WOODY ENCROACHMENT AND WOODY INVASIVES

PURDUE UNIVERSITY
Extension

FNR-646-W

Do's

- Prioritize prescribed fire during the late growing season (Jul-Oct).
- Prepare the site for herbicide application with prescribed fire or mowing.
- Combine various control practices.
- Treat woody encroachment with foliar applied herbicides from leaf out to leaf color change (preferably in late summer: Aug-Sep).

Don'ts

- Mow woody encroachment without a follow-up treatment.
- Use prescribed fire in the dormant season (Feb-Apr) to control woody encroachment without a follow-up herbicide treatment.

Tree and shrub encroachment into conservation plantings, such as Conservation Reserve Program fields and old fields, is common. Some woody encroachment, such as from native shrubby species like blackberry, sumac, plum, or hawthorn, can be beneficial to wildlife species such as northern bobwhite, field sparrows, eastern cottontails, and white-tailed deer. For other species, such as Henslow's sparrows, woody encroachment can degrade habitat. Additionally, once woody species become overabundant in a field, they outcompete native grasses and wildflowers.

Species that commonly encroach in conservation plantings include pioneering woody plants, such as yellow (tulip) poplar, eastern cottonwood, American sycamore, willows, sweetgum, black locust, and honeylocust. Invasive species such as autumn olive, Asian bush honeysuckle, Callery pear, multiflora rose, and white mulberry can also be problematic in conservation plantings.

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Control Options

Several control options exist to help reduce woody encroachment into conservation plantings. Generally, a combination of practices will provide the best control.

Mowing

Mowing alone, especially in the spring, is not a desirable way to control woody plants. Mowing, unless it is done multiple times throughout the growing season, only reduces the height of woody stems, but does not kill the plant. Mowing cuts the woody stem off a few inches above the ground, resulting in vigorous resprouting from the root system, often resulting in more stems than before the mowing effort. Additionally, mowing creates small stumps across the field that can puncture tires and create walking hazards. To control woody encroachment, strategic or patch mowing problem areas should also be paired with another treatment such as prescribed fire or herbicide application.

Prescribed Fire

Prescribed fire can be effective at reducing the height and density of woody plants in conservation plantings. The timing or seasonality of the prescribed fire is an important consideration for reducing woody plants. Better control occurs when the plant is 1) actively growing, 2) the fire is hot enough, and 3) surrounds the plant long enough to damage the inner living tissue (cambium). Dormant season (Nov-Mar) or spring (Mar-Apr) fires can reduce the size of woody plants but are not a reliable method to reduce the presence/abundance of woody plants across the site, unless the fires occur every 1-2 years. However, late-growing season fires (Jul-Oct) have been shown to reduce both the size and abundance of woody plants. Prescribed fire conducted at any time of the year can be paired with a follow-up herbicide application to control any resprouting woody plants.

Herbicide

Several herbicides, including those containing the active ingredients triclopyr, imazapyr, and metsulfuron methyl can be used effectively to controlling woody plants in conservation plantings. Some of these active ingredients, such as triclopyr and metsulfuron methyl, are broadleaf selective and will reduce woody encroachment and not harm native warm-season grasses but will reduce other broadleaf plants that receive treatment. Other active ingredients such as imazapyr or glyphosate are less or non-selective and applications with these chemistries will also control most grasses and broadleaf plants. Several of these herbicides can be mixed (consult herbicide labels) to provide control of multiple woody species.

Many herbicides are particularly effective on woody plants during the late summer (Aug-Sep). However, some species such as multiflora rose are best controlled at other times (e.g., late spring). Where woody encroachment is extensive across a field, a broadcast application may be warranted. However, even at high densities, individual woody plants can be controlled with spot-spraying, cut-stump or basal bark treatments. Treating individual plants can reduce damage to non-target plants. Mowing or burning the site prior to an herbicide application will reduce the size of woody plants, thus reducing the amount of herbicide needed for the site.

Tillage

Tillage, such as disking, can be used to control small seedlings of woody plants. However, once seedlings grow for 3-4 years, they will likely be too large or dense to control with tillage. Tillage could also create an ideal seedbed for new woody seedlings to grow — especially wind-dispersed seed such as cottonwood — which could worsen the problem. Tillage may also assist with the spread or introduction of other invasives such as Canada thistle and sericea lespedeza. If tillage is used as a management practice, follow-up targeted herbicide applications to control any new seedlings are recommended.

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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.

Harper, C. and J. Gruchy. 2009. Managing Early Successional Habitat: Technical Note. Managing working lands for northern bobwhite. USDA NRCS, pg. 100-113

Renz M., and J. Drewitz. 2008. Managing Woody Weeds in Fields Enrolled in the Conservation Reserve Program. University of Wisconsin Extension. A3853.

University of Missouri. 2014. Weed and Brush Control for Forages, Pastures, and Noncropland. University of Missouri Extension. IPM1031.

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.

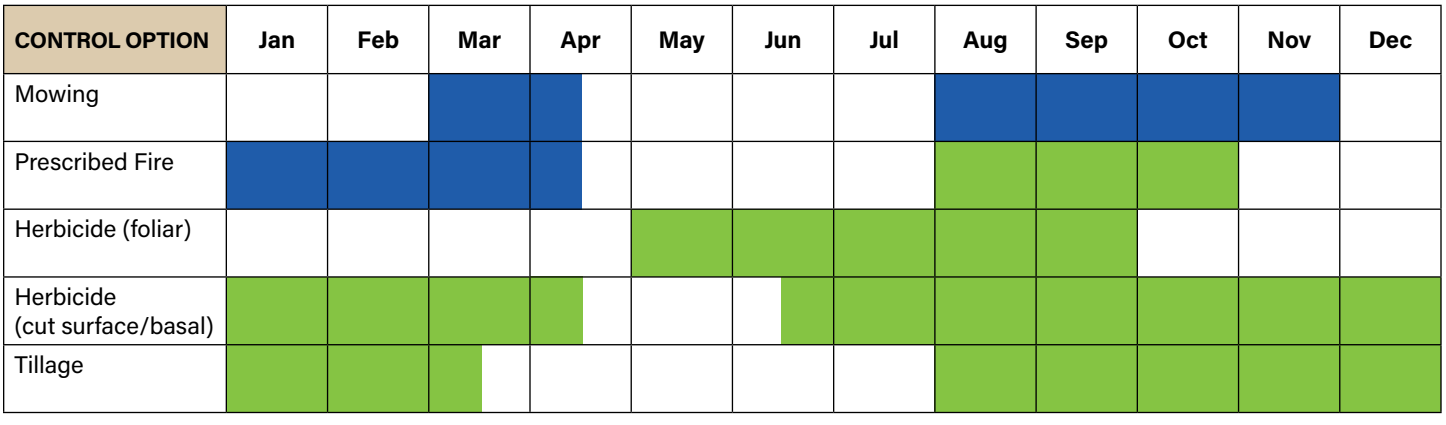
Native grassland with high native plant diversity, but woody plants such as cottonwood and mulberry are encroaching

OPTION 1. FIRE + FOLIAR HERBICIDE	OPTION 2. FOLIAR HERBICIDE ONLY
Year 1 ▪ Use prescribed fire during the late-growing season (Jul-Oct) **Year 2** ▪ Spot treat resprouting woody plants in Aug-Sep with appropriate herbicide mix **Year 3+** ▪ Utilize prescribed fire as necessary ▪ Spot treat resprouting woody plants in Aug-Sep with appropriate herbicide mix.	**Year 1** ▪ (Optional) Mow site in the fall or spring prior to applying herbicide to reduce plant height ▪ Spot treat woody plants in Aug-Sep with appropriate herbicide mix **Year 2** ▪ Spot treat resprouting woody plants in Aug-Sep with appropriate herbicide mix **Year 3+** ▪ Spot treat resprouting woody plants in Aug-Sep with appropriate herbicide mix

Old field, native grass pasture, or CRP field with low native plant diversity and heavy infestation of woody plants such as autumn olive, multiflora rose, and yellow (tulip) poplar.

OPTION 1. FIRE + FOLIAR HERBICIDE	OPTION 2. MOWING + FOLIAR HERBICIDE
Year 1 ▪ Use prescribed fire during the late-growing season (Jul-Oct) **Year 2** ▪ Broadcast or spot treat resprouting woody plants with appropriate herbicide mix in Aug-Sep **Year 3+** ▪ Use prescribed fire as necessary ▪ Spot treat resprouting woody plants in Aug-Sep with appropriate herbicide mix	**Year 1** ▪ Mow woody plants in April or early May ▪ Broadcast or spot treat resprouting woody plants with appropriate herbicide mix in Aug-Sep **Year 2** ▪ Broadcast or spot treat resprouting woody plants with appropriate herbicide mix **Year 3+** ▪ Spot treat resprouting woody plants in Aug-Sep with appropriate herbicide mix

Control Timeline



Control[1]

Suppression[2]

Site Preparation[3]

[1] Control = provides effective control

[2] Suppression = reduces vigor or dominance but may not provide long-term control

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

Herbicide Recommendations

Active Ingredient	Trade Names[1]	Application rates[2]	Application Timing	Adjuvant Information[3]	Additional Information
aminopyralid + metsulfuron methyl	Chaparral	**Broadcast:** 3.3 oz/ac **Spot Spray:** equivalent to broadcast rate	Timing depends on species, but no earlier than full leaf expansion. Check label for species specifics	Apply with COC/MSO (1% v/v), or NIS (0.25%). AMS (2 lb/A) can also be added for tough weeds.	Many established native grasses are tolerant to applications. Will harm many native forbs. Can damage non-target woody species through root uptake. For some woody species, if the site is mowed applications should wait until the following growing season.
glyphosate	Roundup, Gly Star Plus, and others	**Broadcast:** 2-5 qt/ac **Spot Spray:** 3% by volume	After full leaf expansion, but prior to leaf color change	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.	Broad-spectrum herbicide. Will kill or damage most plants (forbs or grasses) it contacts. Not soil active.
imazapyr	Arsenal, Arsenal AC, Habitat (water-labelled)	**Broadcast:** 4-6 pt/ac (Arsenal) **Spot Spray:** 1-1.5% by volume	After full leaf expansion, but prior to leaf color change. Aug-Sep is ideal.	Apply with NIS (1 qt./100 gal.).	Imazapyr is soil active and may damage overstory trees by translocation through the roots. Therefore, do not spray imazapyr within the dripline of desirable trees. Will kill various grasses and forbs. But, many Rubus species and legumes are somewhat tolerant of imazapyr. Will not control leguminous woody plants like black locust or honeylocust
metsulfuron methyl	Escort XP, MSM 60, Patriot	**Broadcast:** 1-3 oz/ac **Spot Spray:** 1 gram of Escort XP per gallon of water	After full leaf expansion, but prior to leaf color change	Apply with NIS at a minimum rate (concentration) of 0.25% v/v (1qt/100 gal of spray solution)	Many native grasses are tolerant to application. Woody species controlled includes; ash, black locust, Callery pear, cottonwood, elm, honeysuckle, mulberry, multiflora rose, maple, osage orange, willow, yellow poplar
Metsulfuron methyl + Chlorsulfuron	Cimarron Plus	**Broadcast:** 1.25-3.75 oz/ac **Spot Spray:** 1 gram of Cimmarron Plus per gallon of water	After full leaf expansion, but prior to leaf color change	Apply with COC/MSO (1% v/v), or NIS (0.25%).	Many established native grasses are tolerant to application. Will harm many native forbs. Can damage non-target woody species through root uptake. For multiflora rose control, treat plants less than 3 feet tall shortly after full leaf expansion (spring)
triclopyr (amine or choline formulation)	Element 3A, Garlon 3A, Remedy Ultra, Triclopyr 3A, Vastlan	**Broadcast:** 4-6 qt/ac (Triclopyr 3a) **Spot Spray:** 1-3% by volume	After full leaf expansion, but prior to leaf color change	Add a NIS to all spray mixtures.	Applications during drought conditions may not be as effective. Not soil active. Will kill other broadleaf plants, but not grasses.
triclopyr (ester formulation)	Element 4, Garlon 4, Triclopyr 4	**Broadcast:** 4-8 qt/ac (Element 4) **Spot Spray:** 1.5-2% by volume	After full leaf expansion, but prior to leaf color change	For water dilution mixes, use an NIS at the manufacturer's recommended rate.	Can be mixed with water for foliar application but should be agitated. Not soil active. Will kill other broadleaf plants, but not grasses.
triclopyr + fluroxypyr	Pasturegard HL	**Broadcast:** 1.5 - 4 pt/ac **Spot Spray:** equivalent to broadcast rate	After full leaf expansion, but prior to leaf color change for most species	Add an NIS or AMS (0.25-0.5% or 1-2 qt/ 100 gal) can improve weed control	If woody stems are mowed, allow 9-12 months of regrowth before applying herbicide. Effective for spot-spraying sericea lespedeza or woody plants. Established native grasses are tolerant to applications.

[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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