

Family: *Poaceae*

Taxon: *Dendrocalamus sikkimensis*

Synonym: NA

Common Name: Philippine sweet shoot bamboo
xi jin long zhu

Questionnaire :	current 20090513	Assessor:	HPWRA OrgData	Designation: L
Status:	Assessor Approved	Data Entry Person:	HPWRA OrgData	WRA Score 0
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)	High
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	n
301	Naturalized beyond native range		y = 1*multiplier (see Appendix 2), n= question 205	n
302	Garden/amenity/disturbance weed		n=0, y = 1*multiplier (see Appendix 2)	n
303	Agricultural/forestry/horticultural weed		n=0, y = 2*multiplier (see Appendix 2)	n
304	Environmental weed		n=0, y = 2*multiplier (see Appendix 2)	n
305	Congeneric weed		n=0, y = 1*multiplier (see Appendix 2)	n
401	Produces spines, thorns or burrs		y=1, n=0	n
402	Allelopathic		y=1, n=0	
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	
406	Host for recognized pests and pathogens		y=1, n=0	n
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	n
409	Is a shade tolerant plant at some stage of its life cycle		y=1, n=0	y
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)		y=1, n=0	
411	Climbing or smothering growth habit		y=1, n=0	n

412	Forms dense thickets	y=1, n=0	n
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	n
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	n
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	>3
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	n
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	n
704	Propagules adapted to wind dispersal	y=1, n=-1	y
705	Propagules water dispersed	y=1, n=-1	n
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
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	
803	Well controlled by herbicides	y=-1, n=1	
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	

Designation: L

WRA Score 0

Supporting Data:

101	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Is the species highly domesticated? No] No evidence
102	2013. WRA Specialist. Personal Communication.	NA
103	2013. WRA Specialist. Personal Communication.	NA
201	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Species suited to tropical or subtropical climate(s) 2-High] "This species is distributed in subtropical and warm temperate mountains of North-Eastern India and Bhutan, from West Bengal and Sikkim, to Arunachal Pradesh, Nagaland and Meghalaya (Garro Hills). This is cultivated in Indian Botanic Gardens, Calcutta and elsewhere."
202	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Quality of climate match data 2-High]
203	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Broad climate suitability (environmental versatility)? Yes] [Elevation range exceeds 1000 m] "- Altitude range: 500 - 2100 m - Mean annual rainfall: > 800 mm - Rainfall regime: summer; uniform - Dry season duration: 0 - 8 months - Mean annual temperature: 15 - 40°C - Mean maximum temperature of hottest month: 20 - 30°C - Mean minimum temperature of coldest month: 10 - 20°C - Absolute minimum temperature: 0 - 2°C"
204	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Native or naturalized in regions with tropical or subtropical climates? Yes] "This species is distributed in subtropical and warm temperate mountains of North-Eastern India and Bhutan, from West Bengal and Sikkim, to Arunachal Pradesh, Nagaland and Meghalaya (Garro Hills)"
205	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Does the species have a history of repeated introductions outside its natural range? No] No evidence
205	2012. Acevedo-Rodríguez, P./Strong, M.T.. Catalogue of Seed Plants of the West Indies. Smithsonian Contributions to Botany. 98: 1192 pp.	[Does the species have a history of repeated introductions outside its natural range?] "Distribution: Exotic in Cuba and Puerto Rico; native to tropical Asia."
301	2012. Randall, R.P.. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	[Naturalized beyond native range?] No evidence
302	2012. Randall, R.P.. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	[Garden/amenity/disturbance weed? No] No evidence
303	2012. Randall, R.P.. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	[Agricultural/forestry/horticultural weed? No] No evidence
304	2012. Randall, R.P.. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	[Environmental weed? No] No evidence
305	2012. Randall, R.P.. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	[Congeneric weed? No] Several <i>Dendrocalamus</i> species are listed as naturalized
401	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Produces spines, thorns or burrs? No] "A very large bamboo with caespitose culms. Culms large, 17-20 m high, bare at the base, 12-20 cm diameter, dark green at first, becoming a striking orange; internodes up to 45 cm long, rough. Culm-sheaths 36 cm long and 30 cm broad, densely covered with a thick mat of erect darkbrown hairs; imperfect blade lanceolate, often as long as the sheath, recurved, decurrent into two very large auricles fringed with pale bristles; ligule 5 mm wide, sharply serrate. Leaves 15-25 cm long and 3.5-5 cm broad, oblong-lanceolate, unequal at the base, tapering into a twisted point, shortly petiolate, smooth above, strigosely hirsute and rough below; leaf sheaths smooth, edges falcate, auricles fringed with stiff bristles; ligule short, fimbriate."
402	2013. WRA Specialist. Personal Communication.	[Allelopathic? Unknown]
403	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Parasitic? No] Poaceae

404	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Unpalatable to grazing animals? No] "...the very large leaves should provide good fodder for livestock, although Gamble (1896) reported that they were said to be poisonous to cattle and horses."
405	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Toxic to animals?] "...the very large leaves should provide good fodder for livestock, although Gamble (1896) reported that they were said to be poisonous to cattle and horses." [Unconfirmed report of toxicity]
405	2008. Wagstaff, D.J.. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	[Toxic to animals?] No current references or evidence of toxicity to animals
406	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Host for recognized pests and pathogens? No] No evidence
407	2004. Bhatt, B.P./Singha, L.B./Sachan, M.S./Singh, K.. Commercial edible bamboo species of the North-Eastern Himalayan Region, India. Part I: young shoot sales. Journal of Bamboo and Rattan. 3(4): 337-364.	[Causes allergies or is otherwise toxic to humans? No] "Abstract—This paper reports the results on some commercially available edible bamboo species of Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland and Tripura states of the North- Eastern Himalayan (NEH) region." ... "The primary species harvested for young shoots was <i>D. hamiltonii</i> (ca. 1859 ton/year), followed by <i>D. giganteus</i> (ca. 1094 ton/year), <i>D. sikkimensis</i> (ca. 1079 ton/year), <i>M. baccifera</i> (ca. 647 ton/year), <i>D. hookerii</i> (ca. 326 ton/year) and <i>B. balcooa</i> (ca. 272 ton/year), irrespective of states surveyed." [Edible shoots, with no evidence of toxicity to humans]
407	2008. Wagstaff, D.J.. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	[Causes allergies or is otherwise toxic to humans? No] No evidence of toxicity in genus
408	2010. Jha, L.K.. Bamboo based agroforestry systems to reclaim degraded hilly tracts (jhum) land in North Eastern India. Bamboo Science and Culture. 23(1): 1-28.	[Creates a fire hazard in natural ecosystems? No] "Habitat: Light demander, prefers gentle slopes, fire resistant" [No evidence, and unlikely if fire resistant]
409	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Is a shade tolerant plant at some stage of its life cycle? Yes] "Tolerates shade"
410	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Tolerates a wide range of soil conditions?] "Soil descriptors - Soil texture: light; medium - Soil drainage: free - Soil reaction: acid; neutral"
410	2013. Backyard Gardener. <i>Dendrocalamus sikkimensis</i> . http://www.backyardgardener.com/plantname/pda_eccd.html [Accessed 02 Apr 2013]	[Tolerates a wide range of soil conditions?] "pH Range: 4.5 to 7.5. Soil Range: Sandy Loam to Clay Loam"
411	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	[Climbing or smothering growth habit? No] "Culms 10–18 m, 10–13 cm in diam.; internodes becoming orange, 46–56 cm; wall 1–2.5 cm thick. Branches several, sometimes 1 branch dominant. Culm sheaths deciduous, leathery, very densely dark brown velvety; auricles reflexed, broad, 0.5–2 × 0.2–0.5 cm; oral setae orange, curved, long; ligule ca. 5 mm, serrulate; blade strongly deflexed, 10–18 cm. Leaf sheaths appressed white hairy; auricles and oral setae prominent; ligule ca. 1 mm; blade variable, 15–30 × 3.8–7 cm. Pseudospikelet clusters ca. 4 cm in diam. Spikelets lanceolate, 1.2–1.8 cm; florets 2 or 3. Glumes 3 or 4, ovate; lemma ovate, margins ciliate, apex acute or mucronate; palea keels ciliate, many veined. Anthers apiculate at apex. Ovary spherical. Caryopsis obovoid, apex beaked."
412	2010. Jha, L.K.. Bamboo based agroforestry systems to reclaim degraded hilly tracts (jhum) land in North Eastern India. Bamboo Science and Culture. 23(1): 1-28.	[Forms dense thickets? No] "Distribution: Maximum sporadic distribution in Aizawl district of Mizoram. Also present in other north-eastern states." [Sporadic distribution suggests no]
412	2012. Goyal, A.K./Ghosh, P.K./Dubey, A.K./Sen, A.. Inventorying bamboo biodiversity of North Bengal: A Case Study. International Journal of Fundamental & Applied Sciences. 1(1): 5-8.	[Forms dense thickets? No] "Table1: List of the different species of bamboo included in the 13 genera with brief idea about the sub-tribe they belong to, their common name, vernacular name and the type of rhizome they possesses" [<i>Dendrocalamus sikkimensis</i> - Clump type = Clumping (i.e. Not Running)]
501	2013. WRA Specialist. Personal Communication.	Aquatic? No] Terrestrial
502	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Grass? No] Poaceae
503	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Nitrogen fixing woody plant? No] Poaceae

504	2010. Gordon, D.R./Mitterdorfer, B./Pheloung, P.C. et al.. Guidance for addressing the Australian Weed Risk Assessment questions. <i>Plant Protection Quarterly</i> . 25(2): 56-74.	[Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)? No] "This question relates to perennial plants with tubers, corms or bulbs. This question is specifically to deal with plants that have specialized organs and should not include plants merely with rhizomes/ stolons"
601	1994. Stapleton, C.M.A.. The bamboos of Nepal and Bhutan Part I: <i>Bambusa</i> , <i>Dendrocalamus</i> , <i>Melocanna</i> , <i>Cephalostachyum</i> , <i>Teinostachyum</i> , and <i>Pseudostachyum</i> (Gramineae: Poaceae, Bambusoideae). <i>Edinburgh Journal of Botany</i> . 51(1): 1-32.	[Evidence of substantial reproductive failure in native habitat? No] "In the hills of Sikkim, Bhutan, and West Bengal, the rare <i>D. sikkimensis</i> Gamble ex Oliver occurs and is distinguished by the thick, erect, velvet-like culm sheath hairs, and the long bristles on the auricles of the culm sheaths and the leaf sheaths." [Rare, but no evidence of reproductive failure]
602	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	[Produces viable seed? Yes] "Caryopsis obovoid, apex beaked."
602	2012. Jijeesh, C.M./Seethalakshmi, K.K./Raveendran V.P.. Flowering, reproductive biology and post flowering behaviour of <i>Dendrocalamus sikkimensis</i> Gamble, in Kerala, India. <i>Bamboo Science & Culture</i> . 25(1): 36-42.	[Produces viable seed? Yes] "Flowering was followed by abundant seed production and subsequent drying and death of the culms."
603	2013. WRA Specialist. Personal Communication.	[Hybridizes naturally? Unknown]
604	1993. Nadgauda, R.S./John, C.K./Mascarenhas, A.F.. Floral biology and breeding behavior in the bamboo <i>Dendrocalamus strictus</i> Nees.. <i>Tree physiology</i> . 13(4): 401-408.	[Self-compatible or apomictic? Unknown] " <i>Dendrocalamus strictus</i> is wind pollinated. There are reports that some bamboos may be self compatible (Kondas et al. 1973, Venkatesh 1984). In <i>D. strictus</i> , protogyny effectively prevents self pollination." [Biology of related species prevents self-pollination]
604	2012. Jijeesh, C.M./Seethalakshmi, K.K./Raveendran V.P.. Flowering, reproductive biology and post flowering behaviour of <i>Dendrocalamus sikkimensis</i> Gamble, in Kerala, India. <i>Bamboo Science & Culture</i> . 25(1): 36-42.	[Self-compatible or apomictic? Possibly] "Pollen viability indicates the ability of pollen grain to perform its function of delivering the sperm cells to the embryo sac following compatible pollination (Shivanna et al., 1991)."
605	2012. Jijeesh, C.M./Seethalakshmi, K.K./Raveendran V.P.. Flowering, reproductive biology and post flowering behaviour of <i>Dendrocalamus sikkimensis</i> Gamble, in Kerala, India. <i>Bamboo Science & Culture</i> . 25(1): 36-42.	[Requires specialist pollinators? No] "Like many other bamboo species, <i>D. sikkimensis</i> is anemophilous (wind pollinated). Honey bees <i>Apis floria</i> , <i>Apis dorsata</i> and <i>Apis cerana</i> were seen visiting the flowers during morning hours. They foraged mainly on anthers of flowers. Peak insect visit was observed during 8-11 am. Presence of large number of pollen grains on the adhesive tapes fixed near flowers also indicated the anemophily. Moreover, the presence of large anthers producing abundant uniform pollen grains which is the characteristic of wind pollinated species also leads to conclusion of the occurrence of anemophily in this species."
606	2012. Jijeesh, C.M./Seethalakshmi, K.K./Raveendran V.P.. Flowering, reproductive biology and post flowering behaviour of <i>Dendrocalamus sikkimensis</i> Gamble, in Kerala, India. <i>Bamboo Science & Culture</i> . 25(1): 36-42.	[Reproduction by vegetative fragmentation? No] "Flowering was followed by abundant seed production and subsequent drying and death of the culms." [A clumping bamboo that infrequently reproduces by seed]
607	2012. Jijeesh, C.M./Seethalakshmi, K.K./Raveendran V.P.. Flowering, reproductive biology and post flowering behaviour of <i>Dendrocalamus sikkimensis</i> Gamble, in Kerala, India. <i>Bamboo Science & Culture</i> . 25(1): 36-42.	[Minimum generative time (years)? 17+ years] " <i>D. sikkimensis</i> was introduced to Kerala during 1992 and planted in the Kerala Forest Research Institute campus, Peechi and bambusetum at Field Research Centre, Velupadam, Thrissur. Clump and culm attributes during January 2011 are presented in the Table 1. It flowered in both locations during August, 2009."
701	2005. CAB International. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	[Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)? No] "Flowering in this species has been observed in Kalimpong Forest Division in 1916, 1930 and 1982. Flowering has also been reported from Mizoram during 1977-79. It has been estimated that about 123 kg seeds are obtained from one clump." [No evidence & highly unlikely given the long time to flowering]
702	2013. Backyard Gardener. <i>Dendrocalamus sikkimensis</i> . http://www.backyardgardener.com/plantname/pda_eccd.html [Accessed 02 Apr 2013]	[Propagules dispersed intentionally by people? Yes] Cultivated for landscaping and ornamental purposes outside of native range
703	2005. CAB International. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	[Propagules likely to disperse as a produce contaminant? No] "Caryopsis obovate, depressed, apiculate, shining above with few hairs. Flowering in this species has been observed in Kalimpong Forest Division in 1916, 1930 and 1982. Flowering has also been reported from Mizoram during 1977-79. It has been estimated that about 123 kg seeds are obtained from one clump." [No evidence, and not likely given lack of seed production until end of a long life cycle]

704	2006 (onwards). Clayton, W.D./Vorontsova, M.S./Harman, K.T./Williamson, H.. GrassBase - The Online World Grass Flora. http://www.kew.org/data/grasses-db.html	[Propagules adapted to wind dispersal? Yes] "FRUIT Caryopsis with adherent pericarp; obovoid." [When produced, seeds presumably wind or gravity dispersed]
705	1997. Stapleton, C./Barrow, S./Pradhan, R.. Bamboo and Cane Study of Zhemgang Dzongkhag. Ministry of Agriculture, Royal Government of Bhutan, Thimphu	[Propagules water dispersed? No] "This species is found on drier sites than <i>D. hamiltonii</i> , often growing on the spurs and ridges arising above the Mangde Chhu." [Unlikely based on distribution]
706	2006 (onwards). Clayton, W.D./Vorontsova, M.S./Harman, K.T./Williamson, H.. GrassBase - The Online World Grass Flora. http://www.kew.org/data/grasses-db.html	[Propagules bird dispersed? No] "FRUIT Caryopsis with adherent pericarp; obovoid." [Not fleshy fruited. When seeds are infrequently produced, they are not adapted for internal consumption & dissemination by birds]
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	[Propagules dispersed by other animals (externally)? No] "Caryopsis obovoid, apex beaked." [Possible, but unlikely given lack of obvious means of external attachment, and infrequent flowering after long vegetative growth phase]
708	2013. WRA Specialist. Personal Communication.	[Propagules survive passage through the gut? Unknown]
801	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Prolific seed production (>1000/m ²)? Unknown] "Flowering in this species has been observed in Kalimpong Forest Division in 1916, 1930 and 1982. Flowering has also been reported from Mizoram during 1977-79. It has been estimated that about 123 kg seeds are obtained from one clump."
801	2012. Jijeesh, C.M./Seethalakshmi, K.K./Raveendran V.P.. Flowering, reproductive biology and post flowering behaviour of <i>Dendrocalamus sikkimensis</i> Gamble, in Kerala, India. <i>Bamboo Science & Culture</i> . 25(1): 36-42.	[Prolific seed production (>1000/m ²)?] "Although profuse flowering was initiated in 2009, the fallen mass contained more chaff than seeds. In 2010, the seed set was low during initial stages of flowering and only during January the seeds were obtained." [Low seed set reported in this study]
802	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Evidence that a persistent propagule bank is formed (>1 yr)? Unknown] "Seed storage orthodox" [No information on longevity of seeds under field conditions]
803	1961. Cruzado, H.J./Muzik, T.J./Kennard, W.C.. Control of Bamboo in Puerto Rico by Herbicides. <i>Weeds</i> . 9 (1): 20-26.	[Well controlled by herbicides? Possibly Yes] "Observations 24 months after treatment (Table 1) showed that the following bamboo species were eradicated by basal application of monuron at the rate of 1.6 pounds of chemical in 2 gallons of water per 50 culms: <i>B. tulda</i> , <i>B. textilis</i> , <i>G. apus</i> , <i>D. asper</i> , and <i>D. strictus</i> . <i>P. meyeri</i> was more sensitive and was killed at the 0.8-pound rate. <i>B. textilis</i> , <i>D. asper</i> , and <i>D. strictus</i> also were eradicated with dalapon at the 1.6-pound rate." [No information on herbicide efficacy or chemical control of this species, but related taxa are effectively controlled with herbicides]
804	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] "- Ability to sucker; regenerate rapidly; coppice"
805	2013. WRA Specialist. Personal Communication.	[Effective natural enemies present locally (e.g. introduced biocontrol agents)? Unknown]

Summary of Risk Traits

High Risk / Undesirable Traits

- Broad elevational distribution within native range (500 - 2100 m)
- Unconfirmed report of toxicity to cattle and horses
- Shade tolerant
- Seeds dispersed by gravity, people and probably wind
- Possibly prolific seed production when maturity is reached
- Will resprout after repeated cutting or harvesting of shoots & culms (may be difficult to remove from unwanted areas)

Low Risk / Desirable Traits

- No negative impacts have been documented
- Non-toxic to people
- Edible shoots
- Landscaping and ornamental value
- A sympodial, or clumping bamboo
- Long time to reproductive maturity (decades)
- Lack of seed production until possibly at the end of long life cycle