



Jointed Goatgrass Introduction

Jointed goatgrass plagues U.S. winter wheat production by severely reducing yields and increasing dockage in marketed grain. One may be excused for stumbling a bit when pronouncing *Aegilops cylindrica* (Age-uh-lops sa-lin-dri-ca), the scientific name for jointed goatgrass. However, the impact this weed has on winter wheat producers goes far beyond issues of enunciation. Jointed goatgrass costs wheat producers big dollars.

Domestic and export customers of U.S. wheat are currently demanding low dockage grain. Grain high in dockage is difficult to sell, expensive to transport, and requires additional cleaning. Failure by the United States to export clean wheat only makes it easier for foreign competitors to increase their own market share in the world wheat market.

Dense infestations of jointed goatgrass in production fields have forced growers to abandon standard rotations and switch to spring crops having lower profit potential (and greater production risk) than winter wheat. Jointed goatgrass seeds can persist in the soil for many years. The use of a 3- or 4-year crop rotation with winter wheat may be necessary to reduce soil seedbank populations to more acceptable levels. Broadleaf or warm-season grass crops can allow tillage before spring planting and the use of various selective herbicides for jointed goatgrass control.

Minimizing economic losses from jointed goatgrass requires an integrated approach by producers. They must implement management strategies for growing winter wheat while maintaining profitable crop rotations. In addition, growers must integrate alternate crops into their normal rotation when jointed goatgrass infestations are severe. The introduction of Clearfield®

wheat provides another management tool to control jointed goatgrass.

Following a decade of research, scientists involved in the National Jointed Goatgrass Research Program have prepared a series of management bulletins for winter wheat producers. These publications offer the latest information on the biology and control of jointed goatgrass from scientists across the United States. They also will be available on the National Jointed Goatgrass Research Program website at www.jointedgoatgrass.org.

Control

Historically, jointed goatgrass has been difficult to control in winter wheat. Winter wheat and jointed goatgrass are genetically similar and



Jointed goatgrass infesting winter wheat.

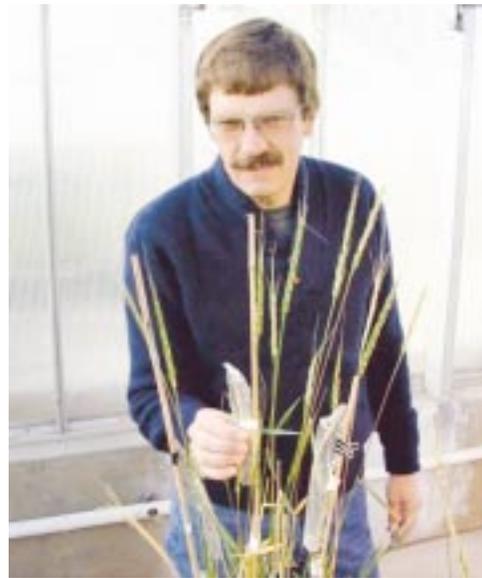
have parallel growth habits. These similarities make selective control of jointed goatgrass in winter wheat fields very difficult.

- **Similar Genetics.** Jointed goatgrass has two genomes (complements of genetic information), referred to as C and D, and four sets of chromosomes. Wheat has three genomes—A, B, and D—and six sets of chromosomes. The D genomes in wheat and jointed goatgrass are similar, thereby allowing some outcrossing. When wheat and jointed goatgrass cross pollinate, the D genomes complement each other and a hybrid is created. This genetic similarity likewise hinders the development of selective herbicides for control of jointed goatgrass in wheat.
- **Similar Growth Habits.** Jointed goatgrass will germinate over a long period of time in fields of seedling winter wheat: from late summer to early spring. Jointed goatgrass and winter wheat possess similar temperature optimums, photosynthetic maximums, and growth rates. Wheat generally outcompetes jointed goatgrass under optimum growing conditions, but the reverse is true when soil moisture is low or temperatures are high.

Jointed goatgrass and winter wheat are winter annuals that must overwinter (vernalize) in order to flower. Seed containing sufficient water for germination (imbibed seed) or juvenile plants can vernalize successfully. Flowering in wheat and jointed goatgrass



Jointed goatgrass leaf and collar on the left, wheat on right.



Dr. Robert Zemetra, University of Idaho plant geneticist, is researching wheat–jointed goatgrass hybrids for herbicide resistance transfer.

begins at about the same time in May and June, followed by seed formation in early summer. Production of wheat–jointed goatgrass hybrids can occur during this time.

- **Limited Herbicide Options.** Herbicides are not currently available to selectively control jointed goatgrass in winter wheat because the plants have similar genetics and growth habits. The recent introduction of the Clearfield® Wheat Production System (imidazolinone tolerant wheat plus imazamox herbicide combination) will provide wheat producers a means to selectively control jointed goatgrass and other winter annual grasses in winter wheat. However, some weed scientists are concerned about the potential for resistance transfer from Clearfield® wheat to jointed goatgrass in the field. Although resistant hybrids have not been discovered in production fields, herbicide tolerant jointed goatgrass has developed in greenhouse experiments after selection with imazamox. Short crop rotations and the lack of other selective herbicides may further increase the risk of resistance transfer.

Nonselective herbicides such as glyphosate and paraquat can be used to control jointed goatgrass in fallow. These herbicides cannot be used in conventional wheat.

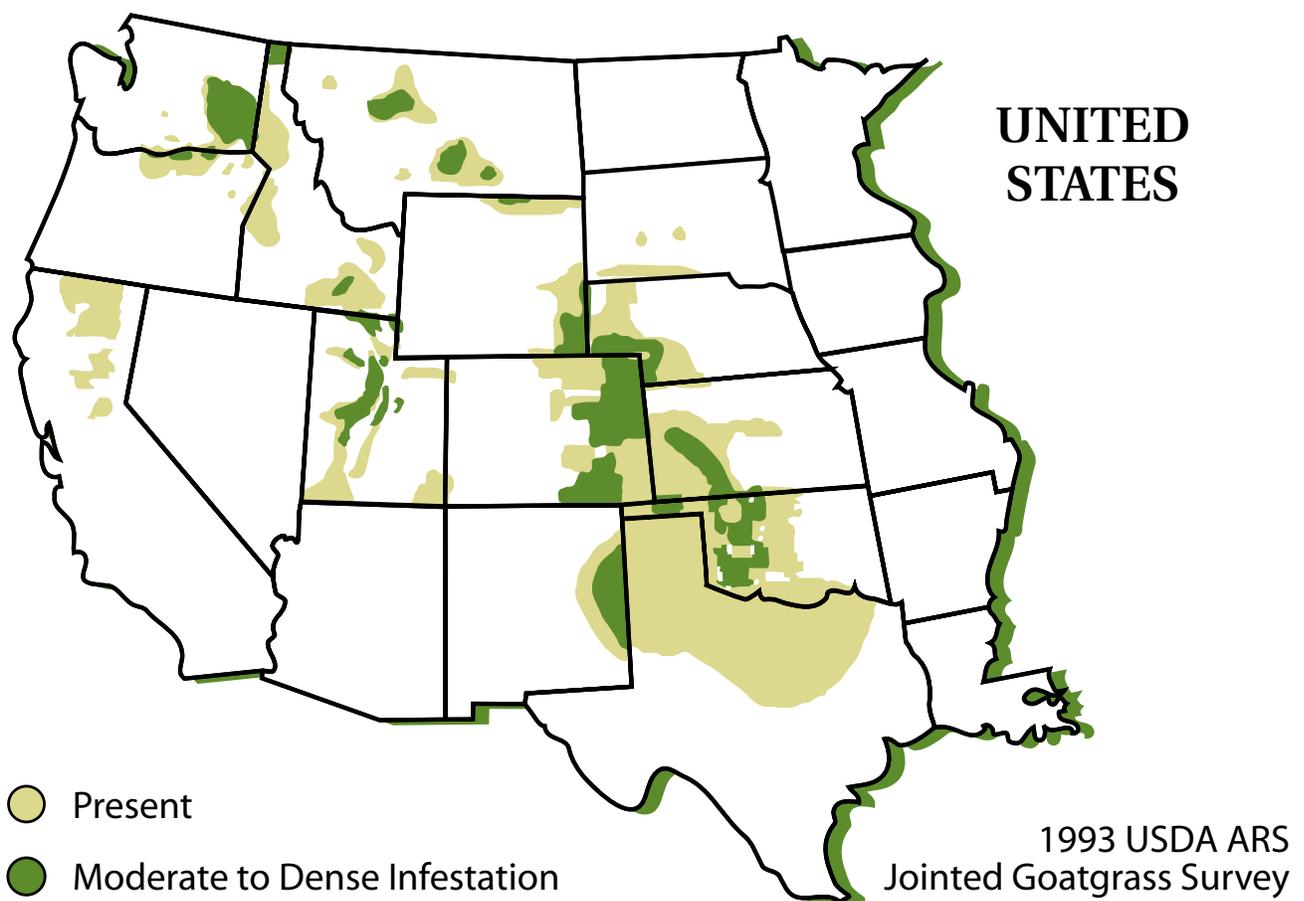
Distribution

Weed scientists estimate jointed goatgrass infests almost five million acres across 14 western and midwestern states. Infestations occur from the southern Great Plains in Texas and Oklahoma through the central Great Plains wheat regions of western Kansas, western Nebraska, eastern Colorado and eastern Wyoming. The northern Great Plains of South Dakota and eastern Montana also contend with this troublesome weed, as do wheat producers in the intermountain regions of Utah

and southern Idaho and the Pacific Northwest (northern Idaho, eastern Oregon and Washington, and northern California).

With the exception of Texas and Kansas, jointed goatgrass infestations appear to be increasing in all of the above-mentioned states. Contributing factors may include lack of crop rotation, short crop rotations, use of semi-dwarf wheat cultivars, improper fertilizer placement, and reduced-tillage farming practices. The movement of custom harvesters from the southern Great Plains through the central Great Plains also has increased the distribution of jointed goatgrass.

Kansas winter wheat producers have battled jointed goatgrass by extending their wheat-fallow rotations to include grain sorghum and sunflower. Jointed goatgrass infests Texas road-



sides and field borders. However, the weed is not competitive in that area since growers plant winter wheat only once every 4 or 5 years.

Spread & Invasiveness

Jointed goatgrass seeds are enclosed in spikelets (often called joints) that spread in the following ways to create new infestations:

1. Planting contaminated seed distributes jointed goatgrass across entire fields.
2. Combines and other harvesting equipment spread spikelets from field to field. They often travel long distances, transporting spikelets from one farm to another.
3. Trucks hauling contaminated grain without tarp covers can shower spikelets along roadsides and ditches, causing new infestations to occur in adjacent fields.
4. Livestock and wildlife consuming jointed goatgrass spikelets can spread weed seeds throughout pastures, fields, and rangeland.
5. Goatgrass spikelets float in water and can be washed to new locations by heavy rains and snowmelt.

Most jointed goatgrass seeds survive in the soil for 3 to 5 years. Diligent weed management over a number of years is required to reduce even moderate infestations to acceptable levels. Once fields are infested with jointed goatgrass, they may never become entirely free of this persistent grass weed.

National Jointed Goatgrass Program History & Objectives

The National Jointed Goatgrass Research Program was established in 1994 through a special grant from the Cooperative State Research, Education, and Extension Service (CSREES)

through the United States Department of Agriculture. This program is an integrated multi-disciplinary effort involving 11 states and more than 35 state and federal scientists. The primary goal of the program is to ensure producers have the best and most recent information possible to help them successfully manage jointed goatgrass in winter wheat.

The national program receives guidance and support from state wheat commissions and associations across the western and midwestern United States. Wheat commission members and administrators, along with state and federal scientists, comprise the 14-member National Jointed Goatgrass Research Program Steering Committee. This committee establishes priorities, controls the allocation of funds, and ensures coordination of all projects. It awards research grants each year through a national, merit-based competition.

Participating states

Colorado	Oregon
Idaho	Texas
Kansas	Utah
Montana	Washington
Nebraska	Wyoming
Oklahoma	

Current research topics:

- **Integrated management**
- **Herbicide-resistant wheat management**
- **Herbicide resistance**
- **Gene flow**
- **Best management practices**
- **Competitive cultivars**
- **Postharvest tillage**
- **Tillage systems**
- **Crop rotations**

Jointed Goatgrass Management Bulletins

Scientists participating in this national program are developing jointed goatgrass management bulletins that will conclude nearly a decade of



jointed goatgrass research. These bulletins will be concise summaries that provide wheat producers with the most current information on jointed goatgrass management. Bulletin topics include:

- Jointed Goatgrass Ecology
- Jointed Goatgrass Genetics and Origins
- Ecology and Biology of Jointed Goatgrass
- Jointed Goatgrass Control Practices
- Herbicide Resistance Management
- Integrated Management of Jointed Goatgrass in the Southern Great Plains
- Integrated Management of Jointed Goatgrass in the Central Great Plains
- Integrated Management of Jointed Goatgrass in the Intermountain Region
- Integrated Management of Jointed Goatgrass in the Pacific Northwest

Printed copies of jointed goatgrass management bulletins will be available from many state and county cooperative extension offices, directly from state extension publication offices, and can be downloaded from the National Jointed Goatgrass Research Program Web site at www.jointedgoatgrass.org.

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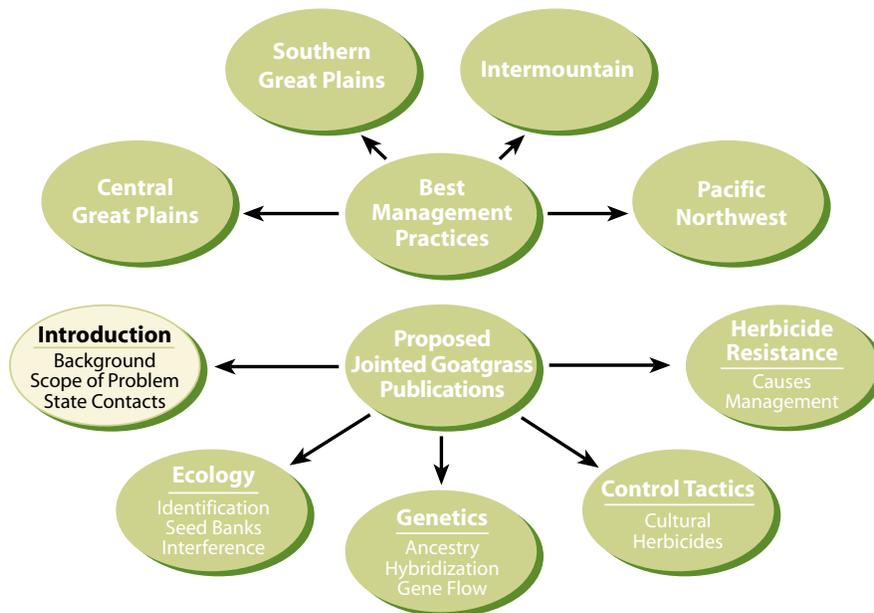
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- 2—Idaho—University of Idaho, Moscow & Twin Falls
- 3—Kansas—Kansas State University, Hays & Manhattan
- 4—Montana—Montana State University, Bozeman
- 5—Nebraska—University of Nebraska, North Platte & Scottsbluff
- 6—Oklahoma—Oklahoma State University, Stillwater
- 7—Oregon—Oregon State University, Corvallis & Pendleton
- 8—Texas—Texas A&M University, Vernon
- 9—Utah—Utah State University, Logan
- 10—Washington—Washington State University, Pullman
- 11—Wyoming—University of Wyoming, Laramie

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Use pesticides with care. Apply them only to plants, animals, or sites listed on the label. When mixing and applying pesticides, follow all label precautions to protect yourself and others around you. It is a violation of the law to disregard label directions. If pesticides are spilled on skin or clothing, remove clothing and wash skin thoroughly. Store pesticides in their original containers and keep them out of the reach of children, pets, and livestock.

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