NEW YORK
NON-NATIVE PLANT INVASIVENESS RANKING FORM

Scientific name:	Schedonorus phoenix (Scop.) Holub (S. arundinaceus (Schreb.) Dum. nom. illeg.; Festuca arundinacea Schreb. ; F. elatior L. nom. rej.; Lolium arundinaceum (Schreb.) S.J. Darbyshire) USDA Plants Code: CSPH
Common names:	Tall Fescue, Kentucky Fescue, Reed Fescue, Coarse Fescue, Alta Fescue
Native distribution:	Europe
Date assessed:	December 2, 2009
Assessors:	Gerry Moore
Reviewers:	LIISMA SRC
Date Approved:	December 9, 2009 Form version date: 10 July 2009

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

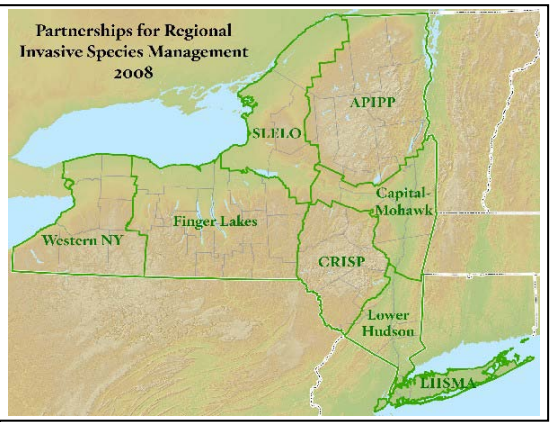
Distribution and Invasiveness Rank (*Obtain from PRISM invasiveness ranking form*)			
	Status of this species in each PRISM:	Current Distribution	PRISM Invasiveness Rank
1	Adirondack Park Invasive Program	Not Assessed	Not Assessed
2	Capital/Mohawk	Not Assessed	Not Assessed
3	Catskill Regional Invasive 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

Invasiveness Ranking Summary (see details under appropriate sub-section)		Total (Total Answered*) Possible	Total
1	Ecological impact	40 (40)	24
2	Biological characteristic and dispersal ability	25 (25)	18
3	Ecological amplitude and distribution	25 (25)	15
4	Difficulty of control	10 (10)	8
	Outcome score	100 (100)[b]	65[a]
	Relative maximum score †		65.00
	New York Invasiveness Rank §	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."
†Calculated as 100(a/b) to two decimal places.
§Very High >80.00; High 70.00−80.00; Moderate 50.00−69.99; Low 40.00−49.99; Insignificant <40.00
Not Assessable: not persistent in NY, or not found outside of cultivation.

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

A1.1. Has this species been documented to persist without cultivation in NY? (reliable source; voucher not required)	
☒	Yes – continue to A1.2
☐	No – continue to A2.1
A1.2. In which PRISMs is it known (see inset map)?	
☒	Adirondack Park Invasive Program
☒	Capital/Mohawk
☒	Catskill Regional Invasive Species Partnership
☒	Finger Lakes
☒	Long Island Invasive Species Management Area
☒	Lower Hudson
☒	Saint Lawrence/Eastern Lake Ontario
☐	Western New York



Documentation:
Sources of information:
Brooklyn Botanic Garden, 2009; Weldy & Werier, 2009.

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):
Brooklyn Botanic Garden, 2009.

If the species does not occur and is not likely to occur in any of the PRISMs, then stop here as there is no need to assess the species. Rank is "Not Assessable."

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:
Brooklyn Botanic Garden, 2009; Weldy & Werier, 2009.

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.

Aquatic Habitats	Wetland Habitats	Upland Habitats
☐ Salt/brackish waters	☐ Salt/brackish marshes	☒ Cultivated*
☐ Freshwater tidal	☒ Freshwater marshes	☒ Grasslands/old fields
☐ Rivers/streams	☐ Peatlands	☐ Shrublands
☐ Natural lakes and ponds	☐ Shrub swamps	☐ Forests/woodlands
☐ Vernal pools	☐ Forested wetlands/riparian	☐ Alpine
☐ Reservoirs/impoundments*	☒ Ditches*	☒ Roadsides*
	☐ Beaches and/or coastal dunes	

Other potential or known suitable habitats within New York:

Documentation:
Sources of information:
Batcher, 2000; Brooklyn Botanic Garden, 2009.

B. INVASIVENESS RANKING

Questions apply to areas similar in climate and habitats to New York unless specified otherwise.

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: 7

Documentation:
Identify ecosystem processes impacted (or if applicable, justify choosing answer A in the absence of impact information)
Species oftentimes has a symbiotic association with an endophytic fungus, Neotyphoidium coenophialum (Acremonium coenophialum). Infected individuals tend to produce more seed with higher viability. The fungi produce potent alkaloids (loline) which alter soil chemistry and make the plant less palatable to domesticated and wild animals, inlcuding insects. Species also produces other allelopathic compounds indepdendent of the fungus. Not all populations are infected and populations observed to date in New York and surrounding areas are not large; these factors are the justification for recognizing the impact as significant as opposed to major.
Sources of information:
Wheeler and Hill, 1957; Ball et al., 1993; Batcher, 2000; Henson 2001.

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: 3

Documentation:
Identify type of impact or alteration:
Species can change the density of the herb layer. No evidence for creation or elimination of a layer.
Sources of information:
Batcher, 2000; Maybury, 2005; author's pers. obs.

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	7

population size of one or more native species in the community)

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

U. Unknown

Score 7

Documentation:
Identify type of impact or alteration:
Batcher (2000): "Studies have shown that F. arundinacea produces allelopathic compounds that inhibit the growth of other plants. In Pennsylvania, F. arundinacea hindered woody plant growth and survival on stripmined sites. On low-fertility acid mine sites, tall fescue either prevented establishment or retarded growth of several species including silky dogwood (Cornus amomum), northern arrowwood (Viburnum recognitum), black locust (Robinia pseudoacacia), sweetgum (Liquidambar styraciflua), black walnut (Juglans nigra), northern red oak (Quercus rubra) and sycamore (Platanus occidentalis). When F. arundinacea was chemically controlled, survival and height growth of both shrub and tree species were greater (Anderson et al. 1989). In a study of mine reclamation techniques using forest soils, tall fescue seed was added to the seedbank in topsoil derived from a native species forest community. The resulting community had both fewer native species and produced less total biomass of native species than a control community without tall fescue (Wade 1989)."
Sources of information:
Anderson et al., 1989; Wade, 1989; Batcher, 2000

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 7

Documentation:
Identify type of impact or alteration:
Batcher (2000): "Songbirds consume tall fescue seeds, and both seeds and foliage are used by small mammals (Wasser 1982). However, some small mammals feeding on fescue infected by the endophyte may become ill as a result of the toxins the endophyte produces (see Impacts and Threats Posed by Tall Fescue section above). Fields dominated by F. arundinacea were found to be poor habitat for bobwhite and quail in Kentucky due to lack of high quality, preferred foods, and impropervegetation structure and composition for nesting and foraging habitat (Barnes et al. 1994). Tall fescue palatability for elk has been reported as poor (Wasser 1982) and elk may show a preference for other grasses. Several studies showed varying preferences by white tailed deer for F. arundinacea (Fire Effects Information System (1996)." Because of its ability to outcompete native vegetation, tall fescue should not be used for wetland mitigation, reforestation, or rehabilitation where managing for wildlife and plant diversity are intended (Burchick 1993)." Absence of extensive stands in New York and adjacent areas is why the species was scored as having moderate as opposed to severe impact.
Sources of information:

Wasser, 1982; Barnes et al., 1994; FEIS, 1996; Batcher, 2000;

Total Possible	40
Section One Total	24

2. BIOLOGICAL CHARACTERISTICS AND DISPERSAL ABILITY

2.1. Mode and rate of reproduction

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):
Seeds less than 1000 per plant; viability variable.
Sources of information:
Batcher, 2003; Maybury, 2005.

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 4

Documentation:
Identify dispersal mechanisms:
Seeds taken by animals and can remain viable after passing through the digestive track (endozoochory).
Sources of information:
Burchick, 1993; Maybury, 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 3

Documentation:
Identify dispersal mechanisms:
Readily transported by farm and mowing equipment; still planted in some cases for forage.
Sources of information:
Batcher, 2003; Maybury, 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 6

Documentation:
Evidence of competitive ability:
Perennial; allelopathic, drought tolerant.
Sources of information:
Batcher, 2003; Maybury, 2005.

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:
While can form solid stands, not known to forms thickets or exhibit a climbing or smothering habit. More of a "bunch" grass than a turf former.
Sources of information:
Author'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 3

Documentation:
Describe germination requirements:
Colonizes best in open soil but can germinate in wide range of conditions.
Sources of information:
Wolf et al., 1979; Batcher, 2003; Maybury, 2005.

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

A. No 0
B. Yes 3
U. Unknown

Score 0

Documentation:

Species:
No other Schedonorus in New York. Brooklyn Botanic Garden, 2009; Weldy & Werier, 2009; U.S.D.A. NRCS, 2009.

Total Possible	25
Section Two Total	18

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
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: 0

Documentation:
Identify reason for selection, or evidence of weedy history:
While large stands have been observed in the West, the author is unaware of large stands in the Northeast. It should be noted that large dense stands may be unreported because the species is not readily identified when not fruiting.
Sources of information:
Maybury, 2005; author's pers. obs.

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 one natural habitat given at A2.3	1
C.	Known to occur in two natural habitats given at A2.3	2
D.	Known to occur in three natural habitat given at A2.3	4
E.	Known to occur in four or more natural habitats given at A2.3	6
U.	Unknown	

Score: 2

Documentation:
Identify type of habitats where it occurs and degree/type of impacts:
See A2.3.
Sources of information:
Brooklyn Botanic Garden, 2009.

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: 2

Documentation:

Identify type of disturbance:
Generally occurs in disturbed open habitats; not known to require anthropogenic disturbance for establishment.
Sources of information:
Batcher, 2000; Maybury, 2005

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 3

Documentation:
Describe what part of the native range is similar in climate to New York:
Temperate Europe.
Sources of information:
Brooklyn Botanic Garden, 2009.

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

Documentation:
Identify states and provinces invaded:
All northeastern states and provinces.
Sources of information: See known introduced range in plants.usda.gov, and update with information from states and Canadian provinces.
Brooklyn Botanic Garden, 2009; U.S.D.A. NRCS, 2009.

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

Documentation:
Describe distribution:
See A1.1.
Sources of information:

Brooklyn Botanic Garden, 2009; Weldy & Werier.

Total Possible	25
Section Three Total	15

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
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 can remain viable in situ for longer than one year; no evidence for longer than 10 years. In storage, germination rates of 4.5% were recorded for seeds stored for nineteen years.
Sources of information:
Hull, 1973; FEIS, 1996.

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: 2

Documentation:
Describe vegetative response:
Regrowth from extensive underground root system.
Sources of information:
Batcher, 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^2).	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:
Batcher (2003): "The potential for large-scale restoration of unmanaged wildlands infested with F. arundinacea is

probably low, unless the entire area is tilled and/or herbicided and then reseeded. For managed wildlands infested with F. arundinacea, restoration potential is probably moderately low, unless large areas are tilled, herbicided and reseeded, or unless large scale, resource-intensive prescribed burn programs, coupled with herbiciding and other restoration programs are implemented. If attacked early, managed wildlands only recently colonized by F. arundinacea, have a moderate to high potential for restoration. Festuca arundinacea has high reproductive vigor and is moderately adaptable. There are apparently no reports indicating that pests or predators appreciably effect F. arundinacea populations in North America. The species is widespread and occasionally locally abundant. Control is difficult in natural areas or wildlands because the application of herbicides can reduce populations of native grasses. (This can be true even with selective herbicides) An exception is spring applications of herbicides to control F. arundinacea which may have little effect on warm season grasses as they are not yet actively growing."
Sources of information:
Batcher, 2000.

Total Possible	10
Section Four Total	8
Total for 4 sections Possible	100
Total for 4 sections	65

C. STATUS OF CULTIVARS AND HYBRIDS:

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: Numerous cultivars; see PLANTS website.

References for species assessment:

Anderson, C.P., B.H. Bussler, and W.R. Chaney. 1989. Concurrent establishment of ground cover and hardwood trees on reclaimed mined land and unmined references sites. Forest Ecology and Management. 28: 81-99.

Ball, D.M., J.F. Pedersen, and G.D. Lacefield. 1993. The tall-fescue endophyte. American Scientist. 81: 370-379.

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United States Department of Agriculture, National Resources Conservation Service. 2008. The PLANTS Database. National Plant Data Center, Baton Rouge, Louisiana [Accesssed on].
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Wasser, C.H. 1982. Ecology and culture of selected species useful in revegetating disturbed lands in the west. FWS/OBS-82/56. U.S. Department of the Interior, Fish and Wildlife Service, Office of Biological Services, Western Energy and Land Use Team, Washington, DC. NTIS publication PB-83-167023.

Weldy, T. and D. Werier. 2005. New York Flora Atlas. [S.M. Landry, K.N. Campbell, and L.D. Mabe (original application development), Florida Center for Community Design and Research. University of South Florida]. New York Flora Association, Albany, New York. [Accesssed onDecember 2, 2009.]

Wheeler, W.A. and D.D. Hill. 1957. Grassland seeds. Van Nostrand Co. Princeton, New Jersey.

Wolf, D.D., R.H. Brown, and R.E. Blaser. 1979. Physiology of Growth and Development. In Buckner, R.C. and L.P. Bush (eds) Tall Fescue. American Society of Agronomy, Crop Science Society of America, Soil Science Society of America. Madison, WI.

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References for ranking form:

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