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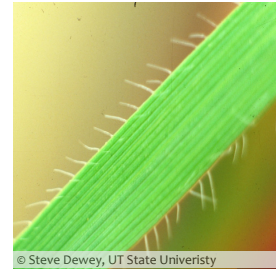
tains 1 to 3 viable seeds which develop quickly after pollination. Seeds germinate in fall and throughout cool months. Seeds remain viable for up to nine years. Often, spikelets will still be attached to the roots when plants are seedlings. In the seedling stage, Jointed goatgrass looks similar to winter wheat. The hairs on the jointed goatgrass will be the key diagnostic feature; winter wheat does not have these hairs.

Jointed goatgrass looks very similar to winter wheat in the younger stages of growth and hybridizes with winter wheat. The presence of the hairs on the leaf margin, sheath, ligules and auricles is key to identifying it apart from winter wheat. Mature hybrid spikelets closely resemble the zigzag structure of jointed goatgrass. A 2000 study found that hybrids do have a limited ability to produce viable seeds that can germinate and produce plants (Synder et al. 2006). The seeds of both species are also similar in terms of size and weight and so its assumed that hybrid seeds would be similar. It has a longer flowering season than winter wheat.

Jointed goatgrass is native to the temperate regions of central Asia, Russia and the Mediterranean. Long growing seasons, precipitation and cool weather favor jointed goatgrass. It invades a wide variety of sites, including grasslands, wheat fields, fence rows, waste places, roadsides, alfalfa fields, and pastures. Winter wheat fields infested with jointed goatgrass cause long-term economic loss

and wheat certification issues for the agricultural industry for years.

Jointed goatgrass is designated as a "List B" species on the Colorado Noxious Weed Act. It is required to be eradicated; some populations may be contained or suppressed depending on state regulations. For state regulations described for each county, refer to the most recent Rule, or visit www.colorado.gov/ag/co-weedcontacts for details.



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Jointed goatgrass (left), hybrid (middle), winter wheat (right)

Key ID Points

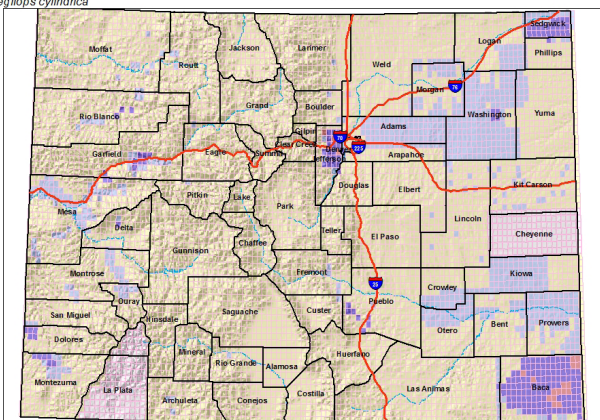
1. Stiff short hairs evenly spaced on the margins of leaf blades.
2. Evenly spaced hairs are on auricles, leaf sheath and ligules.
3. Spikelets fit in a zig-zag pattern in a cylindrical shape.

2015 Quarter Quad Survey

Jointed Goatgrass *Aegilops cylindrica*

2015 Quarterquad Field Survey Data
Distribution in Colorado

Approximately 9,785 Infested Acres



Jointed goatgrass *Aegilops cylindrica* Host

Integrated Weed Management Recommendations

Jointed goatgrass *Aegilops cylindrica* Host

Effective integrated management means using a variety of eradication methods that also includes restoration, prevention of seed production and dispersal, and monitoring. Maintain robust healthy native landscapes and restore degraded sites. Avoid soil disturbance. As with most annuals, prevent seed production. Prevent seed from dispersing, such as on contaminated equipment. Rest sites until they are effectively restored. Control jointed goatgrass before March for the most effective results. Implementation and choice of method must consider the plant's life cycle.



CULTURAL CONTROL METHODS

Rotate crops for three seasons or longer before winter wheat is recultivated. Alternate crop selection is important: winter wheat/sunflower/fallow and winter wheat/corn/fallow decrease jointed goatgrass seed density. Early spring crops may not be effective as rotation crops. Band nitrogen fertilizer with desired species' seeds and irrigate; avoid broad nitrogen fertilizer applications. Select cultivars that result in early fall or spring growth, taller plants, and high till capacity to outcompete jointed goatgrass. Increase seed rates and reduce row space of crops and seeded sites. Isolate and harvest jointed goatgrass patches separately from other crops.



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BIOLOGICAL CONTROL METHODS

The long awns and hard seeds make jointed goatgrass unpalatable to domestic livestock and can cause injury and may even be fatal. Grazing before flower production is believed to stimulate growth and plant density; properly timed grazing may increase the vigor of desired plants. Avoid high intensity-short duration and heavy grazing. There are no known biological control agents effective against jointed goatgrass authorized in Colorado. For more information about biological control agents, visit the Colorado Department of Agriculture's Palisade Insectary website at www.colorado.gov/ag/biocontrol.



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MECHANICAL CONTROL METHODS

Mowing and weed whacking should be done before flower production; these methods can induce more tiller and flower production and disperse seeds. Ensure that all methods do not cause spikelets to shatter and disperse seeds. Tilling may bring buried seeds back to the soil surface and could increase germination. Till "in the fall when primary dormancy is lost, but before secondary dormancy is imposed" (Fandrich and Mallory-Smith 2006). Mechanical methods have limited success. Prescribed fire can kill seeds if there is enough vegetation (> 7,000 lbs/acre) on the soil surface to carry fire and increase heat generated. Consecutive fire applications will be needed.

CHEMICAL CONTROL METHODS

NOTE: The following are recommendations for herbicides that can be applied to pastures and rangeland. Rates are approximate and based on equipment with an output of 30 gal/acre. Follow the label for exact rates. Always read, understand, and follow the label directions. The herbicide label is the LAW!

HERBICIDE	RATE	APPLICATION TIMING
Glyphosate* (Roundup, and others)	16 oz./acre + 0.25% v/v non-ionic surfactant	Apply before first spikelets begin to emerge from the boot; usually weeds are < 6" in height. (Late winter to early spring). *These herbicide products are non-selective and will kill any vegetation contacted.
Imazapic + Glyphosate* (Journey)	6 oz./acre + 0.25% v/v non-ionic surfactant	Apply before first spikelets begin to emerge from the boot; usually weeds are < 6" in height. (Late winter to early spring). Note: *These herbicide products are non-selective and will kill any vegetation contacted.
Imazapic (Plateau, Panoramic)	6 oz./acre + 1% v/v methylated seed oil	Apply pre-emergence in late summer or fall, or early postemergence in late winter before tiller.
Aminocyclopyrachlor plus chlorsulfuron (Perspective)*	4.75-8 oz. product/acre + 0.25% v/v non-ionic surfactant	Apply from the seedling to the bolting stage. IMPORTANT: Applications greater than 5.5 oz. product/acre exceeds the threshold for selectivity. DO NOT treat in the root zone of desirable trees and shrubs. Not for use on grazed or feed forage. *Product not permitted for use in the San Luis Valley.



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