

FAQS AND INFORMATION ABOUT BROME GRASSES

What is the policy for use of images?

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How should information in this database be cited?

Please use the following citation information:

Atkinson S, Bromus REEnet. 2012. The *Bromus* database.
<http://greatbasin.wr.usgs.gov/GBRMPnew/bromus/search.aspx>. Accessed <date>.

How can I contribute to this database?

This database an ongoing project, and data is missing or incomplete for many species. We would greatly appreciate suggestions, corrections, additions, comments, or images.

Please contact us at bromusdb@colostate.edu.

How is this project funded?

The *Bromus* database is developed, populated, and maintained as part of a REE-net project to coordinate networking on the distribution and abundance, impacts, and management of exotic and invasive species in the genus *Bromus* (Poaceae). It is funded by grants 2010-85320-20506 and 2012-03083 from US Department of Agriculture, National Institute of Food and Agriculture, to M. Germino, C. Brown, and J. Chambers.

What grasses are included in this database?

The database contains information about brome grasses in the Family Poaceae, Subfamily Pooideae, Tribe Bromeae.

What are brome grasses?

The brome grasses are a group of grasses that grow primarily in temperate regions, and sometimes at high elevations in the tropics. They are found worldwide in a variety of habitats including grasslands, shrublands, and forests. Many brome grasses grow in natural communities, while others grow primarily in disturbed areas or as crop weeds. Some species of brome are widely distributed around the world, while others grow only in small areas. Some bromes such as downy brome or cheatgrass (*Bromus tectorum*) and red brome (*Bromus rubens* or *Bromus madritensis* ssp. *rubens*) are highly invasive, while many other species are not invasive. A few brome species are believed to be extinct in the wild.

Brome grasses have flowers in panicles of similar spikelets, with infertile flowers above fertile flowers. Almost all species have awns near the tips of the flower lemmas. A few species have awns that can be long and sharp enough to injure grazing animals.

Bromes have C3 photosynthesis (rather than C4 photosynthesis or CAM photosynthesis, which are often found in plants that grow in hot dry conditions). They have small to large chromosomes with a base number of seven. Some species of bromes are diploid (with 14 chromosomes) while others are polyploid (with 28, 42, 56, 70, or 84 chromosomes). Some species include individuals that have different numbers of chromosomes. For example, one individual may be diploid while other individuals in the same species may be polyploid. Some species can hybridize. Bromes are different from most grasses in that they have simple rounded starch grains. The only other grasses with similar starch grains are grasses in the Triticeae tribe such as wheat, rye, and barley. The brome grasses are considered to be closely related to the Triticeae grasses.

Some species of bromes are grown in pastures for hay or forage, or used for revegetation of disturbed areas. A few are used in dried flower arrangements. One species, *Bromus mango*, used to be grown in South America for food. Another, *Bromus secalinus*, was accidentally harvested with crops such as wheat, rye, and barley, and often eaten, probably unintentionally, by early Europeans.

What is the taxonomy of the brome grasses?

Kingdom:	Plantae - plants
Division:	Magnoliophyta – flowering plants
Class:	Liliopsida – monocots having 1 cotyledon (seed leaf), leaves with parallel veins, and flower parts often in sets of three
Order:	Poales – grasses, sedges, bromeliads, and others with reduced flowers that are mostly wind pollinated
Family:	Poaceae (Graminae) – grasses with alternate leaves, hollow stems (except at nodes) and inflorescences of reduced flowers arranged in spikelets
Tribe:	Bromeae
Genera:	<i>Bromus</i> , <i>Boissiera</i> , <i>Littledalea</i>

Genus Boissiera

The genus *Boissiera* contains one species, *Boissiera squarrosa*, which grows in Asia and North Africa.

Genus Littledalea

The genus *Littledalea* contains 4 species which grow in Asia.

Genus Bromus

The genus *Bromus* contains 150+ species and is found worldwide. It is divided into a number of subgroups. Some taxonomists consider the subgroups to be individual genera, so they may put *Bromus tectorum* into the genus *Anisantha* instead of genus *Bromus*, and call it *Anisantha tectorum*. Others call the subgroups “sections” or “subgenera”. Taxonomists do not always agree on how many species of *Bromus* there are. Some list include as many as 400 species.

Here are the most commonly used subgroups:

Section *Bromus* (Subgenus *Bromus*, Genus *Bromus*)

This group contains about 35 annual species native to Asia, North Africa, Europe, and Australia. A few species that have lemmas with three awns are sometimes placed in Section *Triniusia*.

Section *Genea* (Subgenus *Stenobromus*, Genus *Anisantha*)

This group contains about eight annual species native to western Asia, North Africa and Europe.

Section *Bromopsis* (Subgenus *Festucoides* or *Festucaria*, Genus *Bromopsis*)

This group contains about 70 mostly perennial species native to Asia, Africa, Europe, North America, and South America. Some Chinese species are sometimes placed in section *Sinobromus*.

Section *Ceratochloa* (Subgenus *Ceratochloa*, Genus *Ceratochloa*).

This group contains about 15-20 annual, biennial, or perennial species native to North America and South America.

Section *Nevskiella* (Subgenus *Nevskiella*, Genus *Nevskiella*)

This group has only one annual species native to western and central Asia.

Section *Neobromus* (Subgenus *Neobromus*, Genus *Trisetobromus*)

This group has two annual species native to South America.

Why are some species of Bromus not included?

The taxonomy of the brome grasses is very complex, and not all taxonomists agree about which bromes are considered valid species. The species listed in this database are based on those listed on the Integrated Taxonomic Information System website (<http://www.itis.gov>), and the Kew Royal Botanical Gardens GrassBase website (<http://www.kew.org/data/grasses-db.html>). The database includes synonyms for many species. Currently, the Advanced Search option may be used to find synonyms.

How was native range determined?

A species is considered to be native to a given country, if it is listed as native to the country by an information source, or if the type specimen was collected in the country (unless there is information suggesting that the type specimen was collected outside of the native range).

A species is considered not to be native to a given country if it belongs to a subgenus that is not native to the region. For example, species in the subgroup *Ceratochloa* are native to North and South America only, so they are shown as not native in countries in the eastern hemisphere.

The native status if the species is shown as “Unknown” if sources do not provide information about native status or where sources provide conflicting information.

What does the information in the “Distribution Level” field mean and how this determined?

The Distribution Level for a species is determined by the number of biogeographic realms it occupies outside of its native range. The biogeographic realms are:

Afrotropic
Antarctic
Australasia
Indo-Malay
Nearctic
Neotropic
Oceanic
Palearctic

Biogeographic realms were used rather than continents because they better matched the native ranges and habitats occupied by brome grasses.

The distribution levels are

- 0=Undetermined
- 1=Restricted to one or a few locations within a limited area, or believed to be extinct in the wild
- 2=Restricted to a moderate to large native range
- 3=Found outside of native range in native biogeographic realms or no more than one additional biogeographic realm
- 4=Naturalized in two or more biogeographic realms outside of native range
- 5=Naturalized in three or more biogeographic realms outside of native range

For more information about biogeographic realms, see
<http://www.worldwildlife.org/science/ecoregions/WWFBinaryitem6498.pdf>

Where can I find out more about grass structure and terminology?

The Oregon State University Forage Information System has a webpage that contains diagrams and definitions of grass terms. See
<http://www.fsl.orst.edu/forages/projects/regrowth/print.cfm?PageID=11>.

Harvard University has a glossary of botanical terms used with grasses. See
http://flora.huh.harvard.edu/FloraData/002/Vol22/FOC22_Glossary_Poaceae.pdf.

The Illinois Wildflower site contains a glossary of general botanical terms. See
http://www.illinoiswildflowers.info/files/line_drawings.htm.

What is an invasive plant?

An invasive plant is a plant that has been introduced to new areas outside of its native range, either intentionally or accidentally by human beings, and that grows and reproduces in large numbers over wide areas in its new range. Some authors only consider plants to be invasive if they cause serious ecological or economic damage in areas where they have been introduced.

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