

Weed Risk Assessment: *Amaranthus spinosus*

1. Plant Details

Taxonomy: *Amaranthus spinosus* L. Family Amaranthaceae (also placed in Chenopodiaceae)

Common names: needle burr, spiny amaranth, spiny pigweed.

Origins: Native to tropical America (Randall, 2002).

Distribution: Cosmopolitan in warm temperate and tropical regions but increasingly found in temperate areas, especially between latitudes 30 °N and 30 °S (Waterhouse, 1994). Naturalised in Turkey, Australia.

Description: An annual herb reproducing by seed only. Distinguished by flowers and pairs of spiny bracts that occur in the leaf axils. Mature plants are erect, branched and may grow to 1.2 m tall (see Figure 1). Stems are angled in cross section, reddish, fleshy and bear many spines. Leaves are alternate, ovate-rhombic to lanceolate sometimes with sparse hairs on the lower surface and most with a pair of long, straight spines at the base. Flower heads are either a long terminal spike or clumped at the leaf axils in the lower part of the plant. Male and female flowers are small, greenish and occur on the same plant. Fruit is ovoid and contains compressed, shiny, tiny, dark red to black seeds. (HEAR website).



Biology and ecology:

Habitat. *A. spinosus* appears in a range of climatic conditions but shows frost intolerance at some sites. It is not associated with particular soil types but grows best in well drained but moist situations. It is found on acid, basic and neutral soils. It prefers sunny sites and will not grow well in shaded situations. *A. spinosus* occurs on disturbed ground,

along roadsides, railway lines, neglected land, tip sites and poorly maintained grazing land.(see Figure 3). It is also occurs as a weed of varying significance in a variety of crops and horticultural enterprises (Waterhouse, 1994).

Life cycle. Seed over winters in or on the surface of soil and germinates late spring to early summer. Flowering begins mid-summer and continues until autumn frosts induce senescence.



Reproduction and dispersal. *A. spinosus* produces male and female flowers on the same plant and is self compatible. Pollination is by wind (Waterhouse, 1994). A single plant produces several hundred thousand seeds, a large proportion of which are fertile. Germination is staggered over the growing season and a persistent seed bank is described (Waterhouse, 1994). *A. spinosus* does not reproduce vegetatively. Dispersal is by wind, water and contaminated farm machinery or produce. For example, Japanese authorities report *A. spinosus* as a contaminant of imported animal feed grains (Kurokawa, 2001).

Competition. *A. spinosus*, a C4 plant, is described as being competitive in situations of high light intensity and/or high temperature. It is apparently less successful when growing under a crop canopy and thus may be assumed to have a degree of shade intolerance. Allelopathic effects have been reported for this species (Shrefler et al, 1996).

Hybridisation. The hybridisation capacity of this species is not well documented.

Harmful properties: Spines may cause physical injury and plants grown on nitrogen rich soils may increase risk of stomach cancer (see below).

Economic benefit: *A. spinosus* is used in many countries as a culinary and medicinal plant (Mansfeld's Database, 2002). The leaves and seeds are nutritious and highly sought after in some countries (Plants for a Future Database). However *A. spinosus* is not widely cultivated. Leaves may be cooked as a vegetable but will concentrate nitrates when grown on nitrogen rich soils. Nitrates are implicated in stomach cancers and other health problems (Plants for a Future Database). The seeds are sometimes used as a poultice for broken bones and other plant parts have been used to treat a variety of medical conditions from bleeding to mouth ulcers.



2. Weed Risk

World weed status

A. spinosus is a widespread weed of crops, poor pastures, roadsides and neglected areas in many tropical regions and is increasingly found in temperate areas, mostly in North America. It is

recorded as a weed in 44 countries and affects at least 28 different crops. Most records come from west and south Africa, India and South East Asia (Waterhouse, 1994) but it is also known in Turkey (Gonen and Uygur, 1997).

Australian weed status

A. spinosus is recorded as naturalised in Queensland, the Northern Territory and New South Wales (see Figure 4) (Lazarides et al, 1997). It is particularly notable in the central and north coast of New South Wales and coastal Queensland (Auld and Medd 1987). It is found typically near stockyards and in waste areas but has not been noted as a major problem in crops. It is not prohibited entry to Australia. It is currently prohibited entry from Western Australia but is not regulated in any other State or Territory (Weeds Australia website).

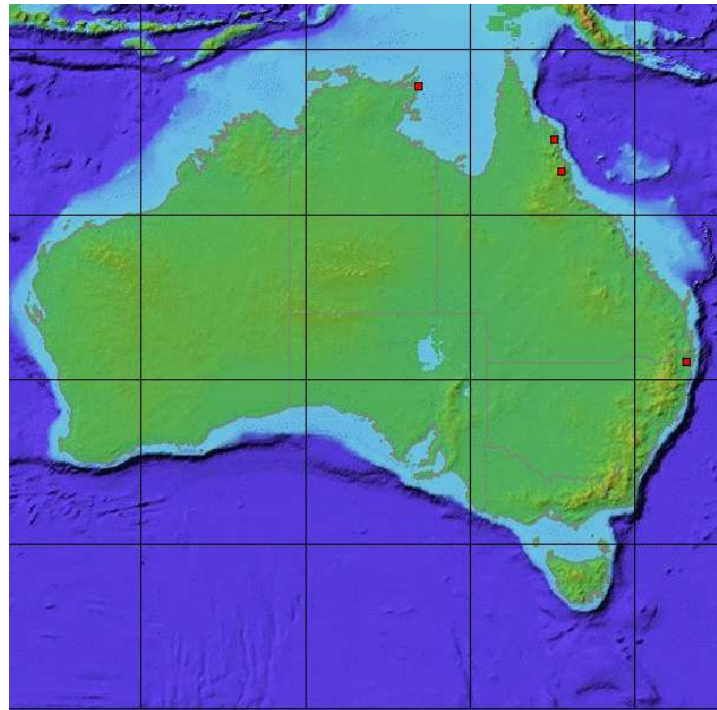


Figure 4. Distribution of *Amaranthus spinosus* in Australia based on herbarium records from Australia's Virtual Herbarium.

Weed potential in Tasmania.

A. spinosus has not been discovered growing and reproducing in the wild in Tasmania. It was found growing in seedling pots on one occasion in 1990s but was eradicated at that time (Tasmanian Herbarium).

Climate matching indicates the plant is unlikely to grow well in Tasmanian environments (see Figure 5). The following analyses indicate the weed potential of *A. spinosus* in Tasmania is relatively low.

Weed risk assessment

Weed risk assessment undertaken by DPIWE involves use of a point scoring system devised by Pheloung (1996). *A. spinosus* scores 10 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).

3. Weed Impact Assessment

Weed impact assessment is based on the DPIWE scoring system designed for that purpose. *A. spinosus* scores 3 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 probable density in mind. *A. spinosus* was assessed for its potential impacts upon agriculture at low densities.

Economic impact. The economic impact of *A. spinosus* in Tasmania is likely to be low to moderate in cropping situations. Despite its prolific seed production, competitive ability relative to crop plants, dispersal ability and the likelihood of a persistent seed bank, this plant is unlikely to grow well in Tasmania's cropping areas, especially those subject to frost. *A. spinosus* is generally well controlled with herbicides. Though it has been implicated in nitrate poisoning of stock in other countries (eg. Peixoto et al, 2003), it is unlikely to present a large threat to grazing industries as it is not known to be competitive in well maintained pastures and again, because it is unlikely to thrive in Tasmania's climatic conditions.

Environmental impact: *A. spinosus* is not described as invasive in natural environments and whilst it appears to occupy a range of agricultural situations, its ecology is ruderal. It is not shade tolerant and is therefore unlikely to establish in native communities with closed ground, understorey or canopy layers.

Social impact. *A. spinosus* is unlikely to have significant social impacts in Tasmania. Though a demonstrated cause of allergies in people and whilst the spines may cause harm, at the low densities at which this plant is likely to occur the harm it causes will be minimal. It is unlikely to hinder movement of people or impede access.

4. Declaration Recommendation.

Whilst *Amaranthus spinosus* L. appears to have limited potential to establish and reach significant densities in Tasmania it should be nominated for declaration under the *Weed Management Act 1999*. This will support eradication of any future incursions at the earliest convenience. This is desirable because the plant appears to be extending its range into temperate areas and because declaration will help support national limitation of this plant.

5. References.

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