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Considerations for Herbicide Use in Pastures

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Why use herbicides

Weeds are often not desirable in pastures for many reasons. Many weeds are less palatable to animals; the nutritive value of weeds decreases rapidly as they mature, and some can be toxic if consumed in large enough quantities. Weeds can also reduce or displace the amount of desirable vegetation. Weed infestations can often be prevented by implementing cultural practices that maintain a dense cover of desirable forage where weeds find it difficult to germinate and grow. When forage competition is weakened or when intolerable weed species are present, herbicide applications are often needed to manage weeds.

Control vs. Renovation

Forage stands should be evaluated to determine stand composition prior to applying herbicides. First, it is critical to know the weed species present and their growth stages in order to determine which herbicide(s) will provide control and what rate(s) to use. Second, in compromised stands, the percentage of undesirable species and/or bare ground must be known to decide if over-seeding or renovation will be necessary to improve the forage stand. If undesirable species and/or bare ground comprise less than 30% of the total ground cover, timely herbicide applications coupled with good forage management practices will usually be sufficient to improve the stand. If undesirable species and/or bare ground comprise 30 to 50% of the total ground cover, overseeding will need to follow herbicide applications. Herbicides must be chosen that will allow over-seeding of forages within a reasonable period of time. If more than 50% of the total ground cover is composed of undesirable species and/or bare ground, renovation will be necessary to improve the stand. Renovation is accomplished by killing all of the existing vegetation with a non-selective burndown herbicide such as glyphosate (sold as Roundup or other trade names) and/or tillage (plowing, disking, etc.), and then reseeding the forage crop.

Chemical weed control in grass forage

There are no herbicides labeled for controlling emerged weeds in a mixed stand of grasses and legumes. No herbicides are currently available for control of emerged grass weeds in grass forage, so cultural and mechanical practices are the best option for grass weed control. Prowl H2O is labeled for established forages, but must be applied before grass weeds begin to emerge.

Several herbicides are available for broadleaf weed control in grass forages. Active ingredient is the term that defines the chemical in an herbicide formulation primarily responsible for its phytotoxicity (ability to injure or kill plants). Some herbicides contain only one active ingredient while others contain two or more.

Currently only Sharpen herbicide is available for application before or immediately after planting to prevent weed competition while the crop is establishing. Once the forage grasses have emerged from the soil, Sharpen can not be used due to injury to the crop. Sharpen is the only herbicide that can provide this type of residual control for forage grasses. Sharpen will not control grassy weeds.

As mentioned earlier, Prowl H2O can be used to control annual grasses in established forages. Prowl H2O is only effective if it is applied before the grasses emerge from the soil. For grass species like crabgrass, this means applications need to be made by early-April (in Delaware) and a second application made by mid-June to provide control throughout the summer.

While several different active ingredients are available for use after broadleaf weeds have emerged in grass forage, a combination of the active ingredients 2,4-D and dicamba is considered the "standard" treatment for our area, this combination is effective on many weeds when applied at the appropriate growth stage, and is relatively inexpensive. 2,4-D and dicamba are sold under a variety of trade names. Appropriate use rates are based on numerous factors including forage species and age, weed species present, weed growth stage (seedling vs. regrowth after cutting, vegetative vs. reproductive, plant height, leaf stage), and season of application (spring, fall, or dormant).

Acceptable control of some species will require the use of alternate or additional herbicide active ingredients. Examples of species not effectively controlled with 2,4-D plus dicamba include bedstraw species, upright blackberry species, mouseear chickweed, dewberry species, honeysuckle species, kudzu, common mullein, multiflora rose, common pokeweed, sumac species, Canada thistle, trumpetcreeper, and many woody shrubs, vines, or trees.

Certain herbicide active ingredients are not appropriate for our region because they may limit replanting and crop rotation. Another consideration is restrictions due to plant residues and animal waste treated with specific herbicides. Some herbicides can remain active in plant tissue or animal manure and then cause injury when these are used near sensitive plants or mushrooms. Clopyralid and aminopyralid are such herbicides that are not recommended for use in Delaware.

Another consideration for herbicides are considering the waiting period between herbicide application and subsequent grazing or harvest (grazing and harvest restrictions). The length of time depends on the herbicides used and the animals being grazed or fed. You must wait the required time for the most restrictive herbicide applied. An additional rule of thumb is to wait the required time and resume grazing or harvest activities only if a half inch or more of rainfall has accumulated since the application. Otherwise, wait for a half inch of rainfall accumulation before grazing or harvest begins.

Some herbicides have a length of time between application and when the area can be seeded. All of this information is on the herbicide label, and it must be read before any product is applied. Always read the herbicide label before making herbicide applications.

Avoiding injury to non-target plants

Sensitive non-target plants such as other crops, lawns, ornamental plants, and trees can be seriously injured or killed when herbicides are allowed to contact their leaves, stems, roots, or the soil in their rooting zone. Do not spray within the drip line of sensitive trees, both within and adjacent to a pasture. Injured non-target plants can cause aesthetic or financial losses. Nontarget plant injury can be caused by pesticide drift or direct application to susceptible plant parts. Herbicide drift results in less herbicide available to provide weed control where it's needed.

Pesticide drift (physical or spray drift) - Pesticide drift is the movement of a pesticide through the air to an unintended (off-target) site. Physical drift occurs during application when spray droplets are moved away with wind before reaching the intended spray target. Size of the spray droplets, relative humidity, height of the spray boom, and wind speed all influence how far spray droplets will drift. Spray droplets can drift from a few feet up to a few hundred feet. All herbicides have the potential to move as physical drift. Not applying when wind speeds exceed 10 mph is the most effective way to avoid drift.

Vapor drift (or volatility) - Vapor drift occurs when the herbicide volatilizes (converts to a gaseous state) and moves freely with the air. Some herbicides are more prone to volatilization than others. Volatilization can occur during or up to a few days after application. Volatilized herbicide vapor can travel up to several miles. For herbicides that are subject to volatility, the risk of volatility increases with increasing temperatures. Plant growth regulator herbicides such as Banvel, MCPA ester, or 2,4-D have the potential to volatilize and should not be applied when daytime temperatures are expected to exceed 85°F. How an herbicide is formulated also influences its potential to volatilize. Ester formulations of 2,4-D and MCPA are more volatile than amine formulations, and the diglycolamine or sodium salts of dicamba (Clarity or Overdrive) are slightly less volatile than dimethylamine salt of dicamba (Banvel).

Injury from Drift - Serious injury can occur when susceptible plants come into contact with either spray particles or vapor. Most of the herbicides used in pasture and hay weed management have a moderate to high potential to injure sensitive plants. With highly sensitive plants like grape, tomato, and others, a very small amount of drifted herbicide can cause serious

plant injury or death. The potential for injury can be minimized by knowing where sensitive plants are located and not spraying when conditions favor drift.

Minimizing Drift - Herbicide drift can be minimized by applying the appropriate herbicide(s) with a properly calibrated, equipped, and functioning sprayer while paying particular attention to environmental factors. Using spray tips that create coarse spray droplets is important. Maintain the boom height as close to the target as possible while maintaining a proper spray pattern. Avoid herbicide applications during windy (more than 8 to 10 mph) or gusty conditions, during temperature inversions (see below), in foggy conditions, or when temperatures are high (> 85°F). Be certain that even slight breezes are blowing away from highly sensitive plants. Do not use mist-blowers or fog-type sprayers, like those used in orchards, vegetable production, or poultry houses, to spray pasture or hay.

Temperature inversions restrict vertical air mixing, which causes small suspended spray droplets to remain in a concentrated cloud. They are characterized by increasing temperatures with altitude and are common on nights with limited cloud cover and light to no wind. They begin to form as the sun sets and can continue into the morning. Ground fog may or may not be present. If ground fog is not present, they can be identified by the movement of smoke. During a temperature inversion, smoke from a ground source will layer and move laterally in a concentrated cloud. Temperature inversions increase the likelihood of both particle and vapor drift. Many herbicides do not recommend applications if there is no breeze to ensure an inversion is not occurring.

In general, it is difficult to apply herbicides during July and August in the mid-Atlantic region because of the high temperatures. Plan accordingly and be proactive by applying herbicides in the late spring.

Use of 2,4-D and dicamba for pasture weed control.

As mentioned previously, a combination of 2,4-D and dicamba is the standard herbicide treatment for controlling most broadleaf weeds in permanent grass pastures. The following are some considerations to help ensure safe, effective weed control with these products.

- **Evaluate forage stand composition**
  - Weeds + bare ground < 30% => herbicide + management = improved stand
  - Weeds + bare ground > 30 & < 50% => herbicide + over-seeding = improved stand
  - Weeds + bare ground > 50% => renovation = improved stand
- **Check weeds**
  - Know the weed species present and which are controlled by 2,4-D + dicamba
    - Weed size is important. Best control is achieved when:
      - Weeds are actively growing
      - Winter annual should be treated in the fall or early spring
      - Summer annuals should be treated in May or early June
      - Annual weeds are less than 4" tall
      - Biennial weeds are in the rosette stage
      - Perennial weeds are in the flower bud to the flowering stage; the time of year is dependent upon the weed species present
- **Check sprayer setup**
  - Calibrate for spray volume of 15 to 20 gallons per acre or more
  - Equip with appropriate spray tips (refer to the labels)
  - Maintain spray tip pressure to ensure proper droplet size
  - Set boom height 16 to 20" above weed height for 110-degree tips or 18 to 30 inches for 80-degree tips.
  - Do not use floodjet, hollow cone, or other types of spray tips that create small droplets.
  - Do not use mist-blower (orchard) or fog-type sprayers
- **Check sensitive plants**
  - Identify non-target sensitive (broadleaf) plants in the area
    - Broadleaf crops such as beans, fruit trees, grapes, peas, potatoes, soybeans, sunflowers, tomatoes, and other vegetables

        - Ornamental plantings including flowers, roses, bushes, trees, etc.
    - When sensitive plants are nearby
        - Use caution
        - Wait for appropriate environmental conditions to spray
        - Use amine salt formulations of 2,4-D
        - Use diglycolamine salt (Clarity) or sodium salt (Overdrive) of dicamba
        - Maintain a setback from sensitive plants or the drip-line of sensitive trees
- **Check environmental conditions**
    - Spray when the anticipated high temperature is less than 85°F
    - Do not spray during extreme relative humidity (RH) conditions, such as:
        - Low RH and high temperature conditions that favor rapid evaporation
        - Foggy conditions or temperature inversions
    - Check direction of any discernable wind (even slight breezes) relative to sensitive plants. Spray when breezes are blowing away from sensitive plants.
    - Do not spray when winds exceed 8 to 10 mph
    - Do not spray during gusty conditions
- **Check Herbicide Labels**
    - Follow all recommendations and restrictions on the herbicide labels.

More detailed information on weed management can be obtained from the "Virginia Tech Pest Management Guide - Field Crops". This publication is available online at https://www.pubs.ext.vt.edu/ - search for Pest Management Guide, Field Crops.