

Weed Risk Assessment: *Berberis darwinii*

1. Plant Details

Taxonomy: *Berberis darwinii* Hook. Family: Berberidaceae

Common names: Darwin's barberry, berberis.

Origins: Native to southern Chile and Argentina (Sykes, 1982).

Distribution: Naturalised in New Zealand, the United States of America and Australia.

Description: A branched, spiny, evergreen shrub growing to 4m tall. The stems and branches are covered with fine, rust coloured hairs. The leaves are evergreen, thick, alternate, spine-tipped and holly-like with a dark green, glossy upper surface and a pale dull lower surface. Leaves occur in clusters of 3-7 underneath which are 5-pronged spines. Bright orange to yellow flowers, each with nine petals, occur in drooping clusters of 10–30. The fruit is an oval berry containing many small seeds. It turns waxy blue/black as it matures. The plant varies in habit from a dense shrub with highly compact and interlacing branches to a small, spreading tree (Allen and Wilson, 1992). There are several named forms sold for ornamental purposes (Blood, 2001).



Biography and ecology:

Habitat. *B. darwinii* occurs in a variety of situations from lowland to alpine. In its native range it is found in moist shady woodlands in the Patagonian mountains (Plants for a Future Database). It is frost and cold tolerant and occurs in sites exposed to wind or salt. It can tolerate a degree of drought but prefers moist areas. It is found in shaded and open situations (Blood, 2001). It grows in a range of soil conditions from light to heavy clay, basic to highly acidic and is found on infertile soils (Plants for a Future

Database). *B. darwinii* occupies a range of vegetation types including scrub, forest and pasture (Allen and Lee, 2001), mostly on margins or in cleared gaps. It is most typically found in situations where human disturbance is pronounced but may also invade relatively undisturbed forest, establishing around wombat holes or other animal diggings (Blood, 2001).

Life cycle. *B. darwinii* begins to reproduce at approximately 4 years (Allen and Lee, 2001). Flowers form in spring and fruit set occurs during summer. Seeds germinate the following spring (Allen and Wilson, 1992). Plants may live to at least 60 years old (Allen and Lee, 2001).

Reproduction and dispersal. Reproduction occurs via seeds and possibly suckers (Blood, 2001). Flowers are hermaphrodite and pollinated by insects such as honey-bees (Allen and Wilson, 1992). Seed is thought to be long-lived (Blood, 2001). Seed viability is relatively high and although the seed is bird dispersed, successful germination does not require passage through the gut of a bird or any other animal (Allen and Wilson, 1992). New Zealand studies indicate a linear spread rate of approximately 30m/year in some areas (Allen and Lee, 2001). Other data from New Zealand indicate seed germination is successful in a range of shade and exposure conditions (Mc Alpine and Drake, 2003). Human assisted dispersal occurs via the ornamental plant trade and garden waste dumping.

Hybridisation. There is limited information about hybridisation of *B. darwinii*. However, it is described as hybridising freely with other *Berberis* and is a parent to the self-fertile garden hybrids *B x logogensis* (*B. darwinii* x *B. linearifolia*) and *B. x stenophylla* (*B. darwinii* x *B. empetrifolia*) (Plants for a Future Database). Both hybrids are described as hardy plants that will grow in a variety of situations and which will re-sprout from the base after hard pruning.

Competition. *B. darwinii* is generally described as highly competitive because of its ability to colonise rapidly, its dispersal ability and because its growth habit allows it to form dense, impenetrable thickets that exclude other plants.

Harmful properties: Spines may cause physical injury to people and animals.

Economic benefit: *B. darwinii* attained its current distribution largely through the ornamental plant trade and it continues to be promoted and sold for its showy flowers and berries in many countries, including Australia. It is also known to be used for culinary purposes (fruit eaten raw or cooked) and berberine, a compound present in all parts of the plant is claimed to have strong antibacterial properties, especially for urinary tract infections. Berberine is also thought to have anti-tumour properties. A yellow dye may also be obtained from the bark and roots (Plants for a Future Database).

2. Weed Risk

World weed status

B. darwinii is a woody weed in a number of temperate areas. It is not regulated anywhere in the world (check NZ)

Australian weed status

B. darwinii is naturalised in the Australian Capital Territory, New South Wales, Victoria and Tasmania) (see distribution map below, based on herbarium records). It is not regulated in any State or Territory and it is permitted entry to Australia (Weeds Australia database). Groves et al. (2003) list it as a major weed in 3 or fewer Australian locations.

Weed potential in Tasmania.

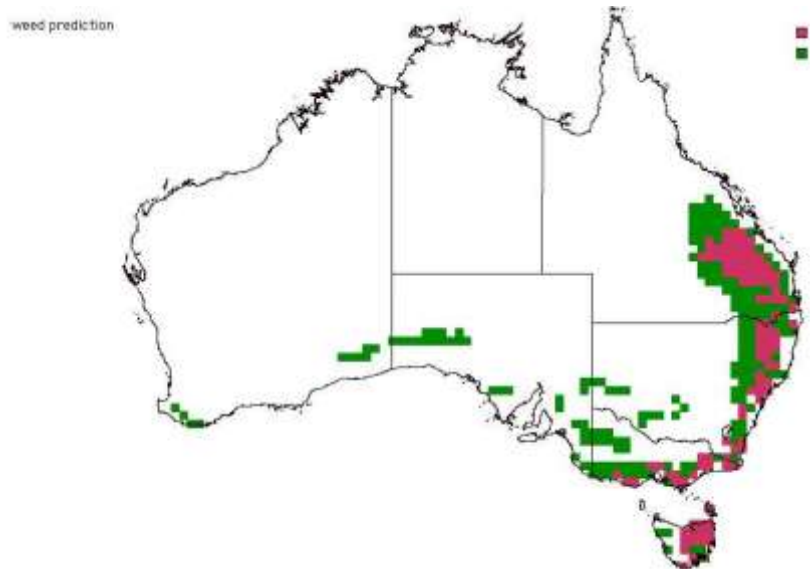
B. darwinii is naturalised in Tasmania but its distribution is relatively limited. Populations occur in the State's north east, in degraded pasture and riparian situations and also on Mt Wellington in the south. The plant is not commonly sold in Tasmania (check hybrids).

Climate matching indicates the plant is likely to grow very well in a range of Tasmanian environments, mostly in cooler, moist situations (see Figure 5). The following analyses indicate the weed potential of *B. darwinii* in Tasmania is significant.

Weed risk assessment

Weed risk assessment undertaken by DPIWE involves use of a point scoring system devised by Pheloung (1996). *B. darwinii* scores 20 on a scale that is positively correlated to weediness. The nominal score for rejection of a plant on this scale is 7 or greater (see Appendix 1 for risk assessment scoring).

Potential distribution of
Berberis darwinii in Australia
using CLIMATE (Pheloung,
1995)



3. Weed Impact Assessment

Weed impact assessment is based on the DPIWE scoring system designed for that purpose. *B. darwinii* scores 6 points on a scale where 4 points or more indicates a plant has significant potential impact. The impact scoring system requires that questions be answered with a particular land use and density in mind. *B. darwinii* was assessed for its potential impacts upon natural environments at moderate to high densities.

Economic impact. The economic impact of *B. darwinii* in Tasmania could manifest in agricultural as well as natural environments. Whilst unlikely to establish in regularly cultivated areas, it has already demonstrated a capacity to invade pasture in the State's north-east. Whilst these effects are likely to be limited to poorly maintained pastures in cooler areas, the consequence of land owners failing to control the plant would include a larger source of seed for potential distribution to natural areas. In addition, the habit of the plant means uncontrolled infestations may form a barrier to stock, vehicular and people movement, especially along riparian areas.

Environmental impact: *B. darwinii* is described as invasive in natural environments due to its colonizing and dispersal ability, shade tolerance, its capacity to persist via long-lived seed and its long life span. It appears to have significant potential to replace native species in Tasmanian forest and heath communities and would presumably also alter animal feeding patterns due to the abundance of fruit produced during summer.

Social impact. *B. darwinii* is unlikely to have significant social impacts in Tasmania although it may render certain natural areas less useful for recreation or tourism.

4. Management Feasibility.

Weed eradication assessment is based on the DPIWE scoring system designed for that purpose. *B. darwinii* scores 10 points on a scale where 6 points or more indicates there is potential for the plant to be eradicated successfully from the entire state.

Current distribution: *B. darwinii* is naturalised in the state's north east around Scottsdale and it is reported in the south near Cackle Creek and in the west at Williamsford. The status of the last two occurrences requires verification. The distribution of this plant across the state has never been thoroughly investigated and formal survey work is recommended.

At present there are between less than 5 known infestations in the state, pending further survey work.

Detectability: The plant is conspicuous due to its glossy, holly-like leaves, bright showy flowers and purple-blue berries.

Control Options: Control of *B. darwinii* has not been attempted in Tasmania to date. However, a Grazon/Pulse mix is likely to be effective in most situations, provided application in riparian areas is undertaken with appropriate precaution.

Chance of Reinvasion: The extent of ornamental planting of *B. darwinii* is not known therefore, even if the sale of this plant is prohibited, re-invasion is possible. The limited distribution of the plant at this time however means targeted awareness programs around affected areas may help encourage and facilitate compliance by people who harbour this plant in their gardens.

Persistence: The main challenge to eradication of this weed from Tasmania is its seed bank which is likely to be long lived. In addition, the plant itself is long lived and may regenerate from suckers if not controlled effectively. This has implications for resource requirements for both the state and affected landowners.

Compliance Issues or Conflicts of Interest: The most important compliance issue is likely to arise in relation to people who value this plant for its ornamental appeal and who therefore will be reluctant to remove it from their gardens. There may also be a conflict of interest with people wishing to sell the plant. Both situations can be addressed by highlighting the range of less invasive alternatives available.

Eradication Feasibility: Compliance and other issues notwithstanding, the eradication of *B. darwinii* at this time from non- garden situations appears both achievable and desirable.

5. Declaration Recommendation.

B. darwinii appears to have potential to establish, reach moderate to high densities and cause environmental significant harm in certain vegetation communities in Tasmania. It may also become a weed of poor pastures and roadsides. Therefore it should be nominated for declaration under the *Weed Management Act 1999*. This will support removal of the plant from trade and timely eradication of existing infestations.

6. References.

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Plants for a Future Database at www.sca.leeds.ac.uk

USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network (GRIN), online database at www.ars.grin.gov/cgi-bin/ngps/html, National Germplasm Resources Laboratory, Beltsville, Maryland.

Weeds Australia Database at www.weeds.org.au