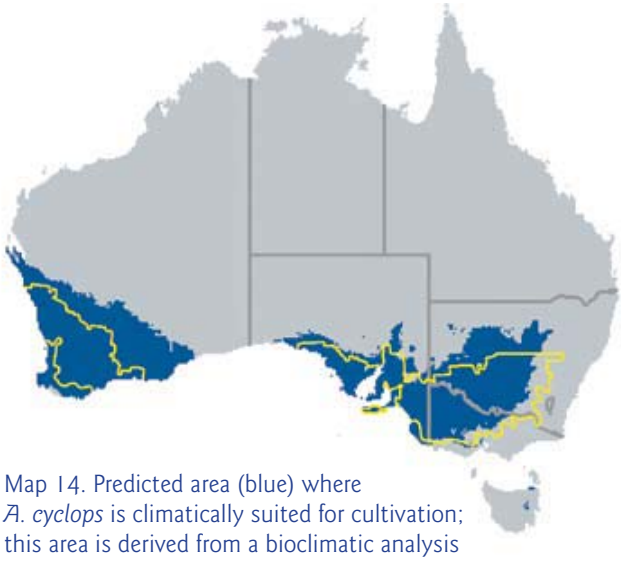
Widely spreading shrubs 1–4 (–6) m or small trees (to 8 m high), single-stemmed to about 1 m or sparingly divided at ground level into a few sub-straight or rather crooked main stems (dbh often about 10–15 cm, rarely exceeding 20 cm), in windy coastal sites it forms hedges less than 0.5 m high (National Academy of Sciences 1980); crowns dense and bushy. Bark smooth except longitudinally fissured at base of main stems, grey.

Botanical descriptions and illustrations/photographs are provided by Costermans (1981), Simmons (1988), Whibley & Symon (1992) and Cowan & Maslin (2001 & 2001a).

Taxonomy

Acacia cyclops is referable to *Acacia* section *Plurinerves,* a diverse and probably artificial group of about 212 species (Maslin 2001) which are characterized by having plurinerved phyllodes and flowers arranged in globular heads (see Maslin & Stirton 1998 and Maslin 2001 for discussion). Species of section *Plurinerves* are widespread in Australia with the main centres of richness located in the inland areas of the southwest and southeast of the continent (Hnatiuk & Maslin 1988, Maslin & Pedley 1988). Five species of section *Plurinerves* are detailed in this report, namely, *A. cyclops*, *A. implexa*, *A. melanoxylon, A. stenophylla* and *A.* aff. *redolens.*

Affinities unknown. Rather invariate.



Map 14. Predicted area (blue) where *A. cyclops* is climatically suited for cultivation; this area is derived from a bioclimatic analysis of the natural distribution (red circles, Map 13), see also Table 5. Target area shown in yellow.

Distribution and habitat

Widespread and somewhat discontinuous in coastal and near-coastal areas ranging from Leeman, Western Australia, to the north western part of the Eyre Peninsula in South Australia. In South Australia there are populations from the eastern Eyre Peninsula, the Yorke and Fleurieu Peninsulas and Kangaroo Island but there is contention over whether some of these are indigenous or have spread from plantings (Virtue & Melland 2002). Much of the natural distribution of this species lies outside the target area only just reaching its southern edge in some regions. Acacia cyclops is one of only four species in this report that occur in both the eastern and westen target areas (the other three are *A. hakeoides*,

Figure 6. *Acacia cyclops*

A – Plant with erect growth form; in clay soil near Scaddan, W.A. (Photo: B.R. Maslin)

B – Pods with seeds encircled by large, bright red arils. (Photo: B.R. Maslin)

C – Plant with typical spreading growth form; in coastal sands. (Photo: B.R. Maslin)

D – Section of stem. (Photo: W. O'Sullivan)

E – 10 month old plants in trial at Narrogin, W.A. (Photo: J. Carslake)

A. murrayana and *A. victoriae*). This species is grown in a number of countries abroad (CAB International 2000) and in places, notably South Africa, it has become an invasive weed (see Weed potential below). *Acacia cyclops* is mostly found on well-drained calcareous coastal sands but around Scaddan and near Esperance in Western Australia it also occurs in water-logged clay soil. Fox (1985), Marcar *et al.* (1995) and CAB International (2000) provide details of the ecological tolerances and preferences for this species.

Flowering and fruiting

Flowers mainly between December and March. Pods with mature seeds are often present when plants are in flower. See Fox (1985) for additional phenological information. Pods (with seeds attached) are commonly retained on the plants for some time following dehiscence (see Gill 1979 & 1985 for details); seed can be collected by threshing technique, but sometimes they may be a little difficult to dislodge from the pods (may possibly depend upon age of seed).

Biological features

According to Marcar *et al.* (1995) this is a relatively slow-growing species, taking 7–10 years to reach harvestable size for fire wood in South Africa. These authors also report it as tolerating mild frosts, drought, sand blast and salinity (expect reduced growth at EC_e c. 10–15 dS/m with reduced survival above c. 20 dS/m). It is apparently sensitive to soil pH, preferring neutral to slightly alkaline soils (Fox 1985). It rarely coppices and seemingly does not root sucker. Fox (1985) provides additional biological details.

Cultivation

Information on silvicultural practice is summarised in CAB International (2000) and the following account is taken from that source (Fox 1985 provides additional information).

Establishment

To establish a stand, direct sowing of pretreated seed is required. Treatment of the seed can be done by abrasion, acid or hot water treatment (National Academy of Sciences 1980). The most effective pretreatment is chipping the seed coat (Youssef *et al.* 1991).

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 10 months plants of the best performing provenance of *A. cyclops* showed an average survival of 85% and an average height of 96 cm. The 'best' plot was located on a downslope site with heavy soil in the Esperance Plains IBRA region, with plants averaging 140 cm high.

Studies in Pakistan showed that for 60 planted trees, survival after 6 months was 72% and after 16 months was 16%. Trees grew up to 0.24 m after 6 months and between 0.2–2.7 m after 16 months (Marcar *et al.* 1991).

Yield

For fuelwood purposes a harvestable size plant may be reached in around 7–10 years. At a sheltered site, trees with a 10 cm basal diameter yield about 12 kg dry mass, and at 15 cm basal diameter can yield up to 60 kg dry mass (National Academy of Sciences 1980). In South Africa, standing biomass of *A. cyclops* was around 131 MT/ha; of this, the litterfall represented 7.4% of the total biomass and 21.2% of the canopy mass (Duke 1983).

Pests and diseases

No significant pests have been recorded for this species, although members of the seed-predating genus *Zulubius* may be potential biocontrol agents in South Africa, where *A. cyclops* has become invasive (fide CAB International 2000). In trials in Western Australia *A. cyclops* is susceptible to locust attack (J. Carslake, pers. comm.). See Fox (1985) for additional information.

Weed potential

Acacia cyclops is a serious environmental weed in the Cape Province, South African (Ross 1975, Stirton 1980, Henderson 2001) where it may form dense, impenetrable stands invading and displacing indigenous flora. Once established over large areas the species is difficult to remove or replace. In South Africa *A. cyclops* is a Declared Invader (category 2) species and attempts to control it have included the use of both herbicides and biocontrol agents (Henderson 2001). The biocontrol agent being employed is the seed-feeding weevil, *Melanterius servulus* (type A) (see Olckers & Hill 1999 for review of the effectiveness of this program).Whibley & Symon (1992) provide a good summary of the weediness of this species in South Africa; Virtue & Melland (2002) regard *A. cyclops* as posing a significant weed risk in parts of the agricultural region of South Australia.

The seeds of *A. cyclops* possess a large, conspicuous red aril and are spread by birds, but once the seed has fallen on the ground ants appear to be the main dispersal agents. The species regenerates prolifically following fire from a huge seed store in the soil.

Wood

Basic density range is 780- 826 kg/m^3 (mean 802 kg/m^3) based on analyses of four wood samples by CALM's NHT-supported 'Search' project (unpublished data). This study preferentially sampled young and adolescent plants. Anecdotal field observations show the wood to comprise darkish brown or pale greyish brown heartwood (which may occupy up to about half the stem diameter) surrounded by pale coloured sapwood; the proportion of heartwood to sapwood, and the extent of the heartwood varied significantly between the two samples examined.

Utilisation

Wood

It produces a dense, high quality firewood according to Ayensu *et al.* (1980).

Land use and environmental

As this species tolerates salt spray, soil salinity and sand blast it is a very useful species for coastal dune stabilization (Marcar *et al.* 1995).

Fodder

According to Craig *et al.* (1991), *A. cyclops* has some potential as a perennial fodder shrub for use in saline areas; however, (Le Houerou 2000) considers it to be of poor forage value in north Africa.

Other uses

Details of utilisation are summarised in CAB International (2000).

Potential for crop development

Acacia cyclops is not regarded as particularly prospective as a crop plant for high volume wood production. It is ranked as a category 4 species and would seem best suited as a phase crop (see Table 6). *Acacia cyclops* generally does not possess a particularly good growth form (plants are commonly rather wide-spreading with a much-branched habit and somewhat crooked stems and branches), its growth rate appears not to be especially fast and its wood density is higher than the optimum for reconstituted wood products. Nevertheless, this is a salt tolerant species which does produce a reasonable amount of woody biomass. Although *A. cyclops* commonly grows in deep sandy soil, around Esperance in Western Australia it may also occur in water logged clays (an atypical habitat for the species) where it may develop an erect (rather than spreading) growth form. These latter provenances in particular may be worth including in trials (perhaps for growing in association with *A. saligna*).

The area predicted to be climatically suitable for the cultivation of *A. cyclops*, based on its natural climatic parameters, is shown in Map 14. This analysis indicates that *A. cyclops* is well-suited to climatic conditions well beyond its natural distribution. The prediction suggests that it has the potential to be cultivated throughout the target area in Western Australia and most of the eastern target area (excluding the region which coincides approximately with the 300 metre elevation contour). This latter area incorporates vast areas of South Australia, Victoria and New South Wales. Within these areas *A. cyclops* has the potential to be cultivated on both sandy and clay soils subject to waterlogging. Trials are warranted to ascertain if provenances of *A. cyclops* display edaphic specificity.

Because of its weed potential caution is needed if any wide-scale use of this species is undertaken, and such use must be accompanied by a thorough weed risk assessment. Because of this issue it may be deemed inappropriate to cultivate *A. cyclops* in areas outside its natural geographic range (see also discussion on other possible weed reduction strategies under **Weed potential of *Acacia* in target area** in the introduction to this report).