

Family: *Pinaceae*

Taxon: *Abies religiosa*

Synonym: *Pinus religiosa* Kunth (*basionym*)

Common Name: Oyamel
Sacred fir

Questionnaire : current 20090513
Status: Assessor Approved

Assessor: Chuck Chimera
Data Entry Person: Chuck Chimera

Designation: L

WRA Score -2

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)	Low
202	Quality of climate match data	(0-low; 1-intermediate; 2-high) (See Appendix 2)	Intermediate
203	Broad climate suitability (environmental versatility)	y=1, n=0	y
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	n
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)	y
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	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	y
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	y
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	>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	
708	Propagules survive passage through the gut	y=1, n=-1	
801	Prolific seed production (>1000/m2)	y=1, n=-1	
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	n
803	Well controlled by herbicides	y=-1, n=1	
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y=1, n=-1	n
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	y=-1, n=1	

Designation: L

WRA Score -2

Supporting Data:

101	2009. Eckenwalder, J.E.. Conifers of the world: the complete reference. Timber Press, Portland, OR	[Is the species highly domesticated? No] No evidence
102	2012. WRA Specialist. Personal Communication.	NA
103	2012. WRA Specialist. Personal Communication.	NA
201	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Species suited to tropical or subtropical climate(s) 0-Low] "A. religiosa is the most widespread mexican fir. This species grows in Mexico Tlaxcala, Morelos, Distrito Federal, Hidalgo, Veracruz, Michoacán, Jalisco, Guerrero, Puebla, and Chiapas states where it is planted (Lopez et al., 1998). It also has isolated populations in south Nuevo León, west chihuahua, sinaloa, and San Luis Potosi (Farjon, 1990). It is also found in western Guatemala (Martinez, 1963; Liu, 1971; Farjon, 1990). It grows in pure stands and in association with Pinus, Cupressus, Quercus, Alnus, and Arbutus spp. (Madrigal Sánchez, 1982). It grows in humid climates and needs high soil and air humidity, and plentiful dew. It usually grows in well drained soils of volcanic origin with a pH of 5 6.5, more commonly at high altitudes of 2100 3600 m although it may be found 1200-4100 m (Madrigal Sánchez, 1982; Santillán Pérez, 1991; Avila Bello, 1994)." [Grows in higher elevation tropical locations]
201	2012. Aussie Gardening. Abies religiosa - Sacred Fir. http://www.aussiegardening.com.au/findplants/plant/Abies_religiosa	[Species suited to tropical or subtropical climate(s) 0-Low] "Stratification is said to produce a more even germination so it is probably best to sow the seed in a cold frame as soon as it is ripe in the autumn[80, 113]." [NOTE: For the special cases of a temperate species whose seeds have been reported to require cold-stratification for germination, the answer to this question is 0(low) and the answer to question 2.02 is 1 (intermediate) regardless of knowledge of the species native range. C. Daehler pers. Comm]
202	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Quality of climate match data? 1-Intermediate] "A. religiosa is the most widespread Mexican fir. This species grows in Mexico Tlaxcala, Morelos, Distrito Federal, Hidalgo, Veracruz, Michoacán, Jalisco, Guerrero, Puebla, and Chiapas states where it is planted (Lopez et al., 1998). It also has isolated populations in south Nuevo León, west Chihuahua, Sinaloa, and San Luis Potosi (Farjon, 1990). It is also found in western Guatemala (Martinez, 1963; Liu, 1971; Farjon, 1990). It grows in pure stands and in association with Pinus, Cupressus, Quercus, Alnus, and Arbutus spp. (Madrigal Sánchez, 1982). It grows in humid climates and needs high soil and air humidity, and plentiful dew. It usually grows in well drained soils of volcanic origin with a pH of 5 6.5, more commonly at high altitudes of 2100 3600 m although it may be found 1200-4100 m (Madrigal Sánchez, 1982; Santillán Pérez, 1991; Avila Bello, 1994)." [Grows in higher elevation tropical locations]
202	2012. Aussie Gardening. Abies religiosa - Sacred Fir. http://www.aussiegardening.com.au/findplants/plant/Abies_religiosa	[Quality of climate match data? 1-Intermediate] "Stratification is said to produce a more even germination so it is probably best to sow the seed in a cold frame as soon as it is ripe in the autumn[80, 113]." [NOTE:(1)For the special cases of a temperate species whose seeds have been reported to require cold stratification for germination, the answer to this question is 0(low) and the answer to question 2.02 is 1 (intermediate) regardless of knowledge of the species native range. C. Daehler pers. Comm]
203	1965. den Ouden, P./Boom, B.K.. Manual of cultivated conifers: hardy in the cold-and warm-temperate zone. Kluwer Academic Publishers, The Hague, The Netherlands	[Broad climate suitability (environmental versatility)? Yes] "Mexico and Guatemala, at altitudes ranging from 1200-3000 m." ... "Not hardy in cold temperate regions." [Elevation range exceeds 1000 m, demonstrating environmental versatility]
203	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Broad climate suitability (environmental versatility)? Yes] "It grows in humid climates and needs high soil and air humidity, and plentiful dew. It usually grows in well-drained soils of volcanic origin with a pH of 5-6.5, more commonly at high altitudes of 2100-3600 m although it may be found 1200-4100 m (Madrigal Sánchez, 1982; Santillán Pérez, 1991; Avila Bello, 1994)." [Elevation range exceeds 1000 m, demonstrating environmental versatility]

204	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Native or naturalized in regions with tropical or subtropical climates? Higher elevation tropics] "A. religiosa is the most widespread Mexican fir. This species grows in Mexico Tlaxcala, Morelos, Distrito Federal, Hidalgo, Veracruz, Michoacán, Jalisco, Guerrero, Puebla, and Chiapas states where it is planted (Lopez et al., 1998). It also has isolated populations in south Nuevo León, west Chihuahua, Sinaloa, and San Luis Potosi (Farjon, 1990). It is also found in western Guatemala (Martinez, 1963; Liu, 1971; Farjon, 1990). It grows in pure stands and in association with Pinus, Cupressus, Quercus, Alnus, and Arbutus spp. (Madriral Sánchez, 1982). It grows in humid climates and needs high soil and air humidity, and plentiful dew. It usually grows in well drained soils of volcanic origin with a pH of 5.6-5.8, more commonly at high altitudes of 2100-3600 m although it may be found 1200-4100 m (Madriral Sánchez, 1982; Santillán Pérez, 1991; Avila Bello, 1994)." [Grows in higher elevation tropical locations]
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
301	2007. Randall, R.P.. Global Compendium of Weeds - Index [Online Database]. http://www.hear.org/gcw/	[Naturalized beyond native range? No] No evidence
301	2007. Randall, R.P.. The introduced flora of Australia & its weed status. CRC for Australian Weed Management, Glen Osmond, Australia	[Naturalized beyond native range? No] No evidence in Australia
302	2007. Randall, R.P.. Global Compendium of Weeds - Index [Online Database]. http://www.hear.org/gcw/	[Garden/amenity/disturbance weed? No] No evidence
302	2007. Randall, R.P.. The introduced flora of Australia & its weed status. CRC for Australian Weed Management, Glen Osmond, Australia	[Garden/amenity/disturbance weed? No] No evidence
303	2007. Randall, R.P.. Global Compendium of Weeds - Index [Online Database]. http://www.hear.org/gcw/	[Agricultural/forestry/horticultural weed? No] No evidence
303	2007. Randall, R.P.. The introduced flora of Australia & its weed status. CRC for Australian Weed Management, Glen Osmond, Australia	[Agricultural/forestry/horticultural weed? No] No evidence
304	2007. Randall, R.P.. Global Compendium of Weeds - Index [Online Database]. http://www.hear.org/gcw/	[Environmental weed? No] No evidence
304	2007. Randall, R.P.. The introduced flora of Australia & its weed status. CRC for Australian Weed Management, Glen Osmond, Australia	[Environmental weed? No] No evidence
305	2004. Richardson, D.M./Rejmánek, M.. Conifers as invasive aliens: a global survey and predictive framework. Diversity and Distributions. 10: 321-331.	[Congeneric weed? Yes] "The 15 non-pine conifers (out of 507 species; 3%) known to be invasive (seven in the Pinaceae; six in Cupressaceae, one in Araucariaceae, one in Podocarpaceae) are: <i>Abies grandis</i> , <i>Abies procera</i> , " ... "Appendix List of naturalized or invasive (in bold) conifers (Pinopsida), based on hundreds of published and unpublished sources and the unpublished data and personal observation of the authors over more than a decade." ... " <i>Abies alba</i> (Great Britain; Ireland; New Zealand); <i>A. cephalonica</i> (Great Britain); <i>A. concolor</i> (USA (New England)); <i>A. grandis</i> (Great Britain, Ireland; Sweden); <i>A. nordmanniana</i> (Great Britain; New Zealand); <i>A. procera</i> (Great Britain); <i>A. sibirica</i> (Finland)"
305	2010. Poindexter, D.B.. <i>Abies firma</i> (Pinaceae) naturalize in North America. Phytoneuron. 41: 1-7.	[Congeneric weed> Potentially] "In North Carolina, <i>Abies firma</i> , an introduced fir from Japan, is reported as escaping and establishing for the first time in North America. Momi Fir is an infrequently introduced taxon that has been proposed as a highly suitable ornamental tree, particularly in the southeastern United States. This recent discovery of its ability to naturally produce viable progeny suggests that widespread horticultural use of this coniferous species needs further evaluation. A description and photographs are provided to aid in identification of this taxon."

401	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Produces spines, thorns or burrs? No] "A. religiosa usually grows to 35-45 m tall, but can reach 50-60 m and 1.5 to 2.0 m d.b.h. (Martinez, 1963). Trunk straight, columnar; branches are long slender, ascending and form a pyramidal or conical crown. Bark is greyish white, rough and scaly becoming platy and deeply fissured on old trees. Young shoots are furrowed, downy, brown on top and olive green on the underside during the first year and brown all over in subsequent years. Winter buds are ovoid and resinous. Leaves are 1.5-3.6 cm long, 1.2-1.6 mm wide flattened twisted at the base, grooved above, and gradually narrow to a blunt apex; upper surface is a dark, shiny green and the lower surface has two greyish bands of stomata. Resin canals 2, marginal, small to medium. Cones are 10-16 x 4-6 cm, ovoid or cylindrical often curved, violet-blue when young and brown when mature."
402	2012. WRA Specialist. Personal Communication.	[Allelopathic? Unknown]
403	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Parasitic? No] Pinaceae
404	1986. FAO. Databook On Endangered Tree And Shrub Species And Provenances Fao Forestry Paper 77. Forest Resources Division , FAO Forestry Department, Rome. Italy	[Unpalatable to grazing animals? Probably No] "The cone crop is frequently poor, and what regeneration does emerge is grazed by sheep and other livestock. The popularity of saplings of A. guatemalensis for Christmas trees and the frequent lopping of branches of mature trees for decoration of houses and churches during religious festivals has undoubtedly also contributed to its general decline." [The closely related A. religiosa likely shares similar palatability with A. guatemalensis]
404	2011. Sánchez-Velásquez, L.R./Domínguez-Hernández, D./del Rosario Pineda-López, M./Lara-González, R.. Does Baccharis conferta Shrub Act as a Nurse Plant to the Abies religiosa Seedling?. The Open Forest Science Journal. 4: 67-70.	[Unpalatable to grazing animals? No] "On the other hand, both the height and coverage of A. religiosa seedlings was greater under the B. conferta canopy, which can also provide protection against cattle should they escape from grazing areas."
405	2008. Wagstaff, D.J.. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	[Toxic to animals? No] No evidence
405	2012. Aussie Gardening. Abies religiosa - Sacred Fir. http://www.aussiegardening.com.au/findplants/plant/Abies_religiosa	[Toxic to animals? No] "Known Hazards - None known"
406	1998. Tkacz, B.M.. Pest risk assessment of the importation into the United States of unprocessed Pinus and Abies logs from Mexico. Gen. Tech. Rep. FPL-GTR-104. USDA Forest Service, Madison, WI	[Host for recognized pests and pathogens? Potentially] "Table 9—Potential pathogens of concern associated with Pinus spp. in Mexico, including known host species, location on host, and pest category" ... "Species - Psittacanthus calyculatus; Hosts - A. religiosa" ... "Table 11—Potential pathogens of concern associated with Abies spp. in Mexico, including known host species, location on host, and pest category" ... "Species - Arceuthobium abietis-religiosae; Hosts - A. religiosa var. emarginata, A. religiosa var. religiosa, A. vejarii"
406	2011. Earle, C.J.. The Gymnosperm Database - Abies religiosa. http://www.conifers.org/pi/Abies_religiosa.php	[Host for recognized pests and pathogens? Potentially] "A. religiosa has experienced severe declines in forests near Mexico City due to foliar injury and reduced needle retention caused by air pollution (Terrazas and Bernal-Salazar 2002). Pests afflicting this species include the sacred fir looper (Lepidoptera: Evita hyalinaria), a defoliator; and the dwarf mistletoe Arceuthobium abietis-religiosae (Hawksworth et al. 1996). Fungal pathogens include Heterobasidion annosum, a root rot widely distributed in northern hemisphere conifers (Scharpf 1993)."
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
407	2012. Aussie Gardening. Abies religiosa - Sacred Fir. http://www.aussiegardening.com.au/findplants/plant/Abies_religiosa	[Causes allergies or is otherwise toxic to humans? No] "Known Hazards - None known"
408	2008. Trejo, D.A.R.. Fire Regimes, Fire Ecology, and Fire Management in Mexico. Ambio. 37(7-8): 548-556.	[Creates a fire hazard in natural ecosystems? Potentially] "During wet years, fir forests offer a natural barrier to fire in central Mexico. In dry years, crown fires may occur in this forest, particularly if high fuel loads are also present, as in the case of the Parque Desierto de los Leones, a 1529 ha National Park in central Mexico." [Situation dependent]
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; frost"

409	2009. Lara-González, R./Sánchez-Velásquez, L.R./Corral-Aguirre, J.. Regeneration of <i>Abies religiosa</i> in canopy gaps versus understory, Cofre de Perote National Park, México. <i>Agrociencia</i> . 43: 739-747.	[Is a shade tolerant plant at some stage of its life cycle? Yes] "Usually, under the canopy of fir forests, <i>A. religiosa</i> (like other species of <i>Abies</i>) is a shade-tolerant species (Rzedowski, 1978; Spurr and Barnes, 1982; Whitmore, 1989). Nevertheless, some species of <i>Abies</i> can regenerate in canopy gaps as well as in understory (Narakawa and Yamamoto, 2001; Sugita and Tani, 2001; Mori and Takeda, 2002)."
409	2012. Aussie Gardening. <i>Abies religiosa</i> - Sacred Fir. http://www.aussiegardening.com.au/findplants/plant/Abies_religiosa	[Is a shade tolerant plant at some stage of its life cycle? Yes] "Plants are very shade tolerant, especially when young, but growth is slower in dense shade[81]."
410	2005. CAB International. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	[Tolerates a wide range of soil conditions ? No] "Soil descriptors - Soil texture: light - Soil drainage: free - Soil reaction: acid; neutral"
411	2005. CAB International. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	[Climbing or smothering growth habit? No] " <i>A. religiosa</i> usually grows to 35-45 m tall, but can reach 50-60 m and 1.5 to 2.0 m d.b.h. (Martinez, 1963). Trunk straight, columnar; branches are long slender, ascending and form a pyramidal or conical crown. "
412	1998. Tkacz, B.M.. Pest risk assessment of the importation into the United States of unprocessed <i>Pinus</i> and <i>Abies</i> logs from Mexico. Gen. Tech. Rep. FPL-GTR-104. USDA Forest Service, Madison, WI	[Forms dense thickets? Yes] "Pure, dense forests of <i>A. religiosa</i> are found at altitudes of 2,900 m grading into mixtures with <i>P. hartwegii</i> at 3,000 m."
412	2005. CAB International. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	[Forms dense thickets? Yes] "It grows in pure stands and in association with <i>Pinus</i> , <i>Cupressus</i> , <i>Quercus</i> , <i>Alnus</i> , and <i>Arbutus</i> spp. (Madrigal Sánchez, 1982)."
501	2005. CAB International. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	[Aquatic? No] Terrestrial
502	2005. CAB International. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	[Grass? No] Pinaceae
503	2005. CAB International. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	[Nitrogen fixing woody plant? No] Pinaceae
504	2005. CAB International. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	[Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)? No] " <i>A. religiosa</i> usually grows to 35-45 m tall, but can reach 50-60 m and 1.5 to 2.0 m d.b.h. (Martinez, 1963). Trunk straight, columnar; branches are long slender, ascending and form a pyramidal or conical crown. "
601	1998. Conifer Specialist Group. <i>Abies religiosa</i> . In: IUCN 2011. IUCN Red List of Threatened Species. Version 2011.2. http://www.iucnredlist.org/apps/redlist/details/39592/0	[Evidence of substantial reproductive failure in native habitat? No] "Although confined to the Nevada de Colima, the species is abundant where it is found, numbering tens of thousands of individuals. The population is not obviously threatened and may occur in additional locations."
602	2005. CAB International. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	[Produces viable seed? Yes] "Seeds are oblong, 9-10 mm long and 5 mm wide, smooth, light brown, and with a strong odour and a bitter taste (Martinez, 1963). Seeds wings 10-15 mm long, brown (Farjon, 1990)."
603	1988. St. Clair, J.B./Critchfield, W.B.. Hybridization of a Rocky Mountain fir (<i>Abies concolor</i>) and a Mexican fir (<i>Abies religiosa</i>). <i>Canadian Journal of Forest Research</i> . 18: 640-643.	[Hybridizes naturally? Potentially] "Interspecific crosses of <i>Abies religiosa</i> (HBK.) Schlecht. & Cham. (oyamel) with <i>Abies concolor</i> (Gord. & Glend.) Lindl. ex Hildebr. var. <i>concolor</i> (white fir) and <i>Abies magnifica</i> A. Murr. (California red fir) were undertaken to explore the relationships between these species. The cross with <i>A. magnifica</i> produced no germinable seed, but many sound seeds were produced from the cross with <i>A. concolor</i> . These were sown in the nursery in 1968 and outplanted in 1970. In 1983, morphological characteristics of seven putative hybrids were compared with those of the <i>A. concolor</i> seed parent, herbarium specimens of <i>A. religiosa</i> , and published descriptions of both species. In addition, monoterpene composition of the putative hybrids was compared with that of the seed parent and two unrelated <i>A. religiosa</i> trees from the same provenance as the pollen parent. Results indicate that the putative hybrids are indeed hybrids between <i>A. concolor</i> and <i>A. religiosa</i> . This finding suggests that either taxonomic sections are not separated by reproductive barriers in <i>Abies</i> (as they are in <i>Pinus</i>) or that earlier classifications should be reconsidered."
603	2000. Aguirre-Planter, E./Furnier, G.R./Eguarte, L.E.. Low Levels of Genetic Variation within and High Levels of Genetic Differentiation among Populations of Species of <i>Abies</i> from Southern Mexico and Guatemala. <i>American Journal of Botany</i> . 87(3): 362-371.	[Hybridizes naturally? No evidence] "In our field observations of vegetative characteristics, these three populations differed from <i>A. religiosa</i> principally in having leaves that were emarginate at the apex instead of acute, obtuse, or rounded. None of the populations showed evidence of being a mixture of species or hybrids. These populations are quite geographically isolated from their conspecific populations, and it is possible that they have undergone a very high degree of genetic drift and are now very different from the other populations in their species."

604	2012. Aussie Gardening. <i>Abies religiosa</i> - Sacred Fir. http://www.aussiegardening.com.au/findplants/plant/Abies_religiosa	[Self-compatible or apomictic? Potentially] "Plants are strongly outbreeding, self-fertilized seed usually grows poorly[200]."
605	2012. Aussie Gardening. <i>Abies religiosa</i> - Sacred Fir. http://www.aussiegardening.com.au/findplants/plant/Abies_religiosa	[Requires specialist pollinators? No] "The flowers from this plant are monoecious (both sexes are found on the plant but each flower is either male or female) and they are pollinated by Wind"
606	2012. Aussie Gardening. <i>Abies religiosa</i> - Sacred Fir. http://www.aussiegardening.com.au/findplants/plant/Abies_religiosa	[Reproduction by vegetative fragmentation? No] "Seed - sow early February in a greenhouse or outdoors in March[78]. Germination is often poor, usually taking about 6 - 8 weeks[78]." [No evidence]
607	2011. Sánchez-Velásquez, L.R./Domínguez-Hernández, D./del Rosario Pineda-López, M./Lara-González, R.. Does <i>Baccharis conferta</i> Shrub Act as a Nurse Plant to the <i>Abies religiosa</i> Seedling?. <i>The Open Forest Science Journal</i> . 4: 67-70.	[Minimum generative time (years)? 23+] "It is a monoecious plant. Age for reproduction ranges begin between 23 and 27 years."
607	2012. Cedar Lodge Nurseries. <i>Abies</i> selections. http://www.conifers.co.nz/abies/abies.html	[Minimum generative time (years)? 4+] "8 metres high x 3 metres wide at base in 7 years in our Nursery/Garden" [Not reproductive after 8 years of cultivation. Likely >4 years]
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] "Seeds are oblong, 9-10 mm long and 5 mm wide, smooth, light brown, and with a strong odour and a bitter taste (Martinez, 1963). Seeds wings 10-15 mm long, brown (Farjon, 1990)." [Unlikely. No means of external attachment]
702	2005. CAB International. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	[Propagules dispersed intentionally by people? Yes] "The wood is of medium to good grade, is yellow, coarse-grained, and easy to work. It is used locally for a variety of carpentry products including beams, doorframes and furniture, as well as for medicinal and ornamental purposes, as a source of paper pulp, and young plants are used as Christmas trees, although the needles tend to fall before the Christmas season is over (Martinez, 1963; Dallimore and Jackson, 1966)."
703	2005. CAB International. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	[Propagules likely to disperse as a produce contaminant? No] "Seeds are oblong, 9-10 mm long and 5 mm wide, smooth, light brown, and with a strong odour and a bitter taste (Martinez, 1963). Seeds wings 10-15 mm long, brown (Farjon, 1990)." [Unlikely. No evidence, and seeds relatively large]
704	2005. CAB International. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	[Propagules adapted to wind dispersal? Yes] "Seeds are oblong, 9-10 mm long and 5 mm wide, smooth, light brown, and with a strong odour and a bitter taste (Martinez, 1963). Seeds wings 10-15 mm long, brown (Farjon, 1990)." [Winged seeds adapted for wind dispersal]
705	2008. Royal Botanic Gardens Kew. Seed Information Database (SID). Version 7.1. http://data.kew.org/sid/	[Propagules water dispersed? No] "Diaspore is blown by wind; Direct or experimental observation" [No evidence]
706	2005. CAB International. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	[Propagules bird dispersed? No] "Seeds are oblong, 9-10 mm long and 5 mm wide, smooth, light brown, and with a strong odour and a bitter taste (Martinez, 1963). Seeds wings 10-15 mm long, brown (Farjon, 1990)." [Not fleshy-fruited]
707	2005. CAB International. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	[Propagules dispersed by other animals (externally)? Unknown] "Seeds are oblong, 9-10 mm long and 5 mm wide, smooth, light brown, and with a strong odour and a bitter taste (Martinez, 1963). Seeds wings 10-15 mm long, brown (Farjon, 1990)." [Seed predators may disperse seeds by seed caching, but no evidence was found]
708	2012. WRA Specialist. Personal Communication.	[Propagules survive passage through the gut? Unknown] Consumption would likely result in seed predation, as seeds are not adapted for internal dispersal
801	2005. CAB International. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	[Prolific seed production (>1000/m ²)? Potentially] "It flowers in February-March and is fertilized in March-April (Santillán Pérez, 1991). Seeds can be collected in December-January. The number of seeds per kg is 19,114-35,137 (average 26,599) (Patino et al., 1983)."
802	2009. Ángeles-Cervantes, E./López-Mata, L.. Survival of a cohort of <i>Abies religiosa</i> seedlings under different post-fire conditions. <i>Boletín de la Sociedad Botánica de México</i> . 84: 25-33.	[Evidence that a persistent propagule bank is formed (>1 yr)? No] "The seeds of <i>Abies religiosa</i> do not form a seed bank in the soil as they lose their viability in the same year of its dispersal..." [Translated from Spanish]

802	2009. Carrillo-Anzures, F./ Vera-Castillo, G./Magaña-Torres, O.S./Guldin, J.M./Guries, R.P.. Seeds stored in the forest floor in a natural stand of <i>Pinus montezumae</i> Lamb.. <i>Revista Ciencia Forestal en México</i> . 34(106): 41-60.	[Evidence that a persistent propagule bank is formed (>1 yr)? Possibly No] "Dominant species in the stand (<i>P. montezumae</i>) and codominant species (<i>P. ayacahuite</i> , <i>Abies religiosa</i> , and <i>Alnus firmifolia</i>) were poorly represented in the soil seed bank which was dominated by seeds of an array of annual and perennial herbs."
803	2012. WRA Specialist. Personal Communication.	[Well controlled by herbicides? Unknown] No evidence of herbicide efficacy or chemical control of this species
804	2003. Rodríguez-Trejo, D.A./Fulé, P.Z.. Fire ecology of Mexican pines and a fire management proposal. <i>International Journal of Wildland Fire</i> . 12(1): 23-37.	"Tolerates, or benefits from, mutilation, cultivation, or fire? Apparently No] "Few Mexican pine ecosystems appear to be maintained by the prevailing anthropogenic and/or natural fire regimes. For example, Minnich and Franco-Vizcaino (1998) suggested that <i>P. jeffreyi</i> dominance of mixed-conifer forests in Baja California may be due to its thick bark, high canopy, and good regeneration following surface fires, in contrast to competing species of <i>Abies</i> and <i>Calocedrus</i> that are more fire-susceptible."
804	2008. Trejo, D.A.R.. Fire Regimes, Fire Ecology, and Fire Management in Mexico. <i>Ambio</i> . 37(7-8): 548-556.	[Tolerates, or benefits from, mutilation, cultivation, or fire? No] "Fir Forests. Fir forests (mostly <i>Abies religiosa</i>) correspond to a fire-sensitive ecosystem. Although some populations under low-intensity fire can resprout foliage after the crown is slightly scorched, fire generally causes high mortality to the species."
805	2012. WRA Specialist. Personal Communication.	[Effective natural enemies present locally (e.g. introduced biocontrol agents)? Unknown]