

Candyleaf

Stevia ovata



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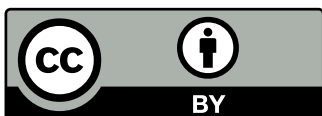
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Front cover: *Stevia ovata* (photo: CSIRO)

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Summary

Stevia ovata is native to tropical America, from the mountains of Texas south to the mountains of Mexico, Ecuador and Peru. Within its native range, it grows at elevations of 1000–3000 m and occupies a range of habitats (generally fairly open, disturbed sites). It is a morphologically variable species and is very closely related to several congeners that share its native range.

In 2007, *S. ovata* was collected for the first time in Australia near Ravenshoe on the Atherton Tableland in North Queensland (at an altitude of around 900 m). At this site, it has formed dense stands scattered along an estimated 23 km of powerline easement, extending into adjacent forest. Further searching could reveal more.

S. ovata has not been listed as a major weed anywhere in the world. However, visual observation of the species in North Queensland provides evidence that it can rapidly colonise open, disturbed habitats within favourable habitat types. As such, it appears to have the potential to colonise similar habitats elsewhere in the state. Based on an assessment of the species' climatic requirements within its native range, it is reasonable to predict that *S. ovata* could spread in cooler subtropical parts of southern Queensland and high elevation areas of North Queensland. It is difficult to predict its potential impact, but it is expected to colonise open, disturbed sites. Where it forms dense stands, it might replace other vegetation such as native plants and pasture.

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 author.

Identity and taxonomy

Taxa: *Stevia ovata*

Common name: Candyleaf (United States)

Taxonomy and synonyms:

Specimens of *S. ovata* collected for the first time in Australia near Ravenshoe in North Queensland in 2007 were identified by Vicki Funk and Harold Robinson at the Smithsonian Institution in Washington.

There are about 230 species of *Stevia* (Watanabe et al. 2001). The genus contains woody shrubs, rhizomatous perennials and annuals. Of all the genera in the Asteraceae (Eupatorieae) family, *Stevia* are one of the most distinctive. All species of *Stevia* have flower heads with five-tube florets and dense pubescence on the inner surface of the corolla throat, and distinctive obovate to elliptical anther appendages with a crenulate distal margin (Watanabe et al. 2001).

S. ovata Willd is also known as *S. rhombifolio* Kunth. *S. triflora* DC is very similar in appearance and may be a synonym (Vicki Funk 2007, pers. comm.).

There are diploid, triploid, tetraploid, pentaploid and hexaploid populations of *S. ovata* within its native range. The triploid is perhaps the most abundant, widespread and variable form (Soejima et al. 2001).

Description

S. ovata is a perennial plant, 40–80 cm tall (var. *texana* has been reported to grow up to 5 m). Its leaves are arranged in mostly opposite pairs along the stem, but sometimes alternately. Petioles are 2–10 mm long. Leaf blades have raised venation (generally limited to mid-vein and primary laterals). Leaves are variable in shape but generally ovate to trullate and mostly 3–6 cm long with serrate margins (Figure 1).



Figure 1. Leaves of *Stevia ovata* specimen collected from North Queensland (photo: CSIRO).

Flower heads are arranged in more or less congested, compact clusters. Peduncles are 1–2 mm, sessile-glandular and finely villous. Involucres are 4–6 mm. Phyllaries are sessile-glandular and finely villous; apices rounded to blunt or obtuse. Flowers are white or light pink (Figure 2); lobes are sessile-glandular. The pappi are shorter than the corollas.



Figure 2. Flowers of *S. ovata* specimen collected from North Queensland (photo: CSIRO).

S. ovata displays significant morphological variation and intermediate forms with other species are sometimes found (Soejima et al. 2001). Among such morphologically related species, *S. nepetifolia* HBK, *S. oligophylla* Soejima and Yahara, *S. organoides* HBK and *S. triflora* DC all have relatively large distribution areas that overlap that of *S. ovata* (Soejima et al. 2001). Three varieties of *S. ovata* (var. *expansa*, *reglesens* and *texana*) are mentioned by Soejima et al. (2001).

Reproduction, seed longevity and dispersal

S. ovata has both sexual (seed producing) and agamosperous forms. In Mexico, agamospermy accompanied by polyploidy seems to be a fairly common mode of reproduction among the perennial herbaceous species of *Stevia* (Soejima et al. 2001).

Grashoff (1974) stated that *S. ovata* flowers in August and September. However, Vicki Funk from the Smithsonian in Washington notes that ‘everywhere but Peru it flowers mostly in September to December. In Peru it seems to flower in April to May’.

This study was unable to find information on rates of seed production, longevity or dispersal. However, high fecundity and short-lived seeds are a common feature of species within the Asteraceae family.

Origin and worldwide distribution

S. ovata is one of the most widely distributed species of its genus in North, Central and South America, ranging from Texas (US) southward through Mexico to Ecuador and Peru (Figures 3 and 4).

Various species of *Stevia* exist in Mexico from altitudes of 1000–3300 m (Soejima et al. 2001). Soejima et al. (2001) noted that *S. ovata* exists along the mountain ranges of the south-western Pacific side of Mexico, in the localities such as Sierra Madre del Sur, the central high mountain region (Trans-Mexican volcanic belt) and the north-eastern mountains (Sierra Madre del Oriental).

Grashoff (1974) noted the distribution of *S. ovata* var. *expansa* as ‘Coahuila, Nuevo Leon and San Luis Potosi with sexual populations known only from Nuevo Leon’ and for *S. ovata* var. *texana* as ‘Chisos and Chinati mountains of Texas and scattered mountainous areas of north-western Coahuila’.

As there are numerous forms and varieties of *S. ovata*, it is presumed that each form occupies a slightly different ecotype and climate zone.



Figure 3. Distribution of *S. ovata* in Central America (source: Missouri Botanic Gardens w³ Tropicos database).



Figure 4. Distribution of *S. ovata* in South America (source: Missouri Botanic Gardens w³ Tropicos database).

Ecology and preferred habitat

Preferred soil types and habitat types

This study was unable to find detailed information on soil and habitat types colonised by *S. ovata*. However, an examination of overseas herbaria records suggests that *S. ovata* can grow in a range of habitat types, perhaps with a preference for pine oak woodlands and various open sites at high altitudes (Table 1). Habitats include exposed rocky sites, roadsides, open woods and wet montane forest.

According to the publication Flora of North America, *S. ovata* var. *texana* grows in rocky sites at an altitude of 1700–2400 m in Texas and Mexico (Coahuila). Other varieties grow further south into South America (mountains of Ecuador and Peru).

Table 1. Notes on habitats where *Stevia ovata* has been collected within its native range (information supplied by Vicki Funk, Smithsonian, Washington, US).

Collection point site description	Altitude (approx.)
Transition area from pine forest to sunny slope	1500 m
Pine-oak woods	1500 m
Open woods on dry hillside	540 m
Uppermost ridge of volcano	3000–3200 m
Wet montane forest	1800–2400 m
Oak forest	2710 m
Weedy field, moist tropical forest zone	
Common roadside weed	730–800 m
Pine, <i>Cupressus</i> , <i>Arbutus</i>	2100 m
Pine forest	1240 m
Cut over mixed forest	1800 m
Open pine-oak woodland on top of plateau	2450 m
Dry vegetation	1800–2200 m
In burned area	
Rocky area	
Grassy slopes with <i>Espeltia</i> , abundant	2790 m
Shrubby area along the quebrada	
Agricultural land	2300 m
Disturbed montane vegetation, roadside	2310 m

Climatic requirements

The distribution of *S. ovata* and closely related species roughly corresponds to the region of ‘Central American Montane Flora’, an area which has a temperate and subhumid climate (Rzedowski 1981). This floristic region consists mainly of pine-oak forest.

Within the highlands of Chiapas (Mexico), where *S. ovata* has been collected and used as a medicinal plant for centuries by native people, the climate varies with altitude, being described as ‘hot’ at lower altitudes (900–1500 m), ‘temperate’ at 1500–1800 m and ‘cold’ at 1800–2900 m (Stepp & Moerman 2001). At the southernmost limit of its range in Peru, *S. ovata* has been collected at an altitude of 2000 m (Missouri Botanical Garden w³Tropicos database). Further north in Ecuador, it has been collected at Cerro de Celica at an altitude of 2400 m. Elsewhere in South America, it has been collected at altitudes above 1000 m.

Hence, even though *S. ovata* has a broad distribution across tropical North, Central and South America, it appears to be confined to high altitude habitats within this range; habitats that experience cooler, subtropical and temperate climates, rather than hot tropical climates.

Tolerance of fire

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

History of introduction

S. ovata was collected for the first time in Australia near Ravenshoe on the Atherton Tableland in 2007. Queensland Herbarium sample notes are presented below. This is the only site where *S. ovata* has been found in Australia.

Sample 1: *Stevia ovata*

AQ number: 751755
Collector: Andrew Ford AF 5091, H. Murphy
Date: 8 June 2007
Location: Tully Falls Road, 3.1 km from Wooroora Road south of Ravenshoe

Sample 2: *Stevia ovata*

AQ number: 751754
Collector: Andrew Ford AF 5090, H. Murphy
Date: 8 June 2007
Location: Chalumbin powerline access road 800 m from Tully Falls Road

Sample 3: *Stevia ovata*

AQ number: 751753
Collector: Andrew Ford AF 5004, R. Jensen, C. Edwards
Date: 14 May 2007
Location: Adjacent to powerline access track, under powerline off Arthur Baillie Road south of Ravenshoe

Distribution in Queensland and Australia

S. ovata is only known to exist near Ravenshoe on the Atherton Tableland, where it was collected for the first time in Australia in 2007. At this site, it has formed dense stands scattered along an estimated 23 km of powerline easement, extending into adjacent forest. Further searching could reveal more.

History as a weed overseas and interstate

This study was unable to find any evidence of *S. ovata* having a major impact as a weed overseas or interstate. While Stepp and Moerman (2001) and various people who have lodged specimens with herbaria loosely describe *S. ovata* as a ‘weed’ within its native range, they do not provide any information on its impact.

Invasive related species

S. eupatoria (Spreng.) Willd. (Kempton’s weed) is a resilient weed of pastures and cultivation in an area near Glen Innes on the northern tablelands of New South Wales (Australia) (Auld & Medd 1987; Parsons & Cuthbertson 1992; Randall 2002). No other species of *Stevia* have been listed as weeds by Randall (2002).

Watanabe et al. (2001) mention that *S. serrata* is weedy in its native range of Mexico.

Uses

Two varieties of *S. ovata* var. *ovata* (roundleaf candyleaf) and var. *texana* (Texan candyleaf) are listed as garden ornamentals on the ‘iVillage Garden Web: the internet’s garden and home community’ (<http://hortiplex.gardenweb.com>). As such, it may be assumed that this species is being traded as a garden plant to some degree.

S. ovata is listed as one of many ‘weed’ species used as medicinal plants by highland Maya people in the central highlands of Chiapas, Mexico (Stepp & Moerman 2001).

Pest potential in Queensland

S. ovata has not been listed as a major weed anywhere in the world. A lack of information on this species in the literature makes a prediction of its pest potential difficult. However, visual observation of the species in North Queensland provides evidence that it can rapidly colonise open, disturbed habitats within favourable habitat types. Near Ravenshoe on the Atherton Tableland, *S. ovata* has started to dominate open, disturbed land along a powerline easement (Figure 5).



Figure 5. *S. ovata* has dominated open land under a powerline easement near Ravenshoe, Atherton Tableland, North Queensland (photo: CSIRO).

In order to predict which areas of Queensland may be at risk of invasion by *S. ovata*, this study reviewed available information on the species' native range and the climatic parameters that appear to define its distribution. *S. ovata* is native to tropical America, but only seems to persist at high elevation (1000–3000 m). This suggests that while *S. ovata* could persist in North Queensland, it is likely to be restricted to cooler, high elevation areas. The recent detection of *S. ovata* at Ravenshoe, at an approximate altitude of 900 m, supports this prediction. Cooler subtropical and warm temperate areas of southern Queensland appear to be climatically suited to the species.

Habitat types at risk of invasion are difficult to predict due to the lack of detailed information on habitats occupied by *S. ovata* within its native range. An examination of limited information presented with herbaria samples from North, Central and South America suggests that *S. ovata* prefers open, rocky sites, generally on mountains at high altitudes. Hence, it is reasonable to predict that comparable habitat types in Queensland are at risk. While *S. ovata* could form pure stands in open, disturbed, and perhaps rocky, sites, there is no evidence to suggest that it will invade closed canopy forest types (except where the canopy is damaged).

This study concludes that, based on visual observations of the plant's behaviour in North Queensland, where it has dominated a small disturbed site, *S. ovata* is a moderate risk species. However, there is no published evidence to suggest *S. ovata* will become a significant pest.

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