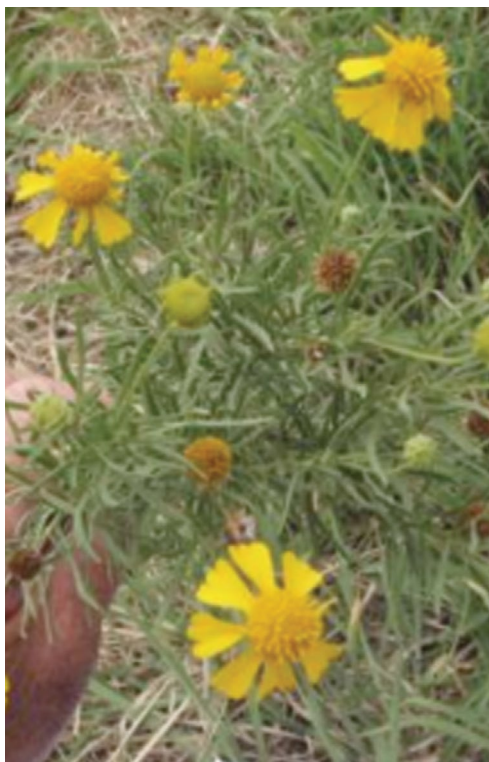


Bitter weed

Helenium amarum



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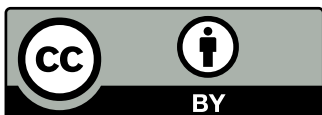
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Summary

Helenium amarum (bitter weed) is an annual plant, up to 60 cm tall. It is native to the south-eastern states of the United States and Mexico. Bitter weed is poisonous to most livestock, but generally only eaten if other feed is scarce/overgrazed. When ingested, it can taint dairy milk, rendering it undrinkable. Together with closely related species, it is a significant cause of mortality of sheep in south-eastern United States.

H. amarum was first detected in Queensland in 1953 near Mt Tarampa (south-eastern Queensland), the only known detection of this plant in Australia. It was subsequently the target of an eradication program lasting more than 40 years. In 2002, complete eradication was claimed, after extensive searches failed to detect the plant. However, more recent surveillance (in 2007) confirmed the existence of small numbers of specimens. These have been removed and the site is being monitored.

Climatically, *H. amarum* appears well suited to warm temperate and perhaps subtropical areas, where annual rainfall does not exceed 1000 mm. As such, subcoastal and inland areas of southern and perhaps central Queensland are most at risk of invasion. This species is not adapted to tropical areas. Within its native range, *H. amarum* is a common and opportunistic weed of open fields, roadsides and waste places. Hence, it is predicted to invade similar habitats in southern Queensland.

There seems little doubt that *H. amarum* has the potential to become much more widespread and abundant in southern Queensland if current control efforts are relaxed. At present, the plant exists as a very small population that is readily controlled. A high level of population suppression, sufficient to prevent this species from having any impact on agriculture, is feasible. Such efforts would avoid problems similar to those experienced throughout the species' native range.

Important note: This weed risk assessment is a working draft only and requires more information before firm recommendations can be made. Please send any additional information, or advice on errors, to the authors.

Identity and Taxonomy

Species: *Helenium amarum* (Raf.) H. Rock

Family: Asteraceae

Common names: Sneezeweed, bitter sneezeweed, fine-leaved sneezeweed, bitter weed (Australia), yellowdicks (US), Spanish daisy.

Synonyms: *Helenium tenuifolium* Nutt; *Gaillardia amara* Raf.

Subordinate taxa (varieties) include:

Helenium amarum var. *amarum*

Helenium amarum var. *badium*

The Asteracea family contains about 1600 genera and 23 000 species (Royal Botanical Gardens). The *Helenium* genus comprises about 40 annual or perennial herbs, native to North and Central America. The genus is well known for its toxic effects on herbivores (Kingsbury 1964, Tomley & Panetta 2002) and the various species are commonly referred to as ‘sneezeweeds’ since their pollen is believed to cause allergic responses in susceptible people.

Description

H. amarum is an annual herb up to 60 cm tall. Its stems are smooth, erect and branching in the upper portion. The leaves are numerous, smooth, thread-like and without petioles. Leaves are arranged alternately along the stems and tend to crowd the main stem and branches. Flower heads are about 2 cm in diameter (see front cover image and Figure 1). Ray flowers are yellow with toothed tips and surround a dome-shaped mass of yellow disk flowers. Seeds are about 1 mm long, reddish-brown, hairy along the edges and wedge-shaped, bearing bristle-tipped scales at their tops (Weeds of the North Central States n.d.).

Two varieties of this plant differ only in their flower colour: one is pure yellow; the other is yellow with a red-brown centre (Toxic Plant Database n.d.).

When growing under favourable conditions, *H. amarum* adopts a compact, bushy morphology. However, when competing with other plants it can go unnoticed, producing a single flower on plants as small as 5 cm tall (Weeds CRC n.d.).



Figure 1. Leaves and flowers of *H. amarum*

Reproduction, seed longevity and dispersal

H. amarum reproduces from seeds. Most flowering occurs over spring and summer. Specimens can flower and produce mature seed very quickly, when only eight weeks old. Mature seeds are non-dormant and germinate readily in sunlight over a wide range of temperatures (Weeds CRC n.d.). Flowering occurs in late spring or summer (Toxic Plant Database n.d.). The scented flowers are hermaphroditic (have both male and female reproductive structures) and are pollinated by insects such as bees and butterflies (Plants for a Future n.d.).

Origin and worldwide distribution

H. amarum is native to the United States and Mexico. According to the United States Department of Agriculture's Germplasm Resources Information Network (GRIN), its native range is:

North America

- North-eastern US:** Indiana, Michigan, Pennsylvania
- North-central US:** Kansas, Missouri, Oklahoma
- South-eastern US:** Alabama, Arkansas, District of Columbia, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia
- South-Central US:** Texas
- Northern Mexico:** Chihuahua, Coahuila

South America

- Caribbean, Cuba:** Hispaniola

Figure 2 illustrates the species' native range in the USA. Figure 3 illustrates the species' worldwide distribution (as recorded by the Missouri Botanic Gardens Tropicos database 2008).

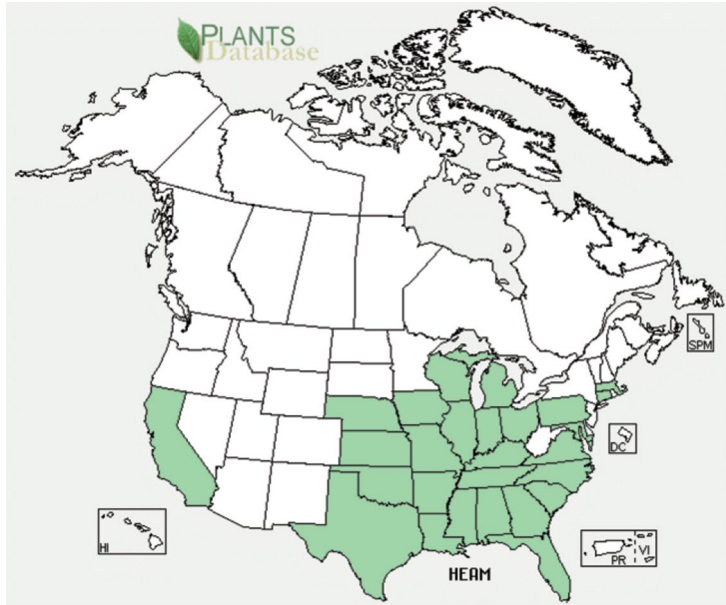


Figure 2. The native range of *H. amarum* in the USA (USDA 2008).

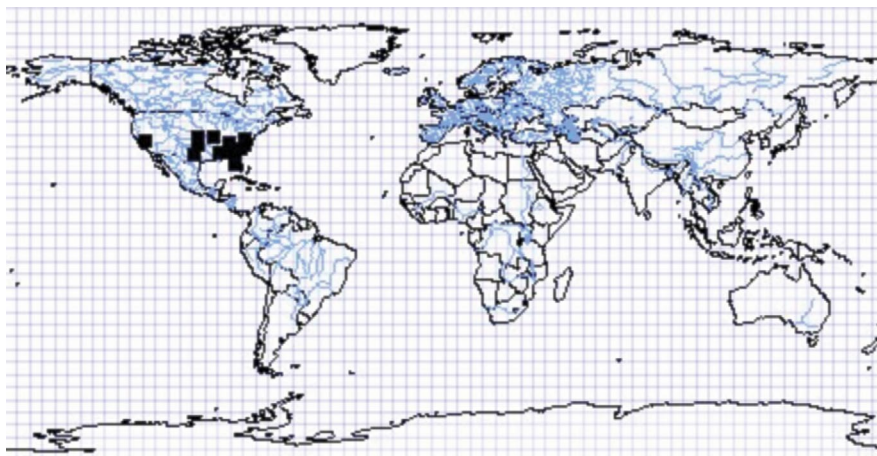


Figure 3. Worldwide distribution of *H. amarum* (MBG 2008).

Ecology and preferred habitat

Preferred soil types and habitat types

Within its native range *H. amarum* prefers ‘sandy soils in fields, woods and waste places’ (Knight & Walter 2001). Fernald (1950) also notes that *H. amarum* occupies ‘open ground, roadsides etc’. Similarly, other authors comment that it is most common on ‘old feed-lots, pastures, idle land, roadsides and wasteland’ (Weeds of the North Central States n.d.) and ‘open woods, fields, pastures and disturbed areas’ (Diggs et al. 1999).

In Texas, the pure yellow-flowered variety of *H. amarum* is widespread in disturbed, sandy or loamy soil in the eastern part of the state, while the dark-centred variety is often found on calcareous soils further west (Toxic Plant Database n.d.).

H. amarum cannot tolerate prolonged shade (Plant for a Future n.d.).

Hence, like many species within the Asteraceae family, *H. amarum* can be described as an ‘opportunistic coloniser’ species that is well adapted to quickly colonise areas where taller vegetation has been damaged or otherwise removed.

Climatic requirements

The natural distribution of *H. amarum* in America suggests that it is adapted to subtropical to warm temperate climates, mainly in drier areas. It does not extend into tropical areas or high rainfall zones (i.e. areas where annual rainfall exceeds 1000 mm). There is a lack of detailed information in the literature on this species’ exact climatic requirements.

Tolerance of fire

This study was unable to find information on this species’ tolerance of fire.

History of introduction

H. amarum was first detected in Queensland in 1953 near Mt Tarampa (south-eastern Queensland). There is popular speculation that it was introduced as a contaminant of military air freight, since the original infestation was located alongside an aircraft runway used by the United States during World War II.

Distribution in Queensland and Australia

In Australia, *H. amarum* is only known to exist at a single location near Mt Tarampa in south-eastern Queensland. Prior to being subject to a successful control program, it had spread over an area of approximately 50 ha. To date, an ongoing eradication program has spanned more than 50 years (since 1953). In 2002, complete eradication was claimed, after extensive searches over many years failed to detect the plant (Tomley & Panetta 2002). However, more recent surveillance by the Queensland Department of Primary Industries and Fisheries (in 2007) confirmed the existence of small numbers of specimens. These have been removed and the site is being monitored.

History as a weed overseas and interstate

H. amarum is a troublesome plant within its native range in the United States. For example, in Texas some grazing paddocks become almost completely covered by this species. When ingested by dairy cattle, it imparts a bitter taste to their milk, rendering it undrinkable (Keeler & Tu 1983). It is also a livestock poison, causing weakness, diarrhoea and vomiting to animals that consume it, including sheep, cattle and horses (Dollahite et al. 1973; Tomley & Panetta 2002). *H. amarum* was listed as one of the few species in *Helenium* that has caused mortality of sheep in Texas (Knight & Walter 2001).

H. amarum has not been recorded in any other Australian state.

Uses

H. amarum was thought to have antiphlogistic effect (Plants for a Future n.d.) being used to clear the nose of mucus. It has also been used in a sweat bath to treat dropsy and swellings (Chevallier 1996).

Pest potential in Queensland

Climatically, *H. amarum* appears well suited to subhumid, warm temperate and perhaps subtropical areas, where annual rainfall does not exceed 1000 mm. As such, subcoastal and inland areas of southern Queensland and perhaps central Queensland are most at risk of invasion. This species is not adapted to tropical areas. A prediction of this species' potential distribution is provided in Figure 4.

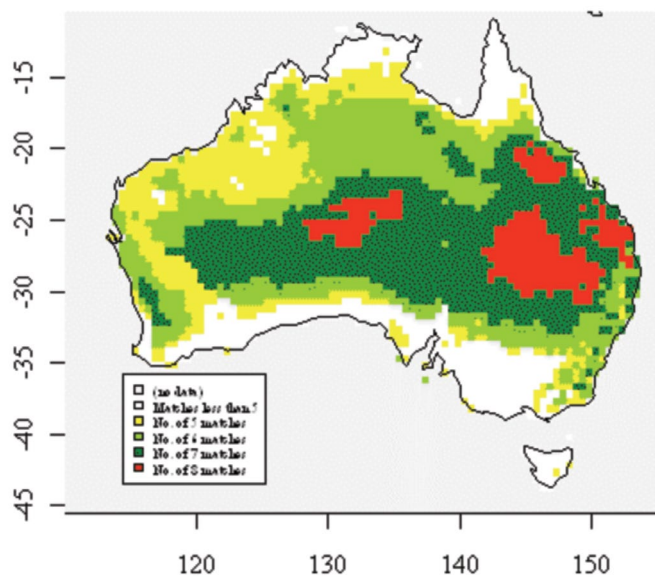


Figure 4. Potential range of *H. amarum* in Australia, as predicted by CLIMATE modelling software (red areas indicate suitable climate, green areas are marginally suitable, yellow and white are unsuitable).

Within its native range, *H. amarum* is a common and opportunistic weed of open fields, roadsides and waste places. Hence, it is predicted to invade similar habitats in southern Queensland.

There seems little doubt that *H. amarum* has the potential to become much more widespread and abundant in southern and perhaps central Queensland if current control efforts are relaxed. At present, the plant exists as a very small population that is readily controlled. A high level of population suppression, sufficient to prevent this species from having any impact on agriculture, is feasible. Such efforts would avoid problems similar to those experienced throughout the species' native range.

Related species

H. autumnale (common sneezeweed, false sunflower) is an erect, clump-forming perennial, growing to 60–150 cm. Leaves are alternate, lance-shaped. Clusters of daisy-like flowers have distinctive wedge-shaped, bright yellow rays. The plant is native to North America, grows in moist soils along streams, ponds or ditches and in spring-fed meadows, prairie and wet open ground throughout most of the United States. It is listed as a weed in Nebraska and the Great Plains (USDA 2008).

Control

Infestations can be controlled with broad-leaf herbicides such as 2,4-D or Grazon P+D® (Toxic Plant Database n.d.).

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