

# Wirestem Muhly Management in Agronomic Crops

- Wirestem muhly is a warm-season perennial grass species with the potential to cause problems in conservation tillage production systems.
- Manage wirestem muhly using an integrated approach that includes preventive, cultural, mechanical, and chemical control tactics.

## Prevention

- Prevent wirestem muhly spread by controlling isolated patches in and around fields, and by cleaning rhizomes and seedheads from tillage and harvesting equipment before leaving infested fields.

## Cultural Control

- Encourage aggressive crop growth through good cultural practices such as maintaining adequate soil fertility, choosing appropriate high-yielding crop varieties, and regularly scouting for and managing pests.
- Include in the rotation crops that allow timely application of effective herbicides or mechanical control options.

## Mechanical Control

- Mowing, plowing, and disking are some commonly used mechanical control methods in agronomic crops.
- Vigorous spring tillage in combination with a subsequent, effective herbicide treatment provides good control of wirestem muhly.

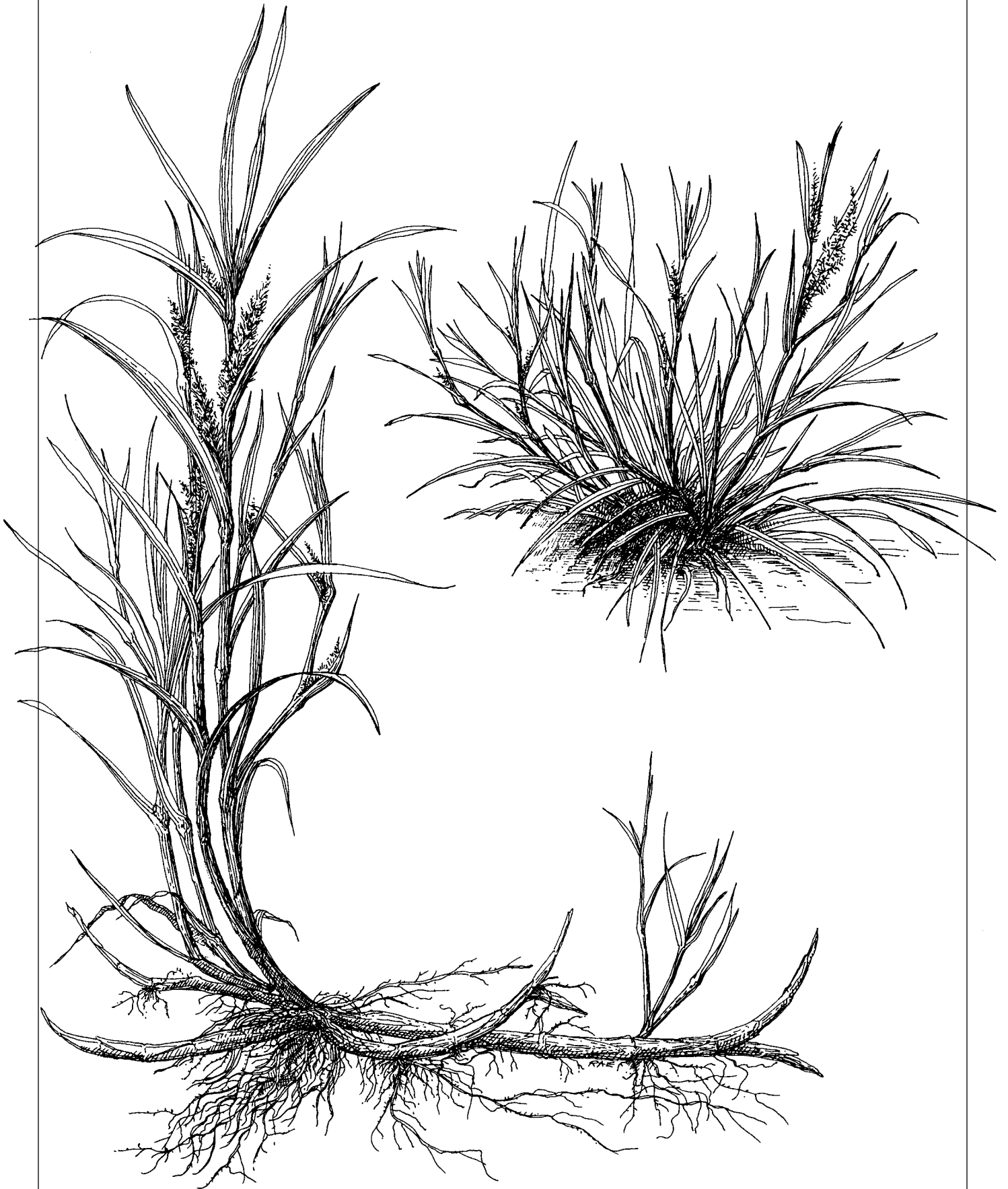
## Chemical Control

- Herbicides are important for wirestem muhly management, but use them in combination with other control methods.
- Several postemergence (foliar-applied) herbicides provide good control of wirestem muhly in crops. Herbicide application timing is critical for good control. For best results, apply herbicides to wirestem muhly during the summer months.
- Timely glyphosate application(s) in Roundup Ready crops or during a fallow period can provide effective control of wirestem muhly.
- “Burndown” treatments are rarely effective, since wirestem muhly generally begins its growth in late spring and delaying crop planting for a timely herbicide application may not be practical.

Wirestem muhly (*Muhlenbergia frondosa*) is a perennial grass species that can be problematic in conservation tillage production systems throughout Pennsylvania and the Northeast. It is a particular problem in no-till corn and soybean production, but it can also be troublesome in orchards, in nursery and vegetable crops, on roadsides and streambanks, and in other areas with rich, moist soils. It is native to America and can be found in many areas of the midwestern United States from South Dakota to Missouri and eastward to Virginia and Maine.

Wirestem muhly is a warm-season grass that begins growth in late spring and goes dormant in early fall. Plants have a bushy appearance and can grow 1 to 2 feet tall. The stems of wirestem muhly are branched and stiff, giving the plant a wiry appearance. Its leaf blades are pale green and short, and 2 to 4 inches long. Wirestem muhly produces many seedheads, or panicles, throughout the plant. Its terminal panicles are 3 to 4 inches long and less than 1/2 inch wide; its secondary panicles are 1 to 2 inches long and are found at the prominent stem nodes.

Wirestem muhly



Wirestem muhly produces abundant viable seed, which can mature from August to October, and has an extensive underground root system of short, thick, scaly rhizomes. Both rhizomes and seed are capable of spreading and initiating new infestations of this weed. If left unchecked, wirestem muhly populations within a field can become very dense, aggressive, and capable of significantly reducing crop yield. Programs can be limited for managing wirestem muhly in agronomic crops produced under reduced tillage regimes, so combinations of preventive, cultural, mechanical, and chemical methods should be used when possible for more effective management.

#### PREVENTION

Since wirestem muhly is native to North America, it is commonly found along field edges and in other noncropland areas. Because the plant is so widespread, there is ample opportunity for dissemination into agricultural lands. Generally, it is less expensive and time consuming to keep wirestem muhly out of a field than to control it once established.

To prevent an infestation, plant only certified weed-free crop seed. Control wirestem muhly in fencerows, ditchbanks, and other noncrop areas to reduce sources of weed seed. To avoid spreading rhizomes, thoroughly clean tillage equipment after working infested fields and, if possible, harvest infested fields last to prevent spread to uninfested fields. Also, to reduce spreading, spot treat with an effective herbicide or mow isolated patches of wirestem muhly before they produce seed.

#### GENERAL CULTURAL CONTROL

The following cultural practices help crops compete with weeds:

- Follow soil-test recommendations for fertilizer and lime.
- Plant high-yielding varieties adapted to your climate, soil, and field conditions.
- Plant the crop using narrow row spacings and high plant populations, when possible.
- Follow practical integrated pest management programs that monitor weeds, insects, and diseases, and use appropriate control tactics when necessary.
- Include in the rotation crops like alfalfa or small grains that provide early competition.
- Rotate to crops that allow timely application of effective herbicides or mechanical control options such as tillage or mowing.

#### MECHANICAL CONTROL

Mowing, plowing, and disking are some of the more commonly used mechanical methods for field crop weed control. Mowing or midsummer harvest can prevent weed seed production in small grains, alfalfa, pastures, and noncrop areas, but they are not suitable for corn and soybean fields. Vigorous primary (moldboard plow, chisel plow, or heavy disk) and secondary tillage when wirestem muhly growth begins in spring helps to reduce severity.

Once the plant is established, however, tillage alone may not provide adequate control. In particular, chisel plowing and other types of less intensive tillage do not sufficiently control or suppress wirestem muhly, and without adequate follow-up, may even increase the infestation's severity. In Penn State research, spring tillage in combination with a subsequent Accent (nicosulfuron) application provided better control of wirestem muhly than tillage or herbicide alone (Table 1). In no-till systems, crop rotation and timely herbicide application are critical for managing wirestem muhly. Frequent mowing, such as during alfalfa hay production, keeps wirestem muhly in check, prevents seed production, and may eventually eliminate the infestation.

**Table 1. Effect of preplant tillage with and without subsequent Accent (nicosulfuron) application.<sup>a</sup>**

Tillage	Without Accent (% control)	With Accent (% control)
Chisel	48	94
Heavy disk	60	92
Moldboard <sup>d</sup>	57	96

<sup>a</sup>Ratings taken at the end of the growing season of the same year treatments occurred (D. D. Lingenfelter and W. S. Curran, "Effect of preplant tillage and nicosulfuron on wirestem muhly control in corn." 1997. Proc. NEWS 51:15).

#### CHEMICAL CONTROL

Herbicides, when combined with mechanical, cultural, and/or preventive methods, are an integral part of a wirestem muhly control program. To ensure effective, safe, and economical herbicide use, always:

- Select the appropriate herbicide for your weed problem and crop. Stage of weed and crop growth, temperature, soil moisture, and soil pH can affect herbicide performance. For additional information, refer to the current edition of *The Agronomy Guide* or consult your county extension agent or other agricultural professional.
- Read the herbicide label carefully and follow the directions. The label provides important information on safe use, application, disposal, and storage.
- Apply herbicides at the proper time.
- Apply the recommended rate to avoid crop injury, soil residues, or poor control.
- Calibrate application equipment several times during the season to ensure that the correct amount of herbicide is applied.
- Wear proper protective clothing when working with pesticides.
- Learn to predict weed problems. Scout fields regularly and record the types and locations of weeds present. Use field records to plan an integrated control program.

## Control in Corn and Soybean

Several herbicides suppress or control wirestem muhly in agronomic crops, but only those providing more consistent control are discussed in the following sections. Generally, soil-applied herbicides are not effective for controlling perennial weeds such as wirestem muhly. The only soil-applied or preemergence herbicides that can provide suppression of established wirestem muhly in corn is a mixture of atrazine and simazine (e.g., Princep) applied at rates that limit crop rotation options. There are no preemergence soybean herbicides that control this weed once it is established.

Foliar-applied or postemergence herbicides that provide suppression or control in corn include Accent and other nicosulfuron-containing products, Roundup/glyphosate (in this publication, glyphosate refers to all glyphosate-like products), and Liberty (glufosinate). Other products such as Basis Gold, Beacon, Lightning, and Pursuit do not provide consistent wirestem muhly control. In soybean, Fusilade DX, glyphosate, Fusion, and Select can provide adequate control. Assure II, Poast, Pursuit, and Raptor, in most cases, are not reliable control options for wirestem muhly.

In Penn State research, wirestem muhly control was affected by the type of adjuvant in the spray mixture. Methylated vegetable oil-based adjuvants enhanced the performance of Accent herbicide in controlling wirestem muhly better than nonionic surfactant, crop oil concentrate, organosilicone, and various combinations with nitrogen fertilizers. However, despite better initial control of wirestem muhly with this spray mixture, long-term control was not achieved. Additional management options will need to be used to supplement this control method, so consider overall costs when determining herbicide programs.

Unlike perennial cool-season grasses such as quackgrass or orchardgrass, wirestem muhly is a warm-season species and begins its growth in late spring or early summer. Therefore, preplant, “burndown” applications of glyphosate are rarely effective for managing wirestem muhly in full-season crops such as corn and full-season soybean. Delaying crop planting (especially corn) until after mid-June, for the purpose of a timely glyphosate application, is generally not practical in Pennsylvania or the Northeast. However, certain cropping systems that allow later planting dates (e.g., double crop soybean) are better for a timely herbicide application.

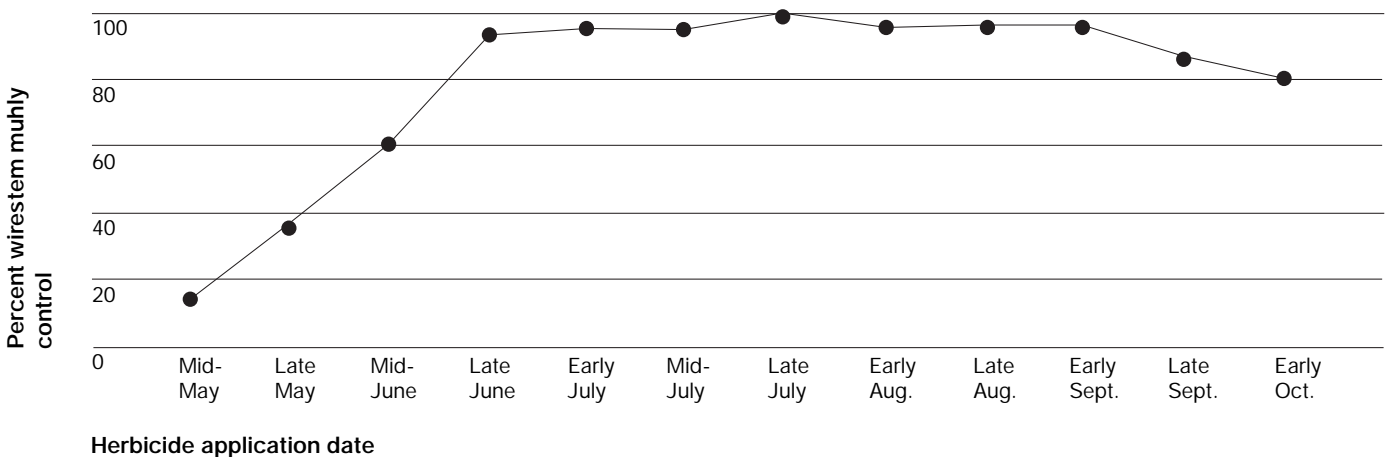
In Penn State research, glyphosate has provided excellent long-term control of wirestem muhly when applied during the summer months (i.e., late June through September) (Figure 1). With the introduction of herbicide-resistant crops, timely postemergence herbicide applications are more feasible. Roundup Ready soybean and corn allow over-the-top applications of glyphosate for more effective management of wirestem muhly as well as other weed species. A timely application of glyphosate to wirestem muhly during a summer fallow period, such as following wheat harvest, can also provide good control.

Below are some general options to consider for managing wirestem muhly in corn and soybean:

- **Spring tillage.**

When possible, use vigorous primary and secondary tillage, followed by a timely postemergence herbicide application. Spring tillage enhances control and may be more feasible in a soybean crop. Tillage disrupts and fragments the root system, allowing for better control of the smaller root segments by the systemic herbicide.

Figure 1. Effect of glyphosate application timing on wirestem muhly control the year following application.



Taken from “Effect of glyphosate application timing on the control of wirestem muhly.” D. D. Lingenfelter and W. S. Curran, 1997. WSSA Abstracts 37:27.

- **Delay crop planting.**

Since wirestem muhly emerges in late spring, delay crop planting so timely herbicide applications are possible. This may be most feasible for crops such as double-crop soybean, late planted sweet corn, or other vegetable crops.

- **Use Roundup Ready crop varieties.**

Apply glyphosate postemergence during mid-June through July on *Roundup Ready crop varieties only*.

- **Timely herbicide application.**

Apply effective herbicides (see Table 2) when wirestem muhly reaches a height of approximately 8 to 10 inches tall. Sequential applications of herbicides can improve control.

#### Control in Alfalfa and Small Grains

Planting alfalfa and small grains in rotation with a summer annual crop such as corn or soybean can provide an opportunity to control wirestem muhly with a timely application of glyphosate. Apply glyphosate when wirestem muhly is actively growing and before planting fall-seeded alfalfa, or after harvesting small grains such as wheat, barley, or spring oats.

Wirestem muhly is less of a problem in hay crops because of frequent cutting, but competition in new spring seedings can reduce the forage stand. Poast, Poast Plus, and Select are the only post-grass herbicides labeled for use in pure-stand alfalfa. Select is better than Poast for controlling wirestem muhly.

#### Spot Treatments, Harvest Aid Applications, and Nonselective Control

Glyphosate can be used to control emerged wirestem muhly before planting or for wirestem muhly control in noncropland areas. In *non-Roundup Ready* crops, glyphosate can be used to *spot-treat* infestations to prevent further spread of wirestem muhly. In addition, glyphosate is labeled for use as a *harvest aid* in all varieties of soybean, corn, and wheat. Refer to the current glyphosate product label for specific information and restrictions.

In summary, wirestem muhly can be managed effectively with a combination of control tactics. The management program should include some of the following: timely application of effective herbicide(s) in either normal or Roundup Ready crops or during a fallow period such as before or after a small grain rotation; tillage when possible, in combination with a later herbicide application; and preventive techniques such as spot treatments and cleaning of equipment to keep wirestem muhly from spreading or infesting new areas. Always include sound agronomic practices to provide a good foundation for crop growth and competition.

**Table 2. Herbicides for wirestem muhly control in agronomic crops.**

Herbicide	Crop	Product/A	Control Rating <sup>a</sup>	Comments
<b>Preemergence</b>				
Atrazine 4L/90DF + Princep 90DF (atrazine + simazine)	Corn	1.5 qt 4L or 1.7 lb 90DF + 1.7 lb 90DF	7-8	Apply in early spring before wirestem muhly emerges. Additional herbicide treatments (simazine) may be necessary. Atrazine is a component of several prepackaged products such as Bicep II Magnum, FulTime, Guardsman, Harness Xtra, and LeadOff. On highly erodible land with less than 30% organic matter, do not apply more than 1.6 lb atrazine prior to crop emergence. Do not apply more than 2.5 lb atrazine per acre per year. Both atrazine and simazine have long soil residuals, and only corn or sorghum can be planted in rotation following this rate of triazine; be cautious of recrop restrictions. Refer to current product label for additional information. <i>(Restricted-use pesticide and water quality advisory)</i>

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Table 2, continued.

Herbicide	Crop	Product/A	Control Rating <sup>a</sup>	Comments
<b>Postemergence</b>				
Accent 75DF (nicosulfuron)	Corn	0.67–1.33 oz 75DF	7	For best results, apply when wirestem muhly is 8–10 inches tall. Accent can suppress wirestem muhly growth; repeat applications may be necessary. Accent can be applied broadcast to corn 20 inches tall or less (or 6 collars) or with drop nozzles when corn is 20–30 inches tall (less than 10 collars). Penn State research showed that a methylated vegetable oil improves control of wirestem muhly with Accent compared to nonionic surfactant. (Celebrity Plus is a premix containing nicosulfuron. Other premixes with nicosulfuron may also be available for suppression of wirestem muhly.)
Fusilade DX 2E (fluazifop)	Soybean	12–16 fl oz 2E	8+	Apply when wirestem muhly is 4–12 inches tall. Repeat applications may be necessary if regrowth occurs. Include crop oil concentrate or nonionic surfactant to the spray mixture. Before tank-mixing with broadleaf herbicides, read the herbicide label to avoid reduced grass control. Fusion is a premix of Fusilade (fluazifop) and Puma (fenoxaprop) and can provide some control of wirestem muhly.
Liberty 1.67L (glufosinate)	Liberty Link corn	28–34 fl oz 1.67L	6–8	<i>For over-the-top applications on Liberty Link varieties only.</i> For best results, use planned sequential treatments of Liberty for control of wirestem muhly. (A single application usually does not provide adequate suppression or control.) Apply 34 fl oz/A when wirestem muhly is 4–8 inches tall, followed by 28 fl oz/A to control regrowth. Include ammonium sulfate in the spray mixture. Liberty may be applied broadcast from emergence until corn is 24 inches tall (7 collars) or with drop nozzles when corn is 24–36 inches tall. Liberty ATZ is a premix of Liberty (glufosinate) and atrazine and can provide suppression of wirestem muhly.

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Table 2, continued.

Herbicide	Crop	Product/A	Control Rating <sup>a</sup>	Comments
Roundup 4S or other glyphosate-like product (glyphosate)	Roundup Ready corn and soybean, spot treatment, burndown	24–32 fl oz 4S or 1% solution	9	<i>For over-the-top applications on Roundup Ready varieties only.</i> (Numerous glyphosate-like products are available, but not all are labeled for use over Roundup Ready crops. Refer to product label for formulation concentration, use rate, application information, and other use restrictions.) Glyphosate generally provides the most consistent control of wirestem muhly compared to other herbicides. Apply in-crop when wirestem muhly is 8–10 inches tall or from mid-June through July. If necessary, a second application may be made through September. Burndown applications are effective prior to fall-seeded alfalfa and small grain establishment or after spring oat harvest.
Select 2E (clethodim)	Alfalfa, soybean	8–16 fl oz 2E	8+	Apply when wirestem muhly is 4–8 inches tall. Repeat applications may be necessary if regrowth occurs. Include crop oil concentrate with the spray mixture. Before tank-mixing with broadleaf herbicides, read the herbicide label to avoid reduced grass control.

<sup>a</sup> 10 = 95 to 100%, 9 = 85 to 95%, 8 = 75 to 85%, 7 = 65 to 75%, 6 = 55 to 65%. Ratings are based on optimal application timing.

The drawing of wirestem muhly was done by Rae D. Chambers.

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