

Taxon: Prunus campanulata Maxim.

Family: Rosaceae

Common Name(s): bellflower cherry
Formosan cherry
Taiwan cherry

Synonym(s):

Assessor: Chuck Chimera

Status: Assessor Approved

End Date: 21 Sep 2018

WRA Score: 11.0

Designation: H(HPWRA)

Rating: High Risk

Keywords: Ornamental Tree, Environmental Weed, Shade Tolerant, Dense Stands, Bird-Dispersed

Qsn #	Question	Answer Option	Answer
101	Is the species highly domesticated?	y=-3, n=0	n
101	Is the species highly domesticated?	y=-3, n=0	n
102	Has the species become naturalized where grown?		
102	Has the species become naturalized where grown?		
103	Does the species have weedy races?		
103	Does the species have weedy races?		
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)	Intermediate
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)	Intermediate
202	Quality of climate match data	(0-low; 1-intermediate; 2-high) (See Appendix 2)	Intermediate
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
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
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
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
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)	n
302	Garden/amenity/disturbance weed	n=0, y = 1*multiplier (see Appendix 2)	n

Qsn #	Question	Answer Option	Answer
303	Agricultural/forestry/horticultural weed	n=0, y = 2*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)	y
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	y
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	y
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	y
401	Produces spines, thorns or burrs	y=1, n=0	n
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic		
402	Allelopathic		
403	Parasitic	y=1, n=0	n
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals		
404	Unpalatable to grazing animals		
405	Toxic to animals		
405	Toxic to animals		
406	Host for recognized pests and pathogens		
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans		
407	Causes allergies or is otherwise toxic to humans		
408	Creates a fire hazard in natural ecosystems	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
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	y
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
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	y
412	Forms dense thickets	y=1, n=0	y
501	Aquatic	y=5, n=0	n
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n

Qsn #	Question	Answer Option	Answer
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	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
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally		
603	Hybridizes naturally		
604	Self-compatible or apomictic		
604	Self-compatible or apomictic		
605	Requires specialist pollinators	y=-1, n=0	n
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	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	2
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	n
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
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
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	n
704	Propagules adapted to wind dispersal	y=1, n=-1	n
704	Propagules adapted to wind dispersal	y=1, n=-1	n
705	Propagules water dispersed		
705	Propagules water dispersed		
706	Propagules bird dispersed	y=1, n=-1	y
706	Propagules bird dispersed	y=1, n=-1	y
707	Propagules dispersed by other animals (externally)		
707	Propagules dispersed by other animals (externally)		
708	Propagules survive passage through the gut	y=1, n=-1	y
708	Propagules survive passage through the gut	y=1, n=-1	y
801	Prolific seed production (>1000/m2)		

Qsn #	Question	Answer Option	Answer
801	Prolific seed production (>1000/m ²)		
802	Evidence that a persistent propagule bank is formed (>1 yr)		
802	Evidence that a persistent propagule bank is formed (>1 yr)		
803	Well controlled by herbicides	y=-1, n=1	y
803	Well controlled by herbicides	y=-1, n=1	y
804	Tolerates, or benefits from, mutilation, cultivation, or fire	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)		
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)		

Supporting Data:

Qsn #	Question	Answer
101	Is the species highly domesticated?	n
	Source(s)	Notes
	Kato, S., et al. (2014). Origins of Japanese flowering cherry (<i>Prunus</i> subgenus <i>Cerasus</i>) cultivars revealed using nuclear SSR markers. <i>Tree Genetics & Genomes</i> , 10(3), 477-487	[<i>Prunus campanulata</i> may be one of the progenitors of Japanese flowering cherry] "Japanese flowering cherry (<i>Prunus</i> subgenus <i>Cerasus</i>) cultivars, which are characterized by beautiful flowers, have been developed through hybridization among wild <i>Prunus</i> taxa. The long history of cultivation has caused significant confusion over the origins of these cultivars." ... "Some of Japanese cultivars are also believed to be related to <i>Prunus campanulata</i> , which is distributed in Taiwan, southern China, and neighboring countries, and <i>Prunus pseudocerasus</i> , a native of China (Kawasaki 1993). These morphology-based predictions for origins of the cultivars need to be confirmed by analysis of their genetic background."

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. 2018. Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. 2018. Personal Communication	NA

201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	Intermediate
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 18 Sep 2018]	"Native Asia-Temperate CHINA: China [Fujian, Guangdong, Guangxi, Hainan, Hunan, Zhejiang] EASTERN ASIA: Taiwan Asia-Tropical INDO-CHINA: Vietnam"

202	Quality of climate match data	Intermediate
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed]	

203	Broad climate suitability (environmental versatility)	y
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Qsn #	Question	Answer
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2003. Flora of China. Vol. 9 (Pittosporaceae through Connaraceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Forests in ravines, forest margins; 100-1300 m." [Elevation range exceeds 1000 m, demonstrating environmental versatility]
	Global Invasive Species Database. (2018) Species profile: <i>Prunus campanulata</i> . http://www.iucngisd.org/gisd/species.php?sc=1666 . [Accessed]	" <i>Prunus campanulata</i> is native to China (temperate), Taiwan (temperate) and Vietnam (tropical), so consequently does well in milder conditions. It is hardy to -12°C."

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Lorence, D. H., & Flynn, T. (2006). New naturalized plant records for Kaua'i and Hawai'i. Bishop Museum Occasional Papers, 88, 1-5	[Naturalized in mid-elevations of Kauai, Hawaiian Islands] "Known as the Taiwan Cherry or Formosan Cherry, this species is becoming naturalized especially along roadsides in mesic <i>Acacia koa</i> forest areas of Kaua'i at ca 1000–1100 m, apparently spreading from cultivated trees. "

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	[Introduced & naturalized in a number of locations] "References: New Zealand-E-246, New Zealand-N-280, Japan-N-287, New Zealand-W-225, New Zealand-NW-425, New Zealand-N-534, Japan-N-794, New Zealand-N-919, New Zealand-W-964, Australia-N-354, New Zealand-E-328, New Zealand-E-505, Japan-N-1278, United States of America-N-1292, New Zealand- ED-2023, New Zealand-N-2048, United States of America-N-2092, India-W-1977, Japan-W-1977, New Zealand-W-1977."

301	Naturalized beyond native range	y
	Source(s)	Notes

Qsn #	Question	Answer
	<p>Lorence, D. H., & Flynn, T. (2006). New naturalized plant records for Kaua 'i and Hawai 'i. Bishop Museum Occasional Papers, 88, 1-5</p>	<p>"<i>Prunus campanulata</i> differs from other native and naturalized Rosaceae in Hawai'i in being a glabrous tree to 10 m tall with smooth purple-brown bark, leaves with elliptic blade to 11 x 8 cm with double serrate margins, petioles to 18 mm long with pair of glands distally, long lacinatedly divided stipules (especially on vegetative shoots), flowers campanulate, in 5–6-flowered umbels, pedicels to 3 cm long, calyx tube campanulate, rose or red, the lobes triangular-ovate, the petals purple-pink or scarlet, 8 x 7 mm, emarginated, and fruits ovoid, 15 mm long, red when ripe. Known as the Taiwan Cherry or Formosan Cherry, this species is becoming naturalized especially along roadsides in mesic <i>Acacia koa</i> forest areas of Kaua'i at ca 1000–1100 m, apparently spreading from cultivated trees. Material examined. KAUAI: Waimea Distr, Koke'e State Park, Faya Rd, numerous seedlings along roadside, 28 Apr 1997, Flynn & Lorence 6149 (BISH, PTBG); Pu'u ka Pele lookout, tree with green fruits, naturalized, 11 Apr 2005, J.H.R. Plews s.n. A (PTBG); Halemanu Rd, second house along rd, Wayne Jacinto's yard, tree 15 ft [5 m] tall with shiny fissured bark, flowers bright purple pink, fruit dark red, 11 Apr 2005, J.H.R. Plews s.n. B (PTBG)."</p>
	<p>Hosking, J. R., Conn, B. J., Lepschi, B. J., & Barker, C. H. 2007. Plant species first recognised as naturalised for New South Wales in 2002 and 2003, with additional comments on species recognized as naturalised in 2000–2001. <i>Cunninghamia</i>, 10(1): 139-166</p>	<p>"<i>Prunus campanulata</i> ... Notes: More than ten naturalised flowering and fruiting trees were scattered over an area of about 100 m of gully and a single naturalised plant was seen in an adjacent gully north of the collection site. A planted tree was also noted on the nature strip of Darwin Drive (immediately to the north of the collection site). This species appears to be spreading via bird-dispersed seed. <i>Prunus campanulata</i> has not been recorded as naturalised in any other Australian state. It is naturalized in New Zealand (Sykes & Given in Webb et al. 1988)."</p>
	<p>Diamond, A. R. (2013). New and noteworthy woody vascular plant records from Alabama. <i>Phytoneuron</i>, 47, 1-13</p>	<p>"This represents the first report of this taxon from Alabama. It was not listed by Clark (1971) or Dean (1961) in their works on woody plants of Alabama. Its inclusion in the Annotated Checklist of the Vascular Plants of Alabama (Kral et. al 2011) is based on this record. This species is commonly recommended for use as an ornamental and occasionally escapes or persists around old home sites. It was reported as naturalized in suburban woodlands in the Tallahassee (Leon Co., Florida) area by Clewell and Tobe (2011). It is not included in the North American Plant Atlas (BONAP 2011) or in the Plants Database (USDA 2013). The species produces abundant crops of small fruit that are eagerly sought by birds and squirrels (Fig. 1). Hundreds of seedlings of various sizes were observed growing on the wooded vacant lot."</p>

Qsn #	Question	Answer
302	Garden/amenity/disturbance weed	n
	Source(s)	Notes
	Global Invasive Species Database. (2018) Species profile: <i>Prunus campanulata</i> . http://www.iucngisd.org/gisd/species.php?sc=1666 . [Accessed 21 Sep 2018]	[Colonizes gaps, & perhaps other disturbed sites, but planted intentionally & regarded as desirable in most landscaping situations] "Prunus campanulata is commonly found in gardens and in public spaces, such as street amenity plantings. However, it is noted that these plants are mostly hybrids of <i>P. campanulata</i> . (ARPS 2007-2012)." ... "Prunus campanulata is able to colonise bush margins, canopy gaps and clearings, where it competes with regenerating native plants (ARPS 2007-2012)."

303	Agricultural/forestry/horticultural weed	n
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

304	Environmental weed	y
	Source(s)	Notes
	Williams, P. A. (2011). Secondary succession through non-native dicotyledonous woody plants in New Zealand. <i>New Zealand Natural Sciences</i> , 36, 73-91	"Figure 3. Several species of flowering cherry are becoming invasive; in this case <i>Prunus campanulata</i> competing with native species such as mahoe and five finger emerging through old stands of gorse and broom in Nelson City."
	Global Invasive Species Database. (2018) Species profile: <i>Prunus campanulata</i> . http://www.iucngisd.org/gisd/species.php?sc=1666 . [Accessed 21 Sep 2018]	"In New Zealand, <i>Prunus campanulata</i> is reported as invading the understory of relatively intact indigenous forests (Owen 1997 in Wisser and Allen 2006). It also competes with regenerating native species in native forests (ARPS 2007-2012)."
	T.E.R.:R.A.I.N. (2018). <i>Prunus campanulata</i> (Taiwan cherry). http://www.terrain.net.nz/ . [Accessed 21 Sep 2018]	" <i>Prunus campanulata</i> is an extremely invasive plant species as it set prodigious amounts of seed which is then spread by birds. The seeds have a high rate of germination and can not be hand pulled after a years growth and when cut will grow again. There is a movement to ban the sale and distribution of <i>Prunus campanulata</i> throughout New Zealand. This invasive plant species is totally banned in the Northland region of New Zealand where it is illegal to distribute, sell, propagate, distribute soil, gravel etc. that contain the seeds or other parts of the plant."

305	Congeneric weed	y
	Source(s)	Notes
	Weber, E. 2003. <i>Invasive Plant Species of the World. A Reference Guide to Environmental Weeds</i> . CABI Publishing, Wallingford, UK	" <i>Prunus cerasifera</i> ... becomes abundant and shades out native vegetation" ... " <i>Prunus laurocerasus</i> ... spreading growth habit and the dense foliage shade out native vegetation and strongly reduce species richness." ... " <i>Prunus serotina</i> ... fast growth and persistence leads to dense stands that eliminate native shrubs and trees."

Qsn #	Question	Answer
	Schrader, G., & Starfinger, U. (2009). Risk analysis for alien plants in European forests, illustrated by the example of <i>Prunus serotina</i> . Pp. 195-215 in Kohli, R. K. et al. (eds.). <i>Invasive Plants and Forest Ecosystems</i> . CRC Press, Boca Raton, FL	"The conclusions for <i>P. serotina</i> are that it can enter, establish, and spread in the PRA area. It is evident that it can become a major threat to biodiversity and to economic goals. Therefore, management options should be analyzed to reduce the risks posed by this plant." ... "Most of the management options mentioned earlier are not applicable to <i>P. serotina</i> . Since the species has severe negative impacts through its forming of tall and dense stands as well as its rapid spread, any large-scale use of the species will lead to severe negative impacts. As control is also hardly feasible and the beneficial effects of <i>P. serotina</i> are comparatively small, the result of the risk analysis should be a cancellation of any intended plantings, at least in and near forests."

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2003. <i>Flora of China</i> . Vol. 9 (Pittosporaceae through Connaraceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[No evidence] "Trees or shrubs, 3–8 m tall. Bark blackish brown. Branchlets grayish brown to purplish brown; young branchlets green, glabrous. Winter buds ovoid, glabrous. Stipules soon caducous. Petiole 0.8–1.3 cm, glabrous, apex with 2 nectaries; leaf blade ovate, ovate-elliptic, or obovate elliptic, 4–7 × 2–3.5 cm, abaxially pale green and glabrous or with tufts of hairs in vein axils, adaxially green and glabrous, base rounded, margin acutely and usually somewhat irregularly serrate, apex acuminate; secondary veins 8–12 on either side of midvein."

402	Allelopathic	
	Source(s)	Notes
	WRA Specialist. 2018. Personal Communication	Unknown. No evidence found, but allelopathic compounds documented in other <i>Prunus</i> species

403	Parasitic	n
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2003. <i>Flora of China</i> . Vol. 9 (Pittosporaceae through Connaraceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Trees or shrubs, 38 m tall." [Rosaceae. No evidence]

404	Unpalatable to grazing animals	
	Source(s)	Notes
	Backyard Gardener. (2018). <i>Prunus campanulata</i> (Taiwan Flowering Cherry). https://www.backyardgardener.com . [Accessed 21 Sep 2018]	"Tolerances: deer, rabbits" [Suggests this species may be unpalatable, or is able to resprout after browsing]

405	Toxic to animals	
	Source(s)	Notes

Qsn #	Question	Answer
	Useful Temperate Plants. (2018). <i>Prunus campanulata</i> . http://temperate.theferns.info/plant/Prunus+campanulata . [Accessed 21 Sep 2018]	[Possibly] "The plant (especially the seed and young shoots) contains cyanogenic glycosides, especially amygdalin and prunasin. When ingested, these compounds break down in the digestive tract to release cyanide. Used in small quantities in both traditional and conventional medicine, this exceedingly poisonous compound has been shown to stimulate respiration, improve digestion, and promote a sense of well-being[238]. It is also claimed by some to be of benefit in the treatment of cancer - though this claim has been largely refuted. In larger concentrations, however, cyanide can cause gasping, weakness, excitement, pupil dilation, spasms, convulsions, coma and respiratory failure leading to death[293]. The fruits and flowers of most members of this genus generally have low or very low concentrations of this toxin, though the seeds and young shoots can contain much higher levels. The levels of toxin can be detected by the level of bitterness:- for example sweet tasting almond seeds are a major food crop and are often eaten in quantity, whilst bitter tasting almond seeds are used as a flavouring (in marzipan for example) but are not usually eaten on their own. In general, it can be considered safe to eat any fruit or seed from species in this genus that either have a sweet flavour or are slightly bitter. Great caution should be taken, however, if the flavour is moderately to very bitter [K]."
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence

406	Host for recognized pests and pathogens	
	Source(s)	Notes
	SelecTree. "Prunus campanulata Tree Record." 1995-2018. https://selectree.calpoly.edu/tree-detail/prunus-campanulata . [Accessed 21 Sep 2018]	"Pests & Disease Information - Susceptible to Caterpillars, Armillaria, Phytophthora, Root Rot, Rust and Verticillium."

407	Causes allergies or is otherwise toxic to humans	
	Source(s)	Notes

Qsn #	Question	Answer
	Useful Temperate Plants. (2018). <i>Prunus campanulata</i> . http://temperate.theferns.info/plant/Prunus+campanulata . [Accessed 21 Sep 2018]	[Possibly] "The plant (especially the seed and young shoots) contains cyanogenic glycosides, especially amygdalin and prunasin. When ingested, these compounds break down in the digestive tract to release cyanide. Used in small quantities in both traditional and conventional medicine, this exceedingly poisonous compound has been shown to stimulate respiration, improve digestion, and promote a sense of well-being[238]. It is also claimed by some to be of benefit in the treatment of cancer - though this claim has been largely refuted. In larger concentrations, however, cyanide can cause gasping, weakness, excitement, pupil dilation, spasms, convulsions, coma and respiratory failure leading to death[293]. The fruits and flowers of most members of this genus generally have low or very low concentrations of this toxin, though the seeds and young shoots can contain much higher levels. The levels of toxin can be detected by the level of bitterness:- for example sweet tasting almond seeds are a major food crop and are often eaten in quantity, whilst bitter tasting almond seeds are used as a flavouring (in marzipan for example) but are not usually eaten on their own. In general, it can be considered safe to eat any fruit or seed from species in this genus that either have a sweet flavour or are slightly bitter. Great caution should be taken, however, if the flavour is moderately to very bitter [K]."
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes
	SelectTree. "Prunus campanulata Tree Record." 1995-2018. https://selecttree.calpoly.edu/tree-detail/prunus-campanulata . [Accessed 21 Sep 2018]	"Fire Resistance is Favorable." [Uncertain. Fire resistance may indicate ability to survive fires, or low flammability]
	Weedbusters. (2018). Taiwan cherry - <i>Prunus campanulata</i> . https://www.weedbusters.org.nz/weed-information/weed-list/taiwan-cherry/ . [Accessed 21 Sep 2018]	"What damage does it do? Forms dense stands in open or disturbed habitats preventing regeneration." [Ability to form dense stands could increase fire risk, but generally does not occur in fire prone habitats]
	Global Invasive Species Database. (2018) Species profile: <i>Prunus campanulata</i> . http://www.iucngisd.org/gisd/species.php?sc=1666 . [Accessed 21 Sep 2018]	[No evidence of increased fire risk] "In New Zealand, <i>Prunus campanulata</i> is reported as invading the understory of relatively intact indigenous forests. It also competes with regenerating native species in native forests. (ARPS 2007-2012; Owen 1997, in Wisser & Allen 2006)."

409	Is a shade tolerant plant at some stage of its life cycle	y
	Source(s)	Notes
	Dirr, M.A. 2011. Dirr's Encyclopedia of Trees and Shrubs. Timber Press, Portland, OR	"Full sun to partial shade (pine) in coastal areas."
	Global Invasive Species Database. (2018) Species profile: <i>Prunus campanulata</i> . http://www.iucngisd.org/gisd/species.php?sc=1666 . [Accessed 21 Sep 2018]	"In New Zealand, <i>Prunus campanulata</i> is reported as invading the understory of relatively intact indigenous forests."

Qsn #	Question	Answer
	Floridata. (2018). <i>Prunus campanulata</i> . https://floridata.com/Plants/Rosaceae/Prunus+campanulata/639 . [Accessed 21 Sep 2018]	"Light: Does best in full sun, but will tolerate considerable shade."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	Dirr, M.A. 2011. <i>Dirr's Encyclopedia of Trees and Shrubs</i> . Timber Press, Portland, OR	"Adaptable to sand and clay soil, preferably acid and well drained."
	SelecTree. "Prunus campanulata Tree Record." 1995-2018. https://selecttree.calpoly.edu/tree-detail/prunus-campanulata . [Accessed 21 Sep 2018]	"Loam or Sand Texture. Highly Acidic to Slightly Alkaline Soil pH."
	Backyard Gardener. (2018). <i>Prunus campanulata</i> (Taiwan Flowering Cherry). https://www.backyardgardener.com . [Accessed 21 Sep 2018]	"pH Range: 4.5 to 7.5 Soil Range: Some Sand to Some Clay"

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2003. <i>Flora of China</i> . Vol. 9 (Pittosporaceae through Connaraceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Trees or shrubs, 38 m tall."

412	Forms dense thickets	y
	Source(s)	Notes
	Weedbusters. (2018). Taiwan cherry - <i>Prunus campanulata</i> . https://www.weedbusters.org.nz/weed-information/weed-list/taiwan-cherry/ . [Accessed 21 Sep 2018]	"What damage does it do? Forms dense stands in open or disturbed habitats preventing regeneration."

501	Aquatic	n
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2003. <i>Flora of China</i> . Vol. 9 (Pittosporaceae through Connaraceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[Terrestrial] "Trees or shrubs, 38 m tall." ... "Forests in ravines, forest margins; 100-1300 m."

502	Grass	n
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 19 Sep 2018]	Family: Rosaceae Subfamily: Amygdaloideae Tribe: Amygdaleae

Qsn #	Question	Answer
503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed]	Family: Rosaceae Subfamily: Amygdaloideae Tribe: Amygdaleae [Not among the 4 N-fixing genera of Rosaceae]

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2003. Flora of China. Vol. 9 (Pittosporaceae through Connaraceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Trees or shrubs, 38 m tall."

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2003. Flora of China. Vol. 9 (Pittosporaceae through Connaraceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Forests in ravines, forest margins; 1001300 m. Fujian, Guangdong, Guangxi, Hainan, Hunan, Taiwan, Zhejiang [Japan, Vietnam]." [No evidence. Also naturalized in several locations]

602	Produces viable seed	y
	Source(s)	Notes
	Chen, S. Y., Chien, C. T., Chung, J. D., Yang, Y. S., & Kuo, S. R. (2007). Dormancy-break and germination in seeds of <i>Prunus campanulata</i> (Rosaceae): role of covering layers and changes in concentration of abscisic acid and gibberellins. <i>Seed Science Research</i> , 17(1), 21-32	"Intact seeds (seed+endocarp) from freshly harvested fruits of <i>Prunus campanulata</i> were dormant, and required 4–6 weeks of warm followed by 8 weeks of cold stratification for maximum germination percentage. Removing both endocarp and seed coat, however, promoted germination in a high percentage of non-stratified seeds. Treatment of intact, non stratified seeds with gibberellic acid (GA3) was only partially effective in breaking dormancy. However, GA3 promoted germination of non-stratified seeds in which the endocarp (but not the seed coat) had been removed. The order of abscisic acid (ABA) concentration in fresh seeds was endocarp > seed coat > embryo, and its concentration in endocarp plus seed coat was about 6.2-fold higher than that in the embryo. Total ABA contents of seeds subjected to warm and/or cold moist stratification were reduced 6- to 12-fold. A higher concentration of GA4 was detected in embryos of non-dormant than in those of dormant seeds. Fluridone, a carotenoid biosynthesis inhibitor, was efficient in breaking dormancy of <i>Prunus</i> seeds. Paclobutrazol, a GA biosynthesis inhibitor, completely inhibited seed germination, and the inhibitory effect could be partially reversed by GA4, but not by GA3. Thus, dormancy in <i>P. campanulata</i> seeds is imposed by the covering layers. Dormancy break is accompanied by a decrease in ABA content of the covering layers and germination by an increase of embryonic GA4 content."

Qsn #	Question	Answer
	Global Invasive Species Database. (2018) Species profile: <i>Prunus campanulata</i> . http://www.iucngisd.org/gisd/species.php?sc=1666 . [Accessed 21 Sep 2018]	" <i>P. campanulata</i> is insect-pollinated and is able to flower and seed within 1-2 years. Seeds exhibit physiological and morphological dormancy, which must be broken by exposure to both warm and cold conditions before germination. (Crawford 1997; DOC 2007; Lee et al. 2006; Lincoln University undated)."
	T.E.R:R.A.I.N. (2018). <i>Prunus campanulata</i> (Taiwan cherry). http://www.terrain.net.nz/ . [Accessed 21 Sep 2018]	" <i>Prunus campanulata</i> is an extremely invasive plant species as it set prodigious amounts of seed which is then spread by birds. The seeds have a high rate of germination and can not be hand pulled after a years growth and when cut will grow again."

603	Hybridizes naturally	
	Source(s)	Notes
	Kato, S., et al. (2014). Origins of Japanese flowering cherry (<i>Prunus</i> subgenus <i>Cerasus</i>) cultivars revealed using nuclear SSR markers. <i>Tree Genetics & Genomes</i> , 10(3), 477-487	[Artificial hybrids exist. Unknown if natural hybridization occurs] "Recently, Ogawa et al. (2012) showed that <i>P. × kanzakura</i> 'Atami-zakura', which is treated as a part of <i>P. × kanzakura</i> 'Kanzakura' in Kato et al (2012), is a hybrid between <i>P. jamasakura</i> and <i>P. campanulata</i> , and <i>P. × kanzakura</i> 'Kawazu-zakura' is a hybrid between <i>P. lannesiana</i> var. <i>speciosa</i> and <i>P. campanulata</i> . Ohta et al. (2011) reported similar results for <i>P. × kanzakura</i> 'Kawazu-zakura'. Our findings (Cer204-i and ii and Cer207) strongly support their findings, and it appears certain that the <i>P. × kanzakura</i> cultivars are hybrids between <i>P. campanulata</i> and <i>P. lannesiana</i> var. <i>speciosa</i> and/or <i>P. jamasakura</i> ."

604	Self-compatible or apomictic	
	Source(s)	Notes
	Dave's Garden. (2018). Taiwan Cherry - <i>Prunus campanulata</i> . https://davesgarden.com/guides/pf/go/64259/ . [Accessed 21 Sep 2018]	"Self-sows freely; deadhead if you do not want volunteer seedlings next season"
	Srinivasan, C., Padilla, I.M.G. & Scorza, R. (2005). <i>Prunus</i> spp. Almond, Apricot, Cherry, Nectarine, Peach and Plum. Pp 512-542 in <i>Biotechnology of Fruit and Nut Crops</i> . CABI Publishing, Wallingford, UK	[Unknown. Related taxa can be self-fertile] "Cherries can be either self-incompatible or self-compatible."

605	Requires specialist pollinators	n
	Source(s)	Notes

Qsn #	Question	Answer
	Abrol, D.P. (2012). <i>Pollination Biology: Biodiversity Conservation and Agricultural Production</i> . Springer, New York	"Abrol (1989b) reported <i>Xylocopa valga</i> , <i>Colletes eous</i> , <i>Lasioglossum</i> sp., <i>Halictus</i> sp., <i>Andrena flavipes</i> Syrphus sp., <i>Apis cerana indica</i> , and <i>Apis mellifera</i> as important pollinators of cherry flowers. Mattu et al. (1994) found predominant presence of <i>Syrphus</i> , <i>Eristalis</i> , <i>Fannia</i> , <i>Musca</i> and <i>Dolichopus</i> on cherry bloom. Abrol (2005) found that more than 11 species of insects belonging to order Hymenoptera and Diptera frequented cherry flowers. Of all the flower visiting insects, honey bees <i>Apis mellifera</i> and <i>Apis cerana</i> were the most abundant and comprised more than 55% of the total flower visiting insects. Percentage fruit set was significantly higher at 100 m (28.2%) from the apiary than at 500 m (9.0%). Similarly, number of colonies/ha also significantly influenced the fruit set fruit yield/plant in the cherry orchards."
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2003. <i>Flora of China</i> . Vol. 9 (Pittosporaceae through Connaraceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	" <i>Hypanthium</i> campanulate, ca. 6 × 3 mm, outside glabrous or very sparsely pilose, base slightly swollen. Sepals oblong, ca. 2.5 mm, persistent in fruit, margin entire, apex obtuse. Petals pink, obovate-oblong, apically darker and emarginate or rarely entire. Stamens 3941. Style longer or rarely shorter than stamens, glabrous."
	Global Invasive Species Database. (2018) Species profile: <i>Prunus campanulata</i> . http://www.iucngisd.org/gisd/species.php?sc=1666 . [Accessed 21 Sep 2018]	" <i>P. campanulata</i> is insect-pollinated and is able to flower and seed within 1-2 years."

606	Reproduction by vegetative fragmentation	n
	Source(s)	Notes
	Plants for a Future. (2018). <i>Prunus campanulata</i> . https://pfaf.org/USER/Plant.aspx?LatinName=Prunus+campanulata . [Accessed 21 Sep 2018]	"Propagation - Seed - requires 2 - 3 months cold stratification and is best sown in a cold frame as soon as it is ripe"
	Weedbusters. (2018). Taiwan cherry - <i>Prunus campanulata</i> . https://www.weedbusters.org.nz/weed-information/weed-list/taiwan-cherry/ . [Accessed 21 Sep 2018]	"Why is it weedy? Seeds are long-lived and widely dispersed. It is tolerant of warm and cold climates, low to medium rainfall. Forms dense stands that are long-lived. How does it spread? Seed is dispersed by birds."

607	Minimum generative time (years)	2
	Source(s)	Notes
	Floridata. (2018). <i>Prunus campanulata</i> . https://floridata.com/Plants/Rosaceae/Prunus+campanulata/639 . [Accessed 21 Sep 2018]	"Fast-growing Taiwan cherry will usually bloom in its third year from seed."
	Global Invasive Species Database. (2018) Species profile: <i>Prunus campanulata</i> . http://www.iucngisd.org/gisd/species.php?sc=1666 . [Accessed 21 Sep 2018]	" <i>P. campanulata</i> is insect-pollinated and is able to flower and seed within 1-2 years."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
	Source(s)	Notes

Qsn #	Question	Answer
	Weedbusters. (2018). Taiwan cherry - <i>Prunus campanulata</i> . https://www.weedbusters.org.nz/weed-information/weed-list/taiwan-cherry/ . [Accessed 21 Sep 2018]	"How does it spread? Seed is dispersed by birds."

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Global Invasive Species Database. (2018) Species profile: <i>Prunus campanulata</i> . http://www.iucngisd.org/gisd/species.php?sc=1666 . [Accessed 21 Sep 2018]	" <i>Prunus campanulata</i> is a popular ornamental tree for both private gardens and public areas."
	Dirr, M.A. 2011. <i>Dirr's Encyclopedia of Trees and Shrubs</i> . Timber Press, Portland, OR	[Grown as an ornamental] "The best flowering cherry for the Deep South, requiring minimal chilling hours to send its carmine rose buds bursting forth." ... "Where it can be grown successfully, should be in every gardener's top ten. Grows 20 to 30 ft. high and wide. Zones 7 to 9, 10 on the West Coast. Taiwan, southern China, Ryukyu Islands of Japan."

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	Weedbusters. (2018). Taiwan cherry - <i>Prunus campanulata</i> . https://www.weedbusters.org.nz/weed-information/weed-list/taiwan-cherry/ . [Accessed 21 Sep 2018]	"How does it spread? Seed is dispersed by birds."

704	Propagules adapted to wind dispersal	n
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2003. <i>Flora of China</i> . Vol. 9 (Pittosporaceae through Connaraceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Drupe red, ovoid, ca. 10 × 56 mm; endocarp ± sculptured."

705	Propagules water dispersed	
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2003. <i>Flora of China</i> . Vol. 9 (Pittosporaceae through Connaraceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Forests in ravines, forest margins;" [Bird-dispersed, but presence in ravines may allow for secondary dispersal by water]

706	Propagules bird dispersed	y
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2003. <i>Flora of China</i> . Vol. 9 (Pittosporaceae through Connaraceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Drupe red, ovoid, ca. 10 × 56 mm; endocarp ± sculptured."

Qsn #	Question	Answer
	Diamond, A. R. (2013). New and noteworthy woody vascular plant records from Alabama. <i>Phytoneuron</i> , 47, 1-13	"The species produces abundant crops of small fruit that are eagerly sought by birds and squirrels"
	Hosking, J. R., Conn, B. J., Lepschi, B. J., & Barker, C. H. 2007. Plant species first recognised as naturalised for New South Wales in 2002 and 2003, with additional comments on species recognized as naturalised in 2000–2001. <i>Cunninghamia</i> , 10(1): 139-166	"This species appears to be spreading via bird-dispersed seed."

707	Propagules dispersed by other animals (externally)	
	Source(s)	Notes
	Nakamoto, A., Kinjo, K., & Izawa, M. (2009). The role of Orii's flying fox (<i>Pteropus dasymallus inopinatus</i>) as a pollinator and a seed disperser on Okinawa-jima Island, the Ryukyu Archipelago, Japan. <i>Ecological research</i> , 24(2), 405-414	[May be carried externally by flying foxes, which are not present in the Hawaiian Islands, but are found in other tropical Pacific Islands] "Table 2 Dispersal types of seeds and characteristics of fruits used by Orii's flying-foxes on Okinawa-jima Island" [Prunus campanulata - Dispersal types = Dropped]

708	Propagules survive passage through the gut	y
	Source(s)	Notes
	Hwang, M., Garshelis, D., & Wang, Y. (2002). Diets of Asiatic Black Bears in Taiwan, with Methodological and Geographical Comparisons. <i>Ursus</i> , 13, 111-125	"Table 1. Diet of Asiatic black bears based on scat analysis (n = 693 scats), observations of feeding sign (n > 600 climbed trees, eaten carcasses, etc.), and Interviews (n = 70) with indigenous hunters (n > 440 reported items), Yushan National Taiwan, 1998-2000." [Flowers & fruit consumed]
	Weedbusters. (2018). Taiwan cherry - <i>Prunus campanulata</i> . https://www.weedbusters.org.nz/weed-information/weed-list/taiwan-cherry/ . [Accessed 21 Sep 2018]	[Presumably Yes] "How does it spread? Seed is dispersed by birds."

801	Prolific seed production (>1000/m2)	
	Source(s)	Notes
	T.E.R:R.A.I.N. (2018). <i>Prunus campanulata</i> (Taiwan cherry). http://www.terrain.net.nz/ . [Accessed 21 Sep 2018]	[Possibly. Densities unspecified] " <i>Prunus campanulata</i> is an extremely invasive plant species as it set prodigious amounts of seed which is then spread by birds. The seeds have a high rate of germination and can not be hand pulled after a years growth and when cut will grow again."

Qsn #	Question	Answer
802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	Notes
	Weedbusters. (2018). Taiwan cherry - <i>Prunus campanulata</i> . https://www.weedbusters.org.nz/weed-information/weed-list/taiwan-cherry/ . [Accessed 21 Sep 2018]	"Seeds are long-lived and widely dispersed." [Possibly. Longevity unspecified]
	Royal Botanic Gardens Kew. (2018) Seed Information Database (SID). Version 7.1. Available from: http://data.kew.org/sid/ . [Accessed 21 Sep 2018]	"Storage Behaviour: No data available for species. Of 38 known taxa of genus <i>Prunus</i> , 97.37% Orthodox(p/?), 2.63% Uncertain"

803	Well controlled by herbicides	y
	Source(s)	Notes
	Weedbusters. (2018). Taiwan cherry - <i>Prunus campanulata</i> . https://www.weedbusters.org.nz/weed-information/weed-list/taiwan-cherry/ . [Accessed 21 Sep 2018]	"1. Pull (all year round): pull out seedlings and small plants. Mulch. 2. Cut and stump treat (all year round): paint freshly cut stump with metsulfuron-methyl 600g/kg (5g/L) or a product containing 100g picloram+300g triclopyr/L (100ml/L). Mulch cut branches and leaves. 3. Cut and inject (all year round): cut a notch in the trunk on a downward angle and inject with 2 ml metsulfuron-methyl 600g/kg (20g/L) or 10 ml a product containing 100g picloram+300g triclopyr/L . 4. Drill and inject (all year round): drill holes around trunk at 5cm intervals and inject with 2 ml metsulfuron-methyl 600g/kg (20g/L) or 10 ml a product containing 100g picloram+300g triclopyr/L . 5. Ringbark and inject (all year round): cut a complete ring around the trunk on a downward angle and inject with metsulfuron-methyl 600g/kg (20g/L) or a product containing 100g picloram+300g triclopyr/L (100ml/L). 6. Overall spray (summer): metsulfuron methyl 600g/kg (5g/10L) or a product containing 100g picloram+300g triclopyr/L (6ml/L)."
	Global Invasive Species Database. (2018) Species profile: <i>Prunus campanulata</i> . http://www.iucngisd.org/gisd/species.php?sc=1666 . [Accessed 21 Sep 2018]	"Management techniques generally recommended for control of <i>P. campanulata</i> include physical and chemical methods. Mature trees should be removed by felling, while seedlings can be dug out. Stumps should then be treated with herbicide. Follow up measures are important, to target any subsequent sprouting or seedlings. (ARC 2007; Harris & Skilton 2007)."

Qsn #	Question	Answer
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y
	Source(s)	Notes
	<p>SelecTree. "Prunus campanulata Tree Record." 1995-2018. https://selectree.calpoly.edu/tree-detail/prunus-campanulata. [Accessed 21 Sep 2018]</p>	"Fire Resistance is Favorable."
	<p>T.E.R:R.A.I.N. (2018). Prunus campanulata (Taiwan cherry). http://www.terrain.net.nz/. [Accessed 21 Sep 2018]</p>	[Resprouts if not treated with herbicide] "The seeds have a high rate of germination and can not be hand pulled after a years growth and when cut will grow again." ... "Management techniques generally recommended for control of P. campanulata include physical and chemical methods. Mature trees should be removed by felling, while seedlings can be dug out. Stumps should then be treated with herbicide. Follow up measures are important, to target any subsequent sprouting or seedlings. (ARC 2007; Harris & Skilton 2007)."

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	<p>Lorence, D. H., & Flynn, T. (2006). New naturalized plant records for Kaua 'i and Hawai 'i. Bishop Museum Occasional Papers, 88, 1-5</p>	"Known as the Taiwan Cherry or Formosan Cherry, this species is becoming naturalized especially along roadsides in mesic Acacia koa forest areas of Kaua'i at ca 1000–1100 m, apparently spreading from cultivated trees." [Unknown. No mention of natural enemies in this publication]

Summary of Risk Traits:

High Risk / Undesirable Traits

- Elevation range exceeds 1000 m, demonstrating environmental versatility
- Grows in temperate to subtropical climates
- Naturalized on Kauai (Hawaiian Islands), Australia, New Zealand, SE USA
- An environmental weed in New Zealand
- Shade tolerant
- Tolerates many soil types
- Forms dense stands in New Zealand, interfering with native plant regeneration
- Reproduces by seeds
- Reaches maturity in 1-3 years
- Seeds dispersed by birds & intentionally by people
- Prolific seeder (densities unspecified)
- Seeds may form a persistent seed bank
- Able to resprout after cutting

Low Risk Traits

- Unarmed (no spines, thorns or burrs)
- Despite weediness, valued as an ornamental
- Not reported to spread vegetatively