

# NEW YORK NON-NATIVE PLANT INVASIVENESS RANKING FORM

Scientific name:	Elaeagnus angustifolia	USDA Plants Code: ELAN
Common names:	Russian Olive	
Native distribution:	Eurasia	
Date assessed:	11 April 2008; 11 April 2008; 16 May 2008; edits January 9, 2009	
Assessors:	J. Ma; S. Clemants; G. Moore	
Reviewers:	LIISMA SRC	
Date Approved:	May 21, 2008	Form version date: 22 October 2008

**New York Invasiveness Rank:** Moderate (Relative Maximum Score 50.00-69.99)

<b>Distribution and Invasiveness Rank</b> ( <i>Obtain from PRISM invasiveness ranking form</i> )			
	Status of this species in each PRISM:	Current Distribution	PRISM Invasiveness Rank
1	Adirondack Park Invasive Program	Not assessed	Not assessed
2	Capital/Mohawk	Not assessed	Not assessed
3	Catskill Regional Invasive Species Partnership	Not assessed	Not assessed
4	Finger Lakes	Not assessed	Not assessed
5	Long Island Invasive Species Management Area	Widespread	Moderate
6	Lower Hudson	Not assessed	Not assessed
7	Saint Lawrence/Eastern Lake Ontario	Not assessed	Not assessed
8	Western New York	Not assessed	Not assessed


<b>Invasiveness Ranking Summary</b> (see details under appropriate sub-section)		Total (Total Answered*) Possible	Total
1	Ecological impact	40 (40)	27
2	Biological characteristic and dispersal ability	25 (25)	19
3	Ecological amplitude and distribution	25 (25)	15
4	Difficulty of control	10 (10)	7
	Outcome score	100 (100) <sup>b</sup>	68 <sup>a</sup>
	Relative maximum score <sup>†</sup>		68.00
	New York Invasiveness Rank <sup>§</sup>	Moderate (Relative Maximum Score 50.00-69.99)	

\* For questions answered "unknown" do not include point value in "Total Answered Points Possible." If "Total Answered Points Possible" is less than 70.00 points, then the overall invasive rank should be listed as "Unknown."

<sup>†</sup> Calculated as 100(a/b) to two decimal places.

<sup>§</sup> Very High >80.00; High 70.00–80.00; Moderate 50.00–69.99; Low 40.00–49.99; Insignificant <40.00

### A. DISTRIBUTION (KNOWN/POTENTIAL): Summarized from individual PRISM forms

<p>A1.1. Has this species been documented to persist without cultivation in NY? (reliable source; voucher not required)</p> <p><input checked="" type="checkbox"/> Yes – continue to A1.2</p> <p><input type="checkbox"/> No – continue to A2.1</p> <p>A1.2. In which PRISMs is it known (see inset map)?</p> <p><input type="checkbox"/> Adirondack Park Invasive Program</p> <p><input checked="" type="checkbox"/> Capital/Mohawk</p> <p><input checked="" type="checkbox"/> Catskill Regional Invasive Species Partnership</p> <p><input type="checkbox"/> Finger Lakes</p> <p><input checked="" type="checkbox"/> Long Island Invasive Species Management Area</p> <p><input checked="" type="checkbox"/> Lower Hudson</p> <p><input type="checkbox"/> Saint Lawrence/Eastern Lake Ontario</p> <p><input type="checkbox"/> Western New York</p>	 <p style="font-size: small;">Partnerships for Regional Invasive Species Management 2008</p>
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**Documentation:**

Sources of information:

Weldy & Werier, 2005; Brooklyn Botanic Garden, 2008.

A2.1. What is the likelihood that this species will occur and persist outside of cultivation, given the climate in the following PRISMs? (obtain from PRISM invasiveness ranking form)

Not Assessed	Adirondack Park Invasive Program
Not Assessed	Capital/Mohawk
Not Assessed	Catskill Regional Invasive Species Partnership
Not Assessed	Finger Lakes
Very Likely	Long Island Invasive Species Management Area
Not Assessed	Lower Hudson
Not Assessed	Saint Lawrence/Eastern Lake Ontario
Not Assessed	Western New York

**Documentation:**

Sources of information (e.g.: distribution models, literature, expert opinions):

Weldy & Werier, 2005; Brooklyn Botanic Garden, 2008.

***If the species does not occur and is not likely to occur with any of the PRISMs, then stop here as there is no need to assess the species.***

A2.2. What is the current distribution of the species in each PRISM? (obtain rank from PRISM invasiveness ranking forms)

	Distribution
Adirondack Park Invasive Program	Not Assessed
Capital/Mohawk	Not Assessed
Catskill Regional Invasive Species Partnership	Not Assessed
Finger Lakes	Not Assessed
Long Island Invasive Species Management Area	Widespread
Lower Hudson	Not Assessed
Saint Lawrence/Eastern Lake Ontario	Not Assessed
Western New York	Not Assessed

**Documentation:**

Sources of information:

Weldy & Werier, 2005; Brooklyn Botanic Garden, 2008.

A2.3. Describe the potential or known suitable habitats within New York. Natural habitats include all habitats not under active human management. Managed habitats are indicated with an asterisk.

<p><b>Aquatic Habitats</b></p> <p><input type="checkbox"/> Salt/brackish waters</p> <p><input type="checkbox"/> Freshwater tidal</p> <p><input type="checkbox"/> Rivers/streams</p> <p><input type="checkbox"/> Natural lakes and ponds</p> <p><input type="checkbox"/> Vernal pools</p> <p><input type="checkbox"/> Reservoirs/impoundments*</p>	<p><b>Wetland Habitats</b></p> <p><input type="checkbox"/> Salt/brackish marshes</p> <p><input type="checkbox"/> Freshwater marshes</p> <p><input type="checkbox"/> Peatlands</p> <p><input type="checkbox"/> Shrub swamps</p> <p><input type="checkbox"/> Forested wetlands/riparian</p> <p><input type="checkbox"/> Ditches*</p> <p><input checked="" type="checkbox"/> Beaches and/or coastal dunes</p>	<p><b>Upland Habitats</b></p> <p><input checked="" type="checkbox"/> Cultivated*</p> <p><input checked="" type="checkbox"/> Grasslands/old fields</p> <p><input type="checkbox"/> Shrublands</p> <p><input type="checkbox"/> Forests/woodlands</p> <p><input type="checkbox"/> Alpine</p> <p><input checked="" type="checkbox"/> Roadsides*</p>
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Other potential or known suitable habitats within New York:

Note: Grows in semi-arid riparian areas in the western US, but not observed in riparian areas in NYS or New England which are different habitats; intolerant of shade.

**Documentation:**

Sources of information:

Zouhar, 2008; Brooklyn Botanic Garden, 2008; SE-EPPC; Katz, 2003; IPANE 2009.

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**B. INVASIVENESS RANKING**

*1. ECOLOGICAL IMPACT*

**1.1. Impact on Natural Ecosystem Processes and System-Wide Parameters (e.g. fire regime, geomorphological changes (erosion, sedimentation rates), hydrologic regime, nutrient and mineral dynamics, light availability, salinity, pH)**

- A. No perceivable impact on ecosystem processes based on research studies, or the absence of impact information if a species is widespread (>10 occurrences in minimally managed areas), has been well-studied (>10 reports/publications), and has been present in the northeast for >100 years. 0
- B. Influences ecosystem processes to a minor degree (e.g., has a perceivable but mild influence on soil nutrient availability) 3
- C. Significant alteration of ecosystem processes (e.g., increases sedimentation rates along streams or coastlines, reduces open water that are important to waterfowl) 7
- D. Major, possibly irreversible, alteration or disruption of ecosystem processes (e.g., the species alters geomorphology and/or hydrology, affects fire frequency, alters soil pH, or fixes substantial levels of nitrogen in the soil making soil unlikely to support certain native plants or more likely to favor non-native species) 10
- U. Unknown

Score 

10
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**Documentation:**  
 Identify ecosystem processes impacted (or if applicable, justify choosing answer A in the absence of impact information)  
 Able to fix nitrogen via root nodules. Alters nutrient cycling and hydrology. Significantly changed the underground water level in the agriculture areas of midwest, and can convert riparian areas to upland, but studies not done in New York.  
**Sources of information:**  
 Tu 2003; Miller & Baker, 1985; Shafroth et al., 1995.

**1.2. Impact on Natural Community Structure**

- A. No perceived impact; establishes in an existing layer without influencing its structure 0
- B. Influences structure in one layer (e.g., changes the density of one layer) 3
- C. Significant impact in at least one layer (e.g., creation of a new layer or elimination of an existing layer) 7
- D. Major alteration of structure (e.g., covers canopy, eradicating most or all layers below) 10
- U. Unknown

Score 

7
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**Documentation:**  
 Identify type of impact or alteration:  
 Can form thick tall shrub layer, and eradicate all of the layers below.  
**Sources of information:**  
 Edelen, 1997; Musika & Swearington, 2005; Shafroth et al., 1995; Zouhar, 2005; author's pers. obs. (Moore's) in New York.

**1.3. Impact on Natural Community Composition**

- A. No perceived impact; causes no apparent change in native populations 0
- B. Influences community composition (e.g., reduces the number of individuals in one or more native species in the community) 3
- C. Significantly alters community composition (e.g., produces a significant reduction in the population size of one or more native species in the community) 7
- D. Causes major alteration in community composition (e.g., results in the extirpation of one or several native species, reducing biodiversity or change the community composition towards species exotic to the natural community) 10

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U. Unknown

Score 7

**Documentation:**

Identify type of impact or alteration:

Completely changes the shrub layer and below; can become a monoculture. Provides inferior wildlife habitat in the west.

Sources of information:

Edelen, 1997; Shafroth et al., 1995; Zhang, 1981; Tu 2003; author's (Moore's) pers. obs. in New York.

1.4. Impact on other species or species groups (cumulative impact of this species on the animals, fungi, microbes, and other organisms in the community it invades. Examples include reduction in nesting/foraging sites; reduction in habitat connectivity; injurious components such as spines, thorns, burrs, toxins; suppresses soil/sediment microflora; interferes with native pollinators and/or pollination of a native species; hybridizes with a native species; hosts a non-native disease which impacts a native species)

- |    |  |    |
|----|--|----|
| A. | Negligible perceived impact                      | 0  |
| B. | Minor impact                                     | 3  |
| C. | Moderate impact                                  | 7  |
| D. | Severe impact on other species or species groups | 10 |
| U. | Unknown  |    |

Score 3

**Documentation:**

Identify type of impact or alteration:

Reduces bird species richness, especially cavity nesting species, reduces insects in the West but no evidence of this for New York.

Sources of information:

Brown, 1990; Knopf & Olson, 1984; Musika & Swearington, 2005; Olson & Knopf, 1986.

Total Possible	40
Section One Total	27

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**2. BIOLOGICAL CHARACTERISTICS AND DISPERSAL ABILITY**

2.1. Mode and rate of reproduction (provisional thresholds, more investigation needed)

- |    |   |   |
|----|---|---|
| A. | No reproduction by seeds or vegetative propagules (i.e. plant sterile with no sexual or asexual reproduction).  | 0 |
| B. | Limited reproduction (fewer than 10 viable seeds per plant AND no vegetative reproduction; if viability is not known, then maximum seed production is less than 100 seeds per plant and no vegetative reproduction)   | 1 |
| C. | Moderate reproduction (fewer than 100 viable seeds per plant - if viability is not known, then maximum seed production is less than 1000 seeds per plant - OR limited successful vegetative spread documented)  | 2 |
| D. | Abundant reproduction with vegetative asexual spread documented as one of the plants prime reproductive means OR more than 100 viable seeds per plant (if viability is not known, then maximum seed production reported to be greater than 1000 seeds per plant.) | 4 |
| U. | Unknown   |   |

Score 2

**Documentation:**

Describe key reproductive characteristics (including seeds per plant):

Seed production but no evidence of more than 100 viable seeds per plant in New York; root sprouting not common.

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Sources of information:

Stannard et al., 2002, Zouhar, 2005; author's (Moore's) pers. obs.

2.2. Innate potential for long-distance dispersal (e.g. bird dispersal, sticks to animal hair, buoyant fruits, pappus for wind-dispersal)

- A. Does not occur (no long-distance dispersal mechanisms) 0
- B. Infrequent or inefficient long-distance dispersal (occurs occasionally despite lack of adaptations) 1
- C. Moderate opportunities for long-distance dispersal (adaptations exist for long-distance dispersal, but studies report that 95% of seeds land within 100 meters of the parent plant) 2
- D. Numerous opportunities for long-distance dispersal (adaptations exist for long-distance dispersal and evidence that many seeds disperse greater than 100 meters from the parent plant) 4
- U. Unknown

Score

Documentation:

Identify dispersal mechanisms:

Mainly distributed by birds, but also by water, dispersal more than 100 meters.

Sources of information:

Zouhar, 2005.

2.3. Potential to be spread by human activities (both directly and indirectly – possible mechanisms include: commercial sales, use as forage/revegetation, spread along highways, transport on boats, contaminated compost, land and vegetation management equipment such as mowers and excavators, etc.)

- A. Does not occur 0
- B. Low (human dispersal to new areas occurs almost exclusively by direct means and is infrequent or inefficient) 1
- C. Moderate (human dispersal to new areas occurs by direct and indirect means to a moderate extent) 2
- D. High (opportunities for human dispersal to new areas by direct and indirect means are numerous, frequent, and successful) 3
- U. Unknown

Score

Documentation:

Identify dispersal mechanisms:

Planted as ornamental and wildlife food; J. Lehrer does not observe it to be a commonly planted species.

Sources of information:

Gilman & Watson, 1993; Zouhar, 2005.

2.4. Characteristics that increase competitive advantage, such as shade tolerance, ability to grow on infertile soils, perennial habit, fast growth, nitrogen fixation, allelopathy, etc.

- A. Possesses no characteristics that increase competitive advantage 0
- B. Possesses one characteristic that increases competitive advantage 3
- C. Possesses two or more characteristics that increase competitive advantage 6
- U. Unknown

Score

Documentation:

Evidence of competitive ability:

Perennial habit, fast growth, infertile soils, seedlings are shade tolerant but don't grow and dominate until canopy is removed.

Sources of information:

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Zouhar, 2005; Tu 2003.

**2.5. Growth vigor**

- A. Does not form thickets or have a climbing or smothering growth habit 0
- B. Has climbing or smothering growth habit, forms a dense layer above shorter vegetation, forms dense thickets, or forms a dense floating mat in aquatic systems where it smothers other vegetation or organisms 2
- U. Unknown

Score 0

**Documentation:**

Describe growth form:

Can form very dense monocultures, suppressing all growth beneath but only occasionally or rarely escapes cultivation in central and northeastern US (Katz 2003). Dense monocultures have not been observed in New York.

Sources of information:

Shafroth et al., 1995; Zouhar, 2005; Katz, 2003; authors (Moore's) pers. obs.

**2.6. Germination/Regeneration**

- A. Requires open soil or water and disturbance for seed germination, or regeneration from vegetative propagules. 0
- B. Can germinate/regenerate in vegetated areas but in a narrow range or in special conditions 2
- C. Can germinate/regenerate in existing vegetation in a wide range of conditions 3
- U. Unknown (No studies have been completed)

Score 2

**Documentation:**

Describe germination requirements:

Can germinate in existing vegetation but not known to germinate in a wide range of conditions in New York.

Sources of information:

Shafroth et al., 1995; Zouhar, 2005; author's (Moore's) pers. obs.

**2.7. Other species in the genus invasive in New York or elsewhere**

- A. No 0
- B. Yes 3
- U. Unknown

Score 3

**Documentation:**

Species:

*Elaeagnus umbellata*.

Total Possible 25  
Section Two Total 19

**3. ECOLOGICAL AMPLITUDE AND DISTRIBUTION**

3.1. Density of stands in natural areas in the northeastern USA and eastern Canada (use same definition as Gleason & Cronquist which is: "The part of the United States covered extends from the Atlantic Ocean west to the western boundaries of Minnesota, Iowa, northern Missouri, and southern Illinois, south to the southern boundaries of Virginia, Kentucky, and Illinois, and south to the Missouri River in Missouri. In Canada the area covered includes Nova Scotia, Prince Edward Island, New Brunswick, and parts of Quebec and Ontario lying south of the 47th parallel of latitude")

- A. No large stands (no areas greater than 1/4 acre or 1000 square meters) 0

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- B. Large dense stands present in areas with numerous invasive species already present or disturbed landscapes 2
- C. Large dense stands present in areas with few other invasive species present (i.e. ability to invade relatively pristine natural areas) 4
- U. Unknown

Score

**Documentation:**

Identify reason for selection, or evidence of weedy history:  
 Produces very dense stands in riparian areas of plains and west. Does not appear to have large stands in NY or New England.  
 Sources of information:  
 Shafroth et al., 1995, Zouhar, 2005; IPANE 2009.

**3.2. Number of habitats the species may invade**

- A. Not known to invade any natural habitats given at A2.3 0
- B. Known to occur in two or more of the habitats given at A2.3, with at least one a natural habitat. 1
- C. Known to occur in three or more of the habitats given at A2.3, with at least two a natural habitat. 2
- D. Known to occur in four or more of the habitats given at A2.3, with at least three a natural habitat. 4
- E. Known to occur in more than four of the habitats given at A2.3, with at least four a natural habitat. 6
- U. Unknown

Score

**Documentation:**

Identify type of habitats where it occurs and degree/type of impacts:  
 Beaches/coastal dunes, cultivated, grasslands/old fields, roadsides; does not grow well in wet sites; intolerant of shade. See A2.3.  
 Sources of information:  
 Shafroth et al., 1995; Zouhar, 2005; Brooklyn Botanic Garden, 2008; SE-EPPC.

**3.3. Role of disturbance in establishment**

- A. Requires anthropogenic disturbances to establish. 0
- B. May occasionally establish in undisturbed areas but can readily establish in areas with natural or anthropogenic disturbances. 2
- C. Can establish independent of any known natural or anthropogenic disturbances. 4
- U. Unknown

Score

**Documentation:**

Identify type of disturbance:  
 Colonizes arid riparian areas in the west, where it takes advantage of the absence of flooding in riparian areas downstream of dams; in New York it has been observed in coastal habitats with natural disturbances.  
 Sources of information:  
 Shafroth et al., 1995, Zouhar, 2005; Katz, 2003; Tu 2003; authors' pers. obs.

**3.4. Climate in native range**

- A. Native range does not include climates similar to New York 0
- B. Native range possibly includes climates similar to at least part of New York. 1
- C. Native range includes climates similar to those in New York 3
- U. Unknown

Score

**Documentation:**

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Describe what part of the native range is similar in climate to New York:  
Grows north to western Siberia  
Sources of information:  
GRIN, 2008

**3.5. Current introduced distribution in the northeastern USA and eastern Canada (see question 3.1 for definition of geographic scope )**

- A. Not known from the northeastern US and adjacent Canada 0
- B. Present as a non-native in one northeastern USA state and/or eastern Canadian province. 1
- C. Present as a non-native in 2 or 3 northeastern USA states and/or eastern Canadian provinces. 2
- D. Present as a non-native in 4–8 northeastern USA states and/or eastern Canadian provinces, and/or categorized as a problem weed (e.g., “Noxious” or “Invasive”) in 1 northeastern state or eastern Canadian province. 3
- E. Present as a non-native in >8 northeastern USA states and/or eastern Canadian provinces. and/or categorized as a problem weed (e.g., “Noxious” or “Invasive”) in 2 northeastern states or eastern Canadian provinces. 4
- U. Unknown

Score 

4
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**Documentation:**  
Identify states and provinces invaded:  
CT, DC, IA, IL, KY, MA, MD, ME, MI, MN, NJ, NY, OH, PA, RI, VA, VT, WI, WY; NB, ON, QC  
Sources of information: See known introduced range in plants.usda.gov, and update with information from states and Canadian provinces.  
USDA, 2008

**3.6. Current introduced distribution of the species in natural areas in the eight New York State PRISMs (Partnerships for Regional Invasive Species Management)**

- A. Present in none of the PRISMs 0
- B. Present in 1 PRISM 1
- C. Present in 2 PRISMs 2
- D. Present in 3 PRISMs 3
- E. Present in more than 3 PRISMs or on the Federal noxious weed lists 4
- U. Unknown

Score 

4
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**Documentation:**  
Describe distribution:  
Capital/Mohawk, CRISP, Lower Hudson and LIISMA.  
Sources of information:  
New York Flora Association, 2008.

Total Possible 

25
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Section Three Total 

15
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**4. DIFFICULTY OF CONTROL**

**4.1. Seed banks**

- A. Seeds (or vegetative propagules) remain viable in soil for less than 1 year, or does not make viable seeds or persistent propagules. 0
- B. Seeds (or vegetative propagules) remain viable in soil for at least 1 to 10 years 2



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- C. Seeds (or vegetative propagules) remain viable in soil for more than 10 years 3
- U. Unknown

Score 2

**Documentation:**

Identify longevity of seed bank:

Seeds remain 3-5 years.

Sources of information:

Zouhar, 2005.

**4.2. Vegetative regeneration**

- A. No regrowth following removal of aboveground growth 0
- B. Regrowth from ground-level meristems 1
- C. Regrowth from extensive underground system 2
- D. Any plant part is a viable propagule 3
- U. Unknown

Score 1

**Documentation:**

Describe vegetative response:

Sprouts and root suckers from stump.

Sources of information:

Zouhar, 2005; Tu 2003.

**4.3. Level of effort required**

- A. Management is not required: e.g., species does not persist without repeated anthropogenic disturbance. 0
- B. Management is relatively easy and inexpensive: e.g. 10 or fewer person-hours of manual effort (pulling, cutting and/or digging) can eradicate a 1 acre infestation in 1 year (infestation averages 50% cover or 1 plant/100 ft<sup>2</sup>). 2
- C. Management requires a major short-term investment: e.g. 100 or fewer person-hours/year of manual effort, or up to 10 person-hours/year using mechanical equipment (chain saws, mowers, etc.) for 2-5 years to suppress a 1 acre infestation. Eradication is difficult, but possible (infestation as above). 3
- D. Management requires a major investment: e.g. more than 100 person-hours/year of manual effort, or more than 10 person hours/year using mechanical equipment, or the use of herbicide, grazing animals, fire, etc. for more than 5 years to suppress a 1 acre infestation. Eradication may be impossible (infestation as above). 4
- U. Unknown

Score 4

**Documentation:**

Identify types of control methods and time-term required:

Seedlings and sprouts can be hand-pulled or removed with a weed wrench, but herbicide is usually required to kill mature trees.

Sources of information:

Tu 2003; Stannard et al., 2002.

Total Possible 10

Section Four Total 7

**Total for 4 sections Possible** 100

**Total for 4 sections** 68

**C. STATUS OF CULTIVARS AND HYBRIDS:**

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At the present time (May 2008) there is no protocol or criteria for assessing the invasiveness of cultivars independent of the species to which they belong. Such a protocol is needed, and individuals with the appropriate expertise should address this issue in the future. Such a protocol will likely require data on cultivar fertility and identification in both experimental and natural settings.

Hybrids (crosses between different parent species) should be assessed individually and separately from the parent species wherever taxonomically possible, since their invasiveness may differ from that of the parent species. An exception should be made if the taxonomy of the species and hybrids are uncertain, and species and hybrids can not be clearly distinguished in the field. In such cases it is not feasible to distinguish species and hybrids, and they can only be assessed as a single unit.

Some cultivars of the species known to be available:

**References for species assessment:**

Borell, A. E. 1962. Russian-olive for wildlife and other conservation uses. USDA Leaflet No. 517.

Brooklyn Botanic Garden, 2008. AILANTHUS databse. [Accessed 11 April 2008.]

Brown, C. R. 1990. Avian use of native and exotic riparian habitats on the Snake River, Idaho. M.S. Thesis. Colorado State Univ., Fort Collins, CO. 60 pp.

Edelen, W. J. 1997. Russian olive (*Elaeagnus angustifolia*) control experiment underway Restor. Manag. Notes 15: 198-9.

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GRIN. No Date. USDA, ARS. National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: [http://www.ars-grin.gov/cgi-bin/npgs/html/tax\\_search.pl](http://www.ars-grin.gov/cgi-bin/npgs/html/tax_search.pl) (19 March 2008)

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Herron, P.M. 2007. Invasive plants and their ecological strategies: prediction and explanation of woody plant invasion in New England Diversity and Distributions 13: 633-644.

Hogue, E. J. & L. J. LaCroix, 1970. Seed dormancy of Russian olive (*Elaeagnus angustifolia* L.) J. Amer. Soc. Hort. Sci. 95(4): 449-52.

Katz, Gabrielle L.; Shafroth, Patrick B. 2003. Biology, ecology, and management of *Elaeagnus angustifolia* L. (Russian olive) in western North America. Wetlands. 23(4): 763-777.

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SE-EPPC. No date; 1991 or later. Southeast Exotic Pest Plant Council Invasive Plant Manual. <http://www.se-eppc.org/manual/autolive.html>

Shafroth, P. B.; G. T. Auble, & M. L. Scott, 1995. Germination and establishment of the native plains cottonwood (*Populus deltoides* Marshall subsp. *monilifera*) and the exotic Russian-olive (*Elaeagnus angustifolia* L.) *Conserv. Biol.* 9(5): 1169-75.

Stannard, M., D. Ogle, L. Holzworth, J. Scianna & E. Sunleaf. 2002. History, Biology, Ecology, Suppression, and Revegetation of Russian-Olive Sites (*Elaeagnus angustifolia* L.). USDA NRCS Plant Materials Technical Note MT-43.

Tu, M. 2003. Element Stewardship Abstract for *Elaeagnus angustifolia*. The Nature Conservancy. <http://tncweeds.ucdavis.edu/esadocs/documnts/elaearang.rtf>

United States Department of Agriculture, National Resources Conservation Service. 2008. The PLANTS Database. National Plant Data Center, Baton Rouge, Louisiana [Accessed on April 11, 2008.]

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