

# Part IV. Plant Assessment Form

For use with “Criteria for Categorizing Invasive Non-Native Plants that Threaten Colorado’s Wildlands and Agriculture”  
By the Colorado Noxious Weed Advisory Committee

Electronic version: December 4, 2008

**Table 1. Species and Evaluator Information**

<b>Species name</b> (Latin binomial):	Lycium barbarum L.
<b>Synonyms:</b>	L ferocissimum Miers, L halimifolium Mill, L europaeum, L lanceolatum Veilard, L megistocarpum Dunal,
<b>Common names:</b>	Matrimony vine, Wolfberry, African boxthorn, Chinese wolfberry, Mede berry, Barbary matrimony vine, Bocksdorn, Duke of Argyll's tea tree, Murali, Red madlar, Tibetan goji, Himalayan goji, Goji berry, Ningxia wolfberry
<b>Evaluation date</b> (mm/dd/yy):	04/19/10
<b>Evaluator #1 Name/Title:</b>	Ryan Edwards/ Graduate research assistant
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<b>Evaluator #2 Name/Title:</b>	enter text here
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<b>Address:</b>	enter text here

Section below for list committee use—please leave blank

<b>List committee members:</b>	enter text here
<b>Committee review date:</b>	enter text here
<b>List date:</b>	enter text here
<b>Re-evaluation date(s):</b>	enter text here

**General comments on this assessment:**

Matrimony vine is a cultivated shrub species that is harvested for its edible fruit, known as Goji berries. Infestations of Matrimony vine have been linked to instances of dispersal by birds, and plants escaping cultivation into surrounding habitats. There is much confusion in the literature into Matrimony vine, starting with the binomial nomenclature and the plethora of common names for this species. Reports linking Matrimony vine to an invasive species come from Australia, where matrimony vine (known there as African box thorn) has escaped from cultivation and windbreaks where they were planted. Now, infestations of African box thorn stretch across wide areas of the Australian outback, where it actively pushes out species and forms dense stands which limit animals from foraging.

Matrimony vine is a deciduous shrub that produces multiple purple flowers, which individually develop into small red berries. Plants produce a large crop of the edible fruits which are actively fed upon by birds and small mammals, offering an avenue for the dispersal of this species.

Matrimony was first reported in 1935 in Colorado. Because it is fed upon by birds, and apparently has been planted as a horticultural species at many locations around the state, populations should be monitored to determine if this species is truly invasive in Colorado and it should go on a watch list.

**Table 2. Criteria, Section, and Overall Scores**

<a href="#">1.1</a>	Impact on abiotic ecosystem processes	<b>D</b>	<b>No Information</b>	<p><b>Impact</b></p> <p><i>Enter four characters from Q1.1-1.4 below:</i></p> <p><b>DBBD</b></p> <p><i>Using matrix, determine score and enter below:</i></p> <p><b>B</b></p>	<p><b>Wildlands Plant Score</b></p> <p><i>Using matrix, determine Overall Score and Alert Status from the first, second, and third section scores and enter below:</i></p> <p><b>Limited No Alert</b></p>
<a href="#">1.2</a>	Impact on plant community	<b>B</b>	<b>Other Pub. Mat'l</b>		
<a href="#">1.3</a>	Impact on higher trophic levels	<b>B</b>	<b>Other Pub. Mat'l</b>		
<a href="#">1.4</a>	Impact on genetic integrity	<b>D</b>	<b>No Information</b>		
<a href="#">2.1</a>	Role of anthropogenic and natural disturbance	<b>D (0 pts)</b>	<b>Observational</b>	<p><b>Invasiveness</b></p> <p><i>Enter the sum total of all points for Q2.1-2.7 below:</i></p> <p><b>10</b></p> <p><i>Use matrix to determine score and enter below:</i></p> <p><b>C</b></p>	
<a href="#">2.2</a>	Local rate of spread with no management	<b>B (2 pts)</b>	<b>Other Pub. Mat'l</b>		
<a href="#">2.3</a>	Recent trend in total area infested within state	<b>B (2 pts)</b>	<b>Other Pub. Mat'l</b>		
<a href="#">2.4</a>	Innate reproductive potential <a href="#">Wksht A</a>	<b>U (0 pts)</b>	<b>Other Pub. Mat'l</b>		
<a href="#">2.5</a>	Potential for human-caused dispersal	<b>C (1 pt)</b>	<b>Anecdotal</b>		
<a href="#">2.6</a>	Potential for natural long-distance dispersal	<b>A (3 pts)</b>	<b>Other Pub. Mat'l</b>		
<a href="#">2.7</a>	Other regions invaded	<b>B (2 pts)</b>	<b>Other Pub. Mat'l</b>		
<a href="#">3.1</a>	Ecological amplitude/Range	<b>A</b>	<b>Observational</b>	<p><b>Distribution</b></p> <p><i>Using matrix, determine score and enter below:</i></p> <p><b>B</b></p>	
<a href="#">3.2</a>	Distribution/Peak frequency <a href="#">Wrksht B</a>	<b>D</b>	<b>Observational</b>		

<a href="#">4.1</a>	Poisonous to livestock	<b>B (2pts)</b>	<b>Other Pub. Mat'l</b>
<a href="#">4.2</a>	Detrimental to economic crops	<b>D (0 pts)</b>	<b>Other Pub. Mat'l</b>
<a href="#">4.3</a>	Detrimental to management of agricultural system, rangeland and pasture	<b>B (2 pts)</b>	<b>Other Pub. Mat'l</b>
<a href="#">4.4</a>	Human impacts <a href="#">Wrksht C</a>	<b>U (0 pts)</b>	<b>Other Pub. Mat'l</b>

### **Agricultural / Human Impact**

*Enter the sum total of all points for Q4.1-4.4 below:*

**4**

*Use matrix to determine score and enter below:*

**C**

### **Agricultural Plant Score**

*Using matrix, determine Overall Score and Alert Status from the second, third and fourth section scores and enter below:*

**Limited**

**No Alert**

**Table 3. Documentation**

<b>Question 1.1</b> Impact on abiotic ecosystem processes	D No Information <a href="#">back</a>
Identify ecosystem processes impacted: There are no reports in the literature mentioning abiotic changes to the surrounding landscape due to Matrimony vine.	
Rationale: Reports in the literature are lacking in the overall effects of Matrimony vine on the surrounding abiotic ecosystem, and should be further researched.	
Sources of information: enter text here	
<b>Question 1.2</b> Impact on plant community composition, structure, and interactions	B Other Pub. Mat'l <a href="#">back</a>
Identify type of impact or alteration: Matrimony vine can form dense stands of hedge-type plants that if unchecked, can reach upwards of 20 feet tall (1).	
Rationale: In Australia, where Matrimony vine is known as African box thorn, the plants were originally planted as windbreaks, and have subsequently escaped. Also, plants were grown and cultivated for medicinal purposes, and subsequently escaped from cultivation as well. Reports from Australia indicate that African box thorn stands can become very thick, and can exclude surrounding wildlife from specific areas.	
Sources of information: (1) Parsons, W.T., and Cuthbertson, E.G. 2001. Noxious weeds of Australia: African Box Thorn. CISRO publishing. Pg. 601-603.	
<b>Question 1.3</b> Impact on higher trophic levels	B Other Pub. Mat'l <a href="#">back</a>
Identify type of impact or alteration: Dense stands of Matrimony vine can exclude farm animals and poultry from areas (1). Matrimony vine is also suspected of causing neurological poisonings in livestock (2). However, Matrimony vine produces a large crop of edible seeds, which are actively fed upon by birds and dispersed (1).	
Rationale: Reports in the literature and on websites, continually promote Matrimony vine, especially its fruits (e.g. Goji berries) for medicinal purposes. The only report found of toxicity was found in Knight and Walter (2001), listing Matrimony vine as being a suspected cause of neurological poisonings. Dispersal by birds also questions the findings of Knight and Walter.	
Sources of information: (1) Parsons, W.T., and Cuthbertson, E.G. 2001. Noxious weeds of Australia: African Box Thorn. CISRO publishing. Pg. 601-603. (2) Knight, A.P., and Walter, R.G. 2001. A guide to plant poisonings of animals in North America. Teton new media. Pg 248.	
<b>Question 1.4</b> Impact on genetic integrity	D No Information <a href="#">back</a>
Identify impacts: There are no reports in the literature of Matrimony vine hybridizing with other species.	

<p>Rationale: Matrimony vine is in the Solanaceae family (nightshade family) and is related to 90 other species of Lycium. Lycium pallidum, is a native species in Colorado, However there are no reports of hybridizations occurring (3).</p>	
<p>Sources of information:</p> <p>(3) Weber, W.A., and Wittmann, R.C. 1996. Colorado Flora, Eastern slope: Lycium. The Universtiy Press of Colorado. Pg 363.</p>	
<p><b>Question 2.1</b> Role of anthropogenic and natural disturbance in establishment</p>	<p>D Observational <a href="#">back</a></p>
<p>Describe role of disturbance: There are no reports in the literature indicating that Matrimony vine responds to disturbance (both natural and human caused).</p>	
<p>Rationale: There is no information on populations of matrimony vine spreading into new environments following a disturbance. Many of the reports indicate that infestations occur from plants escaping from cultivation, and spreading into new habitats.</p>	
<p>Sources of information: enter text here</p>	
<p><b>Question 2.2</b> Local rate of spread with no management</p>	<p>B Other Pub. Mat'l <a href="#">back</a></p>
<p>Describe rate of spread: Reports from Australia indicate that Matrimony vine can form dense patches or thickets of shrubs (1). Matrimony vine is spread through birds feeding upon the seeds and defecating them out over areas (1).</p>	
<p>Rationale: There are no reports in the literature as to how fast Matrimony vine can spread, however it is expected that it would be relatively quickly due to dispersal by birds. In Australia, the literature explains that many of the infestations of Matrimony vine into new environments are due to the plants escaping from cultivation or the original windbreaks that they were planted in. Along powerlines and telephone pole wires, dense infestations on Matrimony vine can spring up, as birds deficate the seeds.</p>	
<p>Sources of information:</p> <p>(1) Parsons, W.T., and Cuthbertson, E.G. 2001. Noxious weeds of Australia: African Box Thorn.CISRO publishing. Pg. 601-603.</p>	
<p><b>Question 2.3</b> Recent trend in total area infested within state</p>	<p>B Other Pub. Mat'l <a href="#">back</a></p>
<p>Describe trend: The USDA PLANTS database lists Matrimony vine as being present in the state (6). Further finer scale looks at the state list the species as being present in 8 counties (6). Herbarium specimens from the CSU herbarium list matrimony vine as entering the state in 1935, in Douglas county. Subsequent specimens were found in 1947 (Larimer county), 1950 (Montezuma county), 1953 (Eagle county), 1966 (Pueblo county), 1977 (Garfield county) and 2004 (Prowers county) (7). Reports from the Colorado Department of Ag list matrimony vine as being</p>	
<p>Rationale: Matrimony vine has been found in the state on several occasions. However, these infestations do not</p>	

appear to be spreading and are very limited in their distribution.	
Sources of information: (6) USDA PLANTS database: Matrimony vine. Available at: <a href="http://plants.usda.gov/java/nameSearch">http://plants.usda.gov/java/nameSearch</a> (7) CSU Herbarium: Matrimony vine. Available at <a href="http://wsprod.colostate.edu/cwis440/herbarium/plantinfo.asp?PlantID=2682">http://wsprod.colostate.edu/cwis440/herbarium/plantinfo.asp?PlantID=2682</a>	
<b>Question 2.4</b> Innate reproductive potential	U Other Pub. Mat'l <a href="#">back</a>
Describe key reproductive characteristics: Matrimony vine produces many small red berries, with up to 50 seeds/berry (4). Matrimony vine plants flower and produce seeds every year, and are actively fed upon by birds (1). Studies have shown that matrimony vine can quickly resport following burning (5).	
Rationale: More information is need on the seed longevity and viability in the soil. Also, there were unclear reports in the literature as to the fertilization of the flowers (some reports indicated that the plants were self pollinated, and others indicated that plants were cross pollinated primarily by bees).	
Sources of information: (1) Parsons, W.T., and Cuthbertson, E.G. 2001. Noxious weeds of Australia: African Box Thorn. CISRO publishing. Pg. 601-603. (4) Wikipedia: wolfberry. Available at <a href="http://en.wikipedia.org/wiki/Wolfberry">http://en.wikipedia.org/wiki/Wolfberry</a> . (5) Pysek, P. 1991. Sprout demography and intracolonial competition in <i>Lycium barbarum</i> , a clonal shrub, during an early phase of revegetation. <i>Folia geobotanica et phytotaxonomica</i> . 25: 141-142.	
<b>Question 2.5</b> Potential for human-caused dispersal	C Anecdotal <a href="#">back</a>
Identify dispersal mechanisms: There are no reports in the literature of direct dispersal due to humans.	
Rationale: While dispersal may not be intentional, indirect dispersal due to the planting of Matrimony vine for agronomic purposes opens the avenue for dispersal by natural vectors (e.g. birds and mammals). There have also been reports in Australia where Matrimony vine has escaped from cultivation, by escaping and becoming naturalized in areas that have been abandoned.	
Sources of information: enter text here	
<b>Question 2.6</b> Potential for natural long-distance dispersal	A Other Pub. Mat'l <a href="#">back</a>
Identify dispersal mechanisms: Matrimony vine is actively fed upon and dispersed by birds and small mammals (1).	
Rationale: Infestations in Australia are attributed in part to dispersal by birds and mammals (e.g. )	
Sources of information:	

(1) Parsons, W.T., and Cuthbertson, E.G. 2001. Noxious weeds of Australia: African Box Thorn. CISRO publishing. Pg. 601-603.	
<b>Question 2.7</b> Other regions invaded	B Other Pub. Mat'l <a href="#">back</a>
Identify other regions: In Australia, Matrimony vine has invaded dry areas, and has escaped from cultivation and infests abandoned farm lands, rangelands, and roadsides (1).	
Rationale: Matrimony vine was planted in Australia for windbreaks and for cultivation. Reports from around the country indicates that Matrimony vine thrives in dry areas across the interior of the country.	
Sources of information: (1) Parsons, W.T., and Cuthbertson, E.G. 2001. Noxious weeds of Australia: African Box Thorn. CISRO publishing. Pg. 601-603.	
<b>Question 3.1</b> Ecological amplitude/Range	A Observational <a href="#">back</a>
Describe ecological amplitude, identifying date of source information and approximate date of introduction to the state, if known: CSU herbarium records show that Matrimony vine entered the state in 1935 in Douglas county (7). Infestations of Matrimony vine have been found in several locations around the state, particularly in environments that are close to abandoned fields where the plants have escaped from cultivation. Habitats include parries, wet meadows, scrublands, and urban areas where plants are being cultivated.	
Rationale: Plants grown near susceptible invasive habitats have been known to escape from cultivation, due to dispersal by birds feeding upon the seeds and perching along power lines or abandoned structures and defecating seeds. Once established, Matrimony vine infestations can form dense groves of bushes.	
Sources of information: (7) CSU Herbarium: Matrimony vine. Available at <a href="http://wsprod.colostate.edu/cwis440/herbarium/plantinfo.asp?PlantID=2682">http://wsprod.colostate.edu/cwis440/herbarium/plantinfo.asp?PlantID=2682</a>	
<b>Question 3.2</b> Distribution/Peak frequency	D Observational <a href="#">back</a>
Describe distribution: Limited populations of Matrimony vine have been found in the state. Pirmary habitats invaded include wet meadows, shortgrass prarie, urban areas, sagebrush shrublands, and foothill shrublands.	
Rationale: Small infestions are attributed to plants escaping from cultivation or from dispersal by birds.	
Sources of information: enter text here	
<b>Question 4.1</b> Poisonous to Livestock	B Other Pub. Mat'l <a href="#">back</a>
Describe impacts in terms of high probability of death, long-term health impacts, or short-term health impacts: Matrimony vine is listed as being suspected of causing neurological poisonings in livestock (2).	

<p>Rationale: Reports in the literature and on websites continually promote matrimony vine, especially its fruits (e.g. Goji berries) for medicinal purposes. the only report found of toxicity was found in Knight and Walter (2001), listing matrimony vine as being a suspected cause of neurological poisonings.</p>	
<p>Sources of information:  (2) Knight, A.P., and Walter, R.G. 2001. A guide to plant posionings of animals in North America. Teton new media. Pg 248.</p>	
<p><b>Question 4.2</b> Detrimental to Economic Crops</p>	<p>D Other Pub. Mat'l <a href="#">back</a></p>
<p>Describe impacts to all aspects of cropping systems (see guidelines): There are no reports of Matrimony vine competing with agronomic crops. There is a mention of Matrimony vine spreading into new habitats from contaminated agronomic seed stocks (1).</p>	
<p>Rationale: There does not appear to be any direct competition from matrimony vine onto agronomic crops at this time. As populations of Matrimony vine spread, however, there may be more instances of Matrimony vine becoming an direct competitor with crops.</p>	
<p>Sources of information:  (1) Parsons, W.T., and Cuthbertson, E.G. 2001. Noxious weeds of Australia: African Box Thorn.CISRO publishing. Pg. 601-603.</p>	
<p><b>Question 4.3</b> Detrimental to Mgmt of Agricultural System, Rangeland and Pasture</p>	<p>B Other Pub. Mat'l <a href="#">back</a></p>
<p>Describe impacts to water diversion systems, increased water use, reduced forage for livestock: Matrimony vine has been shown to invade rangelands, pastures, and abandoned fields where it can form dense stands and impeded livestock from feeding (1).</p>	
<p>Rationale: Matrimony vine forms dense stands of shrubs which can decrease the overall productivity of a pasture, by competing with other plants from limited resources, and by preventing grazing by livestock.</p>	
<p>Sources of information:  (1) Parsons, W.T., and Cuthbertson, E.G. 2001. Noxious weeds of Australia: African Box Thorn.CISRO publishing. Pg. 601-603.</p>	
<p><b>Question 4.4</b> Human Health Impacts</p>	<p>U No Information <a href="#">back</a></p>
<p>Describe key human impacts such as; irritants, property values, recreational values, and industry impacts: There is no information in the literature indicating that Matrimony vine is detrimental to human health, however the reports are conflicting.</p>	
<p>Rationale: Matrimony vine, especially its fruits (e.g. Goji berries) are widely used for medicinal purposes, and have been a part of herbal Chinese medicine for hundreds of years. The only report found of toxicity was found in Knight and Walter (2001), listing matrimony vine as being a suspected cause of neurological poisonings. More research is needed to defiantly rule out the suspected neurological effects.</p>	

Sources of information:  
 (2) Knight, A.P., and Walter, R.G. 2001. A guide to plant poisonings of animals in North America. Teton new media. Pg 248.

**Worksheet A**

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Reaches reproductive maturity in 2 years or less	<b>Unknown: 0 pts</b>
Dense infestations produce >1,000 viable seed per square meter	<b>Yes: 2 pts</b>
Populations of this species produce seeds every year.	<b>Yes: 1 pt</b>
Seed production sustained over 3 or more months within a population annually	<b>Yes: 1 pt</b>
Seeds remain viable in soil for three or more years	<b>Unknown: 0 pts</b>
Viable seed produced with <i>both</i> self-pollination and cross-pollination	<b>Unknown: 0 pts</b>
Has quickly spreading vegetative structures (rhizomes, roots, etc.) that may root at nodes	<b>No: 0 pt</b>
Fragments easily and fragments can become established elsewhere	<b>No: 0 pts</b>
Resprouts readily when cut, grazed, or burned	<b>Yes: 1 pt</b>
	<b>5 pts      3 unknowns</b>
	<b>U (3+ unknowns)</b>

**Note any related traits:** Matrimony vine produces many small red berries, with up to 50 seeds/berry. Matrimony vine plants flower and produce seeds every year, and are actively fed upon by birds. Studies have shown that matrimony vine can quickly resprout following burning.

**Worksheet B - Colorado Ecological Types and Land Use**

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<b>Major Ecological and Land Use Types</b>	<b>Minor Ecological and Land Use Types</b>	<b>Code*</b>
<b>Freshwater and Aquatic Systems</b>	lakes, ponds, reservoirs	<b>Unknown</b>
	rivers, streams, canals	<b>Unknown</b>
<b>Riparian and wetlands</b>	Riparian forest	<b>Unknown</b>
	Riparian shrublands	<b>Unknown</b>
	Wet meadows	<b>D. presen</b>
<b>Grasslands</b>	Shortgrass prairie	<b>D. presen</b>
	Tallgrass prairie	<b>Unknown</b>
	Sandsage prairie	<b>Unknown</b>
	Montane meadows	<b>Unknown</b>
<b>Irrigated Agriculture</b>	Hay meadows	<b>Unknown</b>
	Irrigated crops (alfalfa, corn, sugar beets)	<b>Unknown</b>
<b>Dryland Agriculture</b>	Dryland crops (wheat, corn, millet, dryland grass hay, sunflowers, mustard for biodiesel)	<b>Unknown</b>
<b>Developed Lands</b>	Urban, exurban, industrial	<b>D. presen</b>
<b>Arid Shrublands</b>	Sagebrush shrublands	<b>D. presen</b>
	Foothills shrublands	<b>D. presen</b>
	Gambel oak shrublands	<b>Unknown</b>
<b>Woodlands</b>	Pinyon - juniper	<b>Unknown</b>
	Ponderosa pine	<b>Unknown</b>
	Limber pine	<b>Unknown</b>
<b>Forest</b>	Lodgepole pine	<b>Unknown</b>
	Spruce-fir	<b>Unknown</b>
<b>Alpine</b>	Boulder and rock fields	<b>Unknown</b>
	Dwarf shrublands	<b>Unknown</b>
	Tundra	<b>Unknown</b>
<b>Barrens (lower elevation)</b>	Dunes	<b>Unknown</b>
	Rock outcrops	<b>Unknown</b>
	Canyonlands	<b>Unknown</b>

\* 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).

## Worksheet C – Human Impacts

Human health impacts; irritants (sap), spines, poisonous, and/or smoke impacts	<b>No: 0 pt</b>
Property values are decreased due to increased risk of fire	<b>No: 0 pts</b>
Decreased property value due to moderate to heavy infestations	<b>Unknown: 0 pts</b>
Decreased land value for recreational use; boating, fishing, camping, etc.	<b>Unknown: 0 pts</b>
Impact of listing detrimental to industry; agriculture, horticulture, nursery, and/or seed	<b>Unknown: 0 pts</b>
	<b>Total Pts      3 unknowns</b>
	<b>U (2+ unknowns)</b>
<b>Note any related traits:</b> There are no reports in the literature on the effects of Matrimony vine infestations. Effects on agriculture and recreation are unknown. The only insight into Matrimony vine infestations comes from Australia, indicating that infestations form dense thickets.	