

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>Euryops multifidus</i> (Thunb.) DC. (USDA 2005)
Synonyms:	<i>Euryops subcarnosus</i> DC. ssp. <i>vulgaris</i> B. Nord (USDA 2005)
Common names:	Sweet resinbush, hawk’s eye
Evaluation date (mm/dd/yy):	09/17/04
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Committee review date:	09/24/04 and 03/01/05
List date:	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	A	Other published material	<p>“Impact”</p> <p>Section 1 Score:</p> <p>A</p>	<p>“Plant Score”</p> <p>Overall Score:</p> <p>High</p> <p>Alert Status:</p> <p>None</p>
1.2	Impact on plant community	A	Other published material		
1.3	Impact on higher trophic levels	A	Other published material		
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>13 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	B	Observational		
2.3	Recent trend in total area infested within state	C	Other published material		
2.4	Innate reproductive potential	A	Reviewed scientific publication		
2.5	Potential for human-caused dispersal	B	Other published material		
2.6	Potential for natural long-distance dispersal	B	Other published material		
2.7	Other regions invaded	D	Other published material		
				<p>“Distribution”</p> <p>Section 3 Score:</p> <p>B</p>	
3.1	Ecological amplitude	A	Other published material		
3.2	Distribution	D	Other published material		

Red Flag Annotation

Only about 10 known populations of *Euryops multifidus* occur in Arizona. Those populations have been mapped and most locations have active control efforts. Vegetation survey projects should be aware that undocumented populations may exist on historic Civilian Conservation Corps project sites.

Table 3. Documentation

Question 1.1 Impact on abiotic ecosystem processes	<i>Score: A Doc'n Level: Other pub.</i>
Identify ecosystem processes impacted: Increased soil erosion: Frye Mesa site has lost the A horizon.	
Rationale: <i>Euryops multifidus</i> develops monoculture stands; dormant during initial monsoon events which leave soil unprotected and eliminates other plants in the inter-spaces between shrubs. Alters (decreases) fire regime, reduces soil-water infiltration, adversely impact hydrologic processes, and adversely impacts the ability of a site to support the identified plant community.	
Sources of information: See Pierson and McAuliffe (1995) and McAuliffe (2000). Also considered personal communications with K. Fisher (District Conservationist, U.S. Department of Agriculture, Natural Resources Conservation Service, Safford, Arizona, 2004) and D. Robinett (Rangeland Management Specialist, U.S. Department of Agriculture, Natural Resources Conservation Service, Tucson, Arizona, 2004).	
Question 1.2 Impact on plant community composition, structure, and interactions	<i>Score: A Doc'n Level: Other pub.</i>
Identify type of impact or alteration: Change in plant community, composition, and structure.	
Rationale: <i>Euryops multifidus</i> out competes all native vegetation, establishes monocultures, and keeps native plants (such as tobosa grass, ocotillo, mesquite) from re-establishing on the site. Alleopathic properties were evaluated by McAuliffe and Pierson with no evidence of alleopathy found. Endangered, threatened, and otherwise rare species could be eliminated. Pima pineapple cactus (<i>Coryphantha sheerii</i> Muehlenph. L.D. Benson var. <i>robustispina</i> L.D. Benson) and <i>Sophora arizonica</i> S. Wats are species that are known to occur on or near <i>E. multifidus</i> sites.	
Sources of information: See Pierson and McAuliffe (1995), McAuliffe (2000), and Howery et al. (2003).	
Question 1.3 Impact on higher trophic levels	<i>Score: A Doc'n Level: Other pub.</i>
Identify type of impact or alteration: <i>Euryops multifidus</i> displaces native vegetation and establishes monocultures that would have negative effects on forage for livestock and habitat for wildlife. Sweet resinbush is not know to be grazed by any herbivores. It is used by insects and bees due to its habit of flowering during the winter months in response to adequate winter precipitation (B. Munda, personal observation, 2004).	
Rationale: Sweet resinbush out competes native plants, keeps native plants for establishing, and is an unpalatable plant to domestic and wild herbivores.	
Sources of information: See McAuliffe (2000) and Howery et al. (2003). Also considered personal observations by B. Munda (Plant Materials Specialist, U.S. Department of Agriculture, Natural Resources Conservation Service, Tucson, Arizona, 2004).	
Question 1.4 Impact on genetic integrity	<i>Score: D Doc'n Level: Other pub.</i>
Identify impacts: No known impacts on genetic integrity.	
Rationale: Only one other introduced species (<i>Euryops chrysanthemoides</i> (DC.) B. Nordenstam) from the genus <i>Euryops</i> is known to occur in southern Florida. It is not known if they have the ability to cross.	
Sources of information: Kearney and Peebles (1960) and USDA (2005).	
Question 2.1 Role of anthropogenic and natural disturbance in establishment	<i>Score: A Doc'n Level: Other pub.</i>
Describe role of disturbance: Disturbance is not necessary for sweet resinbush to establish and spread.	
Rationale: Sweet resinbush invades intact plant communities such as semi-arid grasslands and eventually forms uninterrupted monocultures which exclude native grasses, shrubs, and succulents.	

Sources of information: See Pierson and McAuliffe (1995) and Howery et al. (2003).	
Question 2.2 Local rate of spread with no management	<i>Score: B Doc'n Level: Obs.</i>
Describe rate of spread: Has the potential to increase dramatically with no management.	
Rationale: Frye Mesa population spread slowly the first 40 years but exploded since the 1970s, encroaching on thousands of acres of rangeland.	
Sources of information: Personal communication with C.Duncan (Range Staff Officer, U.S. Department of Agriculture, Forest Service, Safford Ranger District, Safford, Arizona, 1998).	
Question 2.3 Recent trend in total area infested within state	<i>Score: C Doc'n Level: Other pub.</i>
Describe trend: Locations under management are stable or decreasing. However, managed sites need follow up efforts every other year to control sprouts and or new plants.	
Rationale: Based on the best available information, sweet resinbush is not establishing in new locations. But it does spread, in the area of infestation, where no management is being applied.	
Sources of information: See Howery et al. (2003). Also considered information from the year 2000 Management Plan for the Sweet Resinbush and Karoo Bush Weed Management Area.	
Question 2.4 Innate reproductive potential	<i>Score: A Doc'n Level: Rev. sci. pub.</i>
Describe key reproductive characteristics: <i>Euryops multifidus</i> can reach reproductive maturity in two years or less. Seed appears to remain viable for over two years. It does not reproduce vegetatively.	
Rationale: Plant mating system is not known. Plants can flower and produce seeds twice a year with adequate winter/spring and summer moisture. If the plant is mechanically controlled it is necessary to cut the plant below the crown (at or below the soil surface) to keep the plant from sprouting from the crown.	
Sources of Information: See Nordenstam (1966), Pierson and McAuliffe (1995), and Parker and Hydock (2004).	
Question 2.5 Potential for human-caused dispersal	<i>Score: B Doc'n Level: Other pub.</i>
Identify dispersal mechanisms: Frye Mesa and Sabino Canyon sites are near high use recreation areas. Seeds (achenes) are covered with white hairs that can attach to clothing, animal fur, and vehicles.	
Rationale: <i>Euryops multifidus</i> produces seed/achenes that are covered with white hairs. The hair can readily attach to clothing, animal fur, and to vehicle tires and be transported from the infestation site.	
Sources of information: See Nordenstam (1966, 1968), Pierson and McAuliffe (1995), and Parker and Hydock (2004).	
Question 2.6 Potential for natural long-distance dispersal	<i>Score: B Doc'n Level: Other pub.</i>
Identify dispersal mechanisms: Hairs on achenes can be transported by wind, animal fur and water.	
Rationale: The hairs on the achenes appear to be able to attach to animal fur and light enough to potentially be moved by wind. Water appears to also move seed during sheet flow. Seeds have been seen to collect in "debris dams" after rainfall events. The hairs on the achenes appear to have mucilaginous characteristics when soaked with water. This characteristic may serve to enhance germination with limited water.	
Sources of information: See Nordenstam (1966, 1968), Pierson and McAuliffe (1995), and Parker and Hydock (2004).	
Question 2.7 Other regions invaded	<i>Score: D Doc'n Level: Other pub.</i>
Identify other regions: No other regions are known to have sweet resin bush.	
Rationale: Pierson and McAuliffe (1995) looked at herbarium specimens in Arizona, California, New Mexico, and Texas and found no specimens outside of Arizona.	

Sources of information: See cited literature. Also see USDA (1934–2002).

Question 3.1 Ecological amplitude *Score: A Doc'n Level: Other pub.*

Describe ecological amplitude, identifying date of source information and approximate date of introduction to the state, if known: Three major types (Scrublands, Desertlands, and Grasslands) and three minor types (southwestern interior chaparral scrub, Sonoran desertscrub, and semi-desert grassland).

Rationale: Eight known sites were planted to *E. multifidus* during the 1930s in the above ecological types. Elevation range for these types is between 2,300 to 4,900 feet. Soil types range from sandy loam to clay loam with or without gravel, cobbles or large rocks; the species does well on granitic soils. Reproduction method is not known (cross- or self-pollinated). Germination appears to occur in late fall, winter, or spring with adequate cool season precipitation. Seedlings are commonly found under the mature plants but are also found in areas between mature plants. The date for introduction was February 1935. During flowering *E. multifidus* produces an abundance of pollen which can be a problem to those people who suffer from pollen type allergies.

Sources of information: See USDA (1934–2002), Pierson and McAuliffe (1995), and McAuliffe (2000). Also considered information from the year 2000 Management Plan for the Sweet Resinbush and Karoo Bush Weed Management Area.

Question 3.2 Distribution *Score: D Doc'n Level: Other pub.*

Describe distribution: Known sites are: Sabino Canyon (U.S. Forest Service Ranger Station and Fenster School), Six-shooter Canyon (Globe), Punkin Center, Montezuma School (Cottonwood), Marijilda Canyon (Mt. Graham), Gravelly Ridge (SRER), Boyce-Thompson (observational planting), Oak Flats (Superior), Miami cemetery (Hwy 60, Miami), Frye Mesa (largest site) near Safford, Arizona.

Rationale: See above. Sites have been inspected, mapped, and most are under management. The Tonto National Forest sites (Punkin Center, Oak Flats, and Miami cemetery) are mapped and proposed for management.

Sources of information: USDA (1934–2002) and the year 2000 Management Plan for the Sweet Resinbush and Karoo Bush Weed Management Area.

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 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.
Total pts: 6 Total unknowns: 2			
Score : A			

Note any related traits: Seeds have fine hairs that become mucilaginous when wet. Germination tests have shown this species has a low germination percentage (below 20%).

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	D
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	D
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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