



COLORADO STATE PARKS
BEST MANAGEMENT PRACTICES
WEED PROFILE



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Parks Affected: Many

Downy brome (cheatgrass)
Bromus tectorum (L.);
Anisantha tectorum (L.) Nevski



Family: *Poaceae* (Grass)

Other Names: cheatgrass, downy chess, early chess, drooping brome, downy cheat, slender chess, downy broomgrass, military grass, broncoglass, Mormon oats

USDA Code: BRTE, ANTE6

Legal Status: Colorado Noxious List A (general weeds)

Identification

Growth form: Annual or winter annual grass.

Flower: Downy brome panicles (loose, irregularly compound flowering part of plant with flowers borne on individual stalks)

change color from green to purple to brown as the plant matures and eventually dries out. Branches are slender, drooping, hairy, flexuous, with up to eight spikelets.

Seeds/Fruit: Spikelets including awns are 0.8-2 inches long, nodding, with 2-8 florets.

Leaves: Leaves are light-green and hairy. Sheaths are fused except near the node at the bottom of each sheath. The lower sheaths are conspicuously hairy, while the upper sheaths are sometimes smooth.

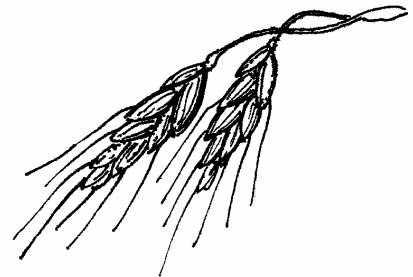
Stems: Mature plants are generally 4-30 inches tall. Stems are erect, slender, glabrous, or slightly hairy.

Roots: The finely divided fibrous root system typically reaches a depth of about 12 inches, but can grow to 60 in. deep in the field (Hironaka 1961; Hulbert 1955).

Seedling: Downy brome seedlings can usually be distinguished by their hairy leaf blades and sheaths.

Keys to Identification:

- Downy brome can be identified by its drooping branches.
- In the late spring and early summer downy brome changes from green to purple to tan or brown allowing for easy identification. It often remains purple during the winter months.



Similar Species

Exotics: Similar to Japanese brome (*Bromus japonicus*) and rye brome (*Bromus secalinus*).

Natives: None known.

Impacts

Agricultural: Downy brome can be a troublesome weed in winter wheat and other crops.

Ecological: Downy brome can greatly alter the species composition of dry native rangeland vegetation by competitive exclusion of reproduction of native plant species and by facilitation of wildfires (Mosky et al. 1999). Invasion of downy brome is greatest in drier environments, particularly in sagebrush-steppe communities. The process in which a pristine Great Basin shrub-steppe ecosystem deteriorates into one that is dominated by downy brome takes several years and has several distinct cycles. First, some sort of disturbance, such as heavy grazing, allows downy brome and other annuals to invade and proliferate. The dry stands of downy brome

in the summer increase the frequency of fires. Initially, this creates an environment dominated by annual grasses, broom snakeweed (*Gutierrezia sarothrae*), and rabbitbrush (*Chrysothamnus* spp.). As fires become even more frequent, the area will be dominated by annual grasses alone, with the loss of surface soil, nutrients, and near permanent deterioration of the site. Species that are commonly displaced by downy brome include big sagebrush (*Artemisia tridentata*), antelope bitterbrush (*Purshia tridentata*), bluebunch wheatgrass (*Agropyron spicatum* = *Pseudoroegneria spicata*), crested wheatgrass (*Agropyron cristatum*), western wheatgrass (*Agropyron smithii* = *Pascopyrum smithii*), Sandberg bluegrass (*Poa sandbergii* = *Poa secunda*), needle-and-thread grass (*Stipa comata* = *Hesperostipa comata*), and Thurber's needlegrass (*Stipa thurberiana*)

Human: No information available.

Habitat and Distribution

General requirements: Downy brome is common in recently burned rangeland and wildlands, winter crops, waste areas, abandoned fields, eroded areas, and overgrazed grasslands (Upadhyaya et al. 1986). It can invade rangelands that have never been grazed by livestock (Svejcar and Tausch 1991).

Distribution: Common throughout Colorado from 4,000 to 9,000 feet. Widely distributed throughout North America. Although downy brome occurs in a variety of habitats, it is most prominent on the Columbia-Snake River Plateau, Wyoming Basin, and the northern edge of the Great Basin in disturbed sagebrush steppe communities (Rice and Mack 1991, West 1983).

Historical: No information available.

Biology/Ecology

Life cycle: Vast numbers of downy brome seedlings usually germinate after the first fall rain in infested areas (West 1983). The leaves typically grow little in the fall, and plants are normally 1-2 inches in height when covered by snow in December. The young, fall-germinated seedlings often over-winter in a semi-dormant state and complete their lifecycle the following spring (Upadhyaya et al. 1986). However, downy brome roots can grow in soil temperatures approaching freezing (West 1983), and roots will continue to grow throughout the winter until soil temperatures drop below about 37 degrees F. Plants head in late April to early May followed by flowering within a week (Upadhyaya et al. 1986). The seeds mature in mid to late June (Upadhyaya et al. 1986).

During ripening downy brome flowers turn purple and then brown as they mature. Once the seeds have matured, plants dry and become flammable. There is a correlation between plant color and moisture status during the drying process (FEIS 1996). Downy brome passes from green (>100% moisture content), to a purple hue (30-100% moisture content), to a straw color (<30% moisture content) as it dries (FEIS 1996). The onset of purple coloring should be taken as a warning that hazardous fire conditions will develop within two weeks (FEIS 1996).

Downy brome greens up earlier in the spring than most other species. Depletion of soil moisture is a mechanism by which downy brome suppresses seedlings of desirable, perennial grasses (Melgoza et al. 1990). In addition, thick mulch in dense downy brome stands favors downy brome seedling germination and establishment while inhibiting that of perennial bunchgrasses (Svejcar and Tausch 1991).

Mode of reproduction: Reproduces by seeds.

Seeds production: Downy brome can be a prolific seed producer and is capable of producing up to 400 lbs. of seeds/acre (Upadhyaya et al. 1986). Seed production per culm, per plant, and per unit area is dependent on plant density and environmental factors (Upadhyaya et al. 1986). Average seed production per plant is generally lowest where plant density is highest (Rice and Mack 1991). If precipitation is adequate, the majority of downy brome seeds will germinate in the fall, or within a year of maturation (Upadhyaya et al. 1986). However, dry conditions can cause environmentally induced dormancy, which may last several years and break down at erratic intervals (Young and Evans 1985).

Seed bank: Low survival rates in the soil, but seeds may last in the seed bank for a few years.

Dispersal: Seeds are dispersed short distances by wind, and the long awns can attach to the fur or feathers of an animal, as well as clothing.

Hybridization: No information available.

Control

Biocontrol: Livestock grazing can help control downy brome. Two grazing periods each spring are required for at least two consecutive years. Plants should first be grazed at the stage just before the inflorescences emerge ("boot" stage), then grazed again before panicles emerge (about 3-4 weeks). Grazing intensity needs to be light enough to leave at least a 3-inch residual height to protect desirable grasses (Mosely 1996). Winter grazing downy brome can reduce mulch, thereby hindering downy brome establishment and favoring perennial grass establishment.

Mechanical: Cutting is not a recommended control method for downy brome. Plants that are cut before seed ripening will produce new stems and seeds at the cut height. Plants that are cut after seed ripening will die, but by this point the seeds are already viable. In one study, repeated mowing (every three weeks) during the spring and summer was as effective at controlling downy brome seed production as an application of glyphosate (Ponzetti 1997). However, this method was very labor-intensive and a cost/benefit analysis should be conducted before any choice is made. Hand-pulling downy brome plants in small infestations before seed set would effectively eliminate current seed production, but may not eliminate the infestation. The large seed production commonly associated with downy brome infestations will allow plants to recover for several years without noticeable reductions in plant density. Hence, any pulling program must be conducted for several years, or until the seed bank has been exhausted. Also, seeds that blow into the cleared areas from adjacent uncleared areas may negate the effects of pulling. When pulling, an effort should be made to extract as much of the root as possible so that the plant cannot simply regrow and produce new seeds.

Fire: Burning is usually conducted in Colorado in June after the plant has dried, but before the seeds have dropped (Carpenter and Murray 1998). However, some seeds will survive and if a burn is not followed by reseeding downy brome will recover to pretreatment proportions within 3 to 4 years (Carpenter and Murray 1998). Reseeding should be done in late fall (a dormant seeding).

Herbicides: There are several types of herbicides that can be used alone or combined to provide effective control of downy brome. Refer to the product label for detailed application directions so as to minimize the damage to non-target species. For relatively small infestations, a backpack sprayer is recommended to minimize the danger to non-target plants. However, infestations are often so large that a four-wheeler, tractor, or truck fitted with a sprayer is necessary. The following herbicides are divided into two groups, spring applied and fall applied.

In most cases, herbicide application should be made in early spring when non-target species are dormant to insure selective control. Downy brome was reported to be controlled best when the plants were 10 cm or less and growing vigorously at the time of application (Wiese et al. 1995). Spring applied herbicides include quizalofop, fluzafop-p-butyl, sethoxydim, glyphosate, and imazapic.

On sites where desirable plants are largely absent, control of downy brome must be followed by reseeding. Chemical fallow with glyphosate at 0.5 lb. ai/ac applied in the early spring when plants are actively growing is one option. The site can be reseeded in the fall (Mosely et al. 1999). Alternatively, one could graze downy brome plants twice with livestock then apply glyphosate.

Fall herbicide applications should be conducted after downy brome seeds have germinated and are beginning to grow. Fall applications are generally used in cropland situations by farmers growing winter wheat or other cool season crops. However, sometimes these herbicides are used in pastures and rangelands. Fall-applied herbicides for non-crop situations include sulfometuron methyl, and metribuzin.

Cultural/Preventive: Prevent the establishment of new infestations by minimizing disturbance and seed dispersal, and maintaining healthy native communities.

Keys to Control:

- Maintain healthy stand of perennial plants.
- Seeding may be needed where perennial grasses have been depleted.
- Manage grazing carefully in seeded areas to promote the establishment of new perennial plants.

Integrated Management Summary

Downy brome is characterized by its early maturation, high seed production, and vigorous growth under favorable environmental conditions. Although, downy brome readily invades perennial forage crops and rangeland under poor management, it also invades communities in the absence of disturbance (Douglas et al. 1990). In undisturbed sites, downy brome will most commonly spread along soil cracks and work its way outward into the natural community (Rice and Mack 1991). Downy brome has a dual role as a serious weed and important early season forage for cattle and sheep (Upadhyaya et al. 1986). Downy brome provides the bulk of early spring forage for all classes of stock on grazing lands in the Intermountain and Pacific Northwest regions (Upadhyaya et al. 1986). Lasting control of downy brome will require a combination of chemical control, physical control, vegetative suppression, and proper livestock management where land is grazed. This "cumulative stress" method will keep the plants constantly under stress, reducing their ability to flourish and spread. Also, a cumulative stress approach provides a level of redundancy in case one type of treatment is not implemented or proves to be ineffective (Carpenter and Murray 1998).

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