

Plant Assessment Form

For use with the “Criteria for Categorizing Invasive Non-Native Plants that Threaten Wildlands”
by the California Exotic Pest Plant Council and the Southwest Vegetation Management Association
(Warner et al. 2003)

Printable version, February 28, 2003
(Modified for use in Arizona, 07/02/04)

Table 1. Species and Evaluator Information

Species name (Latin binomial):	<i>Mesembryanthemum crystallinum</i> L. (USDA 2005)
Synonyms:	<i>Gasoul crystallinum</i> (L.) Rothm. (USDA 2005)
Common names:	Common iceplant
Evaluation date (mm/dd/yy):	05/14/03
Evaluator #1 Name/Title:	Sue Rutman/Plant Ecologist
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List committee members:	05/20/03: D. Backer, D. Casper, P. Guertin, J. Hall, R. Paredes, S. Rutman, J. Ward 03/01/05: D. Backer, D. Casper, J. Filar, E. Geiger, J. Hall, H. Messing, B. Munda, F. Northam
Committee review date:	05/20/03 and 03/01/05
List date:	05/20/03; revised 03/01/05
Re-evaluation date(s):	

Table 2. Scores, Designations, and Documentation Levels

Question		Score	Documentation Level	Section Scores	Overall Score & Designations
1.1	Impact on abiotic ecosystem processes	C	Reviewed scientific publication	<p>“Impact”</p> <p>Section 1 Score:</p> <p>C</p>	<p>“Plant Score”</p> <p>Overall Score:</p> <p>Low</p> <p>Alert Status:</p> <p>None</p>
1.2	Impact on plant community	C	Reviewed scientific publication		
1.3	Impact on higher trophic levels	D	Observational		
1.4	Impact on genetic integrity	D	Other published material		
				<p>“Invasiveness”</p> <p><i>For questions at left, an A gets 3 points, a B gets 2, a C gets 1, and a D or U gets=0. Sum total of all points for Q2.1-2.7:</i></p> <p>11 pts</p> <p>Section 2 Score:</p> <p>B</p>	 <p>Something you should know.</p>
2.1	Role of anthropogenic and natural disturbance	A	Other published material		
2.2	Local rate of spread with no management	U	No information		
2.3	Recent trend in total area infested within state	C	Observational		
2.4	Innate reproductive potential	C	Other published material		
2.5	Potential for human-caused dispersal	A	Observational		
2.6	Potential for natural long-distance dispersal	C	Observational		
2.7	Other regions invaded	B	Other published material		
				<p>“Distribution”</p> <p>Section 3 Score:</p> <p>D</p>	
3.1	Ecological amplitude	D	Other published material		
3.2	Distribution	D	Observational		

Table 3. Documentation

Question 1.1 Impact on abiotic ecosystem processes	Score: C Doc'n Level: Rev. sci. pub.
Identify ecosystem processes impacted: Alters chemical and physical soil properties.	
Rationale: <i>Mesembryanthemum crystallinum</i> in California takes up salt from soils and deposits it on the surface (Vivrette and Muller 1977). By this mechanism, <i>M. crystallinum</i> in Australia formed a monotypic stand after replacing another non-native species (Kloot 1983).	
Sources of information: See cited literature.	
Question 1.2 Impact on plant community composition, structure, and interactions	Score: C Doc'n Level: Rev. sci. pub.
Identify type of impact or alteration: This species is known to form near-monotypic stands to the near-exclusion of native annuals.	
Rationale: The species' ability to form and maintain monotypic stands has been documented in California (Vivrette and Muller 1977) and Australia (Kloot 1983). The species is still rare and localized in Arizona, however. Low winter rainfall during some years results in low <i>Mesembryanthemum</i> (both <i>M. crystallinum</i> and <i>M. nodiflorum</i>) numbers; otherwise plant community alteration would be more significant.	
Sources of information: See cited literature. Also considered personal observations on Organ Pipe Cactus National Monument by S. Rutman (Plant Ecologist, National Park Service, Organ Pipe Cactus National Monument, Ajo, Arizona, 1995–2003).	
Question 1.3 Impact on higher trophic levels	Score: D Doc'n Level: Obs.
Identify type of impact or alteration: None known	
Rationale: Too rare to have any effects yet. If populations expand, animals that depend on herbaceous forage will be depleted locally. No herbivory has been noted on the Organ Pipe Cactus National Monument populations, perhaps because the high concentration of salts in the epidermal bladder cells make the plant unpalatable.	
Sources of information: Personal observations by S. Rutman on Organ Pipe Cactus National Monument (Plant Ecologist, National Park Service, Organ Pipe Cactus National Monument, Ajo, Arizona, 1995–2003).	
Question 1.4 Impact on genetic integrity	Score: D Doc'n Level: Other pub.
Identify impacts: None.	
Rationale: No native <i>Mesembryanthemum</i> or any other spring-blooming member of the Aizoaceae in the state.	
Sources of information: See Kearney and Peebles (1960). Also considered information from the unpublished Organ Pipe Cactus National Monument plant checklist (2003).	
Question 2.1 Role of anthropogenic and natural disturbance in establishment	Score: A Doc'n Level: Other pub.
Describe role of disturbance: Populations can tolerate and benefit from disturbance, but disturbance is not needed for persistence or expansion.	
Rationale: <i>Mesembryanthemum crystallinum</i> is found on disturbed and undisturbed sites. Unlike native perennials, <i>M. crystallinum</i> quickly establishes on freshly graded roads and road shoulders on Organ Pipe Cactus National Monument (S. Rutman, personal observations, 2003). Observers in California and Sonora, Mexico, noted that it can grow on disturbed areas (Felger 2000, Randall 2000, De Ruff 2003). Early monopolization of disturbed sites and soil modification might be the mechanisms whereby <i>M. crystallinum</i> monopolizes a site.	

Sources of information: See cited literature. Also considered personal observations by S. Rutman on the La Abra Plain at the International Boundary, Organ Pipe Cactus National Monument (Plant Ecologist, National Park Service, Organ Pipe Cactus National Monument, Ajo, Arizona, 1995–2003).

Question 2.2 Local rate of spread with no management *Score: U Doc'n Level: No info.*
Describe rate of spread: Unknown
Rationale: Population size fluctuates with the amount of winter rains. Germination and establishment occur only during favorable rainfall years; this trait would mediate the intrinsic rate of increase.
Sources of information: None.

Question 2.3 Recent trend in total area infested within state *Score: C Doc'n Level: Obs.*
Describe trend: No information on whether other populations of *M. crystallinum* currently exist in Arizona besides the Organ Pipe Cactus National Monument population (however, see question 2.7). The size of the population on the monument fluctuates with the amount of winter rains.
Rationale: In 1995 a large population of *M. crystallinum* in Sonoran, Mexico, extended onto about 0.1 acre on Organ Pipe Cactus National Monument (Rutman, unpublished data, 1995). The population consisted of fewer than 500 plants. The same area was occupied in 2003, but the population was sparse and probably consisted of fewer than 50 plants (Rutman, unpublished data, 2003). No plants were seen in formerly occupied habitat during some years. No other information about the presence or size of populations elsewhere in Arizona is available.
Sources of information: Unpublished data of S. Rutman: (1) Memo to the files, May 12, 1995. Subject: Discovery of two previously unrecorded non-native species in Organ Pipe Cactus National Monument. Organ Pipe Cactus National Monument, Ajo, Arizona. 3 p. (2) 2003. Map of exotic plants on Organ Pipe Cactus National Monument.

Question 2.4 Innate reproductive potential *Score: C Doc'n Level: Other pub.*
Describe key reproductive characteristics: An annual species capable of producing about 15,000 seeds per plant when grown under laboratory conditions (Bohnert Laboratories 2003).
Rationale: *Mesembryanthemum crystallinum* has the potential for rapidly expanding its population.
Sources of information: See cited literature.

Question 2.5 Potential for human-caused dispersal *Score: A Doc'n Level: Obs.*
Identify dispersal mechanisms: Spread along transportation corridors and by off-road vehicles; potential for spread by agricultural activities; transported by undocumented migrants.
Rationale: Seeds are tiny and can easily attach to shoes, clothing and tires. Vehicle traffic along Mexico Highway 2 probably spread the species from California to Arizona. Seeds could be transported by vehicles driving along the South Puerto Blanco Drive, which bisects the population.
Sources of information: Personal observations by S. Rutman on Organ Pipe Cactus National Monument (Plant Ecologist, National Park Service, Organ Pipe Cactus National Monument, Ajo, Arizona, 1995–2003).

Question 2.6 Potential for natural long-distance dispersal *Score: C Doc'n Level: Obs.*
Identify dispersal mechanisms: Wind.
Rationale: Strong winds that accompany summer thunderstorms and ‘dust devils’ could move seeds long distances.
Sources of information: Personal observations by S. Rutman on Organ Pipe Cactus National Monument (Plant Ecologist, National Park Service, Organ Pipe Cactus National Monument, Ajo, Arizona, 1995–2003).

<p>Question 2.7 Other regions invaded</p>	<p>Score: B Doc'n Level: Other pub.</p>
<p>Identify other regions: In North America this species occurs in Arizona (Pima and Yuma Counties), California (coastal strands, marshes, coastal sagescrub; four counties), Missouri, and Pennsylvania, USA and Baja California and Sonora, Mexico (Vivrette 1993, MBG 2003, USDA 2005). Elsewhere in the world it is reported from Peru, Chile, Ecuador, China, and Australia (MBG 2003).</p>	
<p>Rationale: Although <i>M. crystallinum</i>'s current occupied habitat is small, its potential range seems large. Its presence in Missouri and Pennsylvania indicates that it can establish in temperate climates. Potential for occurring at least in areas with saline soils in Mediterranean-type climates and as well as cold and warm deserts. Potential for occurring in playas. It appears to be shade-intolerant, however, and would not grow where plant cover is high.</p>	
<p>Sources of information: See cited literature.</p>	
<p>Question 3.1 Ecological amplitude</p>	<p>Score: D Doc'n Level: Other pub.</p>
<p>Describe ecological amplitude, identifying date of source information and approximate date of introduction to the state, if known: Currently documented from the Sonoran desertscrub, <i>Atriplex polycarpa</i>-<i>Atriplex linearis</i>-<i>Larrea divaricata</i> ssp. <i>tridentata</i> Association. Specimens at the University of Arizona indicate the species was found in Reddington (near Tucson) in 1905 (ARIZ 45200) and Yuma in 1986 (ARIZ 262652). Seeds were commercially available in U.S. trade by 1807 (Mack 1991).</p>	
<p>Rationale: The species probably has not reached its full potential in Arizona. High salinity is the only unifying theme among the habitat types where it occurs. In Arizona it might establish in the Great Basin Desert, Mohave Desert, semi-desert grassland, canals, floodplains and playas, and especially in agricultural areas.</p>	
<p>Sources of information: See cited literature. Current herbarium records can be accessed through SEINet (Southwest Environmental Information Network), Arizona herbaria specimen database (available online at: http://seinet.asu.edu/collections).</p>	
<p>Question 3.2 Distribution</p>	<p>Score: D Doc'n Level: Other pub.</p>
<p>Describe distribution: Only known extant population in Arizona is on hypersaline soils on Organ Pipe Cactus National Monument, Pima County (Rutman, unpublished data, 1995, 2003). Surveys in Arizona should occur in and around agricultural fields, irrigation canals, river floodplains (including saltbush uplands).</p>	
<p>Rationale: Known distribution is a fraction of 1% of Sonoran desertscrub.</p>	
<p>Sources of information: Unpublished data of S. Rutman: (1) Memo to the files, May 12, 1995. Subject: Discovery of two previously unrecorded non-native species in Organ Pipe Cactus National Monument. Organ Pipe Cactus National Monument, Ajo, Arizona. 3 p. (2) 2003. Map of exotic plants on Organ Pipe Cactus National Monument.</p>	

Worksheet A. Reproductive Characteristics

Complete this worksheet to answer Question 2.4.

Reaches reproductive maturity in 2 years or less	<input type="checkbox"/> Yes	<input type="checkbox"/> No	1 pt.
Dense infestations produce >1,000 viable seed per square meter	<input type="checkbox"/> Yes	<input type="checkbox"/> No	2 pt.
Populations of this species produce seeds every year.	<input type="checkbox"/> Yes	<input type="checkbox"/> No	1 pt.
Seed production sustained for 3 or more months within a population annually	<input type="checkbox"/> Yes	<input type="checkbox"/> No	1 pt.
Seeds remain viable in soil for three or more years	<input type="checkbox"/> Yes	<input type="checkbox"/> No	2 pt.
Viable seed produced with <i>both</i> self-pollination and cross-pollination	<input type="checkbox"/> Yes	<input type="checkbox"/> No	1 pt.
Has quickly spreading vegetative structures (rhizomes, roots, etc.) that may root at nodes	<input type="checkbox"/> Yes	<input type="checkbox"/> No	1 pt.
Fragments easily and fragments can become established elsewhere	<input type="checkbox"/> Yes	<input type="checkbox"/> No	2 pt.
Resprouts readily when cut, grazed, or burned	<input type="checkbox"/> Yes	<input type="checkbox"/> No	1 pt.
		Total pts: 3 Total unknowns: 2	
		Score : C	
Note any related traits:			

Worksheet B. Arizona Ecological Types

(*sensu* Brown 1994 and Brown et al. 1998)

Major Ecological Types	Minor Ecological Types	Code*
Dunes	dunes	
Scrublands	Great Basin montane scrub	
	southwestern interior chaparral scrub	
Desertlands	Great Basin desertscrub	
	Mohave desertscrub	
	Chihuahuan desertscrub	
	Sonoran desertscrub	D
Grasslands	alpine and subalpine grassland	
	plains and Great Basin shrub-grassland	
	semi-desert grassland	
Freshwater Systems	lakes, ponds, reservoirs	
	rivers, streams	
Non-Riparian Wetlands	Sonoran wetlands	
	southwestern interior wetlands	
	montane wetlands	
	playas	
Riparian	Sonoran riparian	
	southwestern interior riparian	
	montane riparian	
Woodlands	Great Basin conifer woodland	
	Madrean evergreen woodland	
Forests	Rocky Mountain and Great Basin subalpine conifer forest	
	montane conifer forest	
	Tundra (alpine)	tundra (alpine)

*A means >50% of type occurrences are invaded; B means >20% to 50%; C means >5% to 20%; D means present but ≤5%; U means unknown (unable to estimate percentage of occurrences invaded).

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