

Taxon: Bromus biebersteinii Roem. & Schult.	Family: Poaceae
Common Name(s): Bieberstein brome cache meadow brome meadow brome meadow bromegrass	Synonym(s): Bromopsis beckeri (Tzvelev) Tzvelev Bromopsis biebersteinii (Roem. & Schult.) Bromopsis kazbecki (Tzvelev) Tzvelev Bromus albidus M. Bieb. Bromus angustissimus K.Koch Bromus chloroticus M.Bieb. ex Kunth Bromus inermis Steven Zerna biebersteinii (Roem. & Schult.)

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 23 Mar 2022
WRA Score: 4.0	Designation: L	Rating: Low Risk

Keywords: Perennial Grass, Palatable, Non-Toxic, Shade-Tolerant, Weakly Rhizomatous

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)	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		
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		
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals	y=1, n=-1	n

Qsn #	Question	Answer Option	Answer
405	Toxic to animals	y=1, n=0	n
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	n
408	Creates a fire hazard in natural ecosystems		
409	Is a shade tolerant plant at some stage of its life cycle		
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		
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation		
607	Minimum generative time (years)		
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)		
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		
705	Propagules water dispersed		
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)		
708	Propagules survive passage through the gut		
801	Prolific seed production (>1000/m ²)		
802	Evidence that a persistent propagule bank is formed (>1 yr)		
803	Well controlled by herbicides	y=-1, n=1	y
804	Tolerates, or benefits from, mutilation, cultivation, or fire		
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
	St. John, L., D. Tilley, and K. Jensen. (2012). Plant Guide for Meadow Brome (<i>Bromus biebersteinii</i>). USDA-Natural Resources Conservation Service, Aberdeen Plant Materials Center. Aberdeen, Idaho	[Not domesticated] "'Cache' meadow brome was developed by the USDA-ARS, Forage and Range Research Laboratory at Utah State University, Logan, UT and was released in 2004 with Plant Variety Protection (PVP). Cache was derived from selections of Regar, Fleet and Paddock and was selected for improved seedling establishment and increased forage yields on irrigated and semi-irrigated pastures in the Intermountain and Northern Great Plains regions of the western United States. Individual seed weight of Cache is comparable to Fleet and Paddock, but significantly heavier than Regar (Jensen, et al., 2004)."

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. (2022). Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. (2022). 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"	Low
	Source(s)	Notes
	KewScience. (2022). Plants of the World Online - <i>Bromus biebersteinii</i> . http://powo.science.kew.org . [Accessed 21 Mar 2022]	"Distribution - Asia-temperate: Caucasus and western Asia." ... "Native to: Afghanistan, Iran, Iraq, North Caucasus, Transcaucasus"
	USDA, Agricultural Research Service, National Plant Germplasm System. (2022). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 21 Mar 2022]	"Native Asia-Temperate WESTERN ASIA: Afghanistan (e.), Iran (n.w.) CAUCASUS: Russian Federation-Ciscaucasia [Ciscaucasia], Azerbaijan, Russian Federation [Dagestan]"

202	Quality of climate match data	High
	Source(s)	Notes
	KewScience. (2022). Plants of the World Online - <i>Bromus biebersteinii</i> . http://powo.science.kew.org . [Accessed 21 Mar 2022]	

203	Broad climate suitability (environmental versatility)	y
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Qsn #	Question	Answer
	Source(s)	Notes
	Cover Crops Canada. (2022). Brome (Bromus biebersteinii – Meadow Brome Bromus inermis – Smooth Brome Bromus hybrid – Hybrid Brome). https://covercrops.ca/brome/ . [Accessed 22 Mar 2022]	"Adaptable to many soil types and climate conditions"
	Ogle, D., St. John, L., Holzworth, L., Jensen, K., and D. Tilley. Ed. (rev) St. John, (2012). Plant Guide for Meadow Brome (Bromus biebersteinii). USDA-Natural Resources Conservation Service, Aberdeen Plant Materials Center. Aberdeen, Idaho	"Habitat: Meadow brome can grow on plains, mountain valleys, mountain brush, aspen, conifer forest and subalpine sites at elevations of about 4,000 feet (1219 m). It has excellent winter hardiness with moderate tolerance to shade (Ogle, et al., 2011). However, it is less winter hardy than smooth brome and crested wheatgrass (Knowles, et al., 1993). In areas with significant spring frost and little snow cover, meadow brome is a much better species selection than orchard grass."

204	Native or naturalized in regions with tropical or subtropical climates	n
	Source(s)	Notes
	KewScience. (2022). Plants of the World Online - Bromus biebersteinii. http://powo.science.kew.org . [Accessed 21 Mar 2022]	" Distribution Asia-temperate: Caucasus and western Asia." ... "Native to: Afghanistan, Iran, Iraq, North Caucasus, Transcaucasus "
	Imada, C. (2019). Hawaiian Naturalized Vascular Plants Checklist (February 2019 update). Bishop Museum Technical Report 69. Bishop Museum, Honolulu, HI	No evidence

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	Ogle, D., St. John, L., Holzworth, L., Jensen, K., and D. Tilley. Ed. (rev) St. John, (2012). Plant Guide for Meadow Brome (Bromus biebersteinii). USDA-Natural Resources Conservation Service, Aberdeen Plant Materials Center. Aberdeen, Idaho	"Distribution: Meadow brome was introduced to the United States from Turkey in 1949 (Smoliak, et al., 1990). It is most commonly used in the northern tier of the United States and the southern tier of Canada (Majerus, 2009)."

301	Naturalized beyond native range	y
	Source(s)	Notes
	Ogle, D., St. John, L., Holzworth, L., Jensen, K., and D. Tilley. Ed. (rev) St. John, (2012). Plant Guide for Meadow Brome (Bromus biebersteinii). USDA-Natural Resources Conservation Service, Aberdeen Plant Materials Center. Aberdeen, Idaho	"Meadow brome was introduced to the United States from Turkey in 1949 (Smoliak, et al., 1990). It is most commonly used in the northern tier of the United States and the southern tier of Canada (Majerus, 2009)." [Presumably naturalized]
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"References: Canada-A-642, Polar Regions-ZD-1587."

302	Garden/amenity/disturbance weed	n
	Source(s)	Notes

Qsn #	Question	Answer
	Ogle, D., St. John, L., Holzworth, L., Jensen, K., and D. Tilley. Ed. (rev) St. John, (2012). Plant Guide for Meadow Brome (<i>Bromus biebersteinii</i>). USDA-Natural Resources Conservation Service, Aberdeen Plant Materials Center. Aberdeen, Idaho	"This species is native to the Middle East, western and central Europe and China and was introduced to the United States in 1949. It has since been used in the northern United States and southern Canada and has not posed any environmental concerns. It is not considered weedy but could spread into adjoining degraded plant communities via seed under ideal conditions."

303	Agricultural/forestry/horticultural weed	
	Source(s)	Notes
	Ogle, D., St. John, L., Holzworth, L., Jensen, K., and D. Tilley. Ed. (rev) St. John, (2012). Plant Guide for Meadow Brome (<i>Bromus biebersteinii</i>). USDA-Natural Resources Conservation Service, Aberdeen Plant Materials Center. Aberdeen, Idaho	"This species is native to the Middle East, western and central Europe and China and was introduced to the United States in 1949. It has since been used in the northern United States and southern Canada and has not posed any environmental concerns. It is not considered weedy but could spread into adjoining degraded plant communities via seed under ideal conditions."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	[Cited as a possible agricultural weed] "References: Canada-A-642, Polar Regions-ZD-1587."

304	Environmental weed	n
	Source(s)	Notes
	Ogle, D., St. John, L., Holzworth, L., Jensen, K., and D. Tilley. Ed. (rev) St. John, (2012). Plant Guide for Meadow Brome (<i>Bromus biebersteinii</i>). USDA-Natural Resources Conservation Service, Aberdeen Plant Materials Center. Aberdeen, Idaho	"This species is native to the Middle East, western and central Europe and China and was introduced to the United States in 1949. It has since been used in the northern United States and southern Canada and has not posed any environmental concerns. It is not considered weedy but could spread into adjoining degraded plant communities via seed under ideal conditions."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

305	Congeneric weed	y
	Source(s)	Notes
	Weber, E. (2003). Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	" <i>Bromus inermis</i> ... forms dense mats excluding other species and reducing native diversity." ... " <i>Bromus rubens</i> ... forms dense stands and competes for nutrients and water ... enhances the potential for the start and spread of fires ... " ... " <i>Bromus tectorum</i> ... Due to its shallow root system, it extracts soil moisture from the upper soil layers, thus preventing the establishment of other species. The early maturation and accumulation of dead and highly inflammable material greatly increases fire hazards."
	Quattrocchi, U. (2006). CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	[<i>Bromus catharticus</i>] "weed species widely naturalized elsewhere" ... "...common in waste and disturbed places, lawns, gardens, riverbanks, areas under irrigation, dry to moderately moist waste places, near water, along roadsides, bottomlands and moist bottom, agricultural fields, cultivated lands, bare soil, vacant lots, slopes, orchards"

Qsn #	Question	Answer
	Weber, E. (2017). Invasive Plant Species of the World, 2nd Edition: A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	[<i>Bromus tectorum</i>] "In western North America, cheatgrass has spread over millions of acres previously dominated by native perennial grassland and sagebrush (<i>Artemisia</i> sp.) communities. The transformation of these into exotic annual grassland has been initialized by overgrazing and other soil disturbances (Mack, 1981), but the grass increasingly invades sites other than rangeland, e.g. mountain valleys (Banks and Baker, 2011) and disturbed piñon-juniper woodland (Getz and Baker, 2008). Once present, the grass remains for long periods of time (Diamond et al., 2012) and benefits from nitrogen deposition (He et al., 2011). The early maturation and accumulation of dead and highly inflammable material greatly increases fire hazards. In areas covered by <i>B. tectorum</i> the frequency, extent and timing of wildfires has changed, with fires occurring more frequently and moving faster than in native vegetation (Bossard et al., 2000; Chambers et al., 2007). The resulting grass– fire cycle leads to the loss of native shrubs and promotes further establishment of seeds of cheatgrass (Young et al., 1987; Condon et al., 2011)."

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	KewScience. (2022). Plants of the World Online - <i>Bromus biebersteinii</i> . http://powo.science.kew.org . [Accessed 21 Mar 2022]	"Perennial; culms solitary. Rhizomes elongated. Butt sheaths persistent and investing base of culm; with fibrous dead sheaths. Culms erect, or geniculately ascending; 50-100 cm long. Leaf-sheaths glabrous on surface. Ligule an eciliate membrane. Leaf-blades 10-20 cm long; 2-4 mm wide. Leaf-blade surface glabrous. Leaf-blade apex acuminate. "

402	Allelopathic	n
	Source(s)	Notes
	WRA Specialist. (2022). Personal Communication	Unknown. Other <i>Bromus</i> species may be allelopathic

403	Parasitic	n
	Source(s)	Notes
	KewScience. (2022). Plants of the World Online - <i>Bromus biebersteinii</i> . http://powo.science.kew.org . [Accessed 21 Mar 2022]	"Perennial; culms solitary. Rhizomes elongated." [Poaceae. No evidence]

404	Unpalatable to grazing animals	n
	Source(s)	Notes
	Cover Crops Canada. (2022). Brome (<i>Bromus biebersteinii</i> – Meadow Brome <i>Bromus inermis</i> – Smooth Brome <i>Bromus hybrid</i> – Hybrid Brome). https://covercrops.ca/brome/ . [Accessed 22 Mar 2022]	"Grazing: Meadow brome is best. Hybrid brome is good. Smooth brome is best under continuous grazing or for horses or sheep."

Qsn #	Question	Answer
	Ogle, D., St. John, L., Holzworth, L., Jensen, K., and D. Tilley. Ed. (rev) St. John, (2012). Plant Guide for Meadow Brome (<i>Bromus biebersteinii</i>). USDA-Natural Resources Conservation Service, Aberdeen Plant Materials Center. Aberdeen, Idaho	"The primary use of meadow brome is for forage production (Ogle, et al., 2011; Sedivec, et al., 2007). It is used for pasture and hay and is highly palatable to all classes of livestock and wildlife. Meadow brome also provides good erosion control with its dense network of fibrous roots. It is excellent forage for big game animals and waterfowl (particularly geese), and can be used in grass-legume mixes for nesting, brood rearing, escape, and winter cover in upland wildlife conservation plantings and field borders."

405	Toxic to animals	n
	Source(s)	Notes
	Ogle, D., St. John, L., Holzworth, L., Jensen, K., and D. Tilley. Ed. (rev) St. John, (2012). Plant Guide for Meadow Brome (<i>Bromus biebersteinii</i>). USDA-Natural Resources Conservation Service, Aberdeen Plant Materials Center. Aberdeen, Idaho	"It is used for pasture and hay and is highly palatable to all classes of livestock and wildlife." [No evidence]
	Quattrocchi, U. (2012). CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence

406	Host for recognized pests and pathogens	
	Source(s)	Notes
	Ogle, D., St. John, L., Holzworth, L., Jensen, K., and D. Tilley. Ed. (rev) St. John, (2012). Plant Guide for Meadow Brome (<i>Bromus biebersteinii</i>). USDA-Natural Resources Conservation Service, Aberdeen Plant Materials Center. Aberdeen, Idaho	"Meadow brome produced for seed is susceptible to covered head smut (<i>Ustilago bullata</i>). Major seed loss usually occurs in the first year seed crop. Later seed crops have less damage because non-infected plants dominate the stand. Stock seed may need to be treated with fungicide to kill the spores that adhere to the seed before planting. Seed treatments will only prevent infection from spores on the seed but will not control infection if the soil is contaminated. Head smut is not detrimental to forage production or erosion control plantings. Silver top (or "whiteheads") can cause minor damage in meadow brome seed production fields (Knowles, et al., 1993). Silver top is caused from damage to the seed stalk after panicle emergence but before seed development. Affected seed heads die and bleach white, appearing to mature early without affecting the rest of the plant. Causes of silvertop include insects or fungi that damage the seed stalk. Environmental conditions such as late spring frosts or nutrient deficiencies or excesses can also cause silver top. Banks grass mite (<i>Oligonychus pratensis</i>) has also been observed in seed fields (Foster, et al., 1966)."

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	Quattrocchi, U. (2012). CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence

Qsn #	Question	Answer
	Wagstaff, D.J. (2008). International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence

408	Creates a fire hazard in natural ecosystems	
	Source(s)	Notes
	USDA Natural Resources Conservation Service. (2022). <i>Bromus biebersteinii</i> . https://plantsorig.sc.egov.usda.gov/java/charProfile?symbol=BRBI2 . [Accessed 22 Mar 2022]	Fire Resistant No Fire Tolerance High
	WRA Specialist. (2022). Personal Communication	No evidence of increased fire risk, but could possibly contribute to fine fuel load and fires during periods of drought

409	Is a shade tolerant plant at some stage of its life cycle	
	Source(s)	Notes
	Ogle, D., St. John, L., Holzworth, L., Jensen, K., and D. Tilley. Ed. (rev) St. John, (2012). Plant Guide for Meadow Brome (<i>Bromus biebersteinii</i>). USDA-Natural Resources Conservation Service, Aberdeen Plant Materials Center. Aberdeen, Idaho	"It has excellent winter hardiness with moderate tolerance to shade (Ogle, et al., 2011)."
	USDA Natural Resources Conservation Service. (2022). <i>Bromus biebersteinii</i> . https://plantsorig.sc.egov.usda.gov/java/charProfile?symbol=BRBI2 . [Accessed 22 Mar 2022]	"Shade Tolerance: Intolerant"

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	Ogle, D., St. John, L., Holzworth, L., Jensen, K., and D. Tilley. Ed. (rev) St. John, (2012). Plant Guide for Meadow Brome (<i>Bromus biebersteinii</i>). USDA-Natural Resources Conservation Service, Aberdeen Plant Materials Center. Aberdeen, Idaho	"Meadow brome is adapted to a broad range of soil conditions. It performs best on moderately deep to deep, fertile, well-drained soils but also performs fairly well on shallower soils. Preferred soil textures range from coarse gravelly to medium textured."

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	KewScience. (2022). Plants of the World Online - <i>Bromus biebersteinii</i> . http://powo.science.kew.org . [Accessed 21 Mar 2022]	"Perennial; culms solitary. Rhizomes elongated. Butt sheaths persistent and investing base of culm; with fibrous dead sheaths. Culms erect, or geniculately ascending; 50-100 cm long. Leaf-sheaths glabrous on surface. Ligule an eciliate membrane. Leaf-blades 10-20 cm long; 2-4 mm wide. Leaf-blade surface glabrous. Leaf-blade apex acuminate."

412	Forms dense thickets	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Ogle, D., St. John, L., Holzworth, L., Jensen, K., and D. Tilley. Ed. (rev) St. John, (2012). Plant Guide for Meadow Brome (<i>Bromus biebersteinii</i>). USDA-Natural Resources Conservation Service, Aberdeen Plant Materials Center. Aberdeen, Idaho	"It is not considered weedy but could spread into adjoining degraded plant communities via seed under ideal conditions." [No evidence]

501	Aquatic	n
	Source(s)	Notes
	St. John, L., D. Tilley, and K. Jensen. (2012). Plant Guide for Meadow Brome (<i>Bromus biebersteinii</i>). USDA-Natural Resources Conservation Service, Aberdeen Plant Materials Center. Aberdeen, Idaho	[Terrestrial] "Habitat: Meadow brome can grow on plains, mountain valleys, mountain brush, aspen, conifer forest and subalpine sites at elevations of about 4,000 feet (1219 m)."

502	Grass	y
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2022). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 21 Mar 2022]	"Genus: <i>Bromus</i> Subgenus: <i>Festucoides</i> Family: Poaceae (alt. Gramineae) Subfamily: Pooideae Tribe: Bromeae"

503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2022). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 21 Mar 2022]	Family: Poaceae (alt. Gramineae)

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	KewScience. (2022). Plants of the World Online - <i>Bromus biebersteinii</i> . http://powo.science.kew.org . [Accessed]	"Perennial; culms solitary. Rhizomes elongated. Butt sheaths persistent and investing base of culm; with fibrous dead sheaths. Culms erect, or geniculately ascending; 50-100 cm long. Leaf-sheaths glabrous on surface. Ligule an eciliate membrane. Leaf-blades 10-20 cm long; 2-4 mm wide. Leaf-blade surface glabrous. Leaf-blade apex acuminate. "

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes

Qsn #	Question	Answer
	Ogle, D., St. John, L., Holzworth, L., Jensen, K., and D. Tilley. Ed. (rev) St. John, (2012). Plant Guide for Meadow Brome (<i>Bromus biebersteinii</i>). USDA-Natural Resources Conservation Service, Aberdeen Plant Materials Center. Aberdeen, Idaho	"Distribution: Meadow brome was introduced to the United States from Turkey in 1949 (Smoliak, et al., 1990). It is most commonly used in the northern tier of the United States and the southern tier of Canada (Majerus, 2009)."
	KewScience. (2022). Plants of the World Online - <i>Bromus biebersteinii</i> . http://powo.science.kew.org . [Accessed 21 Mar 2022]	"Native to: Afghanistan, Iran, Iraq, North Caucasus, Transcaucasus "

602	Produces viable seed	y
	Source(s)	Notes
	Hall, R. D. (1987). Relationship between seed vigor testing and field performance of regar meadow brome (<i>Bromus biebersteinii</i> Roem and Schult). MSc Thesis. Montana State University, Bozeman	"This study evaluated several laboratory vigor tests to determine their relationship to field performance of 'Regar' meadow brome grass. Standard germination and accelerated aging tests were used to evaluate four seed lots during preliminary studies in 1985. Field performance of these lots were evaluated by determining speed of emergence, total emergence, and forage yield. Total emergence and forage yield were significantly correlated with accelerated aging. The following year, standard germination, seedling growth rate, accelerated aging, electrical conductivity, respiration rate, and ATP content were used to evaluate ten seed lots planted in the field. Accelerated aging, respiration rate, and ATP content were significantly correlated with forage yield. Multiple stepwise regression selected accelerated aging and respiration rate as the best model for predicting first year forage yield."
	Ogle, D., St. John, L., Holzworth, L., Jensen, K., and D. Tilley. Ed. (rev) St. John, (2012). Plant Guide for Meadow Brome (<i>Bromus biebersteinii</i>). USDA-Natural Resources Conservation Service, Aberdeen Plant Materials Center. Aberdeen, Idaho	"To maintain long-lived stands, the grass should be allowed to periodically mature and produce seed for continuation of the stand."

603	Hybridizes naturally	
	Source(s)	Notes
	St. John, L., D. Tilley, and K. Jensen. (2012). Plant Guide for Meadow Brome (<i>Bromus biebersteinii</i>). USDA-Natural Resources Conservation Service, Aberdeen Plant Materials Center. Aberdeen, Idaho	"Hybridization with smooth brome (<i>Bromus inermis</i> L.) can be obtained under controlled greenhouse intercrossing, however natural hybrids appear not to occur under field conditions due to an earlier flowering period (6-10 days) for meadow brome (Knowles, et al., 1993)."

604	Self-compatible or apomictic	
	Source(s)	Notes
	Ogle, D., St. John, L., Holzworth, L., Jensen, K., and D. Tilley. Ed. (rev) St. John, (2012). Plant Guide for Meadow Brome (<i>Bromus biebersteinii</i>). USDA-Natural Resources Conservation Service, Aberdeen Plant Materials Center. Aberdeen, Idaho	"Chromosome number is 2n = 70 and is cross pollinated" [Possibly No]

605	Requires specialist pollinators	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Zomlefer, W.B. (1994). Guide to Flowering Plant Families. The University of North Carolina Press, Chapel Hill & London	Poaceae [anemophilous. Wind-pollinated]

606	Reproduction by vegetative fragmentation	
	Source(s)	Notes
	Ogle, D., Tilley, D., St. John, L., Stannard, M. & Holzworth, L. (2014). Conservation plants species for the intermountain west. Plant Materials Technical Note No. 24. USDA - Natural Resources Conservation Service, Boise, Idaho – Salt Lake City, Utah – Spokane, Washington	[Weakly rhizomatous. Possibly could spread locally by vegetative means] "Brome, Meadow Bromus biebersteinii, B. erectus or B. riparius Meadow brome is a perennial long-lived, introduced, weakly rhizomatous grass reaching full productivity in 2 to 3 years."

607	Minimum generative time (years)	
	Source(s)	Notes
	Ogle, D., Tilley, D., St. John, L., Stannard, M. & Holzworth, L. (2014). Conservation plants species for the intermountain west. Plant Materials Technical Note No. 24. USDA - Natural Resources Conservation Service, Boise, Idaho – Salt Lake City, Utah – Spokane, Washington	"Meadow brome is a perennial long-lived, introduced, weakly rhizomatous grass reaching full productivity in 2 to 3 years." [Unknown, but possibly >1 year]

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Major Pathway/s: Contaminant, Crop, Ornamental, Pasture Dispersed by: Humans"
	Ogle, D., St. John, L., Holzworth, L., Jensen, K., and D. Tilley. Ed. (rev) St. John, (2012). Plant Guide for Meadow Brome (<i>Bromus biebersteinii</i>). USDA-Natural Resources Conservation Service, Aberdeen Plant Materials Center. Aberdeen, Idaho	[Possibly could spread through agricultural activities] "It is not considered weedy but could spread into adjoining degraded plant communities via seed under ideal conditions."

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Ogle, D., St. John, L., Holzworth, L., Jensen, K., and D. Tilley. Ed. (rev) St. John, (2012). Plant Guide for Meadow Brome (<i>Bromus biebersteinii</i>). USDA-Natural Resources Conservation Service, Aberdeen Plant Materials Center. Aberdeen, Idaho	"Distribution: Meadow brome was introduced to the United States from Turkey in 1949 (Smoliak, et al., 1990). It is most commonly used in the northern tier of the United States and the southern tier of Canada (Majerus, 2009)."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Major Pathway/s: Contaminant, Crop, Ornamental, Pasture Dispersed by: Humans"

703	Propagules likely to disperse as a produce contaminant	y
	Source(s)	Notes

Qsn #	Question	Answer
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Major Pathway/s: Contaminant, Crop, Ornamental, Pasture Dispersed by: Humans"
	Huiskes, A. H., et al. (2014). Aliens in Antarctica: assessing transfer of plant propagules by human visitors to reduce invasion risk. <i>Biological Conservation</i> , 171, 278-284	1 seed of <i>Bromus biebersteinii</i> introduced as a seed contaminant

704	Propagules adapted to wind dispersal	
	Source(s)	Notes
	Ogle, D., St. John, L., Holzworth, L., Jensen, K., and D. Tilley. Ed. (rev) St. John, (2012). Plant Guide for Meadow Brome (<i>Bromus biebersteinii</i>). USDA-Natural Resources Conservation Service, Aberdeen Plant Materials Center. Aberdeen, Idaho	"It is not considered weedy but could spread into adjoining degraded plant communities via seed under ideal conditions." [Possibly blown short distances, but otherwise not identified as an important vector]

705	Propagules water dispersed	
	Source(s)	Notes
	Ogle, D., St. John, L., Holzworth, L., Jensen, K., and D. Tilley. Ed. (rev) St. John, (2012). Plant Guide for Meadow Brome (<i>Bromus biebersteinii</i>). USDA-Natural Resources Conservation Service, Aberdeen Plant Materials Center. Aberdeen, Idaho	"It is not considered weedy but could spread into adjoining degraded plant communities via seed under ideal conditions." [Possibly by overland flow, or if planted near riparian habitats, but otherwise not identified as an important vector]

706	Propagules bird dispersed	n
	Source(s)	Notes
	Ogle, D., St. John, L., Holzworth, L., Jensen, K., and D. Tilley. Ed. (rev) St. John, (2012). Plant Guide for Meadow Brome (<i>Bromus biebersteinii</i>). USDA-Natural Resources Conservation Service, Aberdeen Plant Materials Center. Aberdeen, Idaho	"It is not considered weedy but could spread into adjoining degraded plant communities via seed under ideal conditions."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Major Pathway/s: Contaminant, Crop, Ornamental, Pasture Dispersed by: Humans"

707	Propagules dispersed by other animals (externally)	
	Source(s)	Notes
	Ogle, D., St. John, L., Holzworth, L., Jensen, K., and D. Tilley. Ed. (rev) St. John, (2012). Plant Guide for Meadow Brome (<i>Bromus biebersteinii</i>). USDA-Natural Resources Conservation Service, Aberdeen Plant Materials Center. Aberdeen, Idaho	"It is not considered weedy but could spread into adjoining degraded plant communities via seed under ideal conditions." [Possibly moved by grazing animals, but otherwise not identified as an important dispersal vector]

708	Propagules survive passage through the gut	
	Source(s)	Notes

Qsn #	Question	Answer
	Ogle, D., St. John, L., Holzworth, L., Jensen, K., and D. Tilley. Ed. (rev) St. John, (2012). Plant Guide for Meadow Brome (<i>Bromus biebersteinii</i>). USDA-Natural Resources Conservation Service, Aberdeen Plant Materials Center. Aberdeen, Idaho	"It is used for pasture and hay and is highly palatable to all classes of livestock and wildlife." [Unknown if viable seeds survive ingestion]

801	Prolific seed production (>1000/m2)	
	Source(s)	Notes
	Walters, C., Wheeler, L. M., & Grotenhuis, J. M. (2005). Longevity of seeds stored in a genebank: species characteristics. <i>Seed Science Research</i> , 15(01), 1-20	"Dryland seed yields are commonly 150 to 200 pounds per acre and irrigated seed yields range from 450 to 600 pounds per acre. Seed matures fairly evenly and is ready for harvest in mid-late July." [Unknown under natural settings]

802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	Notes
	Walters, C., Wheeler, L. M., & Grotenhuis, J. M. (2005). Longevity of seeds stored in a genebank: species characteristics. <i>Seed Science Research</i> , 15(01), 1-20	[Unknown from natural conditions. Stored seeds remained viable for 39.8 years] "Table 1. Storage performance of seeds in the USDA National Plant Germplasm System (NPGS) collection. The study includes accessions that were harvested between 1934 and 1975 and had initial germination percentages greater than 75% (except where indicated). Seeds were initially stored at 58C, but were transferred to 2188C in 1978. Data for most species reflect storage for 24– 26 years at 2188C. Initial and final germination values are averages calculated within 1 year of harvest and after the indicated storage time, respectively."

803	Well controlled by herbicides	y
	Source(s)	Notes
	Weber, E. (2017). <i>Invasive Plant Species of the World</i> , 2nd Edition: A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	"A number of herbicides are being used to control this grass, e.g. glyphosate, atrazine, imazapic, imazapyr and sulfometuron (Bahm et al., 2011b). In Canada, excellent control has been achieved with a spring burning followed by spraying with glyphosate when the grass forms culms. Any control programme of <i>B. inermis</i> is ideally combined with reseeding native plants to achieve a long-term decrease in abundance of this grass (Bahm et al., 2011b)."
	WRA Specialist. (2022). Personal Communication	No evidence that this species is controlled with herbicides, but chemicals used to control other invasive <i>Bromus</i> species would presumably be effective if needed

804	Tolerates, or benefits from, mutilation, cultivation, or fire	
	Source(s)	Notes

Qsn #	Question	Answer
	<p>Ogle, D., St. John, L., Holzworth, L., Jensen, K., and D. Tilley. Ed. (rev) St. John, (2012). Plant Guide for Meadow Brome (<i>Bromus biebersteinii</i>). USDA-Natural Resources Conservation Service, Aberdeen Plant Materials Center. Aberdeen, Idaho</p>	<p>[Mowing or fire may have similar effects as grazing. May depend on time and condition of grass] "Under dryland conditions the new planting should not be grazed until late summer or fall of the second growing season (Ogle, et al., 2011b). The plants may be severely damaged or pulled out by overgrazing especially in the seedling year due to poorly rooted seedlings. Under irrigated conditions the new planting should not be grazed until late summer or fall of the first growing season. Harvesting for hay during the establishment year is most beneficial to eliminate grazing damage."</p>

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	<p>DiTomaso, J. M., Kyser, G. B., Oneto, et al. (2013). Weed Control in Natural Areas in the Western United States. Weed Research and Information Center, University of California, Davis, CA</p>	<p>[Probably no effective natural enemies in the Hawaiian Islands] "There are no established biocontrol agents for the weedy bromes. Several soil fungi have been tested for their suppressive effect on downy brome. None have proven effective. A rhizobacterium native to Washington's soils, <i>Pseudomonas fluorescens</i> strain D7 (P.f. D7), has been shown to inhibit germinating cheatgrass, offering hope of managing the spread of this highly invasive species. Studies of the efficacy of this organism under a range of environmental conditions are under way to determine if this bacterium could inhibit cheatgrass across the western United States. Results are too preliminary to determine if it will be effective."</p>

Summary of Risk Traits:

High Risk / Undesirable Traits

- Broad climate suitability
- Introduced and presumably naturalized in northern U.S. and southern Canada
- Reported to be weedy in some agricultural settings
- Other *Bromus* species are invasive
- Tolerates many soil types
- Reproduces by seeds
- Seeds dispersed by human activities including cultivation and possibly as a seed contaminant

Low Risk Traits

- Despite introduction and one reference to weediness, negative impacts have not been documented where introduced
- Unarmed (no spines, thorns, or burrs)
- Palatable to browsing and grazing animals

Second Screening Results for Herbs or Low Stature Shrubby Life Forms

(A) Reported as a weed of cultivated lands? Possibly. Uncorroborated

(B) Unpalatable to grazers or known to form dense stands? No. Palatable and not known to form dense stands

Outcome = Accept (Low Risk)