

Mesembryanthemum crystallinum L. (Aizoaceae)
Common Ice Plant, Crystalline Ice Plant

Description. Annual, often densely branched. Stems 10-65 cm long, decumbent to prostrate, succulent when young, surface densely papillose, the papillae rounded, 1-2 mm in diameter. Leaves 1-20 cm long, lowermost leaves cordate, cauline ovate to spatulate, flat, viscid, papillose, often reddish with age, bases tapered, sometimes petiolate, sometimes clasping, margins entire to wavy, apices rounded. Flowers solitary (but often many per plant), 7-10 mm wide, short-pedicellate, the floral tube campanulate, 6-12 mm long, sepals 5, rounded, often reddish, petals technically 0 (the many petal-like structures are staminodia or sterile stamens), 6-8 mm long, white, becoming pink, ascending to spreading, stamens many, ovary inferior, with 5 locules, fruit a capsule, 6-11 mm long, oblong. Seeds many, brown, ca. 1 mm long (Abrams 1944, Munz 1959, Vivrette 1993).

Synonyms: *Gasoul crystallinum* (L.) Rotm., *Cryophytum c.* (L.) N.E.Br.

The closely related *Mesembryanthemum nodiflorum* (slender-leaved ice plant) differs by having erect stems, linear, somewhat terete leaves, smaller flowers (4-5 mm wide), with a floral tube 4-5 mm long, and petals aging yellowish.

Note: *Mesembryanthemum crystallinum* has become a model system for the study of Crassulacean Acid Metabolism (CAM) and its relationship to salt uptake under saline conditions (e.g., Chu et al. 1990, Cockburn et al. 1996, Cushman et al. 1990, Edwards et al. 1996, Herppich and Herppich 1997, Ostrem et al. 1987). It and the related *M. nodiflorum* are among several species recommended for use in revegetating saline soils contaminated with petroleum spills in the Middle East (Hegazy 1997). In Australia, *M. nodiflorum* has been deliberately introduced to stabilize saline waste deposits (Jusaitis and Pillman 1997, Semple and Waterhouse 1994).

Geographic distribution. Crystalline ice plant is a native of southern Africa (Moran 1950, Vivrette 1993) and is widely distributed and naturalized in Australia, southwestern US (Arizona and California), Chile, and the Pacific coast of Mexico (Agata et al. 1996, Arnold, T. and B. de Wet. 1993, Moran 1950, Munz 1959, Vivrette 1993).

Crystalline ice plant was first reported from California ("San Diego" and "Santa Cruz Island") in 1876 (Brewer et al. 1876). Naturalized populations occur on all the Channel Islands (Junak et al. 1997), coastal California from Del Norte County southward to San Diego County, most counties that include the San Joaquin Valley, and interior southern California (Anonymous. 1998, Vivrette 1993).

Ecological distribution. In southern Africa, both *Mesembryanthemum crystallinum* and *M. nodiflorum* occur principally on saline soils of open sites. In California and Mexico, common ice plant occurs in open, disturbed, saline sites, but is most abundant in irrigated areas with saline soils (Agata et al. 1996, Munz 1959, Vivrette 1993). On the Channel Islands, crystalline ice plant is often associated with a combination of deeply eroded sites, saline substrates, and the absence of typical soils (Halvorson et al. 1988, Vivrette and Muller, 1977, Halvorson 1994).

Reproductive and vegetative biology. Floral biology has apparently not been investigated in either species, although most members of Aizoaceae are open-pollinated by insects (Proctor et al. 1996). Based on studies in northern Africa and southern California (El-Darier 1992, El-Ghareeb 1991, Vivrette and Muller 1977), seeds can remain dormant for many years and young plants often grow quickly after initiation of the rainy season. Seeds of the related *M. nodiflorum* can remain dormant for as long as 22 years (Gutterman 1994), but germinate readily with sufficient rainfall.

Vivrette and Muller (1977) showed that crystalline ice plant sequesters salts in epidermal papillae during the growing season. Plants also actively transport salts from the root horizon. As plants die, salts are released onto the soil surface, which accumulates salts at the surface and thus inhibits germination of other taxa in the immediate vicinity during the first rains. Invasion and establishment, at least on Santa Barbara Island, California, was apparently correlated with disturbance and severe rabbit grazing of other plants (Dunkle 1950, Philbrick 1972)

Weed status. *Mesembryanthemum crystallinum* is not considered a noxious weed in agricultural or horticultural practice, at least at a global level (not listed by Holm et al. 1977), nor is it considered a noxious weed by the State Dept. of Food and Agriculture (Anonymous 1996). It is not listed for the United States in Lorenzi and Jeffery (1987).

Microbial pathogens. No literature was found that reported microbial pathogens.

Insect pathogens. Several weevils (Curculionidae: *Calodemus*, *Lixus*) have been reported to infest *Mesembryanthemum crystallinum*, but apparently do not significantly damage plants or reproductive structures (Louw 1993).

Herbicide control. No literature was found that recommended herbicides.

Other control methods. Mechanical removal of plants has been reported as an effective method in small infestations (Halvorson et al. 1988, Moss 1994). Halvorson et al. (1988) also reported that mechanical removal was most effective immediately prior to peak vegetative growth and flowering, and if followed by tillage and revegetation.

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