

Part IV. Plant Assessment Form

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

Electronic version, February 28, 2003

Table 1. Species and Evaluator Information

Species name (Latin binomial):	Kochia scoparia (L.) Schrad.
Synonyms:	Bassia scoparia, Bassia sieversiana, Chenopodium scoparia, Kochia alata, Kochia parodii, Kochia sieversiana, Kochia trichophila, Kochia virgata
Common names:	kochia, belvedere, belvedere-cypress, fireball, fireweed, Mexican burningbush, mock cypress
Evaluation date (mm/dd/yy):	3/17/05
Evaluator #1 Name/Title:	Elizabeth Brusati, project manager
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Section below for list committee use—please leave blank

List committee members:	Jake Sigg, Peter Warner, Bob Case, John Knapp, Elizabeth Brusati
Committee review date:	7/8/05
List date:	enter text here
Re-evaluation date(s):	enter text here

General comments on this assessment:

enter text here

Table 2. Criteria, Section, and Overall Scores

1.1	Impact on abiotic ecosystem processes	B	Rev'd, Sci. Pub'n
1.2	Impact on plant community	B	Rev'd, Sci. Pub'n
1.3	Impact on higher trophic levels	C	Rev'd, Sci. Pub'n
1.4	Impact on genetic integrity	D	Other Pub. Mat'l

Impact

Enter four characters from Q1.1-1.4 below:

BBCD

Using matrix, determine score and enter below:

B

2.1	Role of anthropogenic and natural disturbance	C (1 pt)	Rev'd, Sci. Pub'n
2.2	Local rate of spread with no management	B (2 pts)	Observational
2.3	Recent trend in total area infested within state	C (1 pt)	Other Pub. Mat'l
2.4	Innate reproductive potential Wksht A	A (3 pts)	Rev'd, Sci. Pub'n
2.5	Potential for human-caused dispersal	D (0 pts)	Other Pub. Mat'l
2.6	Potential for natural long-distance dispersal	B (2 pts)	Other Pub. Mat'l
2.7	Other regions invaded	C (1 pt)	Other Pub. Mat'l

Invasiveness

Enter the sum total of all points for Q2.1-2.7 below:

10

Use matrix to determine score and enter below:

C

Plant Score

Using matrix, determine Overall Score and Alert Status from the three section scores and enter below:

Low

No Alert

3.1	Ecological amplitude/Range	B	Other Pub. Mat'l
3.2	Distribution/Peak frequency Wksht C	C	Observational

Distribution

Using matrix, determine score and enter below:

B

Table 3. Documentation

<p>Question 1.1 Impact on abiotic ecosystem processes</p>	<p>B Rev'd, Sci. Pub'n back</p>
<p>Identify ecosystem processes impacted: Can create positive feedbacks between nutrient levels and plants. Much more common to other western states than to California. Densities there much higher as well. May not cause the same impact in California.</p>	
<p>Rationale: Kochia invaded a site in Colorado that had N and water additions. Twenty years after additions had stopped, Kochia still dominated the community. N availability in soils under Kochia may be maintained by tissue chemistry favorable to microbial decomposition and release of nitrogen. Soils under Kochia had less plant-induced heterogeneity in nutrients, greater C and N mineralization, and higher levels of microbial biomass than soils associated with other species (1).</p>	
<p>Sources of information: 1. Vinton, M. A. and I. C. Burke. 1995. Interactions between individual plant species and soil nutrient status in shortgrass steppe. Ecology 76(4): 1116-1133.</p>	
<p>Question 1.2 Impact on plant community composition, structure, and interactions</p>	<p>B Rev'd, Sci. Pub'n back</p>
<p>Identify type of impact or alteration: Highly competitive in nutrient-rich soils, possible allelopathic effects on other species. Can maintain dominance even after nutrient additions stop (1). Litter has allelopathic properties that affect crop plants and kochia seedlings (2). Was the pioneer species in a mine rehabilitation site but was quickly replaced by grasses. Kochia appears to have acted as a nurse crop. Although it is allelopathic, the compounds appear to create autotoxicity that hastens its own demise (3).</p>	
<p>Rationale: enter text here</p>	
<p>Sources of information: 1. Vinton and Burke 1995. 2. DiTomaso, J., and E. Healy. in prep. Weeds of California and Other Western States 3. Wali, M. K. 1999. Ecological succession and the rehabilitation of disturbed terrestrial ecosystems. Plant & Soil 213(1-2): 195-220.</p>	
<p>Question 1.3 Impact on higher trophic levels</p>	<p>C Rev'd, Sci. Pub'n back</p>
<p>Identify type of impact or alteration: Causes hepatotoxicity with photosensitization, renal disease, and polioencephalomalacia to livestock. However, still used as a forage crop (1). No information on effects on wildlife. Likely to have some impact if wildlife is forced to eat it.</p>	
<p>Rationale: enter text here</p>	
<p>Sources of information: Burrows, G. E. 1993. Kochia scoparia: A noxious weed pest, livestock toxicant or remarkable livestock feed. Toxicon 31(2): 116.</p>	
<p>Question 1.4 Impact on genetic integrity</p>	<p>D Other Pub. Mat'l back</p>
<p>Identify impacts: Two native Kochia species, but no information on hybridization. Not expected to hybridize as the two native species are found in the desert.</p>	

Rationale: enter text here	
Sources of information: Hickman, J. C. (ed.) 1993. The Jepson Manual, Higher Plants of California. University of California Press. Berkeley, CA	
Question 2.1 Role of anthropogenic and natural disturbance in establishment	C Rev'd, Sci. Pub'n back
Describe role of disturbance: Inhabits disturbed areas (1). Pioneer species (2). In Colorado, was present in both logged forest and undisturbed, protected ponderosa-pine/Douglas fir forest (3). In California, however, kochia is not often found in wildland areas. It is primarily restricted to disturbed sites, roadsides and croplands.	
Rationale: enter text here	
Sources of information: 1. DiTomaso and Healy in prep. 2. Wali 1999 3. Fornwalt, P. J., M. R. Kaufmann, L. S. Huckaby, J. M. Stoker, and T. J. Stohlgren. 2003. Non-native plant invasions in managed and protected ponderosa pine/Douglas-fir forests of the Colorado Front Range. Forest Ecology & Management 177(1-3): 515-527.	
Question 2.2 Local rate of spread with no management	B Observational back
Describe rate of spread: Appears to move but not rapidly.	
Rationale: enter text here	
Sources of information: DiTomaso, observational.	
Question 2.3 Recent trend in total area infested within state	C Other Pub. Mat'l back
Describe trend: Expanding range in California (1).	
Rationale: enter text here	
Sources of information: 1. DiTomaso and Healy in prep.	
Question 2.4 Innate reproductive potential	A Rev'd, Sci. Pub'n back
Describe key reproductive characteristics: Summer annual (1). Produces 12,000 seeds per plant (2). Seeds on soil surface survive 1-2 years (1) but buried seeds can remain viable for 36 months or more(1,3). Mowed or grazed plants resprout from base (1).	

Rationale: enter text here	
Sources of information: 1. DiTomaso, J., and E. Healy. in prep. Weeds of California and Other Western States. 2. Thompson, C. R., D. C. Thill, and B. Shafii. 1994. Germination characteristics of sulfonylurea-resistant and -susceptible kochia (<i>Kochia scoparia</i>). Weed Science 42: 50-56. 3. Zorner, P. S., R. L. Zimdahl, and E. E. Schweizer. 1984. Effect of depth and duration of seed burial on kochia (<i>Kochia scoparia</i>). Weed Science 32(5): 602-607.	
Question 2.5 Potential for human-caused dispersal	D Other Pub. Mat'l back
Identify dispersal mechanisms: Used to be planted for livestock forage and as an ornamental, but no longer (1). Recommended as an annual for cool, moist conditions, but not in California (2).	
Rationale: enter text here	
Sources of information: 1. DiTomaso and Healy in prep 2. University of Illinois Extension. Gardening with Annuals - Plants for Specific Uses. Accessed on-line 3/17/05, Available: http://www.urbanext.uiuc.edu/annuals/uses.html#8 .	
Question 2.6 Potential for natural long-distance dispersal	B Other Pub. Mat'l back
Identify dispersal mechanisms: Senesced plants break off at the base and scatter fruits as they tumble in the wind (1, 2). 99.9% of shed pollen was estimated to be deposited within 154m of the source (3). Some seed may move long distances by this tumble action.	
Rationale:	
Sources of information: 1. DiTomaso and Healy in prep. 2. Boerboom, C. 1993. Kochia. Pacific Northwest Extension Publication. PNW460 3. Mulugeta D., B. D. Maxwell, P. K. Fay, and W. E. Dyer. 1994. Kochia (<i>Kochia scoparia</i>) Pollen Dispersion, Viability and Germination. Weed Science 42: 548-552.	
Question 2.7 Other regions invaded	C Other Pub. Mat'l back
Identify other regions: Native to Asia. Present in most contiguous US states except possibly Maryland and a few southern states. Common in northern plains and listed as a noxious weed in Colorado, Minnesota, Washington, and Oregon (1). Introduced to the US as an ornamental in the early 1900's (2).	
Rationale: Scoring as C because already widespread in California.	
Sources of information: 1. DiTomaso and Healy in prep. 2. Khan, M. A., B. Gul, and D. J. Weber. 2001. Influence of salinity and temperature on the germination of <i>Kochia scoparia</i> . Wetlands Ecology and Management. 9:483-489.	

Question 3.1 Ecological amplitude/Range	B Other Pub. Mat'l back
Describe ecological amplitude, identifying date of source information and approximate date of introduction to the state, if known: Inhabits roadsides, fields, disturbed places, crop fields. Tolerates alkaline or saline soil and drought. Central Valley, San Francisco Bay region, Central Coast, South Coast, Mojave and Sonoran deserts, Great Basin, to 1500m (1). Can maintain high productivity at salinity up to 40% of seawater (2).	
Rationale: enter text here	
Sources of information: 1. DiTomaso and Healy in prep 2. Burrows 1993.	
Question 3.2 Distribution/Peak frequency	C Observational back
Describe distribution: enter text here	
Rationale: enter text here	
Sources of information: DiTomaso, observational.	

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Reaches reproductive maturity in 2 years or less	Yes: 1 pt
Dense infestations produce >1,000 viable seed per square meter	Yes: 2 pts
Populations of this species produce seeds every year.	Yes: 1 pt
Seed production sustained over 3 or more months within a population annually	No: 0 pt
Seeds remain viable in soil for three or more years	Yes: 2 pts
Viable seed produced with <i>both</i> self-pollination and cross-pollination	Unknown: 0 pts
Has quickly spreading vegetative structures (rhizomes, roots, etc.) that may root at nodes	No: 0 pt
Fragments easily and fragments can become established elsewhere	No: 0 pts
Resprouts readily when cut, grazed, or burned	No: 0 pt
	6 pts 1 unknown
	A (6+ pts)
Note any related traits: enter text here	

Worksheet C - California Ecological Types

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(*sensu* Holland 1986)

Major Ecological Types	Minor Ecological Types	Code*
Marine Systems	marine systems	score
Freshwater and Estuarine Aquatic Systems	lakes, ponds, reservoirs	score
	rivers, streams, canals	score
	estuaries	score
Dunes	coastal	score
	desert	score
	interior	score
Scrub and Chaparral	coastal bluff scrub	score
	coastal scrub	D. presen
	Sonoran desert scrub	C. 5-20%
	Mojavean desert scrub (incl. Joshua tree woodland)	score
	Great Basin scrub	D. presen
	chenopod scrub	D. presen
	montane dwarf scrub	score
	Upper Sonoran subshrub scrub	D. presen
	chaparral	D. presen
Grasslands, Vernal Pools, Meadows, and other Herb Communities	coastal prairie	D. presen
	valley and foothill grassland	D. presen
	Great Basin grassland	D. presen
	vernal pool	score
	meadow and seep	score
	alkali playa	D. presen
	pebble plain	score
Bog and Marsh	bog and fen	score
	marsh and swamp	score
Riparian and Bottomland	riparian forest	score
	riparian woodland	score
	riparian scrub (incl. desert washes)	score
Woodland	cismontane woodland	score
	piñon and juniper woodland	score
	Sonoran thorn woodland	score
Forest	broadleaved upland forest	score
	North Coast coniferous forest	score
	closed cone coniferous forest	score
	lower montane coniferous forest	score
	upper montane coniferous forest	score
	subalpine coniferous forest	score
Alpine Habitats	alpine boulder and rock field	score
	alpine dwarf scrub	score

* 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).