USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

Plant Guide

MEADOW BROME

Bromus biebersteinii Roem. & Schult. [excluded]

Plant Symbol = BRBI2

Contributed by: USDA NRCS Idaho Plant Materials Program and USDA-ARS Forage and Range Research Laboratory

Meadow brome. USDA-NRCS, Bismarck, ND PMC.

Alternate Names

Scientific Alternate Names: Bromopsis biebersteinii (Roem. & Schult.) Holub, *Bromus erectus*, *Bromus riparius*

Uses

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.

Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g., threatened or endangered species, state noxious status, and wetland indicator values).

Description

General: Grass Family (Poaceae). Meadow brome is an introduced, long-lived, cool season perennial with short rhizomes. Plants are 50-120 cm (19-47 in) tall. The leaves are flat, 5-7 mm (0.20-0.28 in) wide, 20-35 cm (7.8-13.8 in) long, pubescent on both surfaces, and predominantly basal. The upper surface is deeply grooved and the lower surface has a prominent mid-nerve giving the blade a somewhat folded appearance. Auricles are absent and the ligule is membranous and about 0.7 mm (0.03 in) long, truncate, ciliolate, and glabrous. The inflorescence is an erect panicle, branching and whorled, drooping at maturity. The spikelets are 7-11 flowered. The glumes are glabrous, 7-13 mm (0.28-0.51 in) long. The awn is 8-10 mm (0.31-0.39 in) long (Majerus, 2009; Skinner, 2010). Seeds are similar in appearance to smooth brome grass seeds but are almost twice the size and have much larger awns (Smoliak et al, 1990). Chromosome number is 2n = 70 and is cross pollinated (Tuna, et al., 2001).

Hybridization with smooth brome (*Bromus inermis*) 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).

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). For current distribution, please consult the Plant Profile page for this species on the PLANTS Web site.

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.

Adaptation

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. Meadow brome can be grown under dryland conditions receiving greater than 14 inches (355 mm) of annual precipitation, but performs best with 16 inches (406mm) or more of annual precipitation or with irrigation. Meadow brome is rated poor to moderate for salinity tolerance depending on testing procedures (electro conductivity vs. sodium adsorption values) as reported by Sedevec, et al. (2007). It is sensitive to flooding and commonly dies if inundated for more than 10 days.

Establishment

A clean, firm, weed-free seedbed is recommended. Dry land and erosion control plantings should be made in the late fall or very early spring when soil moisture is not limited. Irrigated plantings should be made in early to mid spring. On dryland sites under normal precipitation patterns, do not plant later than May 15 or a failure may occur because of drought and hot summer conditions before the grass is well established (Ogle, et al., 2011b). A deep furrow or double disc drill with press wheels may be used. Meadow brome does not flow uniformly through a drill unless it is diluted with rice hulls or other carrier. There are approximately 86,875 seeds per pound (PLANTS Database). For dryland and irrigated land a seeding rate of 10 pounds Pure Live Seed (PLS) per acre is recommended (20 seeds per square foot). If broadcast or planted for critical area treatment, double the seeding rate to 20 pounds PLS per acre or 40 seeds PLS per square foot. Meadow brome is very compatible with legumes such as alfalfa, cicer milkvetch, birdsfoot trefoil, sainfoin, and clover species (Ogle, et al., 2011a). When planting with legumes, alternate row planting is recommended due to differences in seedling vigor. Use 6 to 8 pounds PLS of meadow brome seed per acre when planting in alternate rows with a legume. Adjustments in seeding rate should be made when seeding in mixtures to percent of stand desired. Seeding depth should be 1/4 to 1/2 inch.

Management

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.

Do not graze in the spring until forage is 8 to 12 inches high and remove animals from pasture when 3 to 4 inch stubble height remains (Ogle, et al., 2009). A 3 to 4 week rest period between grazing is recommended. Meadow brome matures early and can become stemmy if not harvested quickly in the spring. Use no more than 60% of the annual growth during the winter season or 50% during the growing season. This plant responds well to rotation-deferred grazing systems. To maintain long-lived stands, the grass should be allowed to periodically mature and produce seed for continuation of the stand.

Meadow brome responds very well to good fertility management. One strategy to even out the forage production is to fertilize the stand after the first and second cutting or grazing periods to boost late spring and summer production. Apply fertilizer based on soil tests. Fertilizer nutrient rates need to be balanced rates of nitrogen and phosphorus to maintain optimum stands of grasses and legumes. Nitrogen will favor the grass while phosphorus will favor the legume (Ogle, et al., 2009).

In an Alberta, Canada yield trial meadow brome had impressive pasture-hay yield performance (Knowles, 1993):

Species	Cultivar	Yield (lbs/ac.)
Meadow brome	Regar	10805 (5.4 ton)
	Fleet	10679 (5.3 ton)
	Paddock	10438 (5.2 ton)
Smooth brome	Manchar	8661 (4.3 ton)
Orchardgrass	Kay	8709 (4.4 ton)
Meadow foxtail	Common	9177 (4.6 ton)

* Fertilized after each cutting for an annual average of 220 lb/ac N and 55 lb/ac P

The forage yields of the meadow brome releases in this study are not significantly different. These yields may be an indicator of production under irrigated conditions. Average yields under non-irrigated conditions are estimated to be about 50 percent of those listed above.

Forage production can be restored and stands may benefit from ripping if sod bound conditions occur in older stands. Care should be taken to avoid excessive ripping because stands may be damaged.

Pests and Potential Problems

Meadow brome produced for seed is susceptible to covered head smut (*Ustillago bullata*). 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 (*Oligonychus pratensis*) has also been observed in seed fields (Foster, et al., 1966).

Environmental Concerns

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.

Seed and Plant Production

When planting for seed increase, seed should be treated with a fungicide (most seed companies can treat seed) to reduce potential head smut problems common in bromes. Irrigated seed production plantings should be in at least 24-inch rows and preferably 36-inch rows. Seeding rate is 4.7 pounds PLS/ac at 36 inch row spacing (Cornforth, et al., 2001). 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. The preferred method of harvest is to windrow at the firm dough stage and then combine about 7 days later, once seed has matured in windrow. Direct combining is also acceptable, but the field must be monitored closely and harvested when seed is mature and before seed shatter occurs. The seed should be dried to 12 percent moisture in bins and 15 percent moisture in sacks before storing.

'Regar' meadow brome seed production fields are only productive for about two to three seed crops and seed production beyond 2-3 years are normally not economical. Proper row culture (cultivation) and ripping may help to extend the stands productive life. 'Fleet', 'Paddock', 'Montana', and 'MacBeth' were selected for a longer seed production life and higher seed production the third production year compared to 'Regar'.

Cultivars, Improved, and Selected Materials (and area of origin)

Foundation and Registered seed is available through the appropriate state Crop Improvement Association or commercial sources to grow certified seed.

'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).

'Fleet' meadow brome was developed by the Agriculture Canada Research Station, Saskatoon, Saskatchewan, and it was released in 1987. Fleet was formed as a synthetic of plants from Eurasian sources including Regar. Fleet is similar to Regar in having a restricted creeping root habit and abundant basal leaves. Fleet also has varying degrees of pubescence similar to Regar. Regrowth following clipping or grazing and fall greenness are also similar to Regar. Forage yields are also similar to Regar, but Fleet may produce higher seed yields (Knowles, 1990).

'MacBeth' meadow brome was developed at Montana State University and released in 2001. MacBeth has similar forage yields to Regar, Fleet and Paddock, with a slight yield advantage in Montana dryland trials. At two test locations, MacBeth produced more total forage of the 30 accessions evaluated in the trials (Montana State University, Online).

'Montana' meadow brome was developed at Montana State University and licensed exclusively to a private seed company. It was released in 2001. Montana has similar forage yields to Regar, Fleet and Paddock. The major attribute for Montana is its improved seed yield potential over Regar and Paddock. At three test locations, Montana averaged 35 percent high seed yields than Paddock and 167 percent higher seed yields than Regar in the third year of production (Cash, et al., 2002).

'Paddock' meadow brome was selected by the Agriculture Canada Research Station, Saskatoon, Saskatchewan, Canada and released in 1987. It was developed from an introduction from Krasnodar, USSR in 1969. Paddock has a similar habit of growth to Regar and Fleet. Leaves are slightly wider than Regar and forage yields are similar to Fleet and Regar. Paddock seed yields are greater than Regar seed yields (Knowles, 1990).

'Regar' meadow brome was selected from a collection made near Zek, in Kars Province in Turkey in 1949 and made available to the Aberdeen Plant Materials Center in 1957 by the USDA Regional Plant Introduction Station. It was released in 1966 by the Aberdeen, Idaho Plant Materials Center and the Idaho Agricultural Experiment Station. Regar seed germinates readily, seedling vigor is good and seedlings establish rapidly. Leaves are numerous, dominantly basal, mildly pubescent, and light

green. Seed stalks are erect and extend above the leaf mass in an open panicle. Regar develops seed heads and matures 7 to 10 days earlier than smooth brome. Regar greens up early in the spring and remains green late into the fall (Foster et al., 1966).

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