

THINNING NATIVE WARM-SEASON GRASSES



Grassland restorations have included tall **native warm-season grasses (NWSGs)** for decades. During early restoration efforts, three tallgrass species were regularly used at high rates (>5 lbs per acre); big bluestem (*Andropogon gerardii*), Indiangrass (*Sorghastrum nutans*), and switchgrass (*Panicum virgatum*). High planting rates combined with the use of cultivars developed for livestock forage and the mismanagement (or lack of management) of these plantings resulted in “rank” (overly dense) stands of almost 100% grass with little broadleaf diversity. These rank stands often fall over (lodge; see picture above) during the winter, which offers little-to-no cover for wildlife.

Do's

- Reduce the use of aggressive tall native warm-season grasses in seed mixes.
- Consider use of late-growing season burns from August through early October.
- Use mowing as potential site preparation for disking or herbicide.
- Treat NWSGs with recommended herbicides, but only during recommended periods (May-Jun, Aug-Sep).
- Avoid “recreational mowing” or mowing for aesthetic purposes.

Don'ts

- Expect mowing to control grasses.
- Use forage-improved varieties of tall warm-season grasses.
- Expect prescribed fire conducted from January to May to reduce native grasses without follow-up management.
- Disk if the seed bank is known to have aggressive or noxious weeds such as Canada thistle or sericea lespedeza.

Plant Facts

- Common aggressive tall grasses include: big bluestem, indiangrass, and switchgrass.
- Growth period: warmer months (May-Sep), starts growth when soil temperatures reach 55-65°F
- 4-7 feet tall, deep fibrous roots that may extend 15' into the soil profile.
- Flowering: Mid to late summer (July-Sep)
- May lay over or flop in moist rich soils, forming a mat.

Prevention

The best way to prevent aggressive native warm-season grasses from becoming a problem is considering the following prior to establishment:

1. Exclude or limit the quantity of aggressive tall NWSGs included in the mix.
2. Do not use forage-improved varieties that were bred to grow fast and spread quickly.
3. Balance grasses to forbs ratio to 50% grass to 50% forbs on a seeds per square foot basis, preferably leaning more heavily on forbs (e.g., 30% grass to 70% forbs)
4. In place of tall warm-season grasses, use sedges, rushes, or less-aggressive shorter grasses such as little bluestem (*Schizrachryium scoparium*), broomsedge (*Andropogon virginicus*), side oats grama (*Boutelua curtipendula*), purpletop (*Tridens flavus*), and dropseed (*Sporobolus spp*).

Control Options

A common goal with management in most conservation plantings is to reduce the density of native grasses, but not eliminate them. At lower densities (<50% of the stand), native wildflowers are more likely to persist and provide better quality wildlife habitat. NWSGs have deep roots and growth patterns that make them resilient to disturbances, and they often return to their pre-management densities within one-to-three years following management. The best way to reduce dense stands of tall NWSGs is to incorporate a combination of the following techniques into a long-term management regime.

Mowing/Haying/Grazing

Mowing alone is not often recommended to reduce density of native grasses. However, mowing can be used in combination with other control methods to increase overall success. For instance, mowing prior to herbicide application or disking can improve the effectiveness of both control methods. Haying, because it removes the cut vegetation from the site, can be an effective way of improving plant diversity, but it should be done later in the summer after birds have had chance to nest at least once (~Jul 15) and before the grasses start to flower. Grazing with cattle or bison can also reduce native grass density and improve forb diversity.

Prescribed Fire

The timing and frequency of prescribed fire both have a tremendous impact on native plant composition. Prescribed fire conducted in the dormant or early growing season (Nov-May) tends to increase the density of warm-season grasses. Alternatively, prescribed fire conducted during the late growing

season (Aug to mid-Oct) has been demonstrated to set back NWSGs temporarily and may increase wildflower density or abundance. Fire can also be effectively used to prepare the site for disking or herbicide application.

Herbicide

Herbicide is an effective way of reducing dense NWSGs. Single applications of a grass-selective herbicide, such as clethodim, are generally not effective at reducing aggressive native grass. However, two closely timed applications of grass-selective herbicides have shown some effectiveness. Using broad-spectrum or non-selective herbicides such as glyphosate or imazapyr at the right time of year can reduce grass density, thereby creating open space for wildflowers. Applying herbicides in the early growing season (May-Jun) when grasses are 8-16 inches tall can be effective. Additionally, a late-growing season treatment (Aug-Sep) is also effective and occurs after many bird species have nested. Herbicides can be applied to NWSGs as a broadcast, spot-spray, or wicking application. Burning or mowing a field prior to an herbicide treatment, regardless of timing, and allowing the vegetation to regrow for at least 2-4 weeks can increase the effectiveness of an herbicide treatment.

Tillage

Disturbing thick native grasses with tillage such as disking or rototilling can be effective when used in the proper season. Tillage in the spring (Apr-May) may encourage grass growth or undesirable plants, whereas tillage in the late summer, fall, or winter (Aug-Mar) will encourage more beneficial wildflowers. If grass is very dense, mowing or burning in advance of tillage may be necessary. When disking, a heavy offset disk is needed to create enough disturbance. Small lightweight garden or finish disks are not effective against tall NWSG thatch. Multiple passes with a disk will be necessary to expose 40-70% or more of the soil in the target area. Do not use disking in areas where invasive species such as Canada thistle or sericea lespedeza are present or on highly erodible sites.

Interseeding Wheat

Interseeding wheat after using a mechanical or chemical disturbance option can slow the return of grasses. At least 40-70% exposed soil on the surface should be present prior to interseeding. Wheat offers competition and allelopathic effects that help reduce grass abundance. Do not use this method if problematic broadleaf plants such as Canada thistle or Canada goldenrod are present. If interseeding wheat is planned, the preceding tillage, prescribed fire, or herbicide application should be done in August or early September to plant the wheat at the correct time (mid-Sep to early-Oct).

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 aggressive native warm-season grasses and moderate forb diversity

OPTION 1.	OPTION 2.
Year 1 - Use prescribed fire during the late-growing season (Aug-Sep) - Use the appropriate herbicide (glyphosate, imazapyr or clethodim) on grass regrowth 3-5 weeks post-burn. - If clethodim is used, treat the native grasses in August and again 2-4 weeks after the first application. Year 2 - Monitor the site for grass dominance. - Treat with appropriate herbicides in areas where grass is still overly dominant. Year 3+ - Continue to utilize prescribed fire during the late-growing season every 2-4 years. - Use herbicide to reduce grass dominance when needed.	Year 1 - Use the appropriate herbicide (glyphosate, imazapyr, or clethodim) on the grasses when grasses are 8-16 inches (May-Jun) - If clethodim is used, treat the native grasses twice, with the second application being 2-4 weeks after the first application. Year 2 - Monitor the site for grass dominance. - Treat with appropriate herbicides in areas where grass is still overly dominant. Year 3+ - Use herbicide(s) to reduce grass dominance when needed. - Incorporate other methods such as prescribed fire when possible.

Native grassland with aggressive native warm-season grasses and low forb diversity

OPTION 1.	OPTION 2.
Year 1 - Use prescribed fire during the late-growing season (Aug to mid-Oct). OR - Use the appropriate herbicide (glyphosate, imazapyr or clethodim) on the grasses during the early growing season (May-Jun) or late-growing season (Aug-Sep). - If clethodim is used, treat the native grasses twice, with the second application being 2-4 weeks after the first application. Year 2 - Monitor the site for grass dominance. - Treat with appropriate herbicides in areas where grass is still overly dominant. Year 3+ - Continue to use prescribed fire during the late-growing season every 2-4 years. - Use herbicide to reduce grass dominance when appropriate.	Year 1 - Mow the site in August or September (at least 2 weeks before disking). - Use an offset disk to expose 40-70% or more of the soil in the mowed area (Sep-Mar). Year 2+ - Monitor the site for grass dominance. - Repeat mowing and disking regime as necessary.

Control Timeline

CONTROL OPTION	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mowing												
Prescribed Fire												
Herbicide Application												
Tillage												
Interseeding wheat*												

 Control¹

 Suppression²

 Site Preparation³

¹ Control = method and timing provide effective control of aggressive warm season grasses

² Suppression = method and timing suppress native warm-season grasses for a short time (less than 1 growing season)

³ Site preparation = typically mowing used prior to control method to improve efficacy. Examples include disking or prescribed fire prior to interseeding

* Wheat planting should follow appropriate planting dates based on latitude and the presence of Hessian Fly

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/ac (Clethodim 2EC) Spot Spray: 0.33-0.65 oz of clethodim per gallon of water (Clethodim 2EC)	May-Jun when native grass is at least 12 inches tall. Aug-Sep while grass is still green and growing	Add COC at 1qt/acre and AMS at 2 lb/A to generic clethodim products.	Multiple full rate applications required for perennial grasses. Second application should be 2-3 weeks after first application. Add crop oil concentrate at 1qt/acre to tank mixture for perennial grass control.
glyphosate	Roundup, Gly Star Plus, and others	Broadcast: 1.5-2 qt/ac Spot Spray: 2-3% solution by volume	May-Jun when native grass is at least 12 inches tall. Aug-Sep while grass is still green and growing	Add AMS (2-3 lbs/A). Add NIS to improve control of tough to control species of if the formulation does not contain a spray adjuvant.	No selectivity. Will also kill emerged broadleaf plants.
imazapyr	Arsenal, Arsenal AC, Polaris	Broadcast: 4-6 pt/ac (Arsenal) Spot Spray: 0.5-1% solution by volume (Arsenal)	May-Jun when native grass is at least 12 inches tall. Aug-Sep while grass is still green and growing	Apply with NIS (1 qt./100 gal.).	Imazapyr is soil active and may damage desirable trees by absorption through the root system. Therefore, do not spray imazapyr within the root zone of desirable trees. Many Rubus species and legumes are somewhat tolerant of imazapyr.

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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Additional Resources

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

Brooke, J.M. and C.A. Harper. 2016. Herbicides are effective for reducing dense native warm-season grass and controlling a common invasive species, sericea lespedeza. Journal of the Southeastern Association of Fish and Wildlife Agencies 3:178-184.

Yeiser, J. M., D. L. Baxley, B. A. Robinson, and J. J. Morgan. 2015. Using prescribed fire and herbicide to manage rank native warm season grass for northern bobwhite. The Journal of Wildlife Management 79:69-76.

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