CONTROLLING INTRODUCED COOL-SEASON GRASSES

PURDUE UNIVERSITY Extension

FNR-650-W

Do's

- Prepare the site for herbicide application with prescribed fire or mowing.
- Combine various control practices.
- Treat with herbicide when grasses are green and actively growing and while native vegetation is dormant (spring or fall).
- Prioritize fall herbicide applications to enable spring follow-up treatments.
- Consider multiple applications of grass-selective herbicides in diverse plantings.

Don'ts

- Use mowing for control.
- Mow CSGs and move equipment to native plantings, which results in transporting undesirable seed.
- Rely on dormant season prescribed fire alone.
- Allow thatch accumulation before an herbicide application.
- Apply herbicides that are only effective on broadleaf vegetation.

Introduced or **non-native cool-season grasses (CSGs)** refer to common perennial grasses such as tall fescue (*Schedonorus arundinaceus*), smooth brome (*Bromus inermis*), Kentucky bluegrass (*Poa pratensis*), orchardgrass (*Dactylius glomerata*), timothy (*Phleum pratense*), and quackgrass (*Elymus repens*). Many non-native CSGs form a dense sod layer at ground level reducing and restricting mobility and forage availability for wildlife while also suppressing native plants. Non-native cool-season grasses grow in colder times of year than their native warm-season counterparts. These grasses grow rapidly in the spring, before native warm-season plant growth, and continue growing in the fall after many warm-season species are dormant. These seasonal growth patterns give CSGs a competitive advantage. If they are not controlled sufficiently before planting or are allowed to colonize from adjacent areas, they can quickly overtake a native planting.

Plant Facts

- Perennial cool-season grasses
- 3-4 feet tall
- Growth period: start growth when the soil temperature reaches 40-45°F and grows from spring to fall, but most active in cooler months (Apr-Jun and Oct-early Dec)
- Flowering: late spring or early summer

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Control Options

The same seasonal growth pattern that gives CSGs a competitive advantage can also be used to control them without damaging many native warm-season plants. Warm-season plants will be dormant during the optimal time of CSG control (spring or fall). Typically, if you see green grasses in November or March, this can indicate that introduced cool-season grasses are present. Cool-season grass control often requires a combination of treatments with the optimal timing for long-term control.

Mowing

Mowing stimulates the growth of cool-season grasses and is not an effective control method. Spot mowing should only be used in preparation for herbicide application, and attention should be paid to vegetation heights. Mowing taller grasses will result in dense thatch accumulation (dead grass residue). Failing to reduce thatch will decrease the effectiveness of an herbicide application. Clean all equipment before entering native vegetation to reduce the likelihood of introducing undesirable species.

Prescribed Fire

Prescribed fire will not eliminate cool-season grasses, but it can be used to reduce CSGs or to prepare the site before herbicide application. Burning during the early-growing season (Apr-May) when CSGs are actively growing has been shown to suppress and reduce CSGs such as smooth brome and Kentucky bluegrass. Burning during the dormant season (Dec-Mar) without follow-up herbicide applications may worsen CSG infestations. Burning during the fall or early spring, followed by an herbicide treatment such as imazapic, has been shown to be successful at significantly reducing several cool-season grasses, including tall fescue.

Herbicide

Cool-season grasses are most effectively controlled with herbicide applied when these species are actively growing (fall; Oct-Dec, and spring; Mar-Apr) and warm-season vegetation is dormant. Species like tall fescue and smooth brome require a minimum of two applications to control. Starting CSG control in the fall after native warm-season plants are dormant allows for a follow-up spring application(s) before native warm-season plants emerge. Single applications of grass-selective herbicides such as clethodim are generally less effective on perennial CSGs than other herbicides. Multiple applications of grass-selective herbicides within 2-4 weeks are required for effective CSG control. Applying glyphosate in the fall after warm-season plants are dormant and again in the spring can control species such as tall fescue, Kentucky bluegrass, and orchardgrass. Imazapic can be used in the fall and spring to control tall fescue, but Kentucky bluegrass, orchardgrass, and smooth brome tolerate imazapic. Smooth brome is best controlled with multiple applications of clethodim or a fall or spring application of imazapyr, glyphosate, or the combination of imazapyr and glyphosate.

Disking

Disking alone is ineffective in controlling cool-season grasses such as tall fescue. However, disking can be combined with herbicide application(s) to control cool-season grasses, reduce thatch, and stimulate the seed bank. Disking during the winter following a fall application of imazapic to control tall fescue has been shown to improve the composition and structure of the field for wildlife. However, disking should be avoided when problematic species such as Canada thistle or sericea lespedeza are present.

Acknowledgments

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Additional Resources

Brooke, J. and C. Harper. 2017. Renovating native warm-season grass stands for wildlife: A land manager's guide. Purdue University and the University of Tennessee Extension. FNR-548-W, PB-1856.

Harper, C. and J. Gruchy. 2009. Eradicating tall fescue and other non-native, perennial, cool-season grasses for improved early successional wildlife habitat: Technical Note. Managing working lands for northern bobwhite. USDA NRCS, pg. 90-99

Conservation Program Disclaimer: *The management practices in this publication may conflict with cost-share program (e.g., CRP) rules and regulations (e.g., primary nesting season). If you are enrolled in a conservation program, please consult with an agency representative before utilizing a prescribed practice.*

Control Scenarios

Below are only a few examples of common scenarios in the field. Many other scenarios exist. For your specific conditions, please consult a biologist.

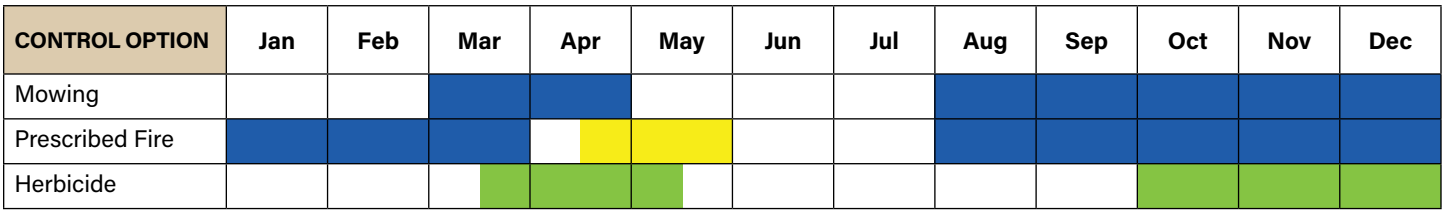
Native grassland with moderate forb diversity and low cool-season grass infestation

OPTION 1. SPRING TREATMENT	OPTION 2. FALL TREATMENT
Year 1 ▪ Mow or conduct a prescribed fire during the dormant season (Nov-Mar). ▪ Spot-spray CSGs when they have at least 3-6 inches of regrowth with imazapic or glyphosate. - For areas with high native diversity, utilize clethodim when regrowth is 3-6 inches. Utilize a second application of clethodim 2- 4 weeks following the first application, especially if done before native warm-season plants emerge. ▪ Spot-spray CSGs in late fall (late Oct-Dec) after a few frosts **Year 2+** ▪ Spot-spray CSGs in spring (Mar-Apr) following green-up but before native warm-season plants emerge ▪ Conduct prescribed fire as needed to encourage native diversity	**Year 1** ▪ Mow or conduct a late-growing season prescribed burn (Aug-Oct) in preparation for herbicide application ▪ Spot-spray CSGs with imazapic or glyphosate after a few frosts and at least 3-6 inches of regrowth (late Oct-Dec) ▪ Spot-spray CSGs the following spring before native warm-season plants emerge **Year 2** ▪ Spot-spray CSGs as needed (spring or fall) ▪ Conduct prescribed fires as needed to encourage native diversity

Native grassland or old field with low forb diversity and high cool-season grass infestation

OPTION 1. FALL TREATMENT	OPTION 2. SPRING TREATMENT
Year 1 ▪ Mow CSGs in late summer or early fall 1-2 times as preparation for herbicide application ▪ Spray CSGs (broadcast or spot) with appropriate herbicide(s) in late fall (late Oct-Dec) after a few frosts ▪ Monitor for green-up in the spring (Mar) and spot-spray remaining CSGs **Year 2+** ▪ Spot-spray CSGs in late fall (late Oct-Dec) after a few frosts ▪ Spot-spray CSGs in spring (Mar-Apr) following green-up but before native warm-season plants emerge	**Year 1** ▪ Mow or conduct a dormant season prescribed burn (Feb-Mar) in preparation for herbicide application ▪ Spray CSGs (broadcast or spot) with appropriate herbicides as they green up in the spring but before the soil warms enough for native warm-season plants to emerge **Year 2+** ▪ Spot-spray CSGs in late fall (late Oct-Dec) after a few frosts ▪ Spot-spray CSGs in spring (Mar-Apr) following green-up but before native warm-season plants emerge

Control Timeline



Control[1]

Suppression[2]

Site Preparation[3]

[1] Control = provides control for cool-season grasses when applied within the appropriate temperature range and at recommended rates. Refer to the herbicide label.

[2] Suppression = reduces seed production or vigor; will not provide long-term control

[3] Site preparation = used before herbicide application to improve herbicide efficiency

Herbicide Recommendations

Active Ingredient	Trade Names[1]	Application rates[2]	Application Timing	Adjuvant Information[3]	Additional Information
clethodim	Clethodim 2EC, Select Max	**Broadcast:** 10–16 oz for perennial grass (Clethodim 2EC) **Spot Spray:** 0.33 – 0.65 oz of clethodim per gallon (Clethodim 2EC)	Late Oct-early Dec and Mar-Apr	Add COC at 1 qt/acre and AMS at 2 lb/A to generic clethodim products.	Multiple full-rate applications are required for perennial grasses. The second application should be 2-3 weeks after the first application.
glyphosate	Roundup, Gly Star Plus, and others	**Broadcast:** 2–3 qt/acre **Spot Spray:** 1-2.5% solution by volume	Late Oct-early Dec and Mar-Apr	Add AMS (2-3 lbs/A). Add NIS to improve control of tough-to-control species if the formulation does not contain a spray adjuvant.	Broad-spectrum herbicide. It will kill or damage most plants (forbs or grasses) it contacts. Not soil active.
imazapic	Plateau, Panoramic 2SL	**Broadcast:** 8–12 oz (Plateau) **Spot Spray:** 0.25-1.5 % solution by volume	Late Oct-early Dec and Mar-Apr	Apply with NIS (1 qt./100 gal.). Plateau can be more effective when applied with MSO (1.5 to 2 pts./A) instead of NIS but will be more injurious to the existing plants. The addition of AMS may improve control of certain weeds but will also increase the risk of injury to non-target plants	Does not control Kentucky bluegrass, orchardgrass, quackgrass, or smooth brome. Select native grasses and forbs are tolerant of imazapic at specific rates (see label).
imazapyr	Arsenal, Arsenal AC, Polaris, Polaris AC	**Broadcast:** 2-6 pt/ac (Arsenal) **Spot Spray:** 0.5-1% solution by volume	Late Oct-early Dec and Mar-Apr	Apply with NIS (1 qt./100 gal.).	Provides control of tall fescue, Kentucky bluegrass, orchardgrass, smooth brome, timothy, and quackgrass. Imazapyr is soil active and may damage desirable overstory trees by translocation throughout the root system. Do not spray imazapyr within the drip line of desirable trees. Many Rubus species and legumes are somewhat tolerant of imazapyr. Arsenal AC is the Applicator's concentrate and has 2x the active ingredient of Arsenal.

[1] Product names are provided as examples and for educational purposes. Several other products with the same active ingredient may exist. Listing of the products does not constitute an endorsement.

[2] The rates for these applications are provided for one specific product as an example. These products are sold under several trade names with different concentrations (active ingredients per gallon). Be sure to read the label to determine application rates for specific products.

[3] Spray adjuvants, including surfactants, are supplemental products added to a spray mixture to improve the performance of the chemical. Please refer to the product labels for more information. AMS = ammonium sulfate, COC = Crop Oil Concentrate, MSO = Methylated Seed Oil, NIS = Nonionic Surfactant, v/v = volume/volume

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