

Keywords: Naturalized, Shrub, Tree, Toxic, Ornamental, Shade Tolerant, Bird and Animal Dispersal

Family: *Rosaceae*

Taxon: *Heteromeles arbutifolia*

Synonym: *Heteromeles salicifolia* (C. Presl) Abrams
Photinia arbutifolia Lindl. (basionym)
Photinia salicifolia C. Presl

Common Name: toyon
Christmas berry
California holly

Questionnaire : current 20090513 **Assessor:** Patti Clifford **Designation:** H(HPWRA)
Status: Assessor Approved **Data Entry Person:** Patti Clifford **WRA Score** 9

101	Is the species highly domesticated?	y=-3, n=0	n
102	Has the species become naturalized where grown?	y=1, n=-1	
103	Does the species have weedy races?	y=1, n=-1	
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
202	Quality of climate match data	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
203	Broad climate suitability (environmental versatility)	y=1, n=0	y
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	y
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	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
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	n
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	n
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	n
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic	y=1, n=0	
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals	y=1, n=-1	n
405	Toxic to animals	y=1, n=0	y
406	Host for recognized pests and pathogens	y=1, n=0	y
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	n
408	Creates a fire hazard in natural ecosystems	y=1, n=0	n
409	Is a shade tolerant plant at some stage of its life cycle	y=1, n=0	y
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	y

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	y
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	n
705	Propagules water dispersed	y=1, n=-1	y
706	Propagules bird dispersed	y=1, n=-1	y
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
708	Propagules survive passage through the gut	y=1, n=-1	y
801	Prolific seed production (>1000/m2)	y=1, n=-1	y
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	y
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	y=-1, n=1	

Designation: H(HPWRA)

WRA Score 9

Supporting Data:

101	2012. WRA Specialist. Personal Communication.	[Is the species highly domesticated? No] No evidence of domestication that reduces invasive traits.
102	2012. WRA Specialist. Personal Communication.	[Has the species become naturalized where grown? NA]
103	2012. WRA Specialist. Personal Communication.	[Does the species have weedy races? NA]
201	2012. USDA ARS National Genetic Resources Program. Germplasm Resources Information Network - (GRIN). http://www.ars-grin.gov/cgi-bin/npgs/html/index.pl	[Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"? 2 - high] Native distribution: United States - California; Mexico - Baja Norte, Baja Sur.
202	1990. McMurray, N.E.. <i>Heteromeles arbutifolia</i> . In: Fire Effects Information System, [Online]. Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/hetarb/all.html	[Quality of climate match data?] Fresh seeds do not need stratification.
202	2012. USDA ARS National Genetic Resources Program. Germplasm Resources Information Network - (GRIN). http://www.ars-grin.gov/cgi-bin/npgs/html/index.pl	[Quality of climate match data? 2 - high] Native distribution: United States - California; Mexico - Baja Norte, Baja Sur.
203	1999. McClellan, J.E./McClellan, G.. <i>Heteromeles arbutifolia</i> (Lindley) Roemer (Rosaceae). California Academy of Sciences, http://www.suddenoakdeath.org/pdf/Heteromeles%20arbutifolia.pdf	[Broad climate suitability (environmental versatility)? Yes] Elevation between 0 and 4000 ft.
203	2012 (v. 1.0). Phipps, J.B.. Jepson eFlora - <i>Heteromeles arbutifolia</i> . Jepson Flora Project [accessed 6/29/2012], http://ucjeps.berkeley.edu/cgi-bin/get_IJM.pl?tid=28072	[Broad climate suitability (environmental versatility)? Yes] Chaparral, oak woodland, mixed-evergreen forest; < 1300 m.
204	2012. Wagner, W.L./Herbst, D.R./Khan, N./Flynn, T.. Hawaiian Vascular Plant Updates: A Supplement to the Manual of the Flowering Plants of Hawai'i & Hawai'i's Ferns & Fern Allies. http://botany.si.edu/pacificislandbiodiversity/hawaiianflora/supplement.htm	[Native or naturalized in regions with tropical or subtropical climates? Yes] Naturalized on the island of Hawaii.
205	2012. Dave's Garden. PlantFiles: toyoun, California holly, Christmasberry <i>Heteromeles arbutifolia</i> . http://davesgarden.com/guides/pf/go/58417/	[Does the species have a history of repeated introductions outside its natural range? Yes] Member's of Dave's Garden have <i>Heteromeles arbutifolia</i> for sale or trade.
205	2012. Wagner, W.L./Herbst, D.R./Khan, N./Flynn, T.. Hawaiian Vascular Plant Updates: A Supplement to the Manual of the Flowering Plants of Hawai'i & Hawai'i's Ferns & Fern Allies. http://botany.si.edu/pacificislandbiodiversity/hawaiianflora/supplement.htm	[Does the species have a history of repeated introductions outside its natural range? Yes] Naturalized in Hawaii.
301	2012. Wagner, W.L./Herbst, D.R./Khan, N./Flynn, T.. Hawaiian Vascular Plant Updates: A Supplement to the Manual of the Flowering Plants of Hawai'i & Hawai'i's Ferns & Fern Allies. http://botany.si.edu/pacificislandbiodiversity/hawaiianflora/supplement.htm	[Naturalized beyond native range? Yes] Naturalized on the island of Hawaii.
302	2007. Randall, R.. Global Compendium of Weeds - <i>Heteromeles arbutifolia</i> (Roseaceae). http://www.hear.org/gcw/species/heteromeles_arbutifolia/	[Garden/amenity/disturbance weed? No] The Global Compendium of Weeds lists <i>Heteromeles arbutifolia</i> as an environmental weed, however there is not indication of control efforts or negative impacts.
303	2007. Randall, R.. Global Compendium of Weeds - <i>Heteromeles arbutifolia</i> (Roseaceae). http://www.hear.org/gcw/species/heteromeles_arbutifolia/	[Agricultural/forestry/horticultural weed? No] No evidence.

304	2007. Randall, R.. Global Compendium of Weeds - <i>Heteromeles arbutifolia</i> (Rosaceae). http://www.hear.org/gcw/species/heteromeles_arbutifolia/	[Environmental weed? No]The Global Compendium of Weeds lists <i>Heteromeles arbutifolia</i> as an environmental weed, however there is no indication of control efforts or negative impacts.
305	1948. Meyer, S.E.. <i>Heteromeles arbutifolia</i> (Lindl.) M. Roemer Christmasberry in: The woody plant seed manual. Agric. Handbook No. 727: .U.S. Department of Agriculture, Forest Service, Washington DC http://www.fs.fed.us/rm/pubs_other/wo_AgricHandbook727/wo	[Congeneric weed? No] The genus <i>Heteromeles</i> only has one species, <i>Heteromeles arbutifolia</i> .
305	2007. Randall, R.P.. Global Compendium of Weeds - Index. http://www.hear.org/gcw/	[Congeneric weed? No] No evidence.
401	1990. McMurray, N.E.. <i>Heteromeles arbutifolia</i> . In: Fire Effects Information System, [Online]. Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/hetarb/all.html	[Produces spines, thorns or burrs? No] Plants are unarmed.
401	2012 (v. 1.0). Phipps, J.B.. Jepson eFlora - <i>Heteromeles arbutifolia</i> . Jepson Flora Project [accessed 6/29/2012], http://ucjeps.berkeley.edu/cgi-bin/get_IJM.pl?tid=28072	[Produces spines, thorns or burrs? No] Plants are unarmed.
402	2012. WRA Specialist. Personal Communication.	[Allelopathic? Unknown]
403	2012 (v. 1.0). Phipps, J.B.. Jepson eFlora - <i>Heteromeles arbutifolia</i> . Jepson Flora Project [accessed 6/29/2012], http://ucjeps.berkeley.edu/cgi-bin/get_IJM.pl?tid=28072	[Parasitic? No] Rosaceae; <i>Heteromeles</i> .
404	1990. McMurray, N.E.. <i>Heteromeles arbutifolia</i> . In: Fire Effects Information System, [Online]. Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/hetarb/all.html	[Unpalatable to grazing animals? No] <i>Heteromeles</i> is grazed in the late summer or fall when more palatable herbaceous plants are cured. The current year's growth is heavily utilized by domestic goats on forested sites. It is of localized importance to deer.
405	2011. Forero, L./Nader, G./Craigmill, A./DiTomaso, J.M./Puschner, B./Mass, J.. Livestock-poisoning plants of California Publication 8398. University of California Agriculture and Natural Resources,	[Toxic to animals? Yes] Goats have died after eating <i>Heteromeles</i> clippings.
405	2012. Dave's Garden. PlantFiles: toyoun, California holly, Christmasberry <i>Heteromeles arbutifolia</i> . http://davesgarden.com/guides/pf/go/58417/	[Toxic to animals? Yes] Parts of plant are poisonous if ingested.
406	2008. Cave, G.L./Randall-Schadel, B./Redlin, S.C.. Risk analysis for <i>Phytophthora ramorum</i> Werres, de Cock & Man in't Veld, causal agent of sudden oak death, <i>Ramorum</i> leaf blight, and <i>Ramorum</i> dieback. United States Department of Agriculture Animal and Plant Health Inspection Service	[Host for recognized pests and pathogens? Yes] <i>Phytophthora</i> has hosts in several families, including Pinaceae that are in Hawaii.
406	2012. Marin Master Gardeners University of California. Plant Guide - <i>Heteromeles arbutifolia</i> . University of California, http://ucanr.org/sites/MarinMG/Plant_Guide/Plants_by_Type/?uid=102&ds=451	[Host for recognized pests and pathogens? Yes] Sudden Oak Death (<i>Phytophthora ramorum</i>) affects this plant. [unknown if <i>Phytophthora</i> will affect native Hawaiian plants]
407	1990. McMurray, N.E.. <i>Heteromeles arbutifolia</i> . In: Fire Effects Information System, [Online]. Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/hetarb/all.html	[Causes allergies or is otherwise toxic to humans?] Berries were used for food, medicine and beverages.

407	2012. Dave's Garden. PlantFiles: toyoun, California holly, Christmasberry <i>Heteromeles arbutifolia</i> . http://davesgarden.com/guides/pf/go/58417/	[Causes allergies or is otherwise toxic to humans?] Parts of plants are poisonous if ingested.
407	2012. National Center for Biotechnology Information. PubMed. http://www.ncbi.nlm.nih.gov/sites/entrez	[Causes allergies or is otherwise toxic to humans? No]
407	2012. Specialized Information Services, U.S. National Library of Medicine. TOXNET toxicology data network [online database]. National Institutes of Health, http://toxnet.nlm.nih.gov/	[Causes allergies or is otherwise toxic to humans? No] No evidence of toxicity or allergies.
408	1990. McMurray, N.E.. <i>Heteromeles arbutifolia</i> . In: Fire Effects Information System, [Online]. Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/hetarb/all.html	[Creates a fire hazard in natural ecosystems? No] Compared to other chaparral species, <i>Heteromeles</i> is relatively non flammable. <i>Heteromeles</i> is a characteristic component of scrub oak chaparral. These communities generally lack an herbaceous understory and do not carry fire as readily as chamise or coastal sage scrub communities.
409	1990. McMurray, N.E.. <i>Heteromeles arbutifolia</i> . In: Fire Effects Information System, [Online]. Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/hetarb/all.html	[Is a shade tolerant plant at some stage of its life cycle? Yes] Long-lived, relatively shade-tolerant species.
409	2012. Dave's Garden. PlantFiles: toyoun, California holly, Christmasberry <i>Heteromeles arbutifolia</i> . http://davesgarden.com/guides/pf/go/58417/	[Is a shade tolerant plant at some stage of its life cycle? Yes] Sun to partial shade.
409	2012. Marin Master Gardeners University of California. Plant Guide - <i>Heteromeles arbutifolia</i> . University of Californai, http://ucanr.org/sites/MarinMG/Plant_Guide/Plants_by_Type/?uid=102&ds=451	[Is a shade tolerant plant at some stage of its life cycle? Yes] <i>Heteromeles</i> likes full sun in coastal Marin but does best under the high shade of oaks in the hotter parts of Marin.
410	2012. Marin Master Gardeners University of California. Plant Guide - <i>Heteromeles arbutifolia</i> . University of Californai, http://ucanr.org/sites/MarinMG/Plant_Guide/Plants_by_Type/?uid=102&ds=451	[Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)?] Tolerates soil pH of 6.5-7.5 (neutral). Tolerates sand and clay as well as serpentine. Well-drained soil.
410	2012. Moosa Creek Nursery. California native plants - <i>Heteromeles arbutifolia</i> . http://www.moosacreeknursery.com/Native_Plants/259/Heteromeles-arbutifolia	[Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)? Yes] Best soil conditions: clay, decomposed granite, sand, serpentine.
411	2012 (v. 1.0). Phipps, J.B.. Jepson eFlora - <i>Heteromeles arbutifolia</i> . Jepson Flora Project [accessed 6/29/2012], http://ucjeps.berkeley.edu/cgi-bin/get_IJM.pl?tid=28072	[Climbing or smothering growth habit? No] Shrub, small tree, < 10 m.
412	1965. Haller, J.R.. A comparison of the mainland and island populations of Torrey pine. University of California, Santa Barbara, Santa Barbara http://repository.library.csuci.edu/bitstream/handle/10139/809/Haller1965ComparisonMainlandIsland~.pdf?sequence=	[Forms dense thickets? Yes] " Shrubs such as <i>Adenostoma fasciculatum</i> and <i>Heteromeles arbutifolia</i> are scattered through the grove, but do not form the dense thickets characteristic of chaparral vegetation on the mainland."
501	2012 (v. 1.0). Phipps, J.B.. Jepson eFlora - <i>Heteromeles arbutifolia</i> . Jepson Flora Project [accessed 6/29/2012], http://ucjeps.berkeley.edu/cgi-bin/get_IJM.pl?tid=28072	[Aquatic? No] Terrestrial; shrub or small tree.
502	2012 (v. 1.0). Phipps, J.B.. Jepson eFlora - <i>Heteromeles arbutifolia</i> . Jepson Flora Project [accessed 6/29/2012], http://ucjeps.berkeley.edu/cgi-bin/get_IJM.pl?tid=28072	[Grass? No] Rosaceae.

503	2010. www.nationmaster.com. Encyclopedia Nitrogen fixation. Nationmaster.com, http://www.nationmaster.com/encyclopedia/Nitrogen-fixation	[Nitrogen fixing woody plant? No] Rosaceae - Heteromeles.
503	2012 (v. 1.0). Phipps, J.B.. Jepson eFlora - Heteromeles arbutifolia. Jepson Flora Project [accessed 6/29/2012], http://ucjeps.berkeley.edu/cgi-bin/get_IJM.pl?tid=28072	[Nitrogen fixing woody plant? No] Rosaceae - Heteromeles.
504	2012 (v. 1.0). Phipps, J.B.. Jepson eFlora - Heteromeles arbutifolia. Jepson Flora Project [accessed 6/29/2012], http://ucjeps.berkeley.edu/cgi-bin/get_IJM.pl?tid=28072	[Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)? No] Woody; shrub or small tree.
601	1948. Meyer, S.E.. Heteromeles arbutifolia (Lindl.) M. Roemer Christmasberry in: The woody plant seed manual. Agric. Handbook No. 727: .U.S. Department of Agriculture, Forest Service, Washington DC http://www.fs.fed.us/rm/pubs_other/wo_AgricHandbook727/wo	[Evidence of substantial reproductive failure in native habitat? Yes] Recruitment of new individuals is rarely observed. Although winter seedling emergence is a common occurrence, the seedlings almost invariably die, either from Herbivory or summer drought.
602	1948. Meyer, S.E.. Heteromeles arbutifolia (Lindl.) M. Roemer Christmasberry in: The woody plant seed manual. Agric. Handbook No. 727: .U.S. Department of Agriculture, Forest Service, Washington DC http://www.fs.fed.us/rm/pubs_other/wo_AgricHandbook727/wo	[Produces viable seed? Yes] Recruitment of new individuals is rarely observed. Although winter seedling emergence is a common occurrence, the seedlings almost invariably die, either from Herbivory or summer drought.
602	1990. McMurray, N.E.. Heteromeles arbutifolia. In: Fire Effects Information System, [Online]. Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/hetarb/all.html	[Produces viable seed? Yes] Seedlings can be started in nursery beds using unstratified seed in the fall and stratified seed in the spring.
603	2012. WRA Specialist. Personal Communication.	[Hybridizes naturally? Unknown]
604	2012. WRA Specialist. Personal Communication.	[Self-compatible or apomictic? Unknown]
605	2002. Kremen, C./Bugg, R.L./Nicola, N./Smith, S.A./Thorp, R.W./Williams, N.M.. Native bees, native plants and crop pollination in California. <i>Fremontia</i> . 30: 41-49. http://www.cnps.org/cnps/publications/fremontia/Fremontia_Vol30-No3and4.pdf#page=41	[Requires specialist pollinators? No] Bee pollinated.
605	2012. Xerces Society for Invertebrate Conservation. The most important plants for native bees that visit crops in the Central Valley of California. http://www.xerces.org/wp-content/uploads/2008/11/california_plants_for_bees_xerces.pdf	[Requires specialist pollinators? No] Heteromeles arbutifolia is considered to be a beneficial native shrub in California for the conservation of native bees.
606	1990. McMurray, N.E.. Heteromeles arbutifolia. In: Fire Effects Information System, [Online]. Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/hetarb/all.html	[Reproduction by vegetative fragmentation? No] Grown from seed, grafting or cuttings.
607	1990. McMurray, N.E.. Heteromeles arbutifolia. In: Fire Effects Information System, [Online]. Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/hetarb/all.html	[Minimum generative time (years)? >3] "Onset of seed production occurs early in toyon; 2-year-old transplants can produce seed during the second season following outplanting."

607	2012. Marin Master Gardeners University of California. Plant Guide - <i>Heteromeles arbutifolia</i> . University of California, http://ucanr.org/sites/MarinMG/Plant_Guide/Plants_by_Type/?uid=102&ds=451	[Minimum generative time (years)?] Growth rate moderate.
701	2012. WRA Specialist. Personal Communication.	[Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)? No] No evidence of unintentional dispersal.
702	1948. Meyer, S.E.. <i>Heteromeles arbutifolia</i> (Lindl.) M. Roemer Christmasberry in: The woody plant seed manual. Agric. Handbook No. 727: .U.S. Department of Agriculture, Forest Service, Washington DC http://www.fs.fed.us/rm/pubs_other/wo_AgricHandbook727/wo	[Propagules dispersed intentionally by people? Yes] <i>Heteromeles</i> has also been widely planted in California as an ornamental for park, freeway, and home landscape use.
702	2012. Marin Master Gardeners University of California. Plant Guide - <i>Heteromeles arbutifolia</i> . University of California, http://ucanr.org/sites/MarinMG/Plant_Guide/Plants_by_Type/?uid=102&ds=451	[Propagules dispersed intentionally by people? Yes] People make Christmas wreaths from <i>Heteromeles</i> . It can also be used as a hedge or screen and for erosion control.
703	2012. WRA Specialist. Personal Communication.	[Propagules likely to disperse as a produce contaminant? No] No evidence.
704	1990. McMurray, N.E.. <i>Heteromeles arbutifolia</i> . In: Fire Effects Information System, [Online]. Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/hetarb/all.html	[Propagules adapted to wind dispersal? No] Fruit a berry.
704	2012 (v. 1.0). Phipps, J.B.. <i>Jepson eFlora - Heteromeles arbutifolia</i> . Jepson Flora Project [accessed 6/29/2012], http://ucjeps.berkeley.edu/cgi-bin/get_IJM.pl?tid=28072	[Propagules adapted to wind dispersal? No] Fruit a berry.
705	1990. McMurray, N.E.. <i>Heteromeles arbutifolia</i> . In: Fire Effects Information System, [Online]. Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/hetarb/all.html	[Propagules water dispersed? Yes] <i>Heteromeles</i> occurs along arroyos (streams).
706	1990. McMurray, N.E.. <i>Heteromeles arbutifolia</i> . In: Fire Effects Information System, [Online]. Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/hetarb/all.html	[Propagules bird dispersed? Yes] Seeds are dispersed by animals, particularly birds.
708	1990. McMurray, N.E.. <i>Heteromeles arbutifolia</i> . In: Fire Effects Information System, [Online]. Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/hetarb/all.html	[Propagules survive passage through the gut? Yes] Seeds are dispersed by animals, particularly birds.
708	2005. Silverstein, R.P.. Germination of native and exotic plant seeds dispersed by coyotes (<i>Canis latrans</i>) in Southern California. The Southwestern Naturalist. 50: 472-478.	[Propagules survive passage through the gut? Yes] Seeds of <i>Heteromeles arbutifolia</i> germinated after passing through the gut of Coyote's in southern California.
801	2011. Aslan, C.E.. Implications of newly-formed seed-dispersal mutualisms between birds and introduced plants in northern California, USA. Biological Invasions. 13: 2829-2845.	[Prolific seed production (>1000/m ²)? Yes] "Fruits are round, bright-red pomes, borne in panicles of dozens to hundreds at the tips of branches; each plant can produce tens to hundreds of thousands of fruits per year."
802	1948. Meyer, S.E.. <i>Heteromeles arbutifolia</i> (Lindl.) M. Roemer Christmasberry in: The woody plant seed manual. Agric. Handbook No. 727: .U.S. Department of Agriculture, Forest Service, Washington DC http://www.fs.fed.us/rm/pubs_other/wo_AgricHandbook727/wo	[Evidence that a persistent propagule bank is formed (>1 yr)? No] <i>Heteromeles</i> seeds have limited longevity at room temperature. Under field conditions seeds germinate within a few months of dispersal and do not form a persistent seedbank.

802	1990. McMurray, N.E.. <i>Heteromeles arbutifolia</i> . In: Fire Effects Information System, [Online]. Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/hetarb/all.html	[Evidence that a persistent propagule bank is formed (>1 yr)? No] Seeds are short lived and retain their viability for not more than 9 months when dried at room temperature.
803	1990. McMurray, N.E.. <i>Heteromeles arbutifolia</i> . In: Fire Effects Information System, [Online]. Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/hetarb/all.html	[Well controlled by herbicides?] <i>Heteromeles</i> is sensitive to 2,4-D, and 2,4,5-T. [does not state that the herbicide is an effective control by itself]
804	1990. McMurray, N.E.. <i>Heteromeles arbutifolia</i> . In: Fire Effects Information System, [Online]. Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/plants/shrub/hetarb/all.html	[Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] Due to its widespread root system and rapid growth following disturbance, <i>Heteromeles</i> is useful for erosion. Plants resprout after fires. Resistant to fire mortality.
804	2012. California Chaparral Institute. Fire and Nature. http://www.californiachaparral.com/firenature.html	[Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] Obligate resprouters like <i>Heteromeles arbutifolia</i> depend on resprouting from their underground root systems or burls to survive after a fire.
805	2012. WRA Specialist. Personal Communication.	[Effective natural enemies present locally (e.g. introduced biocontrol agents)? Unknown]

Summary of Risk Traits

High Risk:

- Native to subtropical region
- Naturalized in Hawaii
- Broad environmental tolerance
- Toxic to animals
- Host for *Phytophthora ramorum* (sudden oak death)
- Shade tolerant
- Tolerant to wide range of soil conditions
- Forms dense thickets
- Bird, animal and water dispersal
- Prolific seeder
- Resprouts after fires

Low Risk:

- Not a weed elsewhere
- Palatable to animals
- Not a nitrogen fixer
- Moderate growth rate
- No persistent seed bank