Keywords: High Risk, Naturalized, Toxic, Ornamental, Ant Dispersal, Wind Dispersal, Water Dispersal

Family: ***Buxaceae***

Taxon: ***Buxus sempervirens L.***

Synonym:
Buxus colchica Pojark.
Buxus hyrcana Pojark.
Buxus myrtifolia Lam.
Buxus sempervirens f. myrtifolia (Lam.) C. K.
Buxus sempervirens var. myrtifolia (Lam.) Sw
Buxus sempervirens f. pendula (Dallim.) Rehd
Buxus sempervirens var. pendula Dallim
Buxus sempervirens f. prostrata (Bean) Rehde
Buxus sempervirens var. prostrata Bean

Common Name:
box
boxtree
boxwood
boxwoodtree
Caucasian boxwood
common box
common boxwood
European box
French boxwood
Persian boxwood
Turkish boxwood

Questionaire : current 20090513 **Assessor:** Patti Clifford **Designation:** H(HPWRA)
Status: Assessor Approved **Data Entry Person:** Patti Clifford **WRA Score** 7.5

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)**	**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**	**n**
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**	**y**
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**	**y**
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**	**y**
411	**Climbing or smothering growth habit**	**y=1, n=0**	**n**
412	**Forms dense thickets**	**y=1, n=0**	**n**
501	**Aquatic**	**y=5, n=0**	**n**
502	**Grass**	**y=1, n=0**	**n**
503	**Nitrogen fixing woody plant**	**y=1, n=0**	
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**	**y**
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**	**y**
706	**Propagules bird dispersed**	**y=1, n=-1**	**n**
707	**Propagules dispersed by other animals (externally)**	**y=1, n=-1**	**y**
708	**Propagules survive passage through the gut**	**y=1, n=-1**	**n**
801	**Prolific seed production (>1000/m2)**	**y=1, n=-1**	**n**
802	**Evidence that a persistent propagule bank is formed (>1 yr)**	**y=1, n=-1**	
803	**Well controlled by herbicides**	**y=-1, n=1**	
804	**Tolerates, or benefits from, mutilation, cultivation, or fire**	**y=1, n=-1**	**y**
805	**Effective natural enemies present locally (e.g. introduced biocontrol agents)**	**y=-1, n=1**	

Designation: H(HPWRA) **WRA Score** 7.5

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	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical? 0 - low] Latitude between 55°N and 30°N
201	2012. USDA ARS National Germplasm Resources Laboratory. Aphelandra sinclairiana Nees Germplasm Resources Information Network - (GRIN) [Online Database]. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?3689	[Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical? 0 - low] Native distribution: Algeria; Libya; Morocco; Iran; Turkey; Azerbaijan; United Kingdom; Austria; Belgium; Germany; Switzerland; Albania; Former Yugoslavia; Greece; Italy; France; Portugal; Spain
202	2012. USDA ARS National Germplasm Resources Laboratory. Aphelandra sinclairiana Nees Germplasm Resources Information Network - (GRIN) [Online Database]. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?3689	Quality of climate match data? 2 - high] Native distribution: Algeria; Libya; Morocco; Iran; Turkey; Azerbaijan; United Kingdom; Austria; Belgium; Germany; Switzerland; Albania; Former Yugoslavia; Greece; Italy; France; Portugal; Spain
203	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Broad climate suitability (environmental versatility)? Yes] Buxus sempervirens is found in many different vegetation types because its natural range is very broad and very diverse in altitudinal strata (lowland, plain, hills, montane, partially subalpine). Climatic amplitude (estimates) - Altitude range: 700 - 2000 m - Mean annual rainfall: 600 - 2500 mm - Rainfall regime: winter - Dry season duration: 0 - 3 months - Mean annual temperature: 9 - 15ºC - Mean maximum temperature of hottest month: 21 - 31ºC - Mean minimum temperature of coldest month: 0 - 18ºC - Absolute minimum temperature: > -23ºC
203	2012. Dave's Garden. PlantFiles - Buxus sempervirens. http://davesgarden.com/guides/pf/go/1627/	[Broad climate suitability (environmental versatility)?] Hardiness: USDA Zone 6a: to -23.3 °C (-10 °F) USDA Zone 6b: to -20.5 °C (-5 °F) USDA Zone 7a: to -17.7 °C (0 °F) USDA Zone 7b: to -14.9 °C (5 °F) USDA Zone 8a: to -12.2 °C (10 °F) USDA Zone 8b: to -9.4 °C (15 °F)
204	2012. USDA ARS National Germplasm Resources Laboratory. Aphelandra sinclairiana Nees Germplasm Resources Information Network - (GRIN) [Online Database]. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?3689	[Native or naturalized in regions with tropical or subtropical climates? No] Native distribution: Algeria; Libya; Morocco; Iran; Turkey; Azerbaijan; United Kingdom; Austria; Belgium; Germany; Switzerland; Albania; Former Yugoslavia; Greece; Italy; France; Portugal; Spain
205	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Does the species have a history of repeated introductions outside its natural range? Yes] "Buxus sempervirens has been widely introduced outside its natural range over many centuries as an ornamental and hedge tree due to its evergreen foliage, but not as a plantation species for wood production. Some typical examples are seen in central Europe where B. sempervirens has been a major ornamental plant in the palace gardens, baroque gardens, churchyards, villages and cemeteries (Çolak, 2003a). In the Middle Ages, it was planted in churchyards due to its pharmaceutical characteristics and for religious reasons; Great Karl, for example, encouraged the planting of B. sempervirens in churchyards (Schmidt, 1990b). The American Boxwood Society reports the first planting in the USA in 1653 at Sylvester Manor on Shelter Island, off Long Island in New York state. The seed came from Amsterdam, The Netherlands, and it can be seen growing in many public and private gardens in the USA, most frequently in the Mid-Atlantic area."
301	2012. Hortipedia. Buxus sempervirens. http://en.hortipedia.com/wiki/Buxus_sempervirens	[Naturalized beyond native range? Yes] Naturalized in Romania

301	2012. Randall, R.P.. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	[Naturalized beyond native range? Yes] Widely naturalized in Europe.
302	2012. Randall, R.P.. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	[Garden/amenity/disturbance weed? No] No evidence.
303	2012. Randall, R.P.. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	[Agricultural/forestry/horticultural weed? No] No evidence.
304	2012. Randall, R.P.. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	[Environmental weed? No] No evidence.
305	2012. Randall, R.P.. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	[Congeneric weed? No] No evidence.
401	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Produces spines, thorns or burrs? No] Unarmed tree.
402	2012. WRA Specialist. Personal Communication.	[Allelopathic? Unknown]
403	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Parasitic? No] Buxaceae.
404	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Unpalatable to grazing animals? Yes] Domestic and wild animals do not browse B. sempervirens as the leaves and bark contain a toxic alkaloid.
405	2012. National Center for Biotechnology Information. PubMed. http://www.ncbi.nlm.nih.gov/sites/entrez	[Toxic to animals? No] No evidence.
405	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/	[Toxic to animals? No] No evidence.
406	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Host for recognized pests and pathogens?] "Pests and diseases are not serious problems for B. sempervirens in natural habitats but there are, however, some significant pests in plantations where introduced which depend somewhat on specific strains and cultivars. Common pests and diseases include boxwood mite, boxwood leafminer, boxwood psyllid, macrophoma leaf spot, volutella stem blight, root-feeding nematodes, phytophthora root rot, boxwood decline, lesion nematodes and spiral nematodes. Controlling measures will need to be taken when attacks are serious. Nematodes and several types of fungi are not usually major threats for B. sempervirens, and boxwood decline, seemingly due to the fungus Paecilomyces buxi, is restricted to B. sempervirens, but is not a serious problem today as it was several decades ago."
407	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Causes allergies or is otherwise toxic to humans? Yes] Leaves and the bark are reported as lethally poisonous.
407	2012. Dave's Garden. PlantFiles - Buxus sempervirens. http://davesgarden.com/guides/pf/go/1627/	[Causes allergies or is otherwise toxic to humans? Yes] All parts of the plant are poisonous.
408	2012. WRA Specialist. Personal Communication.	[Creates a fire hazard in natural ecosystems? Unknown]
409	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Is a shade tolerant plant at some stage of its life cycle? Yes] "B. sempervirens, like some other shrub species, performs many functions in forest ecosystems. Due to its shade tolerance, it constitutes a continuing intermediate understorey strata, which is very important in terms of structured stand establishment and as a habitat for a variety of wildlife, especially birds." Young seedlings are, however, very tolerant to shade, growing with 3.4-65% full sunlight, and demonstrate good growth in small gaps in forest stands.
409	2012. Dave's Garden. PlantFiles - Buxus sempervirens. http://davesgarden.com/guides/pf/go/1627/	[Is a shade tolerant plant at some stage of its life cycle? Yes] Sun to partial shade.

410	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)? Yes] "Buxus sempervirens generally prefers sandy clay, clay, loams, and clay loam soils in its natural range, neutral and slightly alkaline soils in reaction (pH 6.0-7.8) though it also grows in slightly acidic soils in some areas. B. sempervirens also generally prefers moderately deep, porous, well-drained, stony, permeable soils, and calcareous but lime-free soils and dolomite/dolomitic limestone." Soil descriptors - Soil texture: medium; heavy - Soil drainage: free - Soil reaction: neutral - Soil types: alluvial soils; calcareous soils; clay soils; colluvial soils; granite soils; gravelly soils; limestone soils; mountain soils; sandstone soils
410	2012. Dave's Garden. PlantFiles - Buxus sempervirens. http://davesgarden.com/guides/pf/go/1627/	[Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)? Yes] Soil pH requirements: 6.1 to 6.5 (mildly acidic) 6.6 to 7.5 (neutral) 7.6 to 7.8 (mildly alkaline)
411	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Climbing or smothering growth habit? No] "Buxus sempervirens is generally a shrub, 1-2 m high, occasionally a small tree to 3-5 m and rarely a large tree to 8-12 m high and 60 cm in trunk diameter."
412	2012. WRA Specialist. Personal Communication.	[Forms dense thickets? No] No evidence.
501	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Aquatic? No] Terrestrial; tree.
502	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Grass? No] Buxaceae; tree.
503	2012. WRA Specialist. Personal Communication.	[Nitrogen fixing woody plant? Unknown]
504	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)? No] Tree.
601	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Evidence of substantial reproductive failure in native habitat? Yes] "In many parts of its native range, populations of Buxus sempervirens have been destroyed and others are under threat, as it is not able to regenerate or broaden its population, and is classified as a K-strategic species. For that reason, in much of its native range it is in the 'red' list of endangered species."
602	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Produces viable seed? Yes] Stratification of seeds is not necessary but can lead to more regular germination. Fresh seeds germinate in 1-3 months at 15°C and give better results than pre-stored seeds. [does not produce much seed]
603	2012. WRA Specialist. Personal Communication.	[Hybridizes naturally? Unknown]
604	2012. WRA Specialist. Personal Communication.	[Self-compatible or apomictic? Unknown]
605	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Requires specialist pollinators? No] The scented flowers are monoecious and are pollinated by bees, insects and flies and are open from April to May.
606	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Reproduction by vegetative fragmentation? Yes] Buxus sempervirens planting stock is easily produced from cuttings, indicated by the production of many root and stem sprouts when damaged in natural conditions.
607	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Minimum generative time (years)? >3] Buxus sempervirens is a slow-growing species. Seedlings grow very slowly between 1 and 7 years, typically 15 cm tall after 4 years.
701	2012. WRA Specialist. Personal Communication.	[Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)? No] No evidence.
702	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Propagules dispersed intentionally by people? Yes] "Buxus sempervirens is raised today by many nurserymen, landscapers and homeowners for horticultural interests as it is a slow growing, evergreen and easily formed tree, tolerant of pruning, and commonly used in parks, gardens, borders, fountains, hedges, domestic gardens, large formal gardens and in many places individually, in groups and/or hedges."
703	2012. WRA Specialist. Personal Communication.	[Propagules likely to disperse as a produce contaminant? No] No evidence.
704	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Propagules adapted to wind dispersal? Yes] Buxus sempervirens is primarily a myrmecochore, with seeds disseminated by ants. Seeds are also sometimes dispersed by wind over an area of 20-25 m diameter around the tree.

705	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Propagules water dispersed? Yes] On drier sites,Buxus is found in moist deep valleys and on stream edges.
706	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Propagules bird dispersed? No] Buxus sempervirens is primarily a myrmecochore, with seeds disseminated by ants. Seeds are also sometimes dispersed by wind over an area of 20-25 m diameter around the tree.
707	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Propagules dispersed by other animals (externally)? Yes] Buxus sempervirens is primarily a myrmecochore, with seeds disseminated by ants.
708	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Propagules survive passage through the gut? No] "Fruits are hard, ovoid, dehiscent 3-parted capsules, 8.9-9.6 mm long and 6.4-6.9 mm wide, with 3 small horns on the upper part of the capsule. Seed size is 5.0-7.0 mm long and 3.2-3.5 mm diameter, and two blackish seeds are located in each compartment of the 3-parted fruit, thus possessing a total of 6 seeds on average. Seeds fall on to the ground and B. sempervirens is primarily a myrmecochore, with seeds disseminated by ants. Seeds are also sometimes dispersed by wind over an area of 20-25 m diameter around the tree."
801	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Prolific seed production (>1000/m2)? No] Buxus sempervirens has a low reproductive capacity because of the low levels of seed production.
802	2012. Dave's Garden. PlantFiles - Buxus sempervirens. http://davesgarden.com/guides/pf/go/1627/	[Evidence that a persistent propagule bank is formed (>1 yr)?] Seed does not store well, sow as soon as possible.
802	2012. WRA Specialist. Personal Communication.	[Evidence that a persistent propagule bank is formed (>1 yr)? Unknown]
803	2012. WRA Specialist. Personal Communication.	[Well controlled by herbicides? Unknown]
804	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] Buxus resprouts from the stem and roots following damage to the tree, and regeneration is common from such sprouts.
805	2012. WRA Specialist. Personal Communication.	[Effective natural enemies present locally (e.g. introduced biocontrol agents)? Unknown]

Summary of Risk Traits

High Risk

- Broad environmental tolerance
- Naturalized in Europe
- Unpalatable to animals
- Toxic to humans
- Shade tolerant
- Tolerant of a wide variety of soil types
- Viable seeds
- Reproduces from stem or root fragments
- Seed dispersed by water, wind, ants
- Coppices

Low Risk

- Not invasive in natural, disturbed or commercial systems
- No spines, thorns, burrs
- Limited seed production