NEW YORK
NON-NATIVE PLANT INVASIVENESS RANKING FORM

Scientific name:	Miscanthus sinensis Anderss.	USDA Plants Code: MISI
Common names:	Chinese silvergrass	
Native distribution:	Eastern Asia	
Date assessed:	October 29, 2008; March 5, 2009; Sept. 30, 2009; edited March 17, 2010	
Assessors:	Steve Glenn, Gerry Moore	
Reviewers:	LIISMA SRC	
Date Approved:	30 September 2009	Form version date: 25 September 2009

New York Invasiveness Rank: High (Relative Maximum Score 70.00-80.00)

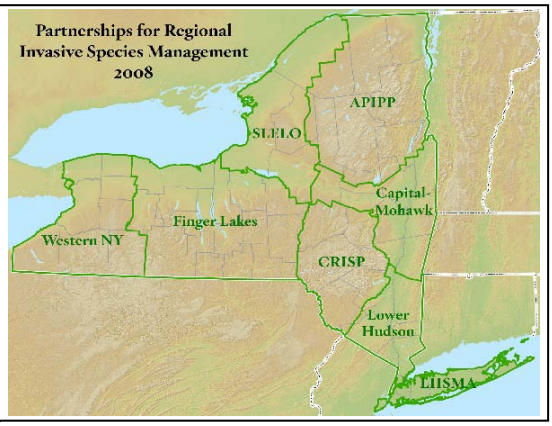
Distribution and Invasiveness Rank (*Obtain from PRISM invasiveness ranking form*)			
	Status of this species in each PRISM:	Current Distribution	PRISM Invasiveness Rank
1	Adirondack Park Invasive Program	Not Assessed	Not Assessed
2	Capital/Mohawk	Not Assessed	Not Assessed
3	Catskill Regional Invasive Species Partnership	Not Assessed	Not Assessed
4	Finger Lakes	Not Assessed	Not Assessed
5	Long Island Invasive Species Management Area	Common	High
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 (30)	21
2	Biological characteristic and dispersal ability	25 (25)	19
3	Ecological amplitude and distribution	25 (25)	23
4	Difficulty of control	10 (10)	7
	Outcome score	100 (90)[b]	70[a]
	Relative maximum score †		77.78
	New York Invasiveness Rank §	High (Relative Maximum Score 70.00-80.00)	

* 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:
All Miscanthus material examined that has clearly escaped in NY and surrounding states keys to M. sinensis. More collections are needed to know if M. sacchariflorus and the hybrid M. xgiganteus (M. sachariflorus x M. sinensis) are established and to what degree, if at all, the two species are intergrading. Jacquart et al., 1995; Weldy & Werier, 2005; Brooklyn Botanic Garden, 2008. Meyer (2008) made the following conlcusions regarding wild populations of Miscanthus sinensis: "Ornamental plantings of Miscanthus sinensis (the species, not a specific cultivar) are probably the source of the 'wild type' Miscanthus sinensis that is now common in western North Carolina; near Valley Vorge, PA; and other areas in the Middle Atlantic States. This wild type probably self-seeded from an ornamental planting and the species is rarely found in the trade today." However, hard evidence regarding whether or not cultivars (either through seed or pollen production) can contribute to the establishment of "wild type" material in natural areas is lacking. Seedless cultivars are currently being developed. It is thought that the later flowering cultivars may be less problematic with respect to seed set and escape. Dr. Richard Iverson (Farmingdale) has provided the following phenological information on cultivars: 'Graziella' (August), 'Adagio' (August), 'Silver Feather' (early September), 'Zebrinus' and 'Variegatus' (mid-September), 'Yaku Shima' (late September), 'Gracillimus' and 'Morning Light' (early October). Despite the later flowering, Dr. Iverson did note that 'Gracillimus' set abundant seed.

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; SRC pers. comm. ; Richard Iverson, pers. comm.

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	Common
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.

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: Vernal pools, upper edge of brackish marshes.

Documentation:
Sources of information:
Ohtsuka et al. 1993; Jacquart et al., 2007; Woo et al. 1996;authors' personal observations; LIISMA SRC, pers. obs.

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)
Soils under 4-16 years of cultivated Miscanthus on different sites in Europe had greater content of organic carbon and total nitrogen. Also, the cation exchange capacities (CEC) and contents of plant available potassium had increased. Among the physical soil properties, decreases in bulk density as well as increases in porosity and water retention were observed. Once established, can lead to low levels of nitrate leaching and improved groundwater quality. May increase fire frequency and intensity due to large amount of flammable fine fuels produced by dead leaves and stems; burns very hot and very quickly (Taylor in Fellows, 2007). Decreases light availability to those species that may grow below the species near the soil surface.
Sources of information:
Christian & Riche, 1998; Kahle et al., 1999; Hansen et al., 2004; Fellows, 2007; authors' pers. obs.

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

Documentation:
Identify type of impact or alteration:
Large clumping grass clearly changes the density and significantly increasing the height of the herb layer. At some sites there are major alterations of natural community structure (e.g., Heckscher State Park) but evidence of major alteration of strucuture is not yet present at other sites. Further observations are clearly warranted.
Sources of information:
Authors' personal observations.

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
U. Unknown

Score 7

Documentation:
Identify type of impact or alteration:
Large clumping grass noted in areas occupied by chiefly native species that are no doubt reduced by individuals of this species, but no clear documentation showing significant or major alterations in community composition. Different populations observed show significantly different degrees of growth vigor and density. Some populations consist of single (or few) clumps that do not appear to spread, while other populations consist of large stands that are rapidly spreading, suggesting that there may be a good deal of intraspecific variability within the material that we are currently identifying as Miscanthus sinensis. Further evidence of variability is the significant differences in flowering times within a given area. There may also be differences in cold hardiness.
Sources of information:
Fellows, 2007; authors' pers. obs.; SRC pers. comm.

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 U

Documentation:
Identify type of impact or alteration:
Studies on impacts on other species or species groups not known.
Sources of information:

Total Possible	30
Section One Total	21

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 4

Documentation:
Describe key reproductive characteristics (including seeds per plant):
Can produce as many as 7,900 seeds and some germination rates approached 100%. There is much variability of the flowering times between different cultivars within the species, some blooming so late that they are unable to set seed before frost .
Sources of information:
Meyer & Tchida, 1999; Wilson & Knox, 2006.

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:
Anemochory- (wind dispersed) due to long callus hairs on spikelets; seeds can also become attached to animals.
Sources of information:
barkworth, 2003; Zhengyi, Raven & Deyuan, 2006.

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:
Commercial sales of scores of ornamental cultivars; one survey of the Connecticut Nursery and Landscape Association found only 14.5% of its members considered this species to be invasive. Introduction for bioenergy production. Possible introduction for light-weight concrete or non binding loose-fill material/isolation material production. Indirect transport by seeds on clothing and also spread by yard waste. Further research needed, but possibly used in camouflage for duck blinds.
Sources of information:
Lewandowski et al. 2003; Pude, et al., 2004; Gagliardi & Brand, 2007.

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; grows on infertile soils. High rates of photosynthesis associated with the C4 pathway of this species, but cespitose to shortly rhizomatous habit.
Sources of information:
Anten & Hirose, 2003; Zhengyi, Raven & Deyuan, 2006; authors' pers. obs..

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:
Cespitose or shortly rhizomatous but not usually, with us, not forming thickets or smothering growth habit. One population on Long Island (e.g., Heckscher State Park) is a thicket. Further research is needed to better understand why some populations can form thickets, while others do not.
Sources of information:
Zhengyi, Raven Deyuan, 2006; SRC 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:
Germination can occur in vegetated areas in a narrow range of conditions.
Sources of information:
Darke, 1999.

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:
Miscanthus sacchariflorus reported from NY and elsewhere, but not confirmed to be clearly established outside of cultivation. Flora of North America Editorial Committee, 2003; New York Flora Association, 2008; Brooklyn Botanic Garden, 2008.

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
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 4

Documentation:
Identify reason for selection, or evidence of weedy history:
Stands of many acres noted on Long Island from Heckscher State Park and Seatuck National Wildlife Refuge.
Sources of information:
Gary Lawton (NYS OPRHP), Alex Chmielewski (USFWS) 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 6

Documentation:
Identify type of habitats where it occurs:
See A2.3.
Sources of information:
Ohtsuka, T. et al. 1993; Woo, B. M. et al. 1996;authors' personal observations

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 establishes in areas that have been disturbed; no evidence that it requires anthropogenic disturbance.
Sources of information:
Woo, et al. 1996; Morisawa, 1999; Zhengyi, Raven & Deyuan, 2006

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:
Central China.
Sources of information:
Zhengyi, Raven, & Deyuan, 2006; Brooklyn Botanic Garden, 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

Documentation:
Identify states and provinces invaded:
CT, DC, DE, IL, KY, MA, MD, MI, NJ, NY, OH, PA, RI, VA, WV; Ontario, Canada.
Sources of information: See known introduced range in plants.usda.gov, and update with information from states and Canadian provinces.
Barkworth, 2003; U.S.D.A., 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

Documentation:
Describe distribution:
See A1.1
Sources of information:
Weldy & Werier, 2005; Brooklyn Botanic Garden, 2008.

Total Possible: 25
Section Three Total: 23

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:
Known to seed bank in native range. Seeds remain viable over one year; no evidence for viability greater than ten years. According to D. Taylor 2007 "Some varieties appear to be sterile, especially a variety that keys to Miscanthus sinensis var. gracillimus in Hitchcock and Chase (Manual of Grasses). "
Sources of information:
FuHsing, 2000; Shang, 2001; D. Taylor 2007 (personal observation)

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:
Tolerates removal of above-ground parts. Does seem to establish less readily where there is mowing.
Sources of information:
Hayashi, 1994; Morisawa, 1999.

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:
Repeated close mowing during the growing season for two years will kill most plants, but continued treamtment due to seed bank may be needed. Glyphosate treatment in mid-spring or early summer will kill most plants; if necessary spray again in late summer when growth is 12." Small populations can be hand pulled; this is less effective for large stands. Presence in wetlands also complicates removal.
Sources of information:
Fellows, 2007; Meyers 2008.

Total Possible	10
Section Four Total	7

Total for 4 sections Possible	90
Total for 4 sections	70

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: Over 40 cultivars known, including 'Gracillimus' - silvery green leaves turn bronze in winter, leaves and flowers with graceful curves, flowers reddish-pink; 'Purpurascens' - reddish-bronze flowers, 3 to 4 feet tall, foliage green and reddish-purple; 'Variegatus' - flowers pale pink, greens leaves striped with white; 'Zebrinus' - flowers pale yellow, yellow bands on leaves; 'Morning Light' with more compact habit and silvery leaves; 'Yaku Jima' with dwarf habit and early blooming.

References for species assessment:

Anten, N. P. R. & T. Hirose. 2003. Shoot structure, leaf physiology, and daily carbon gain of plant species in a tallgrass meadow. Ecology. 84: 955-968.

Barkworth, M. W. 2003. Pp. 616-618 in Flora of North America Editorial Committee (eds.), Flora of North America. Volume 25. Poaceae, part 2. Oxford Univ. Press, New York.

Brooklyn Botanic Garden. 2008. AILANTHUS database. [Accessed 29 October 2008.]

Christian, D. G. & A. B. Riche. 1998. Nitrate leaching losses under Miscanthus grass planted on a silty clay loam soil. Soil Use & Manag. 14: 131-135.

Darke, . 1999. The color encyclopedia of ornamental grasses, sedges, rushes, restios, cat-tails, and selected bamboos.

Fellows, M. 2007. Miscanthus sinensis. U.S. Invasive Species Impact Rank (I-Rank). NatureServe Explorer. <www.natureserve.org>. [Accesssed on 29 October 2008].

FuHsing, H. 2000. Seed longevity of Miscanthus species. Journal of Taiwan Livestock Research 33(2): 145-153

Gagliardi, J. A. & M. H. Brand. 2007. Connecticut nursery and landscape industry preferences for solutions to the sale and use of invasive plants. HortTechnology. 17: 39-45.

Hansen, E. M. et al. 2004. Carbon sequestration in soil beneath long-term Miscanthus plantations as determined by 13C abundance. Biomass & Bioenergy. 26: 97-105.

Hayashi, I. 1994. Experimental community ecology in Miscanthus sinensis grassland: Change of species composition according to mowing frequency. Jap. J. Ecology. 44: 161-170.

Jacqart, E. P. O'Connor, K. Collins, D. Gordon, J. Kieffer, and K. Howe. 1995. Assessment of Miscanthus sinensis and Miscanthus xgiganteus in Indiana's natural areas. Indiana Department of Natural resources. 10 pp.

Kahle, P. et al. 1999. Effects of Miscanthus x giganteus cultivation on chemical and physical soil properties. J. Pl. Nutrition Soil Sci. ; 162: 27-32.

Lewandowski, I. et al. 2003. The development and current status of perennial rhizomatous grasses as energy crops in the US and Europe. Biomass & Bioenergy. 25: 335-361.

Meyer, M. H. and C. L. Tchida. 1999. Miscanthus Anderss. produces viable seed in four USDA hardiness zones. J. Environ. Hort. 17: 137-140.

Meyer, M. 2008. University of Minnesota.
http://horticulture.cfans.umn.edu/miscanthus/management.html accessed March 13,2009

Morisawa, T. 1999. Weed Notes: Miscanthus sinensis. The Nature Conservancy wildland weeds management and research. <http://tncweeds.ucdavis.edu> [accessed 29 October 2008].

Ohtsuka, T. et al. 1993. Early herbaceous succession along a topographical gradient on forest clear-felling sites in mountainous terrain, central Japan. Ecol. Res. 8(3): 329-340.

Pude, R. et al. 2004. Morphological, chemical and technical parameters of Miscanthus genotypes. J. Appl. Bot. 78:58-63.

Shang, G. F. 2001. Characteristics of soil seed bank and seedling bank of shrubland in Tiantong Range, Zhejiang Province. Acta Bot. Yunnanica. 23: 209-215.

Taylor, David. 2007. TNC Invasive Species Listserve Digest #152, Nov. 21, 2007. dtaylor@fs.fed.us)

United States Department of Agriculture. 2008. The PLANTS Database. National Plant Data Center, Baton Rouge, LA <http://plants.usda.gov> [accessed 29 October 2008].

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. <atlas.nyflora.org/>. [Accesssed on 29 October 2008].

Wilson, S. B. & G. W. Knox. 2006. Landscape performance, flowering, and seed viability of 15 Japanese silver grass cultivars grown in Northern and Southern Florida. HortTechnology. 16: 686-693.

Woo, B. M. et al. 1996. A study of plant succession stages of highway cut-slope. A case study on Joongbu-highway. J. Korean For. Soc. 85(3): 347-359.

Zhengyi, W., P. H. Raven, & H. Deyuan. eds. 2006. Flora of China, Volume 22: Poaceae. Beijing and St. Louis, MO: Science Press and Missouri Botanical Garden.

Citation: This NY ranking form may be cited as: Jordan, M.J., G. Moore and T.W. Weldy. 2008. Invasiveness ranking system for non-native plants of New York. Unpublished. The Nature Conservancy, Cold Spring Harbor, NY; Brooklyn Botanic Garden, Brooklyn, NY; The Nature Conservancy, Albany, NY. Note that the order of authorship is alphabetical; all three authors contributed substantially to the development of this protocol.

Acknowledgments: The NY form incorporates components and approaches used in several other systems, cited in the references below. Valuable contributions by members of the Long Island Invasive Species Management Area's Scientific Review Committee were incorporated in revisions of this form. Original members of the LIISMA SRC included representatives of the Brooklyn Botanic Garden; The Nature Conservancy; New York Natural Heritage Program, New York Sea Grant; New York State Office of Parks, Recreation and Historic Preservation; National Park Service; Brookhaven National Laboratory; New York State Department of Environmental Conservation Region 1; Cornell Cooperative Extension of Suffolk/Nassau Counties; Long Island Nursery and Landscape Association; Long Island Farm Bureau; SUNY Farmingdale Ornamental Horticulture Department; Queens College Biology Department; Long Island Botanical Society; Long Island Weed Information Management System database manager; Suffolk County Department of Parks, Recreation and Conservation; Nassau County Department of Parks, Recreation and Museums; Suffolk County Soil & Water Conservation District.

References for ranking form:

Carlson, Matthew L., Irina V. Lapina, Michael Shephard, Jeffery S. Conn, Roseann Densmore, Page Spencer, Jeff Heys, Julie Riley, Jamie Nielsen. 2008. Invasiveness ranking system for non-native plants of Alaska. Technical Paper R10-TPXX, USDA Forest Service, Alaska Region, Anchorage, AK XX9. Alaska Weed Ranking Project may be viewed at: http://akweeds.uaa.alaska.edu/akweeds_ranking_page.htm.

Heffernan, K.E., P.P. Coulling, J.F. Townsend, and C.J. Hutto. 2001. Ranking Invasive Exotic Plant Species in Virginia. Natural Heritage Technical Report 01-13. Virginia Dept. of Conservation and Recreation, Division of Natural Heritage, Richmond, Virginia. 27 pp. plus appendices (total 149 p.).

Morse, L.E., J.M. Randall, N. Benton, R. Hiebert, and S. Lu. 2004. An Invasive Species Assessment Protocol: Evaluating Non-Native Plants for Their Impact on Biodiversity. Version 1. NatureServe, Arlington, Virginia. http://www.natureserve.org/getData/plantData.jsp

Randall, J.M., L.E. Morse, N. Benton, R. Hiebert, S. Lu, and T. Killeffer. 2008. The Invasive Species Assessment Protocol: A Tool for Creating Regional and National Lists of Invasive Nonnative Plants that Negatively Impact Biodiversity. Invasive Plant Science and Management 1:36–49

Warner, Peter J., Carla C. Bossard, Matthew L. Brooks, Joseph M. DiTomaso, John A. Hall, Ann M.Howald, Douglas W. Johnson, John M. Randall, Cynthia L. Roye, Maria M. Ryan, and Alison E. Stanton. 2003. Criteria for Categorizing Invasive Non-Native Plants that Threaten Wildlands. Available online at www.caleppc.org and www.swvma.org. California Exotic Pest Plant Council and Southwest Vegetation Management Association. 24 pp.

Williams, P. A., and M. Newfield. 2002. A weed risk assessment system for new conservation weeds in New Zealand. Science for Conservation 209. New Zealand Department of Conservation. 1-23 pp.