

# 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**

<b>Species name</b> (Latin binomial):	<i>Mesembryanthemum nodiflorum</i> L. (USDA 2005)
<b>Synonyms:</b>	<i>Gasoul nodiflorum</i> (L.) Rothm. (USDA 2005)
<b>Common names:</b>	Slenderleaf iceplant, crystal iceplant
<b>Evaluation date</b> (mm/dd/yy):	05/14/03
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<b>Evaluator #2 Name/Title:</b>	
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<b>List committee members:</b>	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
<b>Committee review date:</b>	05/20/03 and 03/01/05
<b>List date:</b>	05/20/03; revised 03/01/05
<b>Re-evaluation date(s):</b>	

**Table 2. Scores, Designations, and Documentation Levels**

Question		Score	Documentation Level	Section Scores	Overall Score & Designations
1.1	Impact on abiotic ecosystem processes	B	Observational	<p><b>“Impact”</b></p> <p><b>Section 1 Score:</b></p> <p><b>B</b></p>	<p><b>“Plant Score”</b></p> <p><b>Overall Score:</b></p> <p><b>Medium</b></p> <p><b>Alert Status:</b></p> <p><b>Alert</b></p>
1.2	Impact on plant community	B	Observational		
1.3	Impact on higher trophic levels	B	Observational		
1.4	Impact on genetic integrity	D	Other published material		
				<p><b>“Invasiveness”</b></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><b>11 pts</b></p> <p><b>Section 2 Score:</b></p> <p><b>B</b></p>	 <p>Information 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	Observational		
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	B	Observational		
2.6	Potential for natural long-distance dispersal	B	Observational		
2.7	Other regions invaded	B	Other published material		
				<p><b>“Distribution”</b></p> <p><b>Section 3 Score:</b></p> <p><b>C</b></p>	
3.1	Ecological amplitude	B	Other published material		
3.2	Distribution	D	Observational		

**Table 3. Documentation**

<b>Question 1.1</b> Impact on abiotic ecosystem processes	<i>Score: B Doc'n Level: Obs.</i>
<b>Identify ecosystem processes impacted:</b> <i>Mesembryanthemum crystallinum</i> in California takes up salt from soils and deposits it on the surface (Vivrette & Muller 1977). By this mechanism, <i>M. crystallinum</i> in Australia formed a monotypic stand after replacing another non-native species (Kloot 1983).	
<b>Rationale:</b> Although there is no published literature documenting that <i>M. nodiflorum</i> changes soil properties, a study in California showed that a related and conspecific species, <i>M. crystallinum</i> , takes up salt from soils and deposits it on the surface (Vivrette and Muller 1977). Concentrated salts decrease establishment, growth and survival rates of some annual and perennial species native to the Sonoran Desert. Surface deposition of salt is the mechanism whereby <i>M. crystallinum</i> formed a monotypic stand in Australia after replacing another non-native species (Kloot 1983).	
<b>Sources of information:</b> See cited literature.	
<b>Question 1.2</b> Impact on plant community composition, structure, and interactions	<i>Score: B Doc'n Level: Obs.</i>
<b>Identify type of impact or alteration:</b> Moderate alteration of plant community composition. Impact would be severe if <i>Mesembryanthemum</i> populations were dense every year.	
<b>Rationale:</b> The ability to form and maintain monotypic stands has been documented for a related species, <i>M. crystallinum</i> , in California (Vivrette and Muller 1977) and Australia (Kloot 1983). Low winter rainfall during some years causes low number of <i>Mesembryanthemum</i> plants; otherwise plant community alteration would be severe. Although monotypic stands have not been witnessed in Arizona, this species dominates the annual spring flora on a five-acre area of Organ Pipe Cactus National Monument to the near-exclusion of native annuals. On other areas of the monument, the species is a common member of the spring annual community. In some areas of Maricopa County, the species is the numerical dominant across thousands of acres. It is possible that the increase in soil surface salinity caused by the occupation of <i>M. nodiflorum</i> has interfered with the re-establishment of native perennials on some sites.	
<b>Sources of information:</b> See cited literature. Also considered unpublished data of Rutman: 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.	
<b>Question 1.3</b> Impact on higher trophic levels	<i>Score: B Doc'n Level: Obs.</i>
<b>Identify type of impact or alteration:</b> Decline or exclusion of animals that are dependent on herbaceous forage or large-seeded plants.	
<b>Rationale:</b> Epidermal bladder cells contain concentrated salt solutions (Bohnert Laboratories 2003), which undoubtedly make the plants unpalatable to native animals. No herbivory has been noted on the Organ Pipe Cactus National Monument populations, despite the plants' succulence. High-density populations of <i>M. nodiflorum</i> are expected to cause the local depletion of animals that depend on herbaceous forage. Low densities during years of low winter rainfall might mitigate the adverse effects on animal populations.	
<b>Sources of information:</b> 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).	
<b>Question 1.4</b> Impact on genetic integrity	<i>Score: D Doc'n Level: Other pub.</i>
<b>Identify impacts:</b> None.	
<b>Rationale:</b> No native <i>Mesembryanthemum</i> or any other spring-blooming member of the Aizoaceae in the state.	

<b>Sources of information:</b> See Kearney and Peebles (1960). Also considered information from the unpublished Organ Pipe Cactus National Monument plant checklist (2003).	
<b>Question 2.1</b> Role of anthropogenic and natural disturbance in establishment <i>Level: Other pub.</i>	<i>Score: A Doc'n</i>
<b>Describe role of disturbance:</b> Populations can tolerate and benefit from disturbance, but disturbance is not needed for persistence or expansion.	
<b>Rationale:</b> <i>Mesembryanthemum nodiflorum</i> grew on freshly graded roads and road shoulders on Organ Pipe Cactus National Monument (S. Rutman, personal observations, 2003). Felger (2000) noted that it grows on disturbed areas Sonora, Mexico. <i>Mesembryanthemum nodiflorum</i> occurs on a five-acre site south of Pozo Salado and another site west of Hocker Well on Organ Pipe Cactus National Monument that has had no anthropogenic disturbance during the last 25 years (S. Rutman, personal observations, 2003).	
<b>Sources of information:</b> See cited literature. Also considered personal observations by S. Rutman (Plant Ecologist, National Park Service, Organ Pipe Cactus National Monument, observations of <i>M. nodiflorum</i> and map of population near Pozo Salado produced with a Global Positioning System, International Boundary, Organ Pipe Cactus National Monument, 2003).	
<b>Question 2.2</b> Local rate of spread with no management	<i>Score: U Doc'n Level: Obs.</i>
<b>Describe rate of spread:</b> Unknown. Population sizes fluctuate with the amount of winter rains. Germination and establishment occur only during favorable rainfall years; this trait would mediate the intrinsic rate of increase.	
<b>Rationale:</b> Population on Organ Pipe Cactus National Monument has not been documented long enough to assess the species' potential for spread.	
<b>Sources of information:</b> None	
<b>Question 2.3</b> Recent trend in total area infested within state	<i>Score: C Doc'n Level: Obs.</i>
<b>Describe trend:</b> No information is available about the location or size of most populations.	
<b>Rationale:</b> In 1995 a large population of <i>M. nodiflorum</i> in Sonora, Mexico, extended onto dozens of acres in three or four locations on Organ Pipe Cactus National Monument (Rutman, unpublished data, 1995). At the international boundary near Pozo Salado in 1995, the <i>M. nodiflorum</i> population on Organ Pipe occupied about five acres and consisted of more than 20,000 plants. In 2003 the population occupied the same area but consisted of a few thousand plants (Rutman, unpublished data, 2003). No plants were seen during some intervening years. Trend in total area infested within Arizona is unknown but the amount of unoccupied habitat is substantial.	
<b>Sources of information:</b> 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.	
<b>Question 2.4</b> Innate reproductive potential	<i>Score: C Doc'n Level: Other pub.</i>
<b>Describe key reproductive characteristics:</b> <i>Mesembryanthemum nodiflorum</i> is an annual that can produce thousands of seeds per year. A related species, <i>M. crystallinum</i> , is capable of producing about 15,000 seeds per plant when grown under laboratory conditions (Bohnert Laboratories 2003).	
<b>Rationale:</b> <i>Mesembryanthemum nodiflorum</i> has the potential for rapidly expanding its population. Using the scoring form, this species would score as having 'low reproductive potential' (3 points), but additional research on the reproductive potential of this species could justify a higher score.	
<b>Sources of information:</b> See cited literature.	

<b>Question 2.5</b> Potential for human-caused dispersal	<i>Score: B Doc'n Level: Obs.</i>
<b>Identify dispersal mechanisms:</b> Spread along transportation corridors and by off-road vehicles; potential for spread by agricultural activities; transported by undocumented migrants.	
<b>Rationale:</b> 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. Vehicle driving along the South Puerto Blanco Drive, which bisects the population, could transport seeds. Hikers—including undocumented migrants and smugglers—probably transport seeds on shoes and clothing. Vehicle traffic along illegal roads created by smugglers and illegal migrants could transport seeds almost anywhere.	
<b>Sources of information:</b> 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).	

<b>Question 2.6</b> Potential for natural long-distance dispersal	<i>Score: B Doc'n Level: Obs.</i>
<b>Identify dispersal mechanisms:</b> Wind.	
<b>Rationale:</b> Strong winds that accompany summer thunderstorms and ‘dust devils’ could move seeds long distances.	
<b>Sources of information:</b> 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).	

<b>Question 2.7</b> Other regions invaded	<i>Score: B Doc'n Level: Other pub.</i>
<b>Identify other regions:</b> In North America this species occurs in Arizona (Pima and Maricopa Counties), California (coastal bluffs, margins of saline wetlands; four counties), and Oregon, USA and Baja California and Sonora, Mexico (Vivrette 1993, MBG 2003, USDA 2005). Elsewhere in the world it is reported from Chile and Australia (MBG 2004).	
<b>Rationale:</b> The amount of unoccupied habitat is difficult to assess given the existing published information. Potential for occurring at least in areas with saline soils in Mediterranean-type climates and as well as warm deserts. It could invade inter-dunal sloughs, playas, agricultural areas, desert saltbush associations, and the perimeter of cienegas and other waters. It appears to be shade-intolerant, however, and would not grow where plant cover is high.	
<b>Sources of information:</b> See cited literature.	

<b>Question 3.1</b> Ecological amplitude	<i>Score: B Doc'n Level: Other pub.</i>
<b>Describe ecological amplitude, identifying date of source information and approximate date of introduction to the state, if known:</b> Currently documented from the Sonoran desertscrub, <i>Atriplex polycarpa-Atriplex linearis-Larrea divaricata</i> ssp. <i>tridentata</i> Association. Earliest specimens at the University of Arizona were collected in 1983, indicating the species is a recent arrival to the state. In contrast, the species was collected as early as 1935 in California (Shreve 7427, no ARIZ accession number). Hamilton’s 1983 collection (ARIZ 241065) is the first documentation of a population in Maricopa County that covered many square miles in 1995 (Rutman, unpublished data, 1995).	
<b>Rationale:</b> The species probably has not reached its full potential in Arizona. In Arizona it might establish on saline soils in the Great Basin Desert, Mohave Desert, semi-desert grassland, canals, riverbanks, floodplains and playas, and especially in agricultural areas.	
<b>Sources of information:</b> See unpublished data of Rutman. 1995. Summary of label information on herbarium specimens at the University of Arizona (ARIZ), July 1995, and related notes. Also see Mack (1991). Current herbarium records can be accessed through SEINet (Southwest Environmental Information Network), Arizona herbaria specimen database (available online at: <a href="http://seinet.asu.edu/collections">http://seinet.asu.edu/collections</a> ).	

<b>Question 3.2</b> Distribution	Score: <b>D</b> Doc'n Level: <b>Obs.</b>
<b>Describe distribution:</b> Distribution is poorly known. Three extant 'populations' are known in Arizona: (1) Organ Pipe Cactus National Monument, Pima County (Rutman, unpublished data, 1995, 2003), (2) several square miles in each direction from the intersection of Interstate 10 and Maricopa Road south of Phoenix, and (3) along irrigation ditches serving an alfalfa field to the north of the Gila River and west of State Route 85. Surveys in Arizona should occur in and around agricultural fields and irrigation canals as well as river floodplains, saltbush uplands, playas and Pleistocene surfaces.	
<b>Rationale:</b> Known distribution is less than <5% of Sonoran desertscrub.	
<b>Sources of information:</b> 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.	

**Worksheet A. Reproductive Characteristics**

Complete this worksheet to answer Question 2.4.

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

**Worksheet B. Arizona Ecological Types**

(sensu Brown 1994 and Brown et al. 1998)

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