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Control of Common Grassy Weeds in Pastures and Hayfields

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Introduction

Weeds decrease pasture and hayfield forage yield and aesthetics. Grassy weeds can be especially troublesome due to the limited herbicide options to selectively manage them. This publication discusses weed management tactics and herbicide application techniques to control grassy weeds. Additionally, management of Johnsongrass, Japanese stiltgrass, broomsedge, and foxtail species is discussed in more detail.

While this publication focuses on weed management, maintaining optimal soil fertility and practicing proper grazing and haying management are vitally important. Herbicides alone cannot provide a substitute for proper management, and relying solely on herbicides as a weed control program will not be successful. A healthy, vigorous stand of desirable grasses is the best weed management tool. Stopping grazing or cutting hay at 4 inches in height and resting between grazing or cutting events can reduce weed densities and allow for quicker regrowth, adding up to a third more forage to be produced in a season (Sollenberger et al. 2012). Optimizing soil fertility begins with taking routine soil tests and following the recommendations provided. Maintaining optimum soil pH increases nutrient availability. Optimum soil pH is 6.2 to 6.5 for most cool-season grass (Teutsch and Smith 2009) and 6.5 to 7.0 for legume forages (Redmon and McFarland 2013).

The first step in weed control is correct identification. Virginia Cooperative Extension maintains the Weed Identification Guide website (https://weedid.cals.vt.edu), which provides pictures and descriptions of common weeds, as well as the ability for users to identify weeds by selecting plant characteristics. The Virginia Weed Identification Clinic also provides weed identification services free of charge via your local Extension agent (https://agweedsci.spes.vt.edu/extension/weedid.html).

Herbicide Application Methods

Herbicide application timing and method depends on the species being targeted and the life cycle of the species. Different approaches need to be taken to control annual compared to perennial grassy weeds.

Annual Weedy Grasses

Annual weedy grasses can be controlled with pre-emergence or postemergence herbicides. Pendimethalin is a pre-emergence herbicide that can control many annual weedy grasses when it is applied before germination. Prowl H20 and Satellite HydroCap are two pendimethalin products labeled for this use in Virginia. Summer annual grasses, such as crabgrass (*Digitaria* spp.), annual foxtails (*Setaria* spp.; discussed below), field sandbur (*Cenchrus incertus*), jointhead arthraxon (*Arthraxon hispidus*), and others, can be controlled by pendimethalin. While application timing varies by region and weed species, it is recommended prior to germination, which is typically in early April. Pendimethalin will also prevent the establishment of desirable grasses and legumes from seed, so do not apply it to newly seeded or establishing fields.

Certain annual grasses can be selectively controlled postemergence. Generally, the best application timing is when annual grasses are young and actively growing. Quinclorac herbicides (Facet L and Quinstar) can control crabgrasses, annual foxtails, and other annual grasses. Application timing is critical for success. Grasses are most effectively controlled when they are less than 2 inches in size at application. Including proper adjuvants according to the product label is also important.

Perennial Weedy Grasses

There are no selective herbicides that can control established perennial grasses in cool-season grass forages. Spot spraying and wiper applications are ways to achieve selectivity with a nonselective herbicide. Spot spraying is accomplished by only spraying areas infested with weeds using a hand-held sprayer. Glyphosate (Roundup and other products) is recommended for spot spraying and wiper applications. Glyphosate will kill all vegetation, including desirable grass and clover species that it contacts.

Wipers applicators (also known as rope wick applicators) are devices that physically wipe herbicide directly onto weeds (fig. 1). To achieve selectivity, there must be a height difference between weedy and desirable species. The wiper is set at a height above the desirable species and below the weed species so that herbicide is wiped onto the weedy species as it moves through the field and avoids desirable species. Grazing can sometimes be used to create the required height difference. Wiping in two opposite directions with sufficient drying time between applications is generally more effective than a single pass. Mowing or clipping perennial weeds increases effectiveness of herbicides because there are fewer food reserves stored underground after regrowth. However, depending on species, herbicide application might need to be delayed to allow for regrowth to ensure there is adequate leaf area for optimum herbicide uptake.

Figure 1. Weed wiper applicator. (Photo by Lucas Rector.)

More information on spot spraying and weed wipers can be found in the Forages chapter of the Pest Management Guide: Field Crops (https://www.pubs.ext.vt.edu/456/456-016/456-016.html).

Control of Selected Troublesome Grassy Weeds

Johnsongrass, Japanese stiltgrass, broomsedge, green foxtail, yellow foxtail, giant foxtail, and knotroot foxtail are common grassy weeds found throughout Virginia. They each require unique control methods.

Johnsongrass

Johnsongrass (*Sorghum halepense*) is a perennial grass that can spread by rhizomes and seed (fig. 2). When under stress, Johnsongrass produces prussic acid that can poison livestock, especially ruminants. Frost, drought, and high levels of nitrogen fertilization with low levels of phosphorus and potassium increase stress, which increases prussic acid production in Johnsongrass (Comerford 2012). Controlling Johnsongrass in hayfields can be difficult; it can take multiple years due to its extensive root structure and ability to sprout from rhizomes.

Figure 2. Johnsongrass. (Photos courtesy of Shawn Askew, associate professor, School of Plant and Environmental Sciences, Virginia Tech, unless otherwise noted.)

Johnsongrass can be controlled by frequent low cutting, but monthly cutting is not economical. Hay cutting is not sufficient to control Johnsongrass. Grazing can control Johnsongrass in two to three seasons, but grazing should be avoided directly after the plant has been under stress. Spot spraying or using a wiper to apply glyphosate provides good control of Johnsongrass, but multiple applications over multiple years could be required. There are currently no selective herbicides for Johnsongrass control in cool-season grass forages. Rotating to row crops such as corn, which allows for effective control with selective herbicides, could be an option in heavily infested fields (Flessner and Cahoon 2018).

Japanese Stiltgrass

Japanese stiltgrass (*Microstegium vimineum*) is a summer annual that thrives in moist, shaded areas (fig. 3). Most livestock and wildlife will not graze the grass, so it is often left to outcompete desired grass species. Stiltgrass should be aggressively controlled when it first invades a field in order to prevent establishment (Neal and Judge 2013).

Figure 3. Japanese stiltgrass.

Spot spraying glyphosate is highly effective at controlling stiltgrass, but it does not provide long-lasting control, and it will also kill desirable grasses. Herbicides containing aminopyralid, such as Chaparral, Milestone, DuraCor, and GrazonNext HL, are fairly effective at controlling stiltgrass (table 1). Stiltgrass is best controlled when plants reach 3 to 5 inches in height, which usually occurs in late May to June.

Broomsedge

Broomsedge (*Andropogon virginicus*) is a warm-season perennial grass that often goes unnoticed until it turns reddish brown and forms broomlike leaves (figs. 4 and 5). Poor nutritional quality and palatability make broomsedge an undesirable forage. Its presence is an indicator of low fertility and phosphorus deficiencies in soil (Brakie 2009). As soils become more acidic, phosphorus becomes less available, so maintaining a soil pH above 6.0 can increase available phosphorus. Broomsedge requires less phosphorus than other grass species, so it is able to outcompete desired grass species in unfertile soils.

Figure 4. Dormant broomsedge.

Table 1. Relative effectiveness of herbicides for Japanese stiltgrass control in pastures and hayfields.
Control ratings: 10 = 95-100%; 9 = 85-95%; 8 = 75-85%; 7 = 65-75%; 6 = 55-65%; N = less than 55%; - = not applicable.

Species	2,4-D[1] 3–3 pt	2,4-D + dicamba[1] 1 qt + 1 pt	Aim 1–2 oz	Chaparral[1] 2–3 oz (PA, VA, WV)	dicamba[1] 1 pt	Crossbow[1] 2–4 qt	GrazonNext HL[1] 1.5–2.6 pt (PA, VA, WV)	Grazon P+D[1] 3–4 pt (VA, WV)	Metsulfuron 60DF 0.1–0.3 oz	Milestone 5–7 oz (PA, VA, WV)	Overdrive 4–6 oz	Pature-Gard HL[1] 1–1.5 qt	Remedy Ultra 2–4 pt	Roundup/glyphosate 1–2 qt (spot treatment)	Stinger 0.66–1.33 pt	Surmount1 1.5–3 pt (VA, WV)
Stiltgrass, Japanese	N	N	N	8	N	N	7	-	N	7	**-**	-	N	**10**	N	N

Source: (Table reprinted from Flessner and Cahoon [2018, 5-264]).

Figure 5. Actively growing broomsedge.

At optimum nutrient levels and pH, tall fescue and other grass forages increase in density and will outcompete broomsedge. It can take multiple years to completely control broomsedge (Peters and Lowance 1974). For established broomsedge, spot spraying or using a wiper to apply glyphosate when broomsedge is actively growing provides good control.

Foxtails

Yellow foxtail (*Setaria pumila*; fig. 6), green foxtail (*Setaria viridis*; fig. 7), and giant foxtail (*Setaria faberi*; fig. 8) are all summer annuals, while knotroot foxtail (*Setaria parviflora*; fig. 9) is a warm-season perennial. The hairlike barbs on foxtail seedheads can cause mouth ulcers in horses and other livestock. These ulcers lead to reduced weight gain and a decline in animal health.

Figure 6. Yellow foxtail.

Figure 7. Green Foxtail

Figure 8. Giant Foxtail.

Figure 9. Knotroot foxtail. (Reprinted by permission from McCulough [2016].)

The easiest way to identify knotroot foxtail from annual foxtails is to pull up the plant and examine the roots. Knotroot foxtail has rhizomes and knot-looking roots, while annual foxtails have fibrous roots (McCullough 2016). Established knotroot foxtail also produces a seedhead much earlier in the year (June) than annual foxtails (August to September).

Improving the competiveness of desired pasture species can suppress foxtail species. Annual foxtails germinate in spring when soil temperatures reach 60 F. High rates of nitrogen fertilization should be avoided during foxtail germination to reduce see dling survival. Excessive nitrogen can also promote seedhead production and seed spread, so it should be avoided in fields with heavy foxtail pressure (McCullough 2016). At the same time, fields with dense stands of desirable forages require nitrogen applications to compete with foxtail species and prevent them from establishing.

Pendimethalin (Prowl H2O and Satellite HydroCap) and quinclorac (Facet L and Quinstar) can be used to control annual foxtails. Quinclorac at 0.375 lb active ingredient (ai) /A (Facet L at 32 fl oz/A) plus methylated seed oil at 1% volume/volume (v/v) is most effective when applied

within 10 days after the first hay cutting. Quinclorac has some short residual soil activity that will control foxtails that could emerge once sunlight reaches the soil after hay cutting. Quinclorac has the potential to injure orchardgrass under stress. Avoid applying quinclorac during high temperatures or drought stress.

Pendimethalin (Prowl H2O or Satellite HydroCap) at 3-4 qt/A is most effective when applied as a pre-emergence application. It should be applied in March or April, depending on location, before annual foxtails emerge. Pendimethalin generally provides about four to six weeks of weed control per quart applied if it is effectively incorporated into the soil with a quarter to half-inch of rain. Thick residue or forage canopy can inhibit pendimethalin contact with the ground and prevent it from becoming active in the soil. Using higher spray volumes and selecting nozzles that produce courser droplets can help pendimethalin reach the soil surface. Pendimethalin applied pre-emergence early in the season and followed by a postemergence application of quinclorac, or quinclorac alone applied later in the season after the first hay cutting, provides the greatest control of annual foxtails (Flessner, Johnson, and Randhawa 2017).

Established knotroot foxtail is not controlled by pendimethalin or quinclorac because it emerges from a rhizome. Spot spraying with glyphosate is effective at controlling knotroot foxtail when it is actively growing. It is recommended that applications be made prior to seed production (Flessner and Cahoon 2018). Fields heavily infested with knotroot foxtail might require renovation or rotation out of forage.

For more information, please consult the Virginia Coopeative Extension Pest Management Guide: Field Crops (https://www.pubs.ext.vt.edu/456/456-016/456-016.html) or the Mid-Atlantic Field Crop Weed Management Guide, available from Penn State Extension. (https://extension.psu.edu/mid-atlantic-field-crop-weed-management-guide).

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