UF IFAS UNIVERSITY of FLORIDA

Assessment of Non-native Plants in Florida's Natural Areas

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Assessment date: 11 March 2015

| | ***Phyllostachys flexuosa-Zig-Zag Bamboo, Drooping timber bamboo*** | **Answer** | **Score** |
|---|---|---|---|
| 1.01 | Is the species highly domesticated? | n | 0 |
| 1.02 | Has the species become naturalised where grown? | | |
| 1.03 | Does the species have weedy races? | | |
| 2.01 | Species suited to FL climates (USDA hardiness zones; 0-low, 1-intermediate, 2-high) | 2 | |
| 2.02 | Quality of climate match data (0-low; 1-intermediate; 2-high) | 2 | |
| 2.03 | Broad climate suitability (environmental versatility) | y | 1 |
| 2.04 | Native or naturalized in regions with an average of 11-60 inches of annual precipitation | y | 1 |
| 2.05 | Does the species have a history of repeated introductions outside its natural range? | y | |
| 3.01 | Naturalized beyond native range | y | 2 |
| 3.02 | Garden/amenity/disturbance weed | y | 2 |
| 3.03 | Weed of agriculture | n | 0 |
| 3.04 | Environmental weed | unk | |
| 3.05 | Congeneric weed | y | 2 |
| 4.01 | Produces spines, thorns or burrs | n | 0 |
| 4.02 | Allelopathic | | |
| 4.03 | Parasitic | n | 0 |
| 4.04 | Unpalatable to grazing animals | n | -1 |
| 4.05 | Toxic to animals | n | 0 |
| 4.06 | Host for recognised pests and pathogens | n | 0 |
| 4.07 | Causes allergies or is otherwise toxic to humans | n | 0 |
| 4.08 | Creates a fire hazard in natural ecosystems | | |
| 4.09 | Is a shade tolerant plant at some stage of its life cycle | n | 0 |
| 4.10 | Grows on infertile soils (oligotrophic, limerock, or excessively draining soils). North & Central Zones: infertile soils; South Zone: shallow limerock or Histisols. | y | 1 |
| 4.11 | Climbing or smothering growth habit | n | 0 |
| 4.12 | Forms dense thickets | y | 1 |
| 5.01 | Aquatic | n | 0 |
| 5.02 | Grass | y | 1 |
| 5.03 | Nitrogen fixing woody plant | n | 0 |
| 5.04 | Geophyte | n | 0 |
| 6.01 | Evidence of substantial reproductive failure in native habitat | n | 0 |
| 6.02 | Produces viable seed | y | 1 |
| 6.03 | Hybridizes naturally | n | -1 |
| 6.04 | Self-compatible or apomictic | | |
| 6.05 | Requires specialist pollinators | n | 0 |

| | | | |
|---|---|---|---|
| 6.06 | Reproduction by vegetative propagation | y | 1 |
| 6.07 | Minimum generative time (years) | >4 | -1 |
| 7.01 | Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas) | | |
| 7.02 | Propagules dispersed intentionally by people | y | 1 |
| 7.03 | Propagules likely to disperse as a produce contaminant | n | -1 |
| 7.04 | Propagules adapted to wind dispersal | | |
| 7.05 | Propagules water dispersed | | |
| 7.06 | Propagules bird dispersed | | |
| 7.07 | Propagules dispersed by other animals (externally) | n | -1 |
| 7.08 | Propagules dispersed by other animals (internally) | | |
| 8.01 | Prolific seed production | | |
| 8.02 | Evidence that a persistent propagule bank is formed (>1 yr) | n | |
| 8.03 | Well controlled by herbicides | | |
| 8.04 | Tolerates, or benefits from, mutilation or cultivation | y | 1 |
| 8.05 | Effective natural enemies present in U.S. | | |
| | **Total Score** | **10** | |
| | **Implemented Pacific Second Screening** | **n/a** | |
| | **Risk Assessment Results** | **High** | |

| section | # questions answered | satisfy minimum? |
|---|---|---|
| A | 10 | yes |
| B | 10 | yes |
| C | 14 | yes |
| total | 34 | yes |

| | Reference | Source data |
|---|---|---|
| 1.01 | | Cultivated, but no evidence of selection for reduced weediness. |
| 1.02 | | skip to 2.01 |
| 1.03 | | skip to 2.01 |
| 2.01 | 1. PERAL NAPPFAST Global Plant Hardiness (http://www.nappfast.org/Plant_hardiness/NAPPFAST%20Global%20zones/10-year%20climate/PLANT_HARDINESS_10YR%20lgnd.tif). 2. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?409896 (1-28-2015). | No computer analysis was performed. 1. Global hardiness zone: 6, 7, 8, 9, 10 ; equivalent to USDA Hardiness zones: 6a: to -23.3 °C (-10 °F) USDA Zone 6b: to -20.5 °C (-5 °F) USDA Zone 7a: to -17.7 °C (0 °F) USDA Zone 7b: to -14.9 °C (5 °F) USDA Zone 8a: to -12.2 °C (10 °F) USDA Zone 8b: to -9.4 °C (15°F) USDA Zone 9a: to -6.6 °C (20 °F) USDA Zone 9b: to -3.8 °C (25 °F) USDA Zone 10a: to -1.1 °C (30 °F) USDA Zone 10b: to 1.7 °C (35 °F). 2. Native to ASIA-TEMPERATE China - Anhui, Hebei, Henan, Shaanxi, Shanxi, Yunnan |
| 2.02 | | No computer analysis was performed. Native range is well known; refer to 2.01 source data. |
| 2.03 | 1. Köppen-Geiger climate map (http://www.hydrol-earth-syst-sci.net/11/1633/2007/hess-11-1633-2007.pdf). | 1. Distribution in the native/cultivated range occurs in Cwa, Cfa, Cwb, Bwa, Dwb, Bsk |
| 2.04 | 1. China Maps, Anhui Province http://www.chinamaps.org/china/provincemaps/anhui.html (1-28-2015) 2. China Maps, Hubei Pronvince http://www.chinamaps.org/china/provincemaps/hubei.html(1-28-2015) 3. World Bank http://sdwebx.worldbank.org/climateportal/index.cfm?page=country_historical_climate&ThisRegion=Asia&ThisCCode=CHN(1-28-2015) | 30in to 67in |
| 2.05 | 1. Burn Coose Nurseries http://www.burncoose.co.uk/site/plants.cfm?pl_id=5092 (1-28-2015) 2. Mid Atlantic Bamboo Nursery http://www.midatlanticbamboo.com/bamboo-frames/bamboo-0090.htm (1-28-2015) 3. Big Plant Nursery http://www.bigplantnursery.co.uk/Phyllostachys_flexuosa.html (1-28-2015) | Readily available from internet nurseries. |
| 3.01 | 1. Pacific Island Ecosystems at Risk (PIER) http://www.hear.org/pier/species/phyllostachys_flexuosa.htm (1-28-2015) 2. Invasive Species Compendium http://www.cabi.org/isc/datasheet/116311 (1-28-2015) | 1. Listed as an invasive plant in New Caledonia. 2. Listed as invasive in Cuba. |
| 3.02 | 1. Global Invasive Species Database http://www.issg.org/database/species/ecology.asp?fr=1&sts=&lang=EN&si=1302 (1-30-2015) 2. Royal Horticultural Society https://www.rhs.org.uk/plants/details?plantid=1450 (1-30-2015) | 1. Phyllostachys flexuosa has a strong growth rate and spreads very easily via a particularly vigorous network of underground stems which emit shoots. It forms dense stands which prevent native vegetation from growing 2. Can become invasive in warm, moist or favourable conditions |
| 3.03 | | no evidence |
| 3.04 | | evidence currently incomplete |
| 3.05 | 1. Holm, LeRoy G. A Geographical Atlas of World Weeds. Malabar, FL: Krieger Pub., 1991. Print. 2. United States Department of Agriculture Animal and Plant Health Inspection Service August 20, 2012 Version 1 Weed Risk Assessment for Phyllostachys aureosulcata McClure (Poaceae) – Yellow groove bamboo | 1. Phyllostachys mitis is a principle weed in New Zealand 2.Phyllostachys pubescens has invaded forests in Japan, forming uniform monolayers of foliage (monoculture), and dominating competing vegetation; between 1975 and 1993, this bamboo had replaced the trees in a once-mixed forest (Isagi and Torii, 1977). |
| 4.01 | Flora of China http://www.efloras.org/florataxon.aspx?flora_id=2&taxon_id=20000258959 (1-28-2015) | These features are not listed in the species description. |
| 4.02 | | no evidence |

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| 4.03 | 1. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?409896 (1-28-2015) | 1. Family: Poaceae (not a parasitic family). |
| 4.04 | Backyard Gardener http://www.backyardgardener.com/plantname/pda_8277.html (1-28-2015) | Tolerances: deer, drought, heat & humidity, pollution, rabbits, seashore, slope |
| 4.05 | | no evidence |
| 4.06 | Royal Horticultural Society https://www.rhs.org.uk/plants/details?plantid=1450 (1-30-2015) | Generally Pest Free, Generally disease free |
| 4.07 | | no evidence |
| 4.08 | 2011. Smith, M.C. Prediciting plant naturalizations in the Pacific Northwest: the fate of bamboos in the understory of coniferous forests. Washington State University, | According to Smith (2010) Bamboos in Asia, Africa, Australia and the Americas have the ability to change fire frequency, dead culms provide fuel for stand replacing fires, and green bamboo can provide a ladder for fire to reach the canopy. |
| 4.09 | 1. Royal Horticultural Society https://www.rhs.org.uk/plants/details?plantid=1450 (1-30-2015) 2. Plants for a Future http://www.pfaf.org/user/Plant.aspx?LatinName=Phyllostachys+flexuosa (1-28-2015) 3.Backyard Gardener http://www.backyardgardener.com/plantname/pda_8277.html (1-28-2015) | 1. Light preference is full sun to partial shade. 2. It can grow in semi-shade (light woodland) 3. Light Range: Part Shade to Full Sun |
| 4.10 | 1. Bamboo Parque http://bambuparque.org/catalog/product_info.php?products_id=72&language=en (1-28-2015) 2. Plants for a Future http://www.pfaf.org/user/Plant.aspx?LatinName=Phyllostachys+flexuosa (1-28-2015) 3. Backyard Gardener http://www.backyardgardener.com/plantname/pda_8277.html (1-28-2015) | 1. This very rustic bamboo can grow in difficult conditions (cold, dry ground limestone) 2. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: acid, neutral and basic (alkaline) soils. 3. Soil Range: Mostly Sand to Mostly Clay |
| 4.11 | 2006. Wu, Z. Y., P. H. Raven & D. Y. Hong, eds.. Flora of China. Vol. 22 (Poaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis http://flora.huh.harvard.edu/china/mss/volume22/i ndex.htm | Family: Poacae |
| 4.12 | 1. Global Invasive Plant Database http://www.issg.org/database/species/ecology.asp?si=1302&fr=1&sts=&lang=EN (1-28-2015) 2. Backyard Gardener http://www.backyardgardener.com/plantname/pda_8277.html (1-28-2015) | 1. It forms dense stands which prevent native vegetation from growing. 2. These will grow in large thickets or groves if left alone. |
| 5.01 | 1. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?409896 (1-28-2015) | 1. Family: Poaceae. |
| 5.02 | 1. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?409896 (1-28-2015) | 1. Family: Poaceae. |

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|---|---|---|
| 5.03 | 1. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?409896 (1-28-2015) | 1. Family: Poaceae. |
| 5.04 | 1. Wang, K. et al. 2010. Identification of genes related to the development of bamboo rhizome bud. Journal of Experimental Botany, 61(2): 551–561. | 1. According to the type of the rhizome, bamboos have been divided into three groups: scattered bamboos with a monopodial rhizome, caespitose bamboos with a sympodial rhizome, and pluricaespitose bamboos with a monopodial and sympodial rhizome. The rhizome bud can either develop into a bamboo shoot which will grow into a bamboo culm in a very short period, or develop into a new rhizome which will enable the sustainable production of the bamboo grove. |
| 6.01 | | no evidence |
| 6.02 | 1. John, CK et al. 1994. Selection - A valuable method for bamboo improvement. Current Science (Bangalore), 66(11): 822-824. | The most easy method of bamboo propagation is by means of seeds. Propagation of economically important bamboo species by seeds is not possible annually because of their very long inter-mast periods. |
| 6.03 | 1. John, CK et al. 1994. Selection - A valuable method for bamboo improvement. Current Science (Bangalore), 66(11): 822-824. | 1. The peculiar flowering behaviour in bamboos make genetic improvement by hybridizations very difficult. The flowering and seeding at long intervals (7-120 years) render the overlapping of flowering in more than one species, in the same locality very difficult to obtain, making attempts at hybridizations impossible. |
| 6.04 | Plants for a Future http://www.pfaf.org/user/Plant.aspx?LatinName=Phyllostachys+flexuosa (1-28-2015) | The flowers are hermaphrodite (have both male and female organs) and are pollinated by Wind |
| 6.05 | 1. Shor, B., Southern California Chapter. From Flowers to Seedlings. American Bamboo Society. Accessed: 18 March 2014. http://www.bamboo.org/GeneralInfoPages/FromFlowersToSeedlings.html | 1. Most bamboos are wind-pollinated. Insects may be involved with some species. |
| 6.06 | 1. Wang, K. et al. 2010. Identification of genes related to the development of bamboo rhizome bud. Journal of Experimental Botany, 61(2): 551–561. | 1. The rhizome bud can either develop into a bamboo shoot which will grow into a bamboo culm in a very short period, or develop into a new rhizome which will enable the sustainable production of the bamboo grove. |
| 6.07 | Why Bamboos Wait so Long to Flower, Daniel H. Janzen, Annual Review of Ecology and Systematics, Vol. 7, (1976), p. 368 | Phyllostachys flexuosa brought from China in 1864 flowered at Hamma, Toulon, and Paris in 1876 |
| 7.01 | | Other Phyllostachys have been reported to have spread via yard waste contaminated with rhizomes, no evidence was found of this occurring with Phyllostachys flexuosa |
| 7.02 | 1. Scurlock et al. 2000 Bamboo: an overlooked biomass resource? Biomass and Bioenergy, 19:229-244. 2. Liese and Hamburg. 1987. Research on bamboo. Wood Science and Technology, 21:189-209 | 1. Cultivated for erosion control, windbreaks, building material, food, bamboo fiber clothes, etc. 2. Also, has been proposed as a source for pulp for paper and possible biofuel source. |
| 7.03 | 1. John, CK et al. 1994. Selection - A valuable method for bamboo improvement. Current Science (Bangalore), 66(11): 822-824. | 1. Very unlikely. The longevity of the seeds varies from species to species, but usually only last 2-3 months under natural conditions. Furthermore, seeds must be sowed immediately in optimal conditions to prevent damping off. |
| 7.04 | | |
| 7.05 | | no evidence |
| 7.06 | | no evidence |
| 7.07 | Flora of China http://www.efloras.org/florataxon.aspx?flora_id=2&taxon_id=200258959 (1-28-2015) | No morphological features that would suggest bamboo seeds are adapted for attachment. |
| 7.08 | | no evidence |

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|---|---|---|
| 8.01 | | no evidence |
| 8.02 | 1. John, CK et al. 1994. Selection - A valuable method for bamboo improvement. Current Science (Bangalore), 66(11): 822-824. | 1. The longevity of the seeds varies from species to species. Under natural conditions it is for 2-3 months. |
| 8.03 | | Other phyllostachys can be controlled with Round Up |
| 8.04 | 1. Planfor.co.uk http://www.planfor.co.uk/buy,bamboo-phyllostachys-flexuosa,9363,EN (1-30-2015) 2. Discover Life http://www.discoverlife.org/mp/20q?search=Phyllostachys+flexuosa (1-30-2015) | 1. It is possible to re-prune a hedge made up of phyllostachys flexuosa, as this bamboo is quite tolerant of pruning. 2. Occurs in: natural forests, ruderal/disturbed |
| 8.05 | | no evidence |