

<b>Taxon:</b> <i>Poa annua</i> L.	<b>Family:</b> Poaceae
<b>Common Name(s):</b> annual bluegrass annual meadow grass annual poa winter grass	<b>Synonym(s):</b> <i>Poa annua</i> f. reptans

<b>Assessor:</b> Chuck Chimera	<b>Status:</b> Assessor Approved	<b>End Date:</b> 3 Mar 2016
<b>WRA Score:</b> 25.0	<b>Designation:</b> H(HPWRA)	<b>Rating:</b> High Risk

**Keywords:** Annual, Cosmopolitan, Weed, Self-Compatible, Readily Dispersed

Qsn #	Question	Answer Option	Answer
101	Is the species highly domesticated?	y=-3, n=0	n
102	Has the species become naturalized where grown?		
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
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)	y
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	y
304	Environmental weed		
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	n
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	y
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	n

Qsn #	Question	Answer Option	Answer
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	y
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		
604	Self-compatible or apomictic	y=1, n=-1	y
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	1
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	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	y
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	y
707	Propagules dispersed by other animals (externally)	y=1, n=-1	y
708	Propagules survive passage through the gut	y=1, n=-1	y
801	Prolific seed production (>1000/m <sup>2</sup> )	y=1, n=-1	y
802	Evidence that a persistent propagule bank is formed (>1 yr)	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
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
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. 2016. 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
	CABI, 2016. <i>Poa annua</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. <a href="http://www.cabi.org/isc">www.cabi.org/isc</a>	" <i>P. annua</i> is native to temperate areas of Eurasia. The list of countries in which this species now occurs may not be complete, as <i>P. annua</i> has spread to almost all areas of the world where temperate and subtropical crops are grown, and to some relatively undisturbed habitats."

202	Quality of climate match data	High
	Source(s)	Notes
	CABI, 2016. <i>Poa annua</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. <a href="http://www.cabi.org/isc">www.cabi.org/isc</a>	

203	Broad climate suitability (environmental versatility)	y
	Source(s)	Notes
	CABI, 2016. <i>Poa annua</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. <a href="http://www.cabi.org/isc">www.cabi.org/isc</a>	" <i>P. annua</i> is a cosmopolitan grass included in the Global Compendium of Weeds (Randall, 2012) and listed as one of the most aggressive weeds invading areas from sea level up to 1200 m in elevation. It can be found from Arctic to the Antarctic regions in practically all terrestrial ecosystems (Holm et al., 1997; USDA-ARS, 2014)."
	Warwick, S. I. (1979). The biology of Canadian weeds: 37 <i>Poa annua</i> L. Canadian Journal of Plant Science, 59(4), 1053-1066	" <i>Poa annua</i> is a very adaptable species growing in many different climatic regions, from Mediterranean climates through temperate to alpine zones (Wells 197 4b). In the tropics it occurs only in cool, mountainous regions, and because of its drought sensitivity is not found in semiarid regions."

Qsn #	Question	Answer
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Elevation range exceeds 1800 m, demonstrating environmental versatility] "in Hawai'i naturalized and relatively common, occurring in a variety of disturbed, usually mesic habitats, including roadsides, pastures, urban sites, and disturbed mesic and wet forest, 0-1,830 m, on Kure and Midway atolls and all of the main islands except Ni'i'hau and Kaho'olawe."

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Native to Europe; in Hawai'i naturalized and relatively common, occurring in a variety of disturbed, usually mesic habitats, including roadsides, pastures, urban sites, and disturbed mesic and wet forest, 0-1,830 m, on Kure and Midway atolls and all of the main islands except Ni'i'hau and Kaho'olawe. Naturalized prior to 1871 (Hillebrand, 1888)."
	CABI, 2016. <i>Poa annua</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. <a href="http://www.cabi.org/isc">www.cabi.org/isc</a>	"The list of countries in which this species now occurs may not be complete, as <i>P. annua</i> has spread to almost all areas of the world where temperate and subtropical crops are grown..."

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	CABI, 2016. <i>Poa annua</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. <a href="http://www.cabi.org/isc">www.cabi.org/isc</a>	" <i>P. annua</i> is native to temperate areas of Eurasia. The list of countries in which this species now occurs may not be complete, as <i>P. annua</i> has spread to almost all areas of the world where temperate and subtropical crops are grown, and to some relatively undisturbed habitats. It is the only non-native flowering plant species which has successfully established a breeding population in the maritime Antarctic and has been shown to maintain a seed bank (Wódkiewicz et al., 2014), and has become widespread throughout the sub-Antarctic since its introduction (Williams et al., 2013). It is still being recorded from new locations, for example being found on the forefield of a retreating glacier on King George Island, Antarctica (Olech et al., 2011), and in Venezuelan Guyana for the first time in 2010 (Delascio Chitty and Nozwa, 2010). Cody et al. (2000) reported it as a new record for the mainland Northwest Territories, Canada, after discovering it along an oil pipeline."

301	Naturalized beyond native range	y
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Native to Europe; in Hawai'i naturalized and relatively common, occurring in a variety of disturbed, usually mesic habitats, including roadsides, pastures, urban sites, and disturbed mesic and wet forest, 0-1,830 m, on Kure and Midway atolls and all of the main islands except Ni'i'hau and Kaho'olawe. Naturalized prior to 1871 (Hillebrand, 1888)."

Qsn #	Question	Answer
	<p>USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. <a href="http://www.ars-grin.gov/npgs/index.html">http://www.ars-grin.gov/npgs/index.html</a>. [Accessed 3 Mar 2016]</p>	<p>"Naturalized:                      Africa                          Southern Africa: Lesotho; Namibia; South Africa                      Antarctic                          Antarctic Continent: Antarctica                      Australasia                          Australia: Australia                      Northern America                          : Mexico; United States                      Pacific                          North-Central Pacific: United States - Hawaii                      Southern America                          Caribbean: West Indies                          Southern South America: Chile                          Western South America: Colombia; Peru"</p>

302	Garden/amenity/disturbance weed	y
	Source(s)	Notes
	<p>Holm, L.G., Doll, J., Holm, E., Pancho, J.V. &amp; Herberger, J.P. 1997. World weeds: natural histories and distribution. John Wiley and Sons, Inc., New York, NY</p>	<p>"It invades gardens, lawns, foot paths, bowling greens, flower beds, golf courses, and cracks in sidewalks and pavement."</p>
	<p>Warwick, S. I. (1979). The biology of Canadian weeds: 37 <i>Poa annua</i> L. Canadian Journal of Plant Science, 59(4), 1053-1066</p>	<p>"In Canada, annual blue grass is a common weed of cultivated and wasteland , paths, roadsides, etc. It is a major turfgrass weed in Quebec, Ontario and the Prairie Provinces (Cordukes 1977) as well as elsewhere in North America, in Western Europe and the British Isles (Goss 1964; Gibeault 1971). <i>Poa annua</i> is considered a weed in turf as a result of several characteristics. all of which tend to leave ornamental and functional swards with a spotty appearance (Gibeault and Goetz 1973)."</p>
	<p>Western Australian Herbarium (1998–2016). FloraBase—the Western Australian Flora. Department of Parks and Wildlife. <a href="https://florabase.dpaw.wa.gov.au/">https://florabase.dpaw.wa.gov.au/</a>. [Accessed 3 Mar 2016]</p>	<p>"Notes. Generally a weed of disturbed sites usually with limited impact on native plant communities. Survives as a weed due to high genotypic and phenotypic variability, rapid germination, survival when uprooted and tolerance to compacted soils."</p>
	<p>Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL</p>	<p>[In disturbed areas &amp; waster places] "found in turf, herb fields, in stream, wetlands, damp places, in muddy soil along river, sandy soil , moist alluvial soils, cultivated ground and disturbed sites, moist disturbed areas, in disturbed soil near creek, gardens, lawns. fallow fields, open habitats, open woods, shaded forest edge, in sandy clay over loam, in wet soils, on rich soils, along roadsides, waste places. flood deposit"</p>

303	Agricultural/forestry/horticultural weed	y
	Source(s)	Notes

Qsn #	Question	Answer
	CABI, 2016. <i>Poa annua</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"Holm et al. (1997) indicate that <i>P. annua</i> is a weed of 38 crops in 80 countries and is most frequently reported as a weed of vegetables, cereals, turf, sugarbeet, potatoes and orchards. <i>P. annua</i> has frequently been listed as one of the major weed species in a wide range of crops and regions of which a few examples follow: sports turf in the UK (Raikes et al., 1994); vegetable crops in New South Wales, Australia (Greenhalgh and Michael, 1989) and vines and soft fruit in the European Union (Clay, 1987). It is among the most important monocotyledonous weeds in Pakistan (Hussain and Rashid, 1989) and is common in oilseed rape in north-east Scotland (Whytock and Carnegie, 1990). It was one of the most frequent weeds in a survey of orchards in Portugal (Sa et al., 1989). On a plant-for-plant basis, <i>P. annua</i> is only weakly competitive. Woolley and Sherrott (1993) reported that an economic response to control in winter wheat was only obtained when populations exceeded 714 plants/m <sup>2</sup> in the drier regions of the UK and 416 plants/m <sup>2</sup> in the wetter climate of South Wales. Lutman et al. (1995) produced a tentative index of the competitive abilities of eleven weed species in autumn-sown oilseed rape and placed <i>P. annua</i> low in the list. Despite a relatively low competitive ability, this plant is a significant weed in many crops. Populations may build up to very high levels and, at such levels, an economic response is obtained and the soil seed bank may become very high. In such densely infested land, any gap in the crop will rapidly be colonized and completely occupied by <i>P. annua</i> , thus causing difficulties in crop harvest and management. In weakly competitive crops, or crops where the weed is able to establish a foliar canopy significantly before the crop, the situation is much more serious."
	Warwick, S. I. (1979). The biology of Canadian weeds: 37 <i>Poa annua</i> L. Canadian Journal of Plant Science, 59(4), 1053-1066	" <i>P. annua</i> and several broad-leaved species make up a weed complex which is competitive in horticultural crops (Lawson and Wiseman 1969; Hewson 1969 cf. Wells 1974b)."

304	Environmental weed	
	Source(s)	Notes
	Western Australian Herbarium (1998–2016). FloraBase—the Western Australian Flora. Department of Parks and Wildlife. <a href="https://florabase.dpaw.wa.gov.au/">https://florabase.dpaw.wa.gov.au/</a> . [Accessed 3 Mar 2016]	"Notes. Generally a weed of disturbed sites usually with limited impact on native plant communities. Survives as a weed due to high genotypic and phenotypic variability, rapid germination, survival when uprooted and tolerance to compacted soils."
	Queensland Government. 2011. Weeds of Australia - <i>Poa annua</i> . <a href="http://keyserver.lucidcentral.org/weeds/data/080c0106-040c-4508-8300-0b0a06060e01/media/html/Poa_annua.htm">http://keyserver.lucidcentral.org/weeds/data/080c0106-040c-4508-8300-0b0a06060e01/media/html/Poa_annua.htm</a> . [Accessed 3 Mar 2016]	"Winter grass ( <i>Poa annua</i> ) is regarded as an environmental weed in Victoria, New South Wales and Western Australia. While this species is most commonly a weed of habitation and agricultural areas, it also invades natural vegetation in the temperate regions of Australia."

305	Congeneric weed	y
	Source(s)	Notes

Qsn #	Question	Answer
	Weber, E. 2003. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	[ <i>Poa pratensis</i> regarded as an environmental weed in Australia and parts of North America] "Grassland, riparian habitats, freshwater wetlands. Where native, this grass is commonly found in meadows, pastures and disturbed sites. It is invasive because it spreads rapidly and forms dense swards that crowd out native vegetation. Populations reach high shoot densities and the large size makes it highly competitive to native grasses and forbs"

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Bright green annuals; culms spreading or sometimes erect, rooting at nodes and forming mats, 0.3-2(-3.5) dm tall, strongly flattened. Sheaths open ca. 1/2 their length, with overlapping margins; ligule 1-3 mm long, obtuse or truncate, often erose; blades lax, folded or flat, 1-10 cm long, 1- 2.5(-3) mm wide, margins scaberulous, otherwise glabrous."

402	Allelopathic	n
	Source(s)	Notes
	Warwick, S. I. (1979). The biology of Canadian weeds: 37 <i>Poa annua</i> L. Canadian Journal of Plant Science, 59(4), 1053-1066	No evidence
	CABI, 2016. <i>Poa annua</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	No evidence

403	Parasitic	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Bright green annuals; culms spreading or sometimes erect, rooting at nodes and forming mats, 0.3-2(-3.5) dm tall, strongly flattened." [Poaceae. No evidence]

404	Unpalatable to grazing animals	n
	Source(s)	Notes
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"palatable , very low grazing value, grazed by livestock and horses"

Qsn #	Question	Answer
405	<b>Toxic to animals</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Holm, L.G., Doll, J., Holm, E., Pancho, J.V. & Herberger, J.P. 1997. World weeds: natural histories and distribution. John Wiley and Sons, Inc., New York, NY	"does not accumulate nitrates or oxalates"
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"palatable , very low grazing value, grazed by livestock and horses"

406	Host for recognized pests and pathogens	y
	<b>Source(s)</b>	<b>Notes</b>
	CABI, 2016. <i>Poa annua</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. <a href="http://www.cabi.org/isc">www.cabi.org/isc</a>	" <i>P. annua</i> is believed to play an important part in the transmission of barley yellow dwarf luteovirus between successive crops of wheat and barley by acting as an alternate host to the virus and to its principal vectors; the cereal aphids, <i>Sitobion avenae</i> , <i>Rhopalosiphum padi</i> and <i>Metopolophium dirhodum</i> (Masterman et al., 1994; Kendall et al., 1996). An analogous situation occurs with the transmission of maize rough dwarf fivirus by the cicadellid <i>Laodelphax striatella</i> for which <i>P. annua</i> is an alternate host (Grancin 1988). It has also been observed that <i>P. annua</i> supports high numbers of larvae of the Argentine stem weevil, <i>Listronotus bonariensis</i> , which is a pest of tall fescue in dairy pastures in New Zealand (Prestidge et al., 1989)."
	Warwick, S. I. (1979). The biology of Canadian weeds: 37 <i>Poa annua</i> L. Canadian Journal of Plant Science, 59(4), 1053-1066	" <i>Poa annua</i> has been shown to be a host for a wheat fungus, <i>Septoria nodorum</i> Betk. (Shearer and Zadoks 1972)."

407	Causes allergies or is otherwise toxic to humans	y
	<b>Source(s)</b>	<b>Notes</b>
	Warwick, S. I. (1979). The biology of Canadian weeds: 37 <i>Poa annua</i> L. Canadian Journal of Plant Science, 59(4), 1053-1066	" <i>P. annua</i> is an important hayfever plant (Bassett and Crompton, personal communication) and is listed in the Atlas of European allergenic pollens (Chalpin et al. 1974) and as a hayfever plant in Colorado (Newmark 1978)."

408	Creates a fire hazard in natural ecosystems	n
	<b>Source(s)</b>	<b>Notes</b>
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[No evidence. Generally not occurring in fire prone habitats] "in Hawai'i naturalized and relatively common, occurring in a variety of disturbed, usually mesic habitats, including roadsides, pastures, urban sites, and disturbed mesic and wet forest"
	Warwick, S. I. (1979). The biology of Canadian weeds: 37 <i>Poa annua</i> L. Canadian Journal of Plant Science, 59(4), 1053-1066	No evidence
	CABI, 2016. <i>Poa annua</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. <a href="http://www.cabi.org/isc">www.cabi.org/isc</a>	No evidence



Qsn #	Question	Answer
409	Is a shade tolerant plant at some stage of its life cycle	y
	Source(s)	Notes
	Warwick, S. I. (1979). The biology of Canadian weeds: 37 <i>Poa annua</i> L. Canadian Journal of Plant Science, 59(4), 1053-1066	"Other advantages include a tolerance of close mowing ... a tolerance of compacted soils, sun and shade..." ... "It grows in open or partially shaded areas and is particularly absent from closed communities (Gibeault 1966b)."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	Warwick, S. I. (1979). The biology of Canadian weeds: 37 <i>Poa annua</i> L. Canadian Journal of Plant Science, 59(4), 1053-1066	"Annual blue grass is found on most soil types, from sands to clays, although only infrequently found on strongly acid soils (Gibeault 1966a)."
	CABI, 2016. <i>Poa annua</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"It is tolerant of a range of soil conditions and of moderate to hard frost, however, it prefers fertile agricultural soils with an adequate water supply."
	Holm, L.G., Doll, J., Holm, E., Pancho, J.V. & Herberger, J.P. 1997. World weeds: natural histories and distribution. John Wiley and Sons, Inc., New York, NY	"It occurs in areas of 90 to 430 mm annual precipitation; average minimum and maximum temperatures of 4.9 and 27.4° C, respectively; and soil pHs from 4.5 to 8.2. It grows on a wide range of soils,"

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R. & Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Bright green annuals; culms spreading or sometimes erect, rooting at nodes and forming mats, 0.3-2(-3.5) dm tall, strongly flattened."

412	Forms dense thickets	n
	Source(s)	Notes
	CABI, 2016. <i>Poa annua</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	[No evidence. Weakly competitive & dependent on disturbance] "Despite a relatively low competitive ability, this plant is a significant weed in many crops. Populations may build up to very high levels and, at such levels, an economic response is obtained and the soil seed bank may become very high. In such densely infested land, any gap in the crop will rapidly be colonized and completely occupied by <i>P. annua</i> , thus causing difficulties in crop harvest and management. In weakly competitive crops, or crops where the weed is able to establish a foliar canopy significantly before the crop, the situation is much more serious."
	Warwick, S. I. (1979). The biology of Canadian weeds: 37 <i>Poa annua</i> L. Canadian Journal of Plant Science, 59(4), 1053-1066	No evidence

501	Aquatic	n
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Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	[Terrestrial] "found in turf, herb fields, in stream, wetlands, damp places, in muddy soil along river, sandy soil , moist alluvial soils, cultivated ground and disturbed sites, moist disturbed areas, in disturbed soil near creek, gardens, lawns. fallow fields, open habitats, open woods, shaded forest edge, in sandy clay over loam, in wet soils, on rich soils, along roadsides, waste places. flood deposit"

502	<b>Grass</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. <a href="http://www.ars-grin.gov/npgs/index.html">http://www.ars-grin.gov/npgs/index.html</a> . [Accessed 3 Mar 2016]	Family: Poaceae (alt.Gramineae) Subfamily: Pooideae Tribe: Poeae Subtribe: Poinae

503	<b>Nitrogen fixing woody plant</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Poaceae] "Bright green annuals; culms spreading or sometimes erect, rooting at nodes and forming mats, 0.3-2(-3.5) dm tall, strongly flattened."

504	<b>Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"Annual, sometimes biennial, herbaceous" ... "fibrous roots"

601	<b>Evidence of substantial reproductive failure in native habitat</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	CABI, 2016. <i>Poa annua</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. <a href="http://www.cabi.org/isc">www.cabi.org/isc</a>	[No evidence] "P. annua is a cosmopolitan grass included in the Global Compendium of Weeds (Randall, 2012) and listed as one of the most aggressive weeds invading areas from sea level up to 1200 m in elevation. It can be found from Arctic to the Antarctic regions in practically all terrestrial ecosystems (Holm et al., 1997; USDA-ARS, 2014)."

602	<b>Produces viable seed</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	CABI, 2016. <i>Poa annua</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. <a href="http://www.cabi.org/isc">www.cabi.org/isc</a>	"P. annua is a wind-pollinated species. Plants are normally self-pollinated with 0 to 15% outcrossing in natural populations and seeds are viable in only 1 to 2 days after pollination (Holm et al., 1997)."

Qsn #	Question	Answer
	Warwick, S. I. (1979). The biology of Canadian weeds: 37 <i>Poa annua</i> L. Canadian Journal of Plant Science, 59(4), 1053-1066	"The species is fully self-compatible and is predominantly selfing. Seed production and seed viability are generally high."

603	Hybridizes naturally	
	Source(s)	Notes
	Warwick, S. I. (1979). The biology of Canadian weeds: 37 <i>Poa annua</i> L. Canadian Journal of Plant Science, 59(4), 1053-1066	[Unclear whether or not natural hybridization occurs] "Both Tutin (1957) and Miroshnichenko (1968) have reported hybridization between <i>P. annua</i> and other <i>Poa</i> species. The occurrence of a hybrid between <i>P. annua</i> and <i>P. supina</i> Schrad. was first recognized by Nannfeldt (1935), who showed it to be a sterile triploid. Similarly, Nannfeldt (1938) described a sterile hybrid between <i>P. annua</i> and <i>P. maroccana</i> Nannf. Both <i>P. supirw</i> and <i>P. infirma</i> H.B.K. were crossed with <i>P. annua</i> and the derived F <sub>1</sub> generations found to be sterile, characterized by seven paired bivalents and seven univalents (Tutin 1957)."

604	Self-compatible or apomictic	y
	Source(s)	Notes
	CABI, 2016. <i>Poa annua</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. <a href="http://www.cabi.org/isc">www.cabi.org/isc</a>	"Plants are normally self-pollinated with 0 to 15% outcrossing in natural populations and seeds are viable in only 1 to 2 days after pollination (Holm et al., 1997)."

605	Requires specialist pollinators	n
	Source(s)	Notes
	CABI, 2016. <i>Poa annua</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. <a href="http://www.cabi.org/isc">www.cabi.org/isc</a>	" <i>P. annua</i> is a wind-pollinated species."

606	Reproduction by vegetative fragmentation	y
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R. & Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Bright green annuals; culms spreading or sometimes erect, rooting at nodes and forming mats" [Although reported to be an annual, can apparently spread vegetatively]
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"creeping or erect, culms usually geniculate at the base, sometimes rooting from the lower nodes,"
	Western Australian Herbarium (1998–2016). FloraBase—the Western Australian Flora. Department of Parks and Wildlife. <a href="https://florabase.dpaw.wa.gov.au/">https://florabase.dpaw.wa.gov.au/</a> . [Accessed 3 Mar 2016]	"Life form. Annual, caespitose. Reproduction."
	Warwick, S. I. (1979). The biology of Canadian weeds: 37 <i>Poa annua</i> L. Canadian Journal of Plant Science, 59(4), 1053-1066	"The perennial variant of <i>P. annua</i> unlike the annual variant. forms a mass of tillers which develop adventitious roots at the nodes. After flowering, perennial types begin a phase of secondary tiller formation."

Qsn #	Question	Answer
607	Minimum generative time (years)	1
	Source(s)	Notes
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"Annual, sometimes biennial"
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Bright green annuals; culms spreading or sometimes erect, rooting at nodes and forming mats, 0.3-2(-3.5) dm tall, strongly flattened."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y
	Source(s)	Notes
	Western Australian Herbarium (1998–2016). FloraBase—the Western Australian Flora. Department of Parks and Wildlife. <a href="https://florabase.dpaw.wa.gov.au/">https://florabase.dpaw.wa.gov.au/</a> . [Accessed 3 Mar 2016]	"Dispersal. Wind, water, birds, contaminated seed, on footwear and clothing, mowers and other equipment."
	Warwick, S. I. (1979). The biology of Canadian weeds: 37 <i>Poa annua</i> L. Canadian Journal of Plant Science, 59(4), 1053-1066	"Seeds are also readily dispersed in mud, by sticking to shoes, implements etc. The main carrier of seed is probably man, and one of the main means of its transport is his mower (Gibeault 1966)."
	CABI, 2016. <i>Poa annua</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. <a href="http://www.cabi.org/isc">www.cabi.org/isc</a>	"Seeds can be dispersed by wind, water or attached to animal fur, livestock and vehicles."

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Warwick, S. I. (1979). The biology of Canadian weeds: 37 <i>Poa annua</i> L. Canadian Journal of Plant Science, 59(4), 1053-1066	"If grown in monoculture, annual blue grass provides an excellent putting surface."
	CABI, 2016. <i>Poa annua</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. <a href="http://www.cabi.org/isc">www.cabi.org/isc</a>	" <i>P. annua</i> cannot be said to have any real use in productive agriculture although it may provide some forage in very poor grassland. In ornamental and sports turf the situation is more complex. It is often regarded as a weed, supplanting more desirable species but, in some swards, it provides the only effective green cover. It is frequently the dominant species on golf tees and greens, and varieties have been bred for this purpose in the USA."

703	Propagules likely to disperse as a produce contaminant	y
	Source(s)	Notes
	CABI, 2016. <i>Poa annua</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. <a href="http://www.cabi.org/isc">www.cabi.org/isc</a>	" <i>P. annua</i> and <i>P. trivialis</i> are common contaminants of grass seed crops (Rowarth et al., 1990) and can be extremely difficult to separate from the desired species."

Qsn #	Question	Answer
704	Propagules adapted to wind dispersal	y
	Source(s)	Notes
	CABI, 2016. <i>Poa annua</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. <a href="http://www.cabi.org/isc">www.cabi.org/isc</a>	"Seeds can be dispersed by wind, water or attached to animal fur, livestock and vehicles."
705	Propagules water dispersed	y
	Source(s)	Notes
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	[Occurs in riparian areas & in flood deposit. Likely dispersed by water] "found in turf, herb fields, in stream, wetlands, damp places, in muddy soil along river, sandy soil, moist alluvial soils, cultivated ground and disturbed sites, moist disturbed areas, in disturbed soil near creek, gardens, lawns, fallow fields, open habitats, open woods, shaded forest edge, in sandy clay over loam, in wet soils, on rich soils, along roadsides, waste places. flood deposit"
706	Propagules bird dispersed	y
	Source(s)	Notes
	Western Australian Herbarium (1998–2016). FloraBase—the Western Australian Flora. Department of Parks and Wildlife. <a href="https://florabase.dpaw.wa.gov.au/">https://florabase.dpaw.wa.gov.au/</a> . [Accessed 3 Mar 2016]	"Dispersal. Wind, water, birds, contaminated seed, on footwear and clothing, mowers and other equipment."
	Warwick, S. I. (1979). The biology of Canadian weeds: 37 <i>Poa annua</i> L. Canadian Journal of Plant Science, 59(4), 1053-1066	"Lightness of the grain would aid in wind dispersal, but dispersal by birds may be of importance in accounting for unusual distribution patterns, i.e. cracks in city pavements (Green 196l)."
707	Propagules dispersed by other animals (externally)	y
	Source(s)	Notes
	CABI, 2016. <i>Poa annua</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. <a href="http://www.cabi.org/isc">www.cabi.org/isc</a>	"Seeds can be dispersed by wind, water or attached to animal fur, livestock and vehicles."
	Couvreur, M., Christiaen, B., Verheyen, K., & Hermy, M. (2004). Large herbivores as mobile links between isolated nature reserves through adhesive seed dispersal. Applied Vegetation Science, 7(2): 229-236	"Table 1. Plant species identified in the fur of 201 large herbivores" [Includes <i>Poa annua</i> seeds on cattle & donkeys]

Qsn #	Question	Answer
708	Propagules survive passage through the gut	y
	Source(s)	Notes
	Pakeman, R. J., Digneffe, G., & Small, J. L. (2002). Ecological correlates of endozoochory by herbivores. <i>Functional Ecology</i> , 16(3): 296-304	"Table 4. Species with the highest relative abundance (> 1.0 seeds g <sup>-1</sup> per 100% cover) of germinable seed per unit cover in rabbit and sheep dung" [ <i>Poa annua</i> collected in both rabbit & sheep dung] "A number of species classified as having no specific dispersal mechanism (Grime et al. 1988) germinated in high numbers from the dung (Table 4). These were mainly species of low stature such as <i>Cerastium fontanum</i> , <i>Poa annua</i> , <i>Sagina procumbens</i> and <i>Stellaria media</i> ."
	Warwick, S. I. (1979). The biology of Canadian weeds: 37 <i>Poa annua</i> L. <i>Canadian Journal of Plant Science</i> , 59(4), 1053-1066	"Viable seeds of <i>P. annua</i> have been found in cattle dung, indicating that some proportion of those ingested survive the passage through the digestive tract (Wells 1974b)."

801	Prolific seed production (>1000/m <sup>2</sup> )	y
	Source(s)	Notes
	CABI, 2016. <i>Poa annua</i> . In: <i>Invasive Species Compendium</i> . Wallingford, UK: CAB International. <a href="http://www.cabi.org/isc">www.cabi.org/isc</a>	" <i>P. annua</i> has annual and perennial types and individual plants can produce large number of seeds (1050-2250 seeds/plant) increasing the risk of introduction into new areas (Holm et al., 1997)."
	Marañón, T. (1998). Soil seed bank and community dynamics in an annual-dominated Mediterranean salt-marsh. <i>Journal of Vegetation Science</i> , 9(3), 371-378	"Table 1. Soil seed bank (mean ± standard deviation and frequency, n = 20) and density of adult plants (mean ± standard deviation and frequency, n = 10) in spring censuses of two consecutive years." [ <i>Poa annua</i> - Soil seed bank: Mean (seeds/m <sup>2</sup> ) = 2730 ± 4540]

802	Evidence that a persistent propagule bank is formed (>1 yr)	y
	Source(s)	Notes
	Royal Botanic Gardens Kew. (2016) Seed Information Database (SID). Version 7.1. <a href="http://data.kew.org/sid/">http://data.kew.org/sid/</a> . [Accessed 3 Mar 2016]	"Storage Behaviour: Orthodox. Storage Conditions: No problem for long-term storage under IPGRI preferred conditions (SSLR)"
	Marañón, T. (1998). Soil seed bank and community dynamics in an annual-dominated Mediterranean salt-marsh. <i>Journal of Vegetation Science</i> , 9(3), 371-378	"Table 1. Soil seed bank (mean ± standard deviation and frequency, n = 20) and density of adult plants (mean ± standard deviation and frequency, n = 10) in spring censuses of two consecutive years." [ <i>Poa annua</i> seeds collected in 1st & 2nd years]
	CABI, 2016. <i>Poa annua</i> . In: <i>Invasive Species Compendium</i> . Wallingford, UK: CAB International. <a href="http://www.cabi.org/isc">www.cabi.org/isc</a>	"The seed is relatively short-lived (Lawson et al., 1993, suggest 99% decline is reached in 4 to 6 years), but is often moderately dormant and forms a significant presence in the seed bank in many agricultural soils."

803	Well controlled by herbicides	y
	Source(s)	Notes
		[Has developed herbicide resistance, but some are effective] "Chemical control of <i>P. annua</i> has been studied comprehensively, and no less than 26 active ingredients are recommended for its control in the UK, some alone and some used in mixtures which are listed below. Two general caveats must, however, be mentioned; 1. <i>P. annua</i> , in contrast to many other grass weeds, including <i>P. trivialis</i> ,

CABI, 2016. *Poa annua*. In: *Invasive Species Compendium*. Wallingford, UK: CAB International. [www.cabi.org/isc](http://www.cabi.org/isc)

has an innate ability to resist herbicides of the aryloxy phenoxy propionate (for example, fluazifop-butyl) and cyclohexanedione groups (for example, sethoxydim). This is caused by an insensitive form of the acetyl-coenzyme A carboxylase (ACCase) enzyme which is the target of these chemicals (Herbert et al., 1996, 1997). 2. In addition to the innate resistance described above, some populations of *P. annua* have evolved resistance to herbicides which are normally effective. Most commonly, resistance has evolved to the triazine herbicides (Barros and Dyer, 1988; Cavalloro 1989) in situations where triazines are used frequently - maize fields, orchards, nurseries, vineyards and uncropped areas such as railways. Clay (1989) has described a case of evolution of co-resistance to simazine and paraquat where hops had been treated with these two chemicals for about 25 years. The following list of recommended herbicides is compiled from the UK Pesticide Guide, 1998 (Whitehead, 1998). It has wider utility, but includes only herbicides approved under the UK Control of Pesticides Regulations 1986. Thus, chemicals for which the manufacturer makes no label claim are not included. Some further herbicide recommendations can be found in Mamarot and Rodriguez (1997). Herbicides recommended in beet crops are chloridazon, ethofumesate, lenacil, metamitron and tri-allate; in beans (*Vicia faba*) they are simazine, cyanazine + pendimethalin, pendimethalin + prometryne, terbutryne + trietazine and tri-allate; in Phaseolus beans they are fomasafen and monolinuron + paraquat; in cereals they are isoproturon, linuron + trifluralin, methabenzthiazuron, terbutryne, tri-allate, cyanazine + terbutylazine and diflufenican + terbutylazine; in oilseed rape they are carbetamide, metazachlor and tri-allate; in grass leys they are ethofumesate + bromoxynil + ioxynil; in peas they are cyanazine + pendimethalin, pendimethalin + prometryne and terbutryne + trietazine and in onions and leeks they are chloridazon, monolinuron and tri-allate. Many of the same herbicides are recommended for control of *P. trivialis*, but for this species there is the additional option of diclofop-methyl in most broad-leaved crops, and clodinafop or fenoxaprop-ethyl in cereals. Preemergent herbicides such as benefin, bensulide, dithiopyr, oryzalin, oxadiazon, pendimethalin, and prodiamine and their combinations such as benefin/oryzalin have been found effective for limiting germination of *P. annua* in turf in the USA. They should be applied a few weeks before weed seeds germinate to be most effective, as they have no effect on emerged plants. There are a few relatively new postemergent herbicides that control *P. annua*, but none of them can be used in all turf species. Foramsulfuron, sulfosulfuron, and trifloxysulfuron, for example, can be used only on warm-season turfgrass species. In ornamental crops, clethodim is listed by the University of California as the only postemergent herbicide for broadleaved ornamentals which has an effect on *P. annua*. Intensive herbicide use in turf has led to reports of resistance to an increasing number of herbicides. Brosnan et al. (2012) reported a glyphosate-resistant biotype of *P. annua* in Tennessee. In 2001, Lowe et al. reported dinitroaniline-resistant *P. annua*. Acetolactate synthase (ALS)-inhibiting herbicides such as trifloxysulfuron, foramsulfuron, and bispyribac sodium have been effective for *P. annua* control in turfgrass, but resistant biotypes have been reported on golf courses in South Carolina and Georgia, USA (Cross et al., 2013). Brosnan et al. (2014) report the development of resistance to prodiamine in Tennessee, and suggest indaziflam for control of resistant populations."

<b>804</b>	<b>Tolerates, or benefits from, mutilation, cultivation, or fire</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Holm, L.G., Doll, J., Holm, E., Pancho, J.V. & Herberger, J.P. 1997. World weeds: natural histories and distribution. John Wiley and Sons, Inc., New York, NY	"P. annua tolerates close mowing. Plants cut to 0.5 cm can still produce 360 seeds each (Beard 1973). While they easily survive close cutting, maximum dry weight and tiller production occur at 2.5 cm (Bogart and Beard 1973)."

<b>805</b>	<b>Effective natural enemies present locally (e.g. introduced biocontrol agents)</b>	
	<b>Source(s)</b>	<b>Notes</b>
	CABI, 2016. <i>Poa annua</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. <a href="http://www.cabi.org/isc">www.cabi.org/isc</a>	"Biological Control" McCarty et al. (2005) report on trials for using the bacterium <i>Xanthomonas campestris</i> to control <i>P. annua</i> , but say that inconsistent results have been observed due to the pathogenic microbe's extreme sensitivity to changes in their environments. Use of arbuscular mycorrhizas to slowly reduce the abundance of <i>P. annua</i> and increase the growth of desirable perennial grasses in sports turf is discussed by Gange and Whitfield (2004) and Bary et al. (2005)."
	Wagner, W.L., Herbst, D.R. & Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Probably not. Widely distributed] "in Hawai'i naturalized and relatively common, occurring in a variety of disturbed, usually mesic habitats, including roadsides, pastures, urban sites, and disturbed mesic and wet forest, 0-1,830 m, on Kure and Midway atolls and all of the main islands except Ni'ihau and Kaho'olawe."



**Summary of Risk Traits:**

## High Risk / Undesirable Traits

- Elevation range exceeds 1000 m, demonstrating environmental versatility
- Broad climate suitability
- Naturalized in areas with subtropical climates
- Widely naturalized, including all main Hawaiian Islands except Ni'ihau and Kaho'olawe
- A weed of crops, cultivated and wasteland, paths, roadsides, etc.
- Other *Poa* species are invasive
- Host of crop pests
- Allergenic (causes hayfever)
- Shade tolerant
- Tolerates many soil types
- Reproduces by seed
- Self-pollinated
- Able to reproduce vegetatively by rooting at nodes
- Annual forms reach maturity in <1 year
- Seeds dispersed by wind, water or attached to animal fur, livestock and vehicles and as a seed contaminant
- Viable seeds also dispersed internally by grazing animals
- Prolific seed production
- Seeds may persist in the soil for 4-6 years
- Tolerates mowing & trampling

## Low Risk Traits

- May only be a threat to higher elevation areas with tropical to subtropical climates
- Unarmed (no spines, thorns or burrs)
- Palatable to browsing & grazing animals
- Used as a turfgrass
- Some herbicides may provide effective control, although herbicide resistance is reported