Phalaris aquatica L.

Hardinggrass

Family: Poaceae
Range: Arizona, California, Montana, Oregon, Texas, and some southeastern states. It is generally more invasive in coastal regions.
Habitat: Riparian areas, ditch banks, fields. Tolerates frost and drought.
Origin: Native to Mediterranean Europe. Hardinggrass was introduced to Australia and the United States to extend the forage season on pastures and rangeland, but has escaped cultivation in many locations.
Impacts: Once established, robust clumps are competitive for water and space, displacing native species. Under drought conditions, hardinggrass may develop toxic levels of alkaloids.
California Invasive Plant Council (Cal-IPC) Inventory: Moderate Invasiveness

Hardinggrass is a coarse, tufted perennial grass growing to 5 ft tall, with dense, spike-like panicles. It, like other *Phalaris* species, has pinkish juice when stems are broken at the base. The leaves have delicate, membranous ligules and no auricles. The plant develops fibrous roots, usually deep. Tufts expand around the perimeter by short rhizomes but do not develop clonal patches of new plants from the rhizomes. Under suitable conditions, rhizome fragments can develop into a new plant.

Hardinggrass usually flowers from late spring to the end of summer, producing dense, cylindrical spikes like other canarygrass species. The spikes are 0.5 to 1 inch in diameter and up to 4.5 inches long. Spikes typically remain intact for a period after senescence, but most florets are shed at maturity. Most reproduction is by seeds, which typically fall near the parent plant. The seed soil life is short, generally less than 2 years.

NON-CHEMICAL CONTROL

Mechanical (pulling, cutting, disking)	Hand-pulling is practical only for small stands and requires a large time commitment. It can be effective if done over the entire population 2 to 3 times per year for 5 years. Close mowing late in the season, when plants are still green, can reduce the plants' vigor. Mowing can be used to remove excess biomass, thus enhancing the effectiveness of follow-up herbicide applications. Plants should be allowed to regrow before treating. Cultivation of hardinggrass is usually not effective, because the plant can regenerate both from seed and from pieces of rhizome. Cultivation may be used to control seedlings, and repeated cultivations may eventually exhaust established stands.
Cultural	Grazing by livestock or geese can be used, similar to mowing, to remove biomass and stimulate new growth that can be treated with an herbicide. Grazing alone will not eradicate hardinggrass, but intensive grazing may help to suppress it. Burning in early spring, when there are large numbers of new shoots, can suppress this species. Burning alone is not an effective control but may facilitate later herbicide application. Plants can be burned first, then the regrowth treated with herbicide. In denser stands, plants can be treated with herbicide first so that their dead foliage provides fuel for a following burn.
Biological	No effective biocontrol agents are known for hardinggrass.

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.

LIPID SYNTHESIS INHIBITORS	
Clethodim *Select*, *Envoy*	**Rate:** 16 oz product (*Select*)/acre (4 oz a.i./acre) for seedlings; 0.5% of product v/v in spot treatment. **Timing:** Postemergence; best before 6 inches tall. Less effective if applied after a mowing. **Remarks:** Clethodim is grass-selective and is safe on broadleaf species. To select in favor of other perennial grasses, apply before they emerge. It has no soil activity. Use a crop oil surfactant. The first treatment may provide only suppression of established plants; retreat as needed. Registered for fallow and non-crop areas, not generally for rangeland/natural areas, but has specific-use supplemental labels. Rates are based on high-end rates reported for annual canarygrass. Note *Envoy* 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); 0.5% product v/v in spot treatment. **Timing:** Postemergence to rapidly growing plants. Best before boot stage. **Remarks:** Fluazifop is grass-selective and is safe on broadleaf species. It has no soil activity. To select in favor of other perennial grasses, apply before they emerge. Use a crop oil surfactant. The first treatment may provide only suppression of established plants; retreat as needed. Registered for fallow and non-crop areas, not for rangeland/natural areas. Rates are based on those reported for reed canarygrass and other perennial grasses.
AROMATIC AMINO ACID INHIBITORS	
Glyphosate *Roundup*, *Rodeo*, *Aquamaster*, and others	**Rate:** 2 to 3 qt product (*Roundup ProMax*)/acre (2.25 to 3.375 lb a.e./acre); 2% to 5% product v/v in water for spot treatment; 33% to 50% product v/v in water for wiper applications. **Timing:** For selective use, apply in early spring when hardinggrass is just sprouting and before other species germinate. More generally, application to rapidly growing flowering plants provides the best control. **Remarks:** Glyphosate is a nonselective herbicide. It has no soil activity. In addition to foliar sprays it can be applied using a rope wiper. Its effectiveness is increased by addition of ammonium sulfate. Also effective following removal of dead residue by burning, mowing, or grazing. Some formulations, e.g. *Rodeo* and *Aquamaster*, are registered for use in or near water. Rates are based on those reported for reed canarygrass.
Glyphosate + imazapyr *Rodeo* + *Habitat*	**Rate:** 1 qt *Rodeo* + 1 pt *Habitat*/acre **Timing:** Apply in spring to young growth. **Remarks:** Other formulations of each chemical are available; these brands are both registered for aquatic use. Rates are based on those reported for reed canarygrass.
BRANCHED-CHAIN AMINO ACID INHIBITORS	
Imazapic *Plateau*	**Rate:** 8 to 12 oz product/acre (2 to 3 oz a.e./acre) **Timing:** Preemergence in fall. **Remarks:** Imazapic has mixed selectivity and tends to favor members of the Asteraceae, as well as some grasses. It is safe for most native grasses, but higher rates may suppress seed of some cool-season grasses. Use methylated seed oil surfactant. Imazapic has some residual activity. Rates are based on those reported for reed canarygrass. Not registered for use in California.
Imazapyr *Arsenal*, *Habitat*, *Chopper*, *Stalker*, *Polaris*	**Rate:** 1.5 to 4 pt product/acre (6 to 16 oz a.e./acre) broadcast, or spot treatment with 1% product v/v in water. **Timing:** Apply to rapidly growing plants. Use higher rates for larger plants or late-season applications. **Remarks:** Imazapyr has a fairly long soil residual and is nonselective, so may kill desirable competitors. *Habitat* is registered for aquatic use. Rates are based on those reported for reed canarygrass.
Sulfometuron *Oust* and others	**Rate:** 1.33 to 2 oz product/acre (1 to 1.5 oz a.i./acre) for areas receiving 20 inches or less annual precipitation; 3 to 5 oz product/acre (2.25 to 3.75 oz a.i./acre) for areas receiving more than 20 inches precipitation. **Timing:** Preemergence or early postemergence, or apply to soil before the beginning of seasonal growth. **Remarks:** Sulfometuron has mixed selectivity. Do not apply to frozen ground. Add non-ionic surfactant for postemergence applications. It has fairly long soil residual activity.

PHOTOSYNTHETIC INHIBITORS	
Hexazinone *Velpar L*	**Rate:** 1.5 to 3 gal product/acre (3 to 6 lb a.i./acre) **Timing:** Spot apply before hardinggrass begins seasonal growth. **Remarks:** Results of efficacy on hardinggrass are from a trial conducted in New Zealand. 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.