GLOBAL INVASIVE SPECIES DATABASE

FULL ACCOUNT FOR: ***Carpobrotus edulis***

Carpobrotus edulis 简体中文 正體中文

System: Terrestrial

Kingdom	Phylum	Class	Order	Family
Plantae	Magnoliophyta	Magnoliopsida	Caryophyllales	Aizoaceae

Common name
umgongozi (Zulu, South Africa), balsamo (Catalan, Spain), patata frita (Catalan, Spain), sea fig (English, USA), higo del Cabo (Spanish), suurvy (Afrikaans, South Africa), rankvy (Afrikaans, South Africa), sour fig (English, South Africa), iceplant (English, New Zealand), perdevy (Afrikaans, South Africa), hottentot fig (English, USA), freeway iceplant (English, USA), ghoenavy (Afrikaans, South Africa), Hottentosvy (Afrikaans, South Africa), Kaapsevy (Afrikaans, South Africa), highway ice plant (English, USA), ikhambi-lamabulawo (Zulu, South Africa), vyerank (Afrikaans, South Africa), figue marine (French), Hottentottenfeige (German), pigface (English, Australia), ghaukum (Afrikaans, South Africa), higo marino (Spanish), Cape fig (English, South Africa)

Synonym
Mesembryanthemum edule , L.
Mesembryanthemum edulis

Similar species
Carpobrotus chilensis, Carpobrotus acinaciformis, Carpobrotus affine acinaciformis

Summary
Carpobrotus edulis is a mat-forming succulent native to South Africa which is invasive primarily in coastal habitats in many parts of the world. It was often introduced as an ornamental plant or used for planting along roadsides, from which it has spread to become invasive. Its main impacts are smothering, reduced regeneration of native flora and changes to soil pH and nutrient regimes.

view this species on IUCN Red List

Species Description
Carpobrotus edulis is a perennial, mat-forming herb. It is a \"robust, flat-growing, trailing perennial, rooting at nodes and forming dense mats. The succulent horizontal stems curve upwards at the growing point. The leaves are succulent, crowded along the stem, 60–130 x 10–12mm, sharply 3-angled and triangular in cross-section with tiny serrations along the outermost angle, yellowish to grass green, and reddish when older. Flowers are solitary, 100–150mm in diameter, yellow, fading to pale pink, produced mainly during late winter–spring (August–October, in native range). This species is easily distinguished from congeners as it is the only one with yellow flowers. In addition, it has more extensive, although very small, serrations along the outer leaf angle. Fruit is fleshy, indehiscent and edible, 35mm in diameter, shaped like a spinning top, on a winged stalk, becoming yellow and fragrant when ripe. The outer wall of the fruit becomes yellowish, wrinkled and leathery with age. The seeds are embedded in the sticky, sweet, jelly-like mucilage. The fruits can be eaten fresh and they have a strong, astringent, salty, sour taste\" (Malan and Notten, 2006). If they are not eaten they become very hard and dark reddish brown and decay slowly in place on the stems. IMEP (2001) describe the defining characteristics of *C. edulis* as: \"long tapering leaves with equilateral or obtuse isosceles cross-sections, leaf margins and keel are more or less parallel up to the terminal point area, the centre of mats often die back, and sepals are pointy\". *C. edulis* has a very dense fibrous root system concentrated in the upper 50cm of the soil, with new roots forming at each node as the plant spreads outward (D'Antonio and Mahall, 1991).

Notes
In its native range, the flowers of *C. edulis* are pollinated by solitary bees, honey bees, carpenter bees and many beetle species. Fruits are eaten by baboons, rodents, porcupines, antelopes and people, who also disperse the seeds (Malan and Notten, 2006).

Lifecycle Stages
Carpobrotus edulis produces a fleshy indehiscent fruit in early spring in California, USA, which remains on the plant until autumn when it is eaten by a variety of native mammals. Uneaten fruits remain on the plants for several years. Ungerminated seeds remain viable in the soil for at least two years (D'Antonio, 1990b). It flowers in April in the Balearic Islands (Universitat de las Illes Balears, undated), and between August and October in South Africa (Malen and Notten, 2006).

Uses
Carpobrotus edulis is used for erosion control, as an ornamental or ground cover, for fruit and as a medicinal plant in folklore (GRIN, 2006).

Habitat Description
In South Africa, *Carpobrotus edulis* is often seen as a pioneer in disturbed sites. It needs well-drained soil, a sunny position and room to spread. It is an excellent evergreen drought-, and wind-resistant groundcover that can be planted on flat, sandy ground, on loose sand dunes, gravely gardens, lime-rich and brackish soils as well as in containers, rockeries, embankments and will cascade over terrace walls. *C. edulis* is not frost-hardy (Malan and Notten, 2006). In California, *C. edulis* depends upon disturbance to open up vegetative cover, but once it becomes established it is competitively superior to native grasses and will overtop them (D'Antonio, 1993). It can invade coastal dune, bluff, scrub, chaparral and coastal grassland habitat. In Australia it has been observed in coastal heathlands. Schmalzer and Hinkle (1987) observe that soil nitrogen levels limit *C. edulis* growth along highways in California.

Reproduction
Carpobrotus edulis is slightly agamospermic, completely self-fertile, slightly preferentially self-compatible, and experiences no inbreeding depression (Vila *et al.* 1998; Suehs *et al.* 2004b).
"Active growth of *C. edulis* occurs primarily along the main axes, although lateral branches may also grow, particularly following death of the apical meristem of the main axis. An individual branch can elongate more than 1m in a year. Branches tend to grow over each other, resulting in the accumulation of up to 40cm of live and dead plant material. Stems exhibit vine like growth and can crawl over shrubs, fences and other obstacles. Rooting occurs at nodes in contact with the soil surface" (D'Antonio, 1990a). The plant is readily cloned by rooting stem fragments that contain at least one node.

General Impacts
Carpobrotus edulis can form impenetrable mats up to 20cm wide and over 50cm deep, and will sometimes compete aggressively with native species (D'Antonio and Mahall 1991, D'Antonio, 1993; PIER, 2005). Once it becomes established, it shows a high vegetative reproductive rate, and its growth does not appear to be affected by herbivory or competition (D'Antonio 1993; Campelo *et al.* 1999). *C. edulis* can also decrease species diversity by preventing sand movement, which hinders the natural processes of disturbance and change in dune environments (Kim, undated). *C. edulis* reduces soil pH and influences nutrient dynamics (D'Antonio 1990a, D'Antonio and Mahall, 1991). *C. edulis* has been observed to invade new areas following fire events in California (Zedler and Scheid 1988; D'Antonio *et al.* 1993). *C. edulis* hybridises with its related species (native, naturalised and alien) in many parts of its introduced range (Chinnock, 1972; Vila and D'Antonio, 1998; Albert *et al.* 1997; Suehs *et al.* 2004a; Gallagher *et al.* 1997), which may intensify the invasion process (Suehs *et al.* 2004a) or impact on the integrity of native species.

Management Info
Preventative measures: A Risk Assessment of *Carpobrotus edulis* for Hawaii and other Pacific islands was prepared by Dr. Curtis Daehler (UH Botany) with funding from the Kaulunani Urban Forestry Program and US Forest Service. The alien plant screening system is derived from Pheloung *et al*. (1999) with minor modifications for use in Pacific islands (Daehler *et al.* 2004). The result is a score of 9.5 and a recommendation of: \"Likely to cause significant ecological or economic harm in Hawaii and on other Pacific Islands as determined by a high WRA score, which is based on published sources describing species biology and behaviour in Hawaii and/or other parts of the world.\"
Physical: Manual methods appear to be the most effective means of controlling *C. edulis* at this stage. Albert (1996; in PIER, 2005) recommends: \"Hand-pull individual plants and remove any buried stems. Mulch to prevent re-establishment. Large mats can be removed by rolling them up like a carpet\". It is important to remove any *C. edulis* remains during eradication, as any remains left in place become a focus of regeneration, due to the large number of seeds which survive in the fruit for a long time (Fraga *et al*. 2006).
Another thing to keep in mind following removal of *C.edulis* is that secondary plant invaders can take advantage of opened areas, spreading rapidly and impeding restoration efforts in coastal dune habitats. *C. edulis* leaves behind a layer of debris of dead and decaying organic matter that accumulates under the plant. This tends to be left behind after *C. edulis* is removed. Within the debris are often the dormant seeds of invasive grasses, and these sprout after *C. edulis* is removed, benefiting from the accumulation of nutrients in the area that *C. edulis* has facilitated. To avoid this it may be best to selectively remove *C. edulis* to ensure that some is left behind to stabilise the soil and minimise sand movement into the area. Once the area has been restored to a more natural community, the remaining *C. edulis* can be removed and that area restored in turn (Kim, undated).
Chemical: PIER (2005) suggest the use of glyphosate herbicides. Schmalzer and Hinkle (1987) reported that there had been no comprehensive survey of herbicide effects on *C. edulis*. It is assumed that broad spectrum herbicides would kill *C. edulis* but they may also impact adjacent vegetation. Chlorflurenol, a morphactin, has been used to reduce growth of *C. edulis* along roadways (Hield and Hemstreet, 1974; in Schmalzer and Hinkle, 1987).
Biological: The options for biological control are currently limited, as the pathogens which attack *C. edulis* are not specific to it. *Verticillium* wilt can cause considerable damage (McCain *et al.* 1974), but using it could cause problems as it also attacks commercial crops (Schmalzer and Hinkle, 1987). Suehs *et al.* (2004b) state that a constraint on seed production or germination would be the most efficient way to control *C. edulis* on a long-term basis, if possible, due to its high success in these domains. Two introduced scale insects caused widespread mortality of *Carpobrotus edulis* plantings in California in the 1970s (Donaldson *et al.* 1978). As a result the California highway Department introduced natural enemies to control iceplant scale (Tassan *et al.* 1982). Nonetheless, scale insects have been observed to cause death of clones in California and could be more widely promoted in natural settings.

Pathway
Carpobrotus edulis has been widely used for erosion control and has been planted along roadsides in California (GRIN, 2006).

Principal source:

Compiler: National Biological Information Infrastructure (NBII) & IUCN/SSC Invasive Species Specialist Group (ISSG)

Review: Carla D'Antonio Professor Ecology, Evolution & Marine Biology University of California, Santa Barbara USA

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ALIEN RANGE

[1] ALBANIA
[2] AUSTRALIA
[1] CHILE
[5] FRANCE
[1] GERMANY
[1] GREECE
[1] IRELAND
[3] MALTA
[5] NEW ZEALAND
[4] PORTUGAL
[13] SPAIN
[1] UNITED KINGDOM
[1] ARGENTINA
[1] BERMUDA
[1] CROATIA
[1] FRENCH POLYNESIA
[1] GIBRALTAR
[1] GUERNSEY
[2] ITALY
[1] MEXICO
[1] PITCAIRN
[1] SAINT HELENA
[1] TUNISIA
[8] UNITED STATES

Red List assessed species 8: CR = 6; EN = 1; VU = 1;

Apium bermejoi **CR**
Armeria pseudarmeria **EN**
Cheirolophus crassifolius **CR**
Helichrysum melitense **CR**
Armeria berlengensis **CR**
Calendula maritima **CR**
Cremnophyton lanfrancoi **CR**
Rumex rupestris **VU**

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