Family: ***Pinaceae***

Taxon: ***Keteleeria davidiana***

Synonym: *Pseudotsuga davidiana Bertrand (basionym)* ***Common Name:*** Common Keteleeria
Tie Jian Shan

Questionaire : current 20090513 **Assessor:** Chuck Chimera **Designation:** L
Status: Assessor Approved **Data Entry Person:** Chuck Chimera **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**	**n**
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**	
405	**Toxic to animals**	**y=1, n=0**	**n**
406	**Host for recognized pests and pathogens**	**y=1, n=0**	
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**	
409	**Is a shade tolerant plant at some stage of its life cycle**	**y=1, n=0**	**n**
410	**Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)**	**y=1, n=0**	**n**
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**	**n**
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**	
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**	
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	2009. Eckenwalder, J.E.. Conifers of the world: the complete reference. Timber Press, Portland, OR	"Despite the extensive variation in the species, little of this variation has entered general cultivation, even though K. davidiana is more widely cultivated than K. fortunei." [no evidence that species is highly domesticated]
102	2011. WRA Specialist. Personal Communication.	NA
103	2011. WRA Specialist. Personal Communication.	NA
201	2009. Eckenwalder, J.E.. Conifers of the world: the complete reference. Timber Press, Portland, OR	"Central and south-central China, Taiwan, Laos, and Vietnam. Usually mixed with broad-leaved evergreens in open forests and woodlands on slopes; (200-)700-1,500(-2,900) m. Zone 7."
202	2009. Eckenwalder, J.E.. Conifers of the world: the complete reference. Timber Press, Portland, OR	[Broad native distribution extends into subtropical climates]
203	2010. Earle, C.J.. The Gymnosperm Database - Keteleeria davidiana var. formosana. http://www.conifers.org/pi/Keteleeria_davidiana_formosana.php	"Taiwan: 300-600 m in the extreme north, 500-900 m in other areas, usually in association with broad-leaved trees in open settings. Now relatively scarce"
203	2011. Sunny Gardens. Keteleeria davidiana. http://www.sunnygardens.com/garden_plants/keteleeria/keteleeria_1620.php	"Since all need day temperatures of 77º to 95º F for 4 months of the year, they do best in mild-winter areas such as southeastern United States and California. Otherwise, their needs are similar to those of Firs. "
204	2009. Eckenwalder, J.E.. Conifers of the world: the complete reference. Timber Press, Portland, OR	"Central and south-central China, Taiwan, Laos, and Vietnam."
205	2000. Conifer Specialist Group. Keteleeria davidiana var. formosana. In: IUCN 2010. IUCN Red List of Threatened Species. Version 2010.4. www.iucnredlist.org	"Conservation Actions: A reserve has been set up specifically to help conserve the taxon. It is also protected under the Cultural Heritage Preservation Law." [rare in native range, with no evidence of repeated introductions outside native range]
301	2007. Randall, R.P.. Global Compendium of Weeds [Online Database]. http://www.hear.org/gcw/	No evidence of naturalization outside native range.
302	2007. Randall, R.P.. Global Compendium of Weeds [Online Database]. http://www.hear.org/gcw/	No evidence
303	2007. Randall, R.P.. Global Compendium of Weeds [Online Database]. http://www.hear.org/gcw/	No evidence
304	2007. Randall, R.P.. Global Compendium of Weeds [Online Database]. http://www.hear.org/gcw/	No evidence
305	2007. Randall, R.P.. Global Compendium of Weeds [Online Database]. http://www.hear.org/gcw/	No evidence
401	2010. Earle, C.J.. The Gymnosperm Database - Keteleeria davidiana var. formosana. http://www.conifers.org/pi/Keteleeria_davidiana_formosana.php	"A very large tree, up to 35 m high and 2.5 m in diameter, the bark dark gray, irregularly furrowed the young branchlets short-pilose or glabrous. Leaves flat, linear, 2-4 cm long 3-4 mm broad, keeled on both surfaces, the apex acute to obtuse or emarginate, the margins more or less revolute. Mature cones solitary, erect, cylindric-oblong, 5-15 cm long, 4-4.5 cm in diameter, greenish while young, of pale chestnut color when mature. Seeds about 1 cm long, the wing as long as or longer than the seed" [no spines, thorns, or burrs]
402	2007. Fujii, Y./Hiradate, S.. Allelopathy: new concepts and methodology. Science Publishers, Enfield, New Hampshire	"Differences among the tree species were summarized according to the values of existing and latent vegetation under trees (Table 1)…Coniferous species were regarded as more inhibitory than broadleaf species as a whole…Table 1. Classification of 120 tree species by degree of abundance of existing and latent vegetation under tree" [Keteleeria davidiana listed among trees that had "no emergence" of vegetation beneath them, demonstrating possible allelopathic properties]
403	1999. Fu, L./Li, N./Elias, T.S./Mill, R.R.. Flora of China. Vol. 4 - Pinaceae. Missouri Botanical Garden and Harvard University Herbaria, St. Louis	Not parasitic

404	2011. Specialty Ornamentals. Botanical Name: Keteleeria davidiana. http://www.specialtyornamentals.com/	" deer proof " [either unpalatable to deer, or able to tolerate browsing]
405	2009. Eckenwalder, J.E.. Conifers of the world: the complete reference. Timber Press, Portland, OR	[No evidence that trees are browsed by animals, and no evidence of toxicity in genus]
406	2002. Ann, Pao-Jen/Chang, Tun-Tschu/Ko, Wen-Hsiung. Phellinus noxius Brown Root Rot of Fruit and Ornamental Trees in Taiwan. Plant Disease. 86(8): 820-826.	"The fungus causing brown root disease of trees was first described in Singapore by Corner in 1932 as Fomes noxius (18) and reclassified by Cunningham in 1965 as Phellinus noxius (19)...P. noxius has a wide host range; it has been reported on more than 200 plant species representing 59 families." [includes Keteleeria davidiana var. formosana]
407	2011. Plants for a Future Database. Keteleeria davidiana. PFAF, http://digedibles.com/database/plants.php?Keteleeria+davidiana	"Medicinal use of Keteleeria davidiana: None known. Known hazards of Keteleeria davidiana: None known" [no evidence]
408	1988. Frankis, M.P.. Generic inter-relationships in Pinaceae. NOTES Royal Botanical Garden Edinburgh. 45(3): 527-548.	"The unique hypogeal germination and coppicing ability of Keteleeria (Rushforth, 1987) may be best considered as a relatively recent adaptation to fire or grazing pressures in its dry climate and of limited value in determining relationships, though it would be interesting to know if this is shared by Nothotsuga, which has not been recorded." [but unknown whether Keteleeria increase fire hazard in natural ecosystems]
409	2009. Tang, C.Q./Ohsawa, M.. Ecology of subtropical evergreen broad-leaved forests of Yunnan, southwestern China as compared to those of southwestern Japan. Journal of Plant Research. 122: 335–350.	"Keteleeria davidiana (Franch.) Beissn. var. formosana (Hayata) Hayata in Taiwan is a shade intolerant species which is usually found in association with some evergreen broad-leaved trees such as species of Machilus and Castanopsis in open places (Lin et al. 2003)."
409	2011. Plants for a Future Database. Keteleeria davidiana. PFAF, http://digedibles.com/database/plants.php?Keteleeria+davidiana	"It cannot grow in the shade."
409	2011. Sunny Gardens. Keteleeria davidiana. http://www.sunnygardens.com/garden_plants/keteleeria/keteleeria_1620.php	"Give full sun, shelter from strong wind, and moderate water."
410	2011. Sunny Gardens. Keteleeria davidiana. http://www.sunnygardens.com/garden_plants/keteleeria/keteleeria_1620.php	"Thrives in Acid Soil."
411	2009. Eckenwalder, J.E.. Conifers of the world: the complete reference. Timber Press, Portland, OR	"Tree to 25(-45) m tall, with trunk to 1.5(-2.5) m in diameter." [not climbing or smothering]
412	2000. Conifer Specialist Group. Keteleeria davidiana var. formosana. In: IUCN 2010. IUCN Red List of Threatened Species. Version 2010.4. www.iucnredlist.org	"Major Threat(s): The lowland forest habitat is commonly invaded by broadleaved species, leading to very poor regeneration " [instead of forming dense thickets, is being outcompeted by invasive plants]
412	2011. Plants for a Future Database. Keteleeria davidiana. PFAF, http://digedibles.com/database/plants.php?Keteleeria+davidiana	"occasionally forming pure stands" [but var. formosana does not]
412	2011. Taiwan's Ecological Conservation. Low Altitude Areas Flora - Keteleeria davidiana (Franch.) Beissner var. formosana (Hayata). http://www.gio.gov.tw/info/ecology/English/plant_e/LowPlant_e/LowPlant11_e.htm	"Keteleeria davidiana (Franch.) Beissner var. formosana (Hayata) are endemic to Taiwan and quite rare, with only a few natural groves of them on the ridges and slopes at 400 700m elevations in the mountainous areas near Pinglin in northern Taiwan and Dawu in southern Taiwan. A precious tree protected by Taiwan law, Keteleeria davidiana are so few in number that they cannot even form a continuous distribution belt."
501	2009. Eckenwalder, J.E.. Conifers of the world: the complete reference. Timber Press, Portland, OR	Terrestrial tree
502	1999. Fu, L./Li, N./Elias, T.S./Mill, R.R.. Flora of China. Vol. 4 - Pinaceae. Missouri Botanical Garden and Harvard University Herbaria, St. Louis	Pinaceae
503	1999. Fu, L./Li, N./Elias, T.S./Mill, R.R.. Flora of China. Vol. 4 - Pinaceae. Missouri Botanical Garden and Harvard University Herbaria, St. Louis	Pinaceae [not a nitrogen fixing woody plant]

504	2009. Eckenwalder, J.E.. Conifers of the world: the complete reference. Timber Press, Portland, OR	"Tree to 25(-45) m tall, with trunk to 1.5(-2.5) m in diameter." [not a geophyte]
601	2004. López-Pujol, J./Zhao, A-Man. China: a rich flora needed of urgent conservation. Orsis. 19: 49-89.	"Destruction and/or fragmentation of natural habitats are the most important causes of species extinction." [considered rare and endangered within native range, but primarily due to restricted range and habitat loss]
602	2011. Sunny Gardens. Keteleeria davidiana. http://www.sunnygardens.com/garden_plants/keteleeria/keteleeria_1620.php	"Grow from seed, by rooting shoots that form in a coppice, or by grafting onto a Fir species."
603	2011. WRA Specialist. Personal Communication.	Unknown
604	2011. Plants for a Future Database. Keteleeria davidiana. PFAF, http://digedibles.com/database/plants.php?Keteleeria+davidiana	"The flowers are monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and are pollinated by Wind.: [self-compatibility unknown]
605	2011. Plants for a Future Database. Keteleeria davidiana. PFAF, http://digedibles.com/database/plants.php?Keteleeria+davidiana	"The flowers are monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and are pollinated by Wind. "
606	2011. Sunny Gardens. Keteleeria davidiana. http://www.sunnygardens.com/garden_plants/keteleeria/keteleeria_1620.php	"Grow from seed, by rooting shoots that form in a coppice, or by grafting onto a Fir species." [coppices, but no evidence of vegetative spread]
607	2011. WRA Specialist. Personal Communication.	Years to reproductive maturity unknown
701	2009. Eckenwalder, J.E.. Conifers of the world: the complete reference. Timber Press, Portland, OR	"Seed body wedge-shaped, 9-16 mm long, the wing 10-15 mm longer, broadest below the middle." [no evidence of unintentional dispersal, and no means of external attachment]
702	1997. Flint, H.L./Lyverse, J.M.. Landscape plants for eastern North America: exclusive of Florida and the immediate Gulf Coast. John Wiley and Sons, New York, NY	"It is so seldom used in out area that its limitations are not well known, but it is worth trying more widely in Zones 7b-9a+." [planted as a landscaping tree]
703	2009. Eckenwalder, J.E.. Conifers of the world: the complete reference. Timber Press, Portland, OR	"Seed body wedge-shaped, 9-16 mm long, the wing 10-15 mm longer, broadest below the middle." [no evidence that seeds would be grown with or contaminate produce]
704	1988. Frankis, M.P.. Generic inter-relationships in Pinaceae. NOTES Royal Botanical Garden Edinburgh. 45(3): 527-548.	"Wing fully effective; in K. davidiana (Bert.) Beissner and allies, narrow, broadest below the middle (similar to Pseudolarix)"
704	1999. Fu, L./Li, N./Elias, T.S./Mill, R.R.. Flora of China. Vol. 4 - Pinaceae. Missouri Botanical Garden and Harvard University Herbaria, St. Louis	"Seeds triangular-oblong, covered on 1 side by wing, together as long as seed scales; wing lustrous, semitrullate or cuneate, leathery-membranous."
705	2009. Eckenwalder, J.E.. Conifers of the world: the complete reference. Timber Press, Portland, OR	"Seed body wedge-shaped, 9-16 mm long, the wing 10-15 mm longer, broadest below the middle." [no evidence of or apparent adaptations for water dispersal]
706	2009. Eckenwalder, J.E.. Conifers of the world: the complete reference. Timber Press, Portland, OR	"Seed body wedge-shaped, 9-16 mm long, the wing 10-15 mm longer, broadest below the middle." [no evidence of or adaptations for bird dispersal]
707	2009. Eckenwalder, J.E.. Conifers of the world: the complete reference. Timber Press, Portland, OR	"Seed body wedge-shaped, 9-16 mm long, the wing 10-15 mm longer, broadest below the middle." [no means of external attachment, but possible that seeds may be cached by seed predators]
708	2011. WRA Specialist. Personal Communication.	Unknown if seeds would survive passage through gut
801	2011. WRA Specialist. Personal Communication.	Seed production unknown
802	2011. WRA Specialist. Personal Communication.	Seed bank longevity
803	2011. WRA Specialist. Personal Communication.	Unknown [rare in native range, with no evidence that species is being controlled anywhere]
804	2009. Eckenwalder, J.E.. Conifers of the world: the complete reference. Timber Press, Portland, OR	"…the strongest large softwood in much of southern China…employed for a great range of construction and carpentry uses. The exploitation has not overly depleted the species because it is one of the few conifers that will sprout new trunks after harvest." [tolerates cutting and is able to resprout]

804	2011. Sunny Gardens. Keteleeria davidiana. http://www.sunnygardens.com/garden_plants/keteleeria/keteleeria_1620.php	"Young trees have a conical shape, then form a spreading pyramid. They do well in a closely-spaced group, or coppice."
805	2011. WRA Specialist. Personal Communication.	Unknown