

Family: *Poaceae*

Taxon: *Miscanthus floridulus*

Synonym: *Miscanthus japonicus* Andersson
Saccharum floridulum Labill.

Common Name: giant Chinese silver grass
Japanese silver grass
miscanthus

Questionnaire :	current 20090513	Assessor:	Chuck Chimera	Designation:	H(HPWRA)
Status:	Assessor Approved	Data Entry Person:	Chuck Chimera	WRA Score	18
101	Is the species highly domesticated?		y=-3, n=0		n
102	Has the species become naturalized where grown?		y=1, n=-1		
103	Does the species have weedy races?		y=1, n=-1		
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"		(0-low; 1-intermediate; 2-high) (See Appendix 2)		High
202	Quality of climate match data		(0-low; 1-intermediate; 2-high) (See Appendix 2)		Intermediate
203	Broad climate suitability (environmental versatility)		y=1, n=0		y
204	Native or naturalized in regions with tropical or subtropical climates		y=1, n=0		y
205	Does the species have a history of repeated introductions outside its natural range?		y=-2, ?=-1, n=0		y
301	Naturalized beyond native range		y = 1*multiplier (see Appendix 2), n= question 205		y
302	Garden/amenity/disturbance weed		n=0, y = 1*multiplier (see Appendix 2)		
303	Agricultural/forestry/horticultural weed		n=0, y = 2*multiplier (see Appendix 2)		y
304	Environmental weed		n=0, y = 2*multiplier (see Appendix 2)		
305	Congeneric weed		n=0, y = 1*multiplier (see Appendix 2)		y
401	Produces spines, thorns or burrs		y=1, n=0		y
402	Allelopathic		y=1, n=0		y
403	Parasitic		y=1, n=0		n
404	Unpalatable to grazing animals		y=1, n=-1		n
405	Toxic to animals		y=1, n=0		n
406	Host for recognized pests and pathogens		y=1, n=0		y
407	Causes allergies or is otherwise toxic to humans		y=1, n=0		n
408	Creates a fire hazard in natural ecosystems		y=1, n=0		y
409	Is a shade tolerant plant at some stage of its life cycle		y=1, n=0		
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)		y=1, n=0		y

411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	y
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	y
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally	y=1, n=-1	
604	Self-compatible or apomictic	y=1, n=-1	
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	2
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	
704	Propagules adapted to wind dispersal	y=1, n=-1	y
705	Propagules water dispersed	y=1, n=-1	
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)	y=1, n=-1	
708	Propagules survive passage through the gut	y=1, n=-1	
801	Prolific seed production (>1000/m2)	y=1, n=-1	
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	n
803	Well controlled by herbicides	y=-1, n=1	y
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y=1, n=-1	y
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	y=-1, n=1	n

Designation: H(HPWRA)

WRA Score 18

Supporting Data:

101	2011. WRA Specialist. Personal Communication.	[Is the species highly domesticated? No] No evidence
102	2011. WRA Specialist. Personal Communication.	NA
103	2011. WRA Specialist. Personal Communication.	NA
201	2006. Wu, Z.Y./Raven, P.H./Hong, D.Y. (eds.). Flora of China. Vol. 22 (Poaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis http://flora.huh.harvard.edu/china/mss/volume22/index.htm	[Species suited to tropical or subtropical climate(s) 2-high] "Slopes, valleys, grassy places. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Jiangsu, Sichuan, Taiwan, Yunnan, Zhejiang [SE Asia]."
201	2011. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network (GRIN) [Online Database Index]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/index.pl	[Species suited to tropical or subtropical climate(s) 2-high] Native: ASIA-TEMPERATE China: China [s.e.] Eastern Asia: Japan - Honshu [e.], Kyushu, Ryukyu Islands, Shikoku; Taiwan ASIA-TROPICAL Indo-China: Indochina Malesia: Indonesia - Java; Malaysia; Philippines PACIFIC South-Central Pacific: French Polynesia Southwestern Pacific: Fiji
202	2006. Wu, Z.Y./Raven, P.H./Hong, D.Y. (eds.). Flora of China. Vol. 22 (Poaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis http://flora.huh.harvard.edu/china/mss/volume22/index.htm	[Quality of climate match data? 1 - intermediate]
203	1987. Chou, C-H/Hwang, S-Y/Chang, F-C. Population study of <i>Miscanthus floridulus</i> (Labill.) Warb.. 1. Variation of Peroxidase and Esterase in 27 Populations in Taiwan. Botanical Bulletin of Academia Sinica. 28: 247-281.	[Broad climate suitability (environmental versatility)? Yes] <i>Miscanthus floridulus</i> (Labill.) Warb., a dominant endemic grass, is widely distributed in areas of roadsides, hillsides, riverbed, and abandoned fields from low elevation to high elevation in Taiwan ... Hsu (1986) found that the ubiquitous distribution of <i>Miscanthus floridulus</i> is due in part to the behavior of seed germination insensitive to temperature ... It is thus thought that the grass should possess a wide heterogeneity, resulting in a wide adaptability to different environmental regimes, such as high salinity, polluted soil, and severe dry land."
204	2000. Space, J.C./Falanruw, M.. Observations on invasive plant species in Micronesia. Report to the Pacific Islands Committee, Council of Western State Foresters. USDA Forest Service, Honolulu, HI	[Native or naturalized in regions with tropical or subtropical climates? Yes] "Sword grass (<i>Miscanthus floridulus</i>) is especially common, sometimes in fairly pure stands on volcanic soils on Guam. It is also present in the Northern Marianas, Chuuk, Pohnpei and Kosrae as well as American Samoa."
204	2011. Floridata. <i>Miscanthus floridulus</i> . http://www.floridata.com/ref/m/misc_flo.cfm	[Native or naturalized in regions with tropical or subtropical climates? Yes] "Giant miscanthus is native to Japan, the Ryukyu Islands, Taiwan, and other islands in that part of the Pacific."
204	2011. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network (GRIN) [Online Database Index]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/index.pl	[Native or naturalized in regions with tropical or subtropical climates? Yes] Native: ASIA-TEMPERATE China: China [s.e.] Eastern Asia: Japan - Honshu [e.], Kyushu, Ryukyu Islands, Shikoku; Taiwan ASIA-TROPICAL Indo-China: Indochina Malesia: Indonesia - Java; Malaysia; Philippines PACIFIC South-Central Pacific: French Polynesia Southwestern Pacific: Fiji
205	2011. Floridata. <i>Miscanthus floridulus</i> . http://www.floridata.com/ref/m/misc_flo.cfm	[Does the species have a history of repeated introductions outside its natural range? Yes] "This and other species of <i>Miscanthus</i> grow so much during a single growing season that they are used for biomass energy production in Europe and Asia. "
301	2000. Space, J.C./Falanruw, M.. Observations on invasive plant species in Micronesia. Report to the Pacific Islands Committee, Council of Western State Foresters. USDA Forest Service, Honolulu, HI	[Naturalized beyond native range? Yes] "Sword grass (<i>Miscanthus floridulus</i>) is especially common, sometimes in fairly pure stands on volcanic soils on Guam. It is also present in the Northern Marianas, Chuuk, Pohnpei and Kosrae as well as American Samoa."

301	2003. WWF Australia. Weeds and Pests: eradicating the invasive threat. Position Paper 03/01. WWF Australia, Sydney, Australia	[Naturalized beyond native range? Potentially Western Australia] "Since 1999, 40 new plant species have been detected in Western Australia. These include Canary Island's St John's Wort (<i>Hypericum canariense</i>), a serious weed in California and Hawaii, which has the potential to devastate coastal ecosystems, and as well as swordgrass (<i>Miscanthus floridulus</i>), which is a controlled species under Commonwealth quarantine and WA laws but was found in a nursery in late 2002."
301	2011. Lau, A.. Oahu Early Detection Botanist. Pers. Comm. 10 August 2011.	[Naturalized beyond native range? Potentially on Oahu] "We finally got a confident name for that large bunchgrass found on the first day of delimiting surveys for ChrOdo. We have a well respected grass expert, Jef Veldkamp, visiting the herbarium right now to do ID's and he decided the grass was <i>Miscanthus floridulus</i> . This is a listed HI state noxious weed, and has not been collected before in the State, so the KTA location may well be the only place it exists. ...Although we weren't surveying for it officially, it seemed somewhat sparingly naturalized there. I only remember hearing about a few plants people noticed."
301	2012. Beachy, J.R.. O'ahu Army Natural Resources Program. Pers. Comm. 16 May 2012. jane.r.beachy.ctr@mail.mil	[Naturalized beyond native range? Yes] "We were out at Kahuku in April, and got a little more info about the <i>Miscanthus floridulus</i> that we found out there last year. While the inflorescences are more compact than is typical for this taxa, OED still keys it out to MisFlo. We've found approximately 35 plants (roughly 10 immature and 15 mature). They are spread out over approximately 70 acres around Pahipahialua Gulch. Most of the known plants are in a relatively small area, less than 5 acres, with a few lone scattered individuals. The known plants are growing both in full sun and under a shady <i>Casuarina</i> spp canopy. One of the biggest plants was a clump with a radius of about 3m."
302	2000. Macfarlane, D.. Country Pasture/Forage Resource Profiles - Papua New Guinea. http://www.fao.org/ag/AGP/AGPC/doc/Counprof/southpacific/png.htm	[Garden/amenity/disturbance weed? See 3.03] " <i>Miscanthus floridulus</i> colonises disturbed land and old gardens, particularly above 1 800m." [A weed of agriculture]
303	1989. Moody, K.. Weeds reported in rice in South and Southeast Asia. International Rice Research Institute, Manila, Philippines	[Agricultural/forestry/horticultural weed? Yes] "Weeds reported to occur in rice in South and Southeast Asia" [Includes <i>Miscanthus floridulus</i> in Thailand]
303	2011. USDA Natural Resources Conservation Service. Hawaii State-listed Noxious Weeds. http://plants.usda.gov/java/noxious?rptType=State&statefips=15	[Agricultural/forestry/horticultural weed? Yes] A Hawaii State-listed Noxious Weed
304	2011. Reddy, G.P.. Survey of invasive plants on Guam and identification of the 20 most widespread. <i>Micronesica</i> . 41(2): 263–274.	[Environmental weed? Potentially] "The present study documents that six grasses— <i>P. maximum</i> , <i>P. paniculatum</i> , <i>M. floridulus</i> , <i>S. nodiflora</i> , <i>P. polystachion</i> , <i>C. aciculatus</i> , and <i>C. barbata</i> —are among the 20 most widespread invasive species on Guam."
305	2010. Meyer, M.H./Paul, J./Anderson, N.O.. Competitive ability of invasive <i>Miscanthus</i> biotypes with aggressive switchgrass. <i>Biological Invasions</i> . 12: 3809–3816.	[Congeneric weed? Yes] " <i>Miscanthus</i> (<i>Miscanthus sinensis</i> Anderss. [Poaceae]) is an ornamental and invasive grass native to Asia that has naturalized in several areas of the Middle Atlantic United States. Predicting how likely <i>Miscanthus</i> is to become invasive in other areas of the US is a concern of ecologists and horticulturists. The objective of this study was to measure the competitive ability of <i>Miscanthus</i> with an aggressive native grass, switchgrass (<i>Panicum virgatum</i> L. [Poaceae]), in order to show which grass would be more likely to dominate when the two species were grown together. Although switchgrass is a smaller plant than <i>Miscanthus</i> , in this greenhouse experiment it was significantly taller and had more vegetative and flowering culms than <i>Miscanthus</i> . <i>Miscanthus</i> however, was a stable competitor and did not significantly change in shoot or root dry weight as 2 and 4 switchgrass plants replaced the respective number of <i>Miscanthus</i> plants in each treatment. When <i>Miscanthus</i> biotypes from four locations were compared, the Pennsylvania biotype was significantly larger and more competitive with switchgrass than was the Washington, DC biotype. As switchgrass plants were replaced with <i>Miscanthus</i> , the shoot and root dry weights of the remaining switchgrass plants increased significantly, showing a higher competitive ability of switchgrass. Despite the fact that switchgrass was more competitive with itself than <i>Miscanthus</i> , the highest overall dry weight per treatment contained eight switchgrass plants. <i>Miscanthus</i> showed stable, competitive growth when planted together with switchgrass and it is predicted to likely do the same in a field setting."

305	2010. Quinn, L.D./Allen, D. J./Stewart, J. R.. Invasiveness potential of <i>Miscanthus sinensis</i> : implications for bioenergy production in the United States. <i>Global Change Biology Bioenergy</i> . 2: 310–320.	[Congeneric weed? Yes] " <i>Miscanthus sinensis</i> (Anderss.) is a perennial grass species that has been grown widely as an ornamental since the late 1800s and is now being considered for bioenergy production in the United States. With its ability to be grown from seed and tolerate cold climates, this species offers practical advantages over current cultivars of the higher-yielding hybrid species, <i>M. x giganteus</i> . Yet a large-scale release of <i>M. sinensis</i> for bioenergy production in colder northern regions could result in new invasions into natural areas. We show, with reference to historical records and data collected in six wild US populations of <i>M. sinensis</i> in 2009, that ornamental varieties of this species have a long history of localized escape in the Eastern United States, primarily within the Appalachian region. To prevent further escape and gene flow, we recommend the development of sterile or functionally sterile varieties of <i>M. sinensis</i> or the restriction of its usage as a donor of genetic material to new sterile cultivars of <i>M. x giganteus</i> . Other appropriate precautions for new biomass varieties include experimental demonstration of low invasiveness in the target region ahead of commercial production, along with post introduction stewardship programs."
401	2006. Wu, Z.Y./Raven, P.H./Hong, D.Y. (eds.). <i>Flora of China</i> . Vol. 22 (Poaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis http://flora.huh.harvard.edu/china/mss/volume22/index.htm	[Produces spines, thorns or burrs? No] "Plant tufted, robust. Culms erect, 1.5–4 m tall, 6–15 mm in diam., unbranched, nodes usually glabrous, or uppermost sometimes bearded. Leaves cauline, congested; leaf sheaths longer than internodes, overlapping, glabrous, pilose at throat; leaf blades linear, flat, tough, 20–85 × 0.5–4 cm, glabrous, midrib prominent, margins scabrid, base rounded, apex acuminate; ligule 1–3 mm, densely pilose on back. Panicle oblong or elliptic, dense, 20–50 cm; axis 25–45 cm. Racemes numerous, 10–30 cm, appressed or ascending, glabrous, scaberulous; rachis internodes puberulous, nodes glabrous; lower pedicel 1–3.5 mm, upper pedicel 2.5–8 mm. Spikelets 2.5–4(–6) mm, awned; callus hairs 4–6 mm, white, spreading, as long as the spikelet; glumes subequal, membranous, golden brown, 2.5–4(–6) mm, margins pilose near apex, veins obscure, apex acuminate; lower lemma lanceolate, hyaline, 3–3.5 mm, veinless, pilose; upper lemma similar to lower, 2–2.5 mm; awn geniculate, 5–6(–10) mm; upper palea a small hyaline scale. Anthers 3, 1–1.5 mm. Caryopsis oblong, ca. 1.5 mm."
401	2011. Plants For A Future Database. <i>Miscanthus floridulus</i> . http://www.pfaf.org/user/Plant.aspx?LatinName=Miscanthus+floridulus	[Produces spines, thorns or burrs? No. But leaf blades can cause cuts] "The leaves have saw-toothed edges that can cut the unwary gardener, it is best to wear gloves when working with the plant."
402	1974. Chou, C-H/Chung, Y-T. The allelopathic potential of <i>Miscanthus floridulus</i> . <i>Botanical Bulletin of Academia Sinica</i> . 15: 14-27.	[Allelopathic? Yes] "An unique pattern of herb exclusion by a dominant species of <i>Miscanthus floridulus</i> is found ubiquitously throughout the Island. It is found that the aqueous leaf leachate of <i>Miscanthus floridulus</i> exhibits the significant inhibition on the growth of lettuce. The aqueous extracts of leaves and soils collected from the <i>Miscanthus</i> area also show toxic effect. Furthermore, toxic spots are found on the chromatogram of the ether fraction of aqueous extract of <i>Miscanthus</i> leaves. Seven phytotoxins are identified by means of paper chromatography. They are <i>cis</i> and <i>trans</i> p-coumaric acid, ferulic, vanillic, syringic, p-hydroxybenzoic, and (0-hydroxypheny l) acetic acids. In addition, one toxic spot on chromatogram has not yet been identified. Thus, it appears that the bare areas associated with <i>Miscanthus</i> stands are primarily due to allelopathy."
402	1990. Chou, C.H.. The role of allelopathy in agroecosystems: studies from tropical Taiwan. Pp. 104-121 in Gliessman, S.R. (ed.) <i>Agroecology: researching the ecological basis for sustainable agriculture</i> . Springer-Verlag, Berlin-Heidelberg-New York	[Allelopathic? Yes] "Allelopathy is defined and its effects are considered in relation to yield reductions in continuously cropped sugarcane, asparagus and <i>Digitaria decumbens</i> and 2nd rice crops in Taiwan. The allelopathic mechanisms of some aggressive grasses including <i>Miscanthus floridulus</i> , native to Taiwan and <i>D. decumbens</i> are discussed. Allelopathy in forest ecosystems is reviewed with reference to some bamboo species and the allelopathic effect of <i>Leucaena leucocephala</i> . The phytotoxicity of <i>Cunninghamia lanceolata</i> litter on <i>Pennisetum clandestinum</i> growth and the beneficial and phytotoxic effect of cover crops on orchard plants and vegetable crops and of <i>Vitex negundo</i> on pasture grasses are outlined. Regulation of allelopathy by environmental factors is discussed."
403	2006. Wu, Z.Y./Raven, P.H./Hong, D.Y. (eds.). <i>Flora of China</i> . Vol. 22 (Poaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis http://flora.huh.harvard.edu/china/mss/volume22/index.htm	[Parasitic? No] No evidence
404	1992. Decker, B.G.. Secondary plant cover on upland slopes, Marquesas Islands, French Polynesia. <i>Atoll Research Bulletin</i> . 363: 1-36.	[Unpalatable to grazing animals? No] "In the valley of Eiaone, just west of Puamau, Mr. Henry Lie, a resident there for fifty years, has watched <i>Miscanthus floridulus</i> (discussed below) a conspicuous tall grass disappear from the valley's precipitous western flank under grazing pressure from his goats and sheep, only to witness a subsequent invasion of the same locality by <i>T. rosea</i> ."

404	1993. Michalk, D.L./Nan-Ping, F./Chin-Ming, Z.. Improvement of Dry Tropical Rangelands in Hainan Island, China: 2. Evaluation of Pasture Grasses. <i>Journal of Range Management</i> . 46(4): 339-345.	[Unpalatable to grazing animals? No] "...domesticated local grasses such as <i>Miscanthus floridulus</i> Warb. Ex K. Schum & Lauterb., <i>Digitaria sanguinalis</i> (L.) Scop., <i>Sorghum propingnum</i> (Kunth.) Hitchcock, <i>Hemarthria compressa</i> R. Br., and <i>Pennisetum polystachyon</i> Schult. have been cultivated and utilized for many years in the southern provinces (Hong 1985, Hwang et al. 1986..."
404	2006. Wu, Z.Y./Raven, P.H./Hong, D.Y. (eds.). <i>Flora of China</i> . Vol. 22 (Poaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis http://flora.huh.harvard.edu/china/mss/volume22/index.htm	[Unpalatable to grazing animals? No] "The plants are cultivated for hedges and as ornamentals, the rhizomes are used for medicine, the culms are used for papermaking, and the young leaves are used for forage."
404	2010. Natural Resources Conservation Service. Invasive Species Fact Sheet Pacific Islands Area – West - Swordgrass (<i>Miscanthus floridulus</i>). http://www.grazinglandshawaii.org/wp-content/uploads/2010/12/PIA_Fact_Sheet_Miscanthus_floridulus.pdf	[Unpalatable to grazing animals? No] "Palatable to cattle but little or no use by deer and other wildlife."
405	2006. Wu, Z.Y./Raven, P.H./Hong, D.Y. (eds.). <i>Flora of China</i> . Vol. 22 (Poaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis http://flora.huh.harvard.edu/china/mss/volume22/index.htm	[Toxic to animals? No] "The plants are cultivated for hedges and as ornamentals, the rhizomes are used for medicine, the culms are used for papermaking, and the young leaves are used for forage." [No evidence]
405	2011. WRA Specialist. Personal Communication.	[Toxic to animals? No] No evidence, and palatable to grazing animals
406	2000. Rott, P./Bailey, R.A./Comstock, J.C./Croft, B.J./Saumtally, A.S. (eds.). A guide to sugarcane diseases. CIRAD & ISSCT, Montpellier & Quatre-Bornes	[Host for recognized pests and pathogens? Yes] "Research by Egan (1965) showed that chlorotic streak infects various species of <i>Saccharum</i> ...Other species into which the disease has been transmitted include <i>Brachiaria mutica</i> , <i>Erianthus procerus</i> , <i>Miscanthus floridulus</i> ..."
406	2011. Farr, D.F./Rossman, A.Y.. Fungal Databases, Systematic Mycology and Microbiology Laboratory. ARS, USDA, http://nt.ars-grin.gov/fungalatabases/index.cfm	[Host for recognized pests and pathogens? Yes] "122 Fungus-Host combinations in the Fungus Host database"
407	2006. Wu, Z.Y./Raven, P.H./Hong, D.Y. (eds.). <i>Flora of China</i> . Vol. 22 (Poaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis http://flora.huh.harvard.edu/china/mss/volume22/index.htm	[Causes allergies or is otherwise toxic to humans? No] "The plants are cultivated for hedges and as ornamentals, the rhizomes are used for medicine, the culms are used for papermaking, and the young leaves are used for forage." [No evidence]
407	2011. WRA Specialist. Personal Communication.	[Causes allergies or is otherwise toxic to humans? No] No evidence
408	1997. Florence, J./Lorence, D.H.. Introduction to the Flora and Vegetation of the Marquesas Islands. <i>Allertonia</i> . 7(4): 226-237.	[Creates a fire hazard in natural ecosystems? Yes] "In leeward areas from 300 to 1000 m anthropogenic grasslands of <i>Miscanthus</i> , <i>Paspalum</i> , and <i>Rhynchelytrum</i> have been induced by fires and overgrazing." [grasslands promoted and in turn, carry fire]
408	1998. Mueller-Dombois, D./Fosberg, F. R.. <i>Vegetation of the tropical Pacific islands</i> . Springer-Verlag, New York	[Creates a fire hazard in natural ecosystems? Yes] "In burned areas <i>Casuarina</i> saplings were killed by the fire, but the <i>Miscanthus</i> recovered," [The Marianas] "
408	2006. Bassler, P.C./Aguon, C.F.. <i>Guam Comprehensive Wildlife Conservation Strategy</i> . Guam Division of Aquatic and Wildlife Resources, Mangilao, Guam	[Creates a fire hazard in natural ecosystems? Yes] "Guam is covered with <i>Miscanthus floridulus</i> because this grass species quickly flourishes in areas made available by repeated burning."
408	2010. Natural Resources Conservation Service. Invasive Species Fact Sheet Pacific Islands Area – West - Swordgrass (<i>Miscanthus floridulus</i>). http://www.grazinglandshawaii.org/wp-content/uploads/2010/12/PIA_Fact_Sheet_Miscanthus_floridulus.pdf	[Creates a fire hazard in natural ecosystems? Yes] "The lower leaf blades tend to fall off in late summer, adding fuel to wildfire hazard."
409	1994. Tenenbaum, F./Buchanan, S.. <i>Taylor's guide to shade gardening</i> . Houghton Mifflin Harcourt, New York	[Is a shade tolerant plant at some stage of its life cycle? Possibly] "Part to light shade"
409	2011. <i>Floridata</i> . <i>Miscanthus floridulus</i> . http://www.floridata.com/ref/m/misc_flo.cfm	[Is a shade tolerant plant at some stage of its life cycle? Possibly no] "Light: Giant miscanthus does best in full sun. It is likely to stretch for the sun and wind up falling over if planted in too much shade."

409	2011. Plants For A Future Database. <i>Miscanthus floridulus</i> . http://www.pfaf.org/user/Plant.aspx?LatinName=Miscanthus+floridulus	[Is a shade tolerant plant at some stage of its life cycle? Possibly] "It can grow in semi-shade (light woodland) or no shade."
409	2012. Beachy, J.R.. O'ahu Army Natural Resources Program. Pers. Comm. 16 May 2012. jane.r.beachy.ctr@mail.mil	[Is a shade tolerant plant at some stage of its life cycle? Possibly Yes] "The known plants are growing both in full sun and under a shady <i>Casuarina</i> spp canopy."
410	2011. Floridata. <i>Miscanthus floridulus</i> . http://www.floridata.com/ref/m/misc_flo.cfm	[Tolerates a wide range of soil conditions? Yes] "It tolerates fairly moist soils, but does best in well-drained soils with frequent watering."
411	2006. Wu, Z.Y./Raven, P.H./Hong, D.Y. (eds.). <i>Flora of China</i> . Vol. 22 (Poaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis http://flora.huh.harvard.edu/china/mss/volume22/index.htm	[Climbing or smothering growth habit? No] "Plant tufted, robust. Culms erect, 1.5–4 m tall, 6–15 mm in diam., unbranched, nodes usually glabrous, or uppermost sometimes bearded."
412	1974. Chou, C-H/Chung, Y-T. The allelopathic potential of <i>Miscanthus floridulus</i> . <i>Botanical Bulletin of Academia Sinica</i> . 15: 14-27.	[Forms dense thickets? Yes] "There is almost lack of an understory of herbaceous plants in <i>Miscanthus</i> stands."
412	1998. Mueller-Dombois, D./Fosberg, F. R.. <i>Vegetation of the tropical Pacific islands</i> . Springer-Verlag, New York	[Forms dense thickets? Yes] "The reed grass <i>Miscanthus floridulus</i> is often admixed, but it forms another dominant herbaceous vegetation type on deeper soils. The <i>Miscanthus</i> grassland grows in 2-m-tall thickets on relatively fertile colluvium in valleys and on lower slopes." [Fiji] "The loose volcanic ash that covered large areas, especially on the western side, was vegetated largely by an almost pure stand of <i>Miscanthus floridulus</i> . This formed a coarse, harsh, brakelike grassland 1 to 3 meters in height and very dense in places." [The Marianas]
412	2001. FAO. Global Forest Fire Assessment - 1990-2000. Working Paper 55. Forest Resources Assessment Programme, Forestry Department,, Rome	[Forms dense thickets? Yes] "Wild yams often grow among dense stands of a tall grass (or reeds, <i>Miscanthus floridulus</i>) whose thickets are difficult to penetrate and where the emerging shoots of yams are hidden from view. Fijians burn the thickets over large areas so that the emerging shoots can be easily seen and the tubers dug up free of the hindrance of dense vegetation."
412	2010. Natural Resources Conservation Service. Invasive Species Fact Sheet Pacific Islands Area – West - Swordgrass (<i>Miscanthus floridulus</i>). http://www.grazinglandshawaii.org/wp-content/uploads/2010/12/PIA_Fact_Sheet_Miscanthus_floridulus.pdf	[Forms dense thickets? Yes] "Forms dense thickets that out-competes other plants."
501	2006. Wu, Z.Y./Raven, P.H./Hong, D.Y. (eds.). <i>Flora of China</i> . Vol. 22 (Poaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis http://flora.huh.harvard.edu/china/mss/volume22/index.htm	[Aquatic? No] "Plant tufted, robust. Culms erect, 1.5–4 m tall, 6–15 mm in diam., unbranched, nodes usually glabrous, or uppermost sometimes bearded."
502	2006. Wu, Z.Y./Raven, P.H./Hong, D.Y. (eds.). <i>Flora of China</i> . Vol. 22 (Poaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis http://flora.huh.harvard.edu/china/mss/volume22/index.htm	[Grass? Yes] Poaceae
503	2006. Wu, Z.Y./Raven, P.H./Hong, D.Y. (eds.). <i>Flora of China</i> . Vol. 22 (Poaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis http://flora.huh.harvard.edu/china/mss/volume22/index.htm	[Nitrogen fixing woody plant? No] Poaceae
504	1991. Wang, Y.C./Lee, M.L.. The distribution of reserve carbohydrates and their relationship with shooting ability in <i>Miscanthus</i> species in Taiwan. <i>Journal of Taiwan Livestock Research</i> . 24(1): 41-50.	[Geophyte? Potentially] "Rhizome reserve carbohydrate contents decreased from mid-Sep. until Mar. when they increased again; the level also decreased from late May and increased again in Aug. The number of regrowth shoots after cutting and yield decreased with increased cutting frequency. Regrowth ability was positively related to the rhizome reserve starch content." [rhizome as reserve to reshoooting, but no indication of whether storage is extensive enough to be considered a geophyte]

601	2006. Wu, Z.Y./Raven, P.H./Hong, D.Y. (eds.). Flora of China. Vol. 22 (Poaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis http://flora.huh.harvard.edu/china/mss/volume22/index.htm	[Evidence of substantial reproductive failure in native habitat? No] "Panicle oblong or elliptic, dense, 20–50 cm; axis 25–45 cm. Racemes numerous, 10–30 cm, appressed or ascending, glabrous, scaberulous; rachis internodes puberulous, nodes glabrous; lower pedicel 1–3.5 mm, upper pedicel 2.5–8 mm. Spikelets 2.5–4(–6) mm, awned; callus hairs 4–6 mm, white, spreading, as long as the spikelet; glumes subequal, membranous, golden brown, 2.5–4(–6) mm, margins pilose near apex, veins obscure, apex acuminate; lower lemma lanceolate, hyaline, 3–3.5 mm, veinless, pilose; upper lemma similar to lower, 2–2.5 mm; awn geniculate, 5–6(–10) mm; upper palea a small hyaline scale. Anthers 3, 1–1.5 mm. Caryopsis oblong, ca. 1.5 mm."
602	1998. Kao, W-Y/Tsai, T-T/Chen, W-H. A Comparative Study of <i>Miscanthus floridulus</i> (Labill) Warb and <i>M. transmorrisonensis</i> Hayata: Photosynthetic Gas Exchange, Leaf Characteristics and Growth in Controlled Environments. <i>Annals of Botany</i> . 81: 295-299.	[Produces viable seed? Yes] "Seeds of <i>M. floridulus</i> were collected from a number of plants at sites located at an elevation of 390 m near Shui-Li"
602	2011. Plants For A Future Database. <i>Miscanthus floridulus</i> . http://www.pfaf.org/user/Plant.aspx?LatinName=Miscanthus+floridulus	[Produces viable seed? Yes] "Propagation - Seed -surface sow in spring in a greenhouse and keep moist. Germination should take place within a couple of weeks. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Division in spring or early autumn[200]. Very easy, large divisions can be planted out direct into their permanent positions. We have found that it is better to pot up the smaller divisions and grow them on in light shade in a cold frame until they are well established before planting them out in late spring or early summer."
603	1997. Holm, L.G.. World weeds: natural histories and distribution. John Wiley and Sons, Inc., New York, NY	[Hybridizes naturally? Possibly] " <i>S. spontaneum</i> is believed to have crossed spontaneously with <i>Miscanthus floridulus</i> to form <i>S. robustum</i> , which is one of the parents of noble sugarcane (Simmonds 1976)."
603	2008. Bonnett, G.D./Nowak, E./Olivares-Villegas, J.J. et al.. Identifying the Risks of Transgene Escape from Sugarcane Crops to Related Species, with Particular Reference to <i>Saccharum spontaneum</i> in Australia. <i>Tropical Plant Biology</i> . 1: 58–71.	[Hybridizes naturally? Unknown] "Li et al. [33] studied progeny of crosses between <i>S. officinarum</i> and <i>Miscanthus japonicus</i> (= <i>Miscanthus floridulus</i> (Labrill.) Warb ex Schum. et Laut.), and found that variation in the number of univalents at meiotic mitosis could explain the range of chromosome numbers seen in the progeny." [Artificial crosses]
603	2009. Stewart, J.R./Toma, Y./Fernandez, F.G./Nishiwaki, A./Yamada, T./Bollero, G.. The ecology and agronomy of <i>Miscanthus sinensis</i> , a species important to bioenergy crop development, in its native range in Japan: a review. <i>GCB Bioenergy</i> . 1: 126–153.	[Hybridizes naturally? Possibly] "Lee (1964) also reported natural hybridization between <i>M. sinensis</i> and <i>M. sacchariflorus</i> and <i>M. sinensis</i> and <i>Miscanthus floridulus</i> [tokiwasusuki ()], which is generally found on dry grassy hillsides along the Pacific Coast in southern regions of Japan (Koyama 1987). <i>M. sinensis</i> , <i>M. sacchariflorus</i> and <i>M. sinensis</i> <i>M. floridulus</i> were observed to have distinct leaf anatomical characteristics compared with their respective parent species (Lee, 1964)."
604	2010. Natural Resources Conservation Service. Invasive Species Fact Sheet Pacific Islands Area – West - Swordgrass (<i>Miscanthus floridulus</i>). http://www.grazinglandshawaii.org/wp-content/uploads/2010/12/PIA_Fact_Sheet_Miscanthus_floridulus.pdf	[Self-compatible or apomictic? Possibly yes] "Very effective in self-seeding."
605	1994. Zomlefer, W.B.. Guide to Flowering Plant Families. The University of North Carolina Press, Chapel Hill & London	[Requires specialist pollinators? No] "The reduced flowers are anemophilous..." [Wind-pollinated. Poaceae family description]
605	2011. Plants For A Future Database. <i>Miscanthus floridulus</i> . http://www.pfaf.org/user/Plant.aspx?LatinName=Miscanthus+floridulus	[Requires specialist pollinators? No] "The flowers are hermaphrodite (have both male and female organs) and are pollinated by wind."
606	2002. Muniappan, R./Cruz, J./Bamba, J.. Invasive Plants and Their Control in Micronesia. <i>Micronesica Suppl.</i> . 6: 85–92.	[Reproduction by vegetative fragmentation? Potentially] "This grass is found in the volcanic soils of southern Guam and is not common on limestone soils of northern Guam. Propagation is by rhizomes. It readily burns during the dry season but the fire does not kill the plant. The clumps regenerate rapidly after the rains. It also occurs in the Northern Mariana Islands, Chuuk, Pohnpei and Kosrae (Space & Falanruw 1999)."
606	2011. Floridata. <i>Miscanthus floridulus</i> . http://www.floridata.com/ref/m/misc_flo.cfm	[Reproduction by vegetative fragmentation? Potentially] "Although it is technically a clump grass and not a turf-forming grass, giant miscanthus spreads and enlarges slowly with short underground rhizomes."

701	2006. Wu, Z.Y./Raven, P.H./Hong, D.Y. (eds.). Flora of China. Vol. 22 (Poaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis http://flora.huh.harvard.edu/china/mss/volume22/index.htm	[Propagules likely to be dispersed unintentionally ? Unknown] "awn geniculate, 5–6(–10) mm; upper palea a small hyaline scale. Anthers 3, 1–1.5 mm. Caryopsis oblong, ca. 1.5 mm." [awns could potentially adhere to clothing or other surfaces]
702	1998. King, M./Oudolf, P.. Gardening with grasses. Terra Publishing Co., Warnsweld, Netherlands	[Propagules dispersed intentionally by people? Yes] "Such an imposing plant has many garden uses. It makes an effective screening plant and may even be planted en masse." [Landscaping and ornamental uses]
703	2011. Floridata. <i>Miscanthus floridulus</i> . http://www.floridata.com/ref/m/misc_flo.cfm	[Propagules likely to disperse as a produce contaminant? Potentially] "The flowerheads are used in floral arrangements, both fresh and dried plumes persisting indefinitely." [Seeds could potentially be spread in dried flower arrangements]
703	2011. Q-bank Invasive Plants. <i>Miscanthus floridulus</i> . http://www.q-bank.eu/Plants/BioloMICS.aspx?Link=T&TableKey=491790000000008&Rec=1118&Fields=All	[Propagules likely to disperse as a produce contaminant? Potentially] "Potential seed contaminant"
703	2011. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network (GRIN) [Online Database Index]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/index.pl	[Propagules likely to disperse as a produce contaminant? Potentially] "Weed: potential seed contaminant"
704	2010. Natural Resources Conservation Service. Invasive Species Fact Sheet Pacific Islands Area – West - Swordgrass (<i>Miscanthus floridulus</i>). http://www.grazinglandshawaii.org/wp-content/uploads/2010/12/PIA_Fact_Sheet_Miscanthus_floridulus.pdf	[Propagules adapted to wind dispersal? Yes] "The spikelets have many fine hairs from the base that aid in wind dispersion."
705	2007. Marshall, A.J./Beehler, B.M.. The ecology of Papua, Part 2. Tuttle Publishing, Tokyo	[Propagules water dispersed? Possibly] "Phragmites karka may form pure stands in seepage areas on slopes and on valley floors. It is also associated with <i>Miscanthus floridulus</i> along river banks and swamp margins, and in very shallow swamps. Both grasses usually form large hummocks, rising well above water level." [Distribution in Papua suggests that seeds may be dispersed, and germination facilitated by water flow]
706	2006. Wu, Z.Y./Raven, P.H./Hong, D.Y. (eds.). Flora of China. Vol. 22 (Poaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis http://flora.huh.harvard.edu/china/mss/volume22/index.htm	[Propagules bird dispersed? No] "awn geniculate, 5–6(–10) mm; upper palea a small hyaline scale. Anthers 3, 1–1.5 mm. Caryopsis oblong, ca. 1.5 mm." [No evidence, and not fleshy-fruited]
707	2006. Wu, Z.Y./Raven, P.H./Hong, D.Y. (eds.). Flora of China. Vol. 22 (Poaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis http://flora.huh.harvard.edu/china/mss/volume22/index.htm	[Propagules dispersed by other animals (externally)? Unknown] "awn geniculate, 5–6(–10) mm; upper palea a small hyaline scale. Anthers 3, 1–1.5 mm. Caryopsis oblong, ca. 1.5 mm." [awns could potentially adhere to fur]
708	2011. WRA Specialist. Personal Communication.	[Propagules survive passage through the gut? Unknown] Seeds may be consumed by grazers, but effects of viability on gut passage unknown
801	2010. Natural Resources Conservation Service. Invasive Species Fact Sheet Pacific Islands Area – West - Swordgrass (<i>Miscanthus floridulus</i>). http://www.grazinglandshawaii.org/wp-content/uploads/2010/12/PIA_Fact_Sheet_Miscanthus_floridulus.pdf	[Prolific seed production (>1000/m2)? Unknown] "Seed production can be prolific, barring drought, but seed remains viable for only six months." [No estimates available]

802	2000. Hsu FuHsing. Seed longevity of <i>Miscanthus</i> species. <i>Journal of Taiwan Livestock Research</i> . 33(2): 145-153.	[Evidence that a persistent propagule bank is formed (>1 yr)? No] "The objectives of this experiment were to determine the relationship between seed longevity and storage period for <i>Miscanthus</i> spp. Seeds of <i>M. floridulus</i> were harvested from Taitung county and mountainous areas at 1600 m asl in Nantou county and those of <i>M. transmorrisonensis</i> from mountainous areas at 2600 m asl in Nantou county. Before germination testing, the seeds were stored in ambient conditions and in a refrigerator at 4°C for 0, 3, 6, 12, 18 and 24 months, respectively. Germination tests were conducted in an incubator at 25°C. The germination ability of the seeds stored in ambient conditions for 6 months was reduced drastically. No germination was observed after storing in ambient conditions for periods of 12 months or more. The germination ability of seeds stored in a refrigerator for up to 24 months was not affected. Seeds of <i>M. transmorrisonensis</i> showed the highest germination ability stored in a refrigerator for 24 months. No effect was observed on germination ability of the seeds after aging in a dry state at 40°C for 96 hours. However, a significant decrease in germination ability was observed after aging in a moistened state at 40°C for 24 hours, and germination was almost stopped after aging under this condition for 48 hours. Seeds of <i>M. transmorrisonensis</i> were more tolerant to aging treatment than those of <i>M. floridulus</i> . It was concluded that <i>Miscanthus</i> seeds might lose their germination ability 6 months after being dispersed by the wind under natural conditions."
802	2010. Natural Resources Conservation Service. Invasive Species Fact Sheet Pacific Islands Area – West - Swordgrass (<i>Miscanthus floridulus</i>). http://www.grazinglandshawaii.org/wp-content/uploads/2010/12/PIA_Fact_Sheet_Miscanthus_floridulus.pdf	[Evidence that a persistent propagule bank is formed (>1 yr)? No] "...seed remains viable for only six months"
803	2004. Li, J-R. Application of herbicides to afforestation in barren hills suitable for forest. <i>Journal of Zhejiang Forestry College</i> . DOI: CNKI:SUN:ZJLX.0.2004-04-010: .	[Well controlled by herbicides? Yes] "In order to study the effects of applying herbicides to afforestation in barren hills, the random and orthogonal tests of applying a sort of single and mixed herbicides were carried out in Fujian City of Fujian Province. The results indicated that the single use of Hexazinone could eradicate the perennial noxious weeds mainly consisting of <i>Miscanthus floridulus</i> , <i>Pleioblastus amarus</i> , <i>Phyllostachys viridis</i> and <i>Dicranopteris pedata</i> and etc. in barren hills suitable for forest and the mixed use of Glyphosate as principle agents, Sulfometuron methyl and Oxyfluorfen as adjuvants could eradicate <i>Miscanthus floridulus</i> , <i>Miscanthus sinensis</i> and etc. With the effective dose, the effects of weeding could reach over 92% and 96% respectively. Chemical weeding could reduce labor by 61.5% to 87.7%, decrease weeding cost by 40.2% to 70.9%. Compared with manual weeding, it could also reduce water and soil losses and surface water evaporation, which created a good ecological environment for afforestation and growth of young trees."
803	2010. Natural Resources Conservation Service. Invasive Species Fact Sheet Pacific Islands Area – West - Swordgrass (<i>Miscanthus floridulus</i>). http://www.grazinglandshawaii.org/wp-content/uploads/2010/12/PIA_Fact_Sheet_Miscanthus_floridulus.pdf	[Well controlled by herbicides? Yes] "Chemical – Glyphosate is effective if applied to previously burned or cut plants that have regrown to 0.3 m. May need to be repeated annually until control is achieved." [Herbicides effective, but require multiple treatments]
804	1969. Gillison, A.N.. Plant Succession in an Irregularly Fired Grassland Area - Doma Peaks Region, Papua. <i>The Journal of Ecology</i> . 57(2): 415-428.	[Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] "The recently fired area in the plot studied was dominated largely by fire-resistant species accompanied by rapidly invading non aggressive pioneer species (see Fig. 4). The then-flowering dominant grass <i>Miscanthus floridulus</i> was the tallest (1 m (40 in.)) accompanied by the much smaller pioneer grass <i>Isachne globosa</i> ." [Fire does not kill the plants, as it is able to regenerate from rhizomes]
804	2002. Muniappan, R./Cruz, J./Bamba, J.. Invasive Plants and Their Control in Micronesia. <i>Micronesica Suppl.</i> 6: 85–92.	[Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] "It readily burns during the dry season but the fire does not kill the plant. The clumps regenerate rapidly after the rains."
804	2010. Natural Resources Conservation Service. Invasive Species Fact Sheet Pacific Islands Area – West - Swordgrass (<i>Miscanthus floridulus</i>). http://www.grazinglandshawaii.org/wp-content/uploads/2010/12/PIA_Fact_Sheet_Miscanthus_floridulus.pdf	[Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] "Burning does not kill the plants, it quickly regenerates from underground parts...Can be grazed heavily to remove plants and may be cut for roughage. Small infestations can be cut but the underground parts must be dug out and removed. Burning alone is not recommended, it will increase growth, vigor, and seed production. Repeated mowing (2 times) during active growth will eventually kill the plants, usually in two seasons."
804	2011. <i>Floridata</i> . <i>Miscanthus floridulus</i> . http://www.floridata.com/ref/m/misc_flo.cfm	[Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] "Giant <i>Miscanthus</i> flowers late in the season and may not bloom at all in northern latitudes. Cut dead stems back to the ground before new growth begins."

805 2010. Natural Resources Conservation Service. [Effective natural enemies present locally (e.g. introduced biocontrol agents? No]
Invasive Species Fact Sheet Pacific Islands Area "Biological – No known natural enemies. Heavy grazing with cattle, horses,
– West - Swordgrass (*Miscanthus floridulus*). sheep, or goats can help control the spread of the plant."
http://www.grazinglandshawaii.org/wp-content/uploads/2010/12/PIA_Fact_Sheet_Miscanthus_floridulus.pdf

Summary of Risk Traits

High Risk / Undesirable Traits

- Broad climatic suitability
- Naturalized in regions with tropical climates
- Agricultural weed of rice in SE Asia
- Allelopathic properties
- Host of sugar cane pathogens
- Increases fire risk
- Thicket-forming
- Tolerates many soil conditions (and potentially able to exploit many different habitat types)
- Seeds wind-dispersed
- Tolerates cutting and burning

Low Risk / Desirable Traits

- Palatable to browsing animals
- Non-toxic
- Landscaping and ornamental value
- Does not form a persistent seed bank
- Herbicides provide effective control