

Native Warm-Season Grasses as Forage in Mississippi: *Weed Control*



Native warm-season grasses (NWSG) are perennial species that can be grown during the summer months to provide forage for Mississippi livestock. These species are excellent sources of drought-tolerant, low-input forage that, if successfully established and correctly managed, can provide years of grazing and hay production. These nontraditional forage grasses can be somewhat slow to establish and may require extra attention and management to ensure the longevity of the stand.

This publication provides guidance for controlling weed competition in pastures and hayfields where NWSG species are the main forage crop. For information regarding specific establishment methods, grazing management, or establishment issues, see Extension Publication 2830 *Native Warm-Season Grasses as Forage in Mississippi: Establishment*, Publication 2843 *Native Warm-Season Grasses as Forage in Mississippi: Grazing Management*, or Publication 2868 *Native Warm-Season Grasses: Establishment Issues* at <http://extension.msstate.edu>.

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NWSG planted for forage production in Mississippi must compete with several annual and perennial species of grass and broadleaf weeds. Controlling these competing weeds is essential for establishment and seedling development, stand longevity and production, and forage quality and quantity. Due to warm temperatures and typically wet spring and early summer months, soil conditions are suitable for weed species germination and growth, so some level of weed competition is inevitable. However, effective weed control and management can reduce problematic weeds and minimize their impact.

As with any forage crop, establishing a good, thick stand is the first way to reduce competition. You can achieve this with proper site preparation and planting methods (**Figure 1**). Also make sure the stand remains strong and vigorous by constantly managing and



Figure 1. Proper weed control before establishment is essential for stand success. Native grasses are notorious for delayed germination and slow growth. Pre-emergence applications of herbicides can help ensure successful uniform stands of big bluestem, indiagrass, and little bluestem.

improving soil fertility levels. Clip stands no lower than 6 to 8 inches to prevent light from reaching the soil surface and encouraging weed seed germination. Native grasses, which grow in a bunch-type habit, are much taller than sod-forming forages (such as bermudagrass) and do not completely cover the soil surface (**Figure 2**). Close grazing (especially late in the season or during a drought) and excessive clipping will also inhibit regrowth by stressing individual plants.



Figure 2. Native warm-season grasses have a bunch-type growth that does not completely cover the soil surface, unlike many traditional forage grasses. This growth creates natural corridors for ground-nesting birds and small mammals to forage and escape from predators. This exposed soil also allows weeds to germinate and mature. Persistent weed control is needed to manage NWSG stands as a forage source that promotes livestock production and wildlife habitat.

Weedy competition for NWSG in Mississippi can be categorized into four categories: annual summer grasses, perennial warm-season grasses, perennial cool-season grasses, and broadleaf weeds. Annual summer grasses are species that germinate in late spring and summer (during the time of establishment), produce seed in late summer and fall, and die following seed set or frost. Exotic, perennial warm-season grasses are, for the most part, sod grasses that reproduce by seed and/or vegetative structure (stolon or rhizome). These grasses come out of winter dormancy in the spring, produce seed in late summer, and return to dormancy following the first frost. Perennial cool-season grasses are actively growing during the fall and later winter and spring months. They produce seed in late spring and go into a semi-dormant state during the summer. The broadleaf weed category encompasses a wide array of species, growth patterns,

and reproductive methods. However, the control of these species is often the same. Therefore, for the sake of this publication, they will be categorized as such.

Weed control in NWSG stands can be accomplished by three management practices: cultural, mechanical, and chemical. Often, a combination of several of the methods listed can be used to effectively control weedy competition. Each practice is described in detail below.

Cultural Practices

Grazing and prescribed burning are two cultural practices that can be used to manage weed competition in established stands of NWSG. The least labor-intensive method is to use livestock to graze competing species (**Figure 3**). In the case of most grassy weeds, both annual and perennial, forage quality and palatability may exceed that of NWSG in certain times of the year. For instance, cool-season broadleaf species such as clover (*Trifolium* spp.), chickweed (*Stellari* spp.), and prickly lettuce (*Lactuca serriola*) that grow during the early spring months can be grazed close to the ground, allowing NWSG to increase in height and ultimately overshadow competition. For the most part, warm-season broadleaf weeds such as pigweed (*Amaranthus* spp.), horsenettle (*Solanum carolinense*), and sicklepod (*Senna obtusifolia*) are not desirable as forage, produce a large amount of seed, and can be considered toxic to livestock. These species, no matter the forage system, should be controlled.



Figure 3. Cultural methods such as intensive grazing can be used to reduce weed competition and promote native warm-season grass growth. The stand pictured above is infested with summer annual grass weeds. Grazing is being used to reduce this competition to more manageable levels for subsequent herbicide applications.

Close grazing can also control grassy weeds. Before establishment of NWSG, many sites contain mixed or monotypic stands of sod grasses. Even with thorough eradication prior to sowing, residual stolons or rhizomes of sod-forming grasses can re-establish and become troublesome. In small areas of infestation, frequent close grazing during the early spring and summer months can allow NWSG canopies to increase in height and overshadow the sod grasses. Overshadowing of bermudagrass is one of the most effective ways to control this species. If infestations become significant, close grazing can be used to remove as much aboveground vegetation as possible, allowing for subsequent herbicide applications to be more effective in contacting a majority of the available foliage. Heavy stocking during short periods of time is recommended in areas where weeds are prolific and weed species are palatable.

Prescribed burning is another cultural practice that can effectively control weeds in established NWSG stands (**Figure 4**). Prescribed fire is neither innately destructive nor constructive but, ultimately, is a source of change for a landscape (Wade, 1989). Controlled application of fire under specified environmental conditions allows the fire to be managed at a desired intensity within a confined area to meet predetermined vegetation management objectives (Harper et al., 2007). Prescribed burning can reduce litter buildup, increase nutrient availability, stimulate new herbaceous growth, and control undesirable vegetation. For weed control of early successional plants (young trees

and shrubs), growing season fires are recommended. These fires are more likely to kill the entire tree, including the root system, if it is actively growing. Growing season burns are most often conducted during the spring when leaves are green but there is still some residue from the previous year's growth for fuel. Temperatures exceeding 145°F are required for killing actively growing weeds (Harper et al., 2007; DiTomaso, 2006). These temperatures can easily be reached by conducting burns in the late summer when trees begin to prepare for fall senescence and winter dormancy. Fire intensity for these burns is usually less than early growing season burns (more green foliage and less residue), but expect a considerable increase in smoke production.

Prescribed burning is an extremely beneficial tool in managing NWSG, especially for weed control. However, prescribed burning requires a considerable amount of skill. Several factors must be considered before a prescribed burn, including safety protocols, equipment use and maintenance, close weather monitoring, and personnel preparation. If conducting a burn in Mississippi, a certified prescribed burn manager must be on site before and during the burn execution. If you are interested in learning more about this practice or how to obtain certification to conduct prescribed burns, please contact your local Mississippi Forestry Commission office or your local MSU Extension office. For information regarding prescribed burning in pastures, see Publication 2726 *Prescribed Burning for Pasture Management*.



Figure 4. Prescribed burning is an excellent way to control early-successional weeds and brush. The burn pictured above was conducted during the early growing season when vegetation had already begun greening up, yet there was a sufficient amount of the previous year's biomass available as a fuel source.

Mechanical Practices

Haying and mowing are two ways to mechanically control weeds in NWSG stands. Essentially, both practices accomplish the same objective: cutting down tall-growing competitors or cool-season species early in the growing season that may threaten to dominate NWSG (Keyser et al., 2012). If the material being clipped has relatively good forage value, haying provides the option to gain some value from the harvested material. Removing harvested material from the field also allows easier subsequent herbicide applications by exposing weeds to more uniform applications of chemicals.

Chemical Practices

Herbicides are the most flexible and safest method to effectively control or manage tough-to-handle weeds before and following establishment of NWSG stands. When establishing NWSG, there are several nonselective chemicals that can be used for burndown (controlling pre-existing vegetation), along with pre-emergence chemicals that can prevent weed seeds in the soil bank from germinating and developing. For most products, the ideal time to apply herbicides is when weeds are actively growing and relatively small and immature. As weeds mature, they become more difficult to control. Refer to the herbicide label for instructions on timing and specific heights for weed species to be controlled. This section will be broken down into weed control methods for seedling stands and established stands.

Seedling Stands

NWSG, as already mentioned, can be very slow to germinate and develop root systems and aboveground biomass that can compete with weeds. This early stage of development leaves seedlings very vulnerable to excessive competition. Even shorter growing species, like sod-forming grasses, can provide enough canopy coverage to smother new seedlings. Depending on the species desired, several options are available for pre- and post-emergent weed control applications. Very few herbicides are labeled for use in NWSG stands. However, one particular chemical, imazapic, can be very effective in controlling small-seeded broadleaf weeds and annual and perennial grasses. This product can be applied as a pre- or post-emergent. However, some native grass species, like switchgrass, can be severely stunted, and stand losses may occur. Several studies have proven the success of this chemical in providing season-long weed control for establishing native grasses, forbs, and legumes (Washburn and Barnes, 2000; Beran et al., 1999; Beran et al., 2000). **Table 1** provides the specifics for the use of imazapic, along with other herbicides that can be used before planting.

Established Stands

For established stands of NWSG, few options are available for grassy weed control. Broadleaf weeds can be easily controlled with a large array of selective-use herbicides labeled for use in pasture and hay production (**Table 1**). Grazing, haying, and slaughter restrictions for herbicides used for weed control in NWSG pastures and hayfields can be found in **Table 2**.

Typically, once NWSG have reached mature heights, proper grazing and haying management can be used to control weeds. Once established, canopy heights can smother competing grasses and broadleaf weeds. If broadleaf weeds persist, any number of selective herbicides can be used to control this type of vegetation. For grasses, small-area applications such as spot spraying (with a handheld pump-up sprayer or ATV-mounted sprayer) can apply non-selective herbicides (glyphosate). In these areas following spray applications, reseeding may be necessary to fill in thin or unsuccessful stands.

Most modern herbicides are quite safe when used according to label instructions. Nonetheless, take extreme care when using and applying these products. Thoroughly read all herbicide labels before use, and consult your local MSU Extension office if you have questions. For effective weed control, proper sprayer calibration is required. See Publication 1532 *Weed Control Guidelines for Mississippi* for guidance on calibrating equipment. Also, do not rely on a single herbicide or mode of action over a period of years because this can cause resistance issues. Using a combination of cultural, mechanical, and chemical weed control methods over a period of several years will result in more consistent long-term weed control.

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Table 1. Recommended herbicides for use in native warm-season grass pastures for livestock grazing and hay production. Consult herbicide labels for safety protocols, recommended rates for species to control, and proper application methods.

NWSG species	Grass stage	Trade name	Active ingredient	Application timing	Re seeding interval	Adjuvant	Comments
All	established stands only, dormant	Gramoxone Inteon, Gramoxone SL	paraquat (2.0 lb/gal ai)	post-emergence	none	non-ionic surfactant (NIS) or crop oil concentrate (COC)	Controls annual weeds when established NWSG species are dormant.
All	established stands only, dormant	Roundup Weather-MAX	glyphosate (5.5 lb/gal ai)	post-emergence	none	check individual formulations	Controls annual and perennial weeds when NWSG species are dormant.
All	established stands only, dormant	Cornerstone Plus, RangerPro, other generic glyphosate	glyphosate (4.0 lb/gal ai)	post-emergence	none	check individual formulations	Controls annual and perennial weeds when NWSG species are dormant.
All	> 4-leaf stage only	2,4-D Amine 4	2,4-D (3.8 lb/gal ai)	post-emergence	2 weeks per pint applied for grasses	NIS	Controls broadleaf weeds after seedlings are well established.
All	> 4-leaf stage only	2,4-D Ester 4EC	2,4-D (3.8 lb/gal ai)	post-emergence	2 weeks per pint applied for grasses	NIS	Controls broadleaf weeds after seedlings are well established. More volatile than 2,4-D amine.
All	> 4-leaf stage only	Weedmaster	dicamba (1 lb/gal ai) + 2,4-D amine (2.9 lb/gal ai)	post-emergence	10 days per pint applied for grasses	NIS only	Controls broadleaf weeds after seedlings are well established. More effective than 2,4-D alone.
All	well-established seedlings only	Milestone	aminopyralid (2.0 lb/gal ai)	post-emergence	up to 4 months for grasses	NIS	Controls broadleaf weeds after seedlings are well established. One-year plant-back interval for legumes.
All	well-established seedlings only	ForeFront R&P, GrazonNext	aminopyralid (0.3 lb/gal ai) + 2,4-D (2.7 lb/gal ai)	post-emergence with residual	up to 4 months for grasses	NIS	Controls broadleaf weeds after seedlings are well established. One-year plant-back interval for legumes.
All	well-established seedlings only	GrazonNext HL	aminopyralid (0.41 lb/gal ai) + 2,4-D (3.33 lb/gal ai)	post-emergence with residual	up to 4 months for grasses	NIS	Controls broadleaf weeds after seedlings are well established. One-year plant-back interval for legumes.
All	post-tillering	Grazon P+D	picloram (0.5 lb/gal ai) + 2,4-D (2.0 lb/gal ai)	post-emergence	up to 60 days for grasses	NIS only	Controls broadleaf weeds after seedlings are well established. Restricted use herbicide.
All	> 4-leaf stage only	Surmount	picloram (1.2 lb/gal ai) + fluroxypyr (1.0 lb/gal ai)	post-emergence	3 weeks for grasses, 12 months for legumes	NIS	Controls woody brush and broadleaf weeds after seedlings are well established.
All	post-tillering	Remedy Ultra	triclopyr (4 lb/gal ai)	post-emergence	3 weeks for grasses	NIR or COC	Controls woody brush and broadleaf weeds after seedlings are well established.
All	post-tillering	PastureGard	triclopyr (1.5 lb/gal) + fluroxypyr (0.5 lb/gal)	post-emergence	3 weeks for grasses	NIS	Controls woody brush and broadleaf weeds after seedlings are well established.
BBS, LBS, IG, SG*	established stands only	Cimarron Plus	metsulfuron (48% by weight) + chlorosulfuron (15% byweight)	pre- or post-emergence	7 days for grasses	NIS or COC	Controls broadleaf weeds after seedlings are well established.
BBS, IG, LBS, EG	established stands only	Journey	imazapic (0.75 lb/gal) + glyphosate (1.5 lb/gal)	pre- and post-emergence	except for SG, none for NWSG	NIS or methylated seed oil (MSO)	Controls broadleaf weeds and grasses. Contains glyphosate; post-emergence applications will severely stunt or kill living plants. Can be applied when NWSG are dormant.
BBS, IG, LBS, EG	> 4-leaf stage only	Plateau, Panoramic 2 SL	imazapic (2.0 lb/gal)	pre- and post-emergence	except for SG, none for NWSG	NIS or MSO	Controls broadleaf weeds and grasses including crabgrass, foxtail, johnsongrass, broadleaf signalgrass.

Adapted from Competition Control in Native Warm-Season Grasses Grown for Livestock Forage in the Mid-South (University of Tennessee Extension, SP731-F) and the 2014 Weed Control Guidelines for Mississippi (MSU Extension Service).

*BBS = big bluestem, LBS = little bluestem, IG = indiagrass, SG = switchgrass, EG = eastern gamagrass

Table 2. Grazing, haying, and slaughter restrictions for herbicides used for weed control in established stands of native warm-season grasses.

Trade name (active ingredient)	Beef cattle, nonlactating dairy, other livestock			Lactating dairy cattle			Comments
	Grazing	Haying	Slaughter	Grazing	Haying	Slaughter	
Gramoxone SL (paraquat)	N/A	N/A	N/A	N/A	N/A	N/A	
Roundup and others (glyphosate)	none in established pastures	none in established pastures	none in established pastures	none in established pastures	none in established pastures	none in established pastures	
2,4-D Amine 4	N/A	30 days	3 days	7 days	30 days	3 days	
2,4-D Ester 4EC	N/A	30 days	3 days	7 days	30 days	3 days	
Weedmaster (dicamba + 2,4-D)	N/A	37 days	30 days	7 days	37 days	30 days	
Milestone (aminopyralid)	none	none	none	none	none	none	Graze at least 3 days on nontreated pasture before moving into areas with sensitive broadleaf crops to avoid transfer through urine/manure.
ForeFront R&P, GrazonNext, GrazonNext HL (aminopyralid + 2,4-D)	none	7 days	none	none	7 days	none	Graze at least 3 days on nontreated pasture before moving into areas with sensitive broadleaf crops to avoid transfer through urine/manure.
Grazon P+D (picloram + 2,4-D)	none	30 days	3 days	7 days	30 days	3 days	
Surmount (picloram + fluroxypyr)	none	none	3 days	14 days	14 days	3 days	Remove animals from treated pasture/hay 3 days prior to slaughter.
Remedy Ultra (triclopyr)	none	14 days	3 days	following grazing season	14 days	3 days	Remove animals from treated pasture/hay 3 days before slaughter.
PastureGard (triclopyr + fluroxypyr)	none	14 days	3 days	following grazing season	14 days	3 days	Remove animals from treated pasture/hay 3 days before slaughter.
Cimarron Plus (metsulfuron + chlorosulfuron)	none	none	none	none	none	none	
Journey (imazapic + glyphosate)	none	14 days	none	none	14 days	none	
Plateau, Panoramic 2SL (imazapic)	none	14 days	none	none	14 days	none	

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