Bromus diandrus Roth; ripgut brome
Bromus madritensis L. ssp. *rubens* (L.) Husnot; red brome
(= *B. rubens* L.)
Bromus tectorum L.; downy brome or cheatgrass

Ripgut, red, and downy brome (cheatgrass)

Family: Poaceae
Range: Ripgut brome and red brome occur in most of the western states, except Wyoming, South and North Dakota (and Colorado for red brome). Downy brome is the most widespread of the bromes and is found throughout the U.S., particularly in the western states.
Habitat: Open disturbed areas, roadsides, fields, rangelands, agronomic crops, orchards, forestry sites, and many natural communities. They are often in areas with dry sandy soils where there is less competition with other vegetation, including desert communities. They are also common in urban waste places and can grow in most soil types. Red brome is more sensitive to winter cold climates than downy brome. Downy brome can be found as an agricultural weed in irrigated and non-irrigated cool season crops such as alfalfa and cereals.
Origin: All species are native to Eurasia.
Impact: These bromes suppress other grasses in rangeland, can infest agricultural fields, and have sharp florets that can injure grazing animals. These bromes may serve as a minor source of livestock forage early in the season, but they suppress perennial grasses that would extend the grazing season. All are fire promoters. In particular, red brome and downy brome are common in fire-sensitive arid to semiarid communities such as coastal scrub, desert shrubland, pinyon pine-juniper communities, and three-needle pine woodlands. In these ecosystems, native woody species are poorly adapted to increased fire frequencies and often decline following infestation.
Western states listed as Noxious Weed: *B. tectorum*, Colorado
California Invasive Plant Council (Cal-IPC) Inventory: *B. diandrus*, Moderate Invasiveness; *B. madritensis* and *B. tectorum*, High Invasiveness

These are cool-season annual grasses with sharp florets and straight awns. Red brome and downy brome, in particular, have a shorter life cycle than most grasses. In all these grasses, the leaves and especially the leaf sheaths are typically covered with short, soft hairs. Mature stems of ripgut brome grow to 2.5 ft tall, with leaf blades 2 to 7 mm wide and open, loose, nodding panicles 2.4 to 10 inches long. The florets have very long awns (1.4 to 2.2 inches). Red brome is shorter, to 1.5 ft tall, with leaf blades 1 to 4 mm wide; it produces much more compact, dense panicles 1 to 3 inches long, typically dark red. Mature stems of downy brome grow up to 1.3 ft tall, with leaf blades 1 to 6 mm wide and open, loose panicles 2.5 to 9 inches long, usually drooping to one side.

These weedy bromes flower in spring. They become reddish to purplish as the inflorescences mature. Red brome turns an especially dark red. Soon after maturation, the florets disperse short distances with wind and rodent activity or to greater distances by clinging to the fur, feathers, and feet of animals and to the shoes and clothing of people. Most seeds germinate the following fall after the first significant rain. Seeds typically

survive in soil 2 to 3 years under field conditions, but some seeds may survive up to 5 years. Thatch accumulation or shallow burial favors establishment of germinating seeds.

NON-CHEMICAL CONTROL

Mechanical (pulling, cutting, disking)	Individual plants or small patches can be pulled by hand or hoed in early spring before seeds are ripe. Mowing is not usually recommended, but can reduce seed production if conducted shortly after flower initiation and before seeds mature. Plants cut earlier will regrow. Plants should be mowed to about 2 inches with the bolting stems removed. Repeated mowing (every 3 weeks) can eliminate seed production in areas where herbicide applications are unacceptable. Shallow cultivation shortly after the main flush of germination and again a little later can eliminate most seedlings. In agricultural fields, tilling soil with a method that deeply buries seeds in fall or early spring can help control bromes. In the Great Basin, tillage to establish summer fallows is a useful method of suppressing bromes and allowing establishment of perennial grasses.
Cultural	Overgrazing or frequent soil disturbance can increase dominance of bromes by reducing or eliminating more desirable forage species. Moderate grazing can be effective when used in combination with herbicides. Ripgut brome is susceptible to burning, if the burn is conducted before seeds mature. Burns should be conducted in late spring when most desirable vegetation is drying down but before ripgut brome heads shatter. Burning later, after seed dispersal, can increase ripgut brome densities. Red brome and downy brome mature earlier in the season, so burns usually result in an increase in these species. Burning can be effective as part of a 2 to 3 year integrated management program incorporating a spring burn, winter reseeding with native perennial grasses, and early spring application of herbicides.
Biological	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, *Pseudomonas fluorescens* 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.

CHEMICAL CONTROL

The following specific use information is based on published papers and reports by researchers and land managers. Other trade names may be available, and other compounds also are labeled for this weed. Directions for use may vary between brands; see label before use. Herbicides are listed by mode of action and then alphabetically. The order of herbicide listing is not reflective of the order of efficacy or preference.

GROWTH REGULATORS	
Growth regulator herbicides	Although they do not generally kill annual grasses, many of the growth regulator herbicides, particularly aminopyralid and picloram, have been shown to reduce seed production in downy brome. In addition, aminopyralid and aminocyclopyrachlor have been shown in some studies to provide good preemergence control of downy brome at higher rates.
LIPID SYNTHESIS INHIBITORS	
Clethodim *Select*, *Envoy*	**Rate:** 6 to 8 oz product (*Select*)/acre (1.5 to 2 oz a.i./acre) for seedlings; 0.25% to 0.5% of product v/v in spot treatment **Timing:** Postemergence. Best when applications are made before plants are 6 inches tall. It is less effective if applied after a mowing. **Remarks:** Clethodim is grass-selective and safe on broadleaf species. To select for perennial grasses, apply before perennials emerge. It has no soil activity. Use a crop oil surfactant. Registered for fallow and non-crop areas, not generally for rangeland/natural areas, but has specific-use supplemental labels. Note that *Envoy* formulation is 1 lb a.i./gallon, *Select* is 2 lb a.i./gallon.
Fluazifop *Fusilade*	**Rate:** 1 to 1.5 pt product/acre (4 to 6 oz a.i./acre) for established plants, 8 oz product/acre (2 oz a.i./acre) for seedlings; 0.5% product v/v in spot treatment **Timing:** Postemergence. Best when applications are made before the boot stage. **Remarks:** Fluazifop is grass-selective and safe on broadleaf species. To select for perennial grasses,

	apply before perennials emerge. It has no soil activity. Use a crop oil surfactant. Registered for fallow and non-crop areas, not generally for rangeland/natural areas, but has specific-use supplemental labels.
AROMATIC AMINO ACID INHIBITORS	
Glyphosate *Roundup*, *Accord XRT II*, and others	**Rate:** 0.33 to 1 qt product (*Roundup ProMax*)/acre (0.375 to 1.1 lb a.e./acre) **Timing:** Postemergence in early spring to rapidly growing, non-stressed plants after most seedlings have emerged. If possible, apply before desirable perennials emerge. **Remarks:** Glyphosate is a nonselective herbicide. It has no soil activity.
BRANCHED-CHAIN AMINO ACID INHIBITORS	
Imazapic *Plateau*	**Rate:** 4 to 12 oz product/acre (1 to 3 oz a.e./acre) **Timing:** Preemergence to very early postemergence (3 leaves maximum) from fall to early spring. **Remarks:** Imazapic has long soil residual activity and mixed selectivity. It tends to favor members of the Asteraceae and some grasses. Use a spray adjuvant for postemergence applications. Effects vary depending on soil texture and soil organic matter. Heavy soils and high organic matter may require higher rates. Imazapic also can tie up in litter, and its efficacy is reduced under situations where there is thick thatch on the soil surface. Not registered for use in California.
Imazapyr *Arsenal*, *Habitat*, *Chopper*, *Stalker*, *Polaris*	**Rate:** 2 to 3 pt product/acre (8 to 12 oz a.e./acre) **Timing:** Preemergence or postemergence. **Remarks:** Imazapyr has fairly long soil residual activity. It is a nonselective herbicide.
Propoxycarbazone-sodium *Canter R+P*	**Rate:** 1.2 oz product/acre (0.84 oz a.i./acre) **Timing:** Postemergence from the 2-leaf to 2-tiller stage when plants are growing rapidly. **Remarks:** Propoxycarbazone is a broad-spectrum herbicide that will control many species, including downy brome and ripgut brome. Perennial grass species vary in tolerance. A non-ionic surfactant should be added at 0.25 to 0.5% v/v solution.
Rimsulfuron *Matrix*	**Rate:** 2 to 4 oz product/acre (0.5 to 1 oz a.i./acre) **Timing:** Preemergence in fall to early postemergence in early spring. **Remarks:** Rimsulfuron controls several annual grasses and broadleaves. Perennial grasses are tolerant to fall applications when established and grown under dryland conditions. Application to rapidly growing or irrigated perennial grasses may result in injury or death of the crop. It provides soil residual control in cool climates but degrades rapidly under warm conditions. Rimsulfuron will not control summer annual weeds when applied in fall or spring. Add a surfactant when applying postemergence.
Sulfometuron *Oust* and others	**Rate:** 0.75 to 5 oz product/acre (0.56 to 3.75 oz a.i./acre) **Timing:** Preemergence or early postemergence from fall to early spring. Most effective control is with early postemergence treatment after brome seedlings have emerged. However, *Oust* will control large downy brome (e.g., 8 to 12 inches tall). **Remarks:** Sulfometuron has mixed selectivity and is fairly safe on native perennial grasses. It is good for revegetation use. Use lower rates in arid environments and higher rates in wetter areas (> 20 inches rainfall) and on high organic matter soils. Sulfometuron has fairly long soil residual activity. At higher rates, this treatment will generally result in bare ground.
Sulfometuron + chlorsulfuron *Landmark XP*	**Rate:** 0.75 oz product/acre **Timing:** Preemergence in fall or after soil thaws in spring. **Remarks:** See sulfometuron.
Sulfosulfuron *Outrider*	**Rate:** 0.75 to 2 oz product/acre (0.56 to 1.5 oz a.i./acre) **Timing:** Early postemergence, fall to early spring, when desirable perennials are dormant. **Remarks:** Sulfosulfuron has mixed selectivity, but is fairly safe on native perennial grasses, especially wheatgrasses. It has fairly long soil residual activity. Treatments should include a non-ionic surfactant.

PHOTOSYNTHETIC INHIBITORS	
Hexazinone *Velpar L*	**Rate:** 2 to 6 pt product/acre (0.5 to 1.5 lb a.i./acre) **Timing:** Preemergence to early postemergence. **Remarks:** Hexazinone has both foliar and soil activity. In soil applications, rates will vary with soil texture and soil organic matter. Best results result when applied to moist soils. Use rates will also vary depending on the weed species to be controlled. Hardwood trees near application site can absorb this chemical through the roots and may be injured or killed. Do not spray near the root zone of desirable hardwood trees or shrubs. High rates of hexazinone can create bare ground, so only use high rates in spot treatments.

RECOMMENDED CITATION: DiTomaso, J.M., G.B. Kyser et al. 2013. *Weed Control in Natural Areas in the Western United States*. Weed Research and Information Center, University of California. 544 pp.