RWFM-PU-402
March 2023

UNDERSTANDING HERBICIDE TERMINOLOGY AND RESOURCES FOR USE IN RANGELAND AND PASTURE MANAGEMENT

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Land management often requires the reduction of undesirable plants to promote those more aligned with the goals of the property. We have several tools to change plant communities, including prescribed fire and mechanical, chemical, and biological tools, such as grazing. Properly selecting and integrating these control options is much easier when recommendations are easy to understand!

Though herbicides are widely available, understanding the terminology around their use is not always clear. There are resources available to help simplify herbicide use on rangelands and pastures. However, technology is always advancing and changing as more products come to the market and research is conducted. Read on to learn more about herbicide terminology and where to find additional information to support your land management goals.

GENERAL TERMS

Though this list is limited to the most basic, general herbicide terms, it provides an introduction to those most commonly used by pesticide applicators.

Pesticide: The Environmental Protection Agency (EPA) defines pesticides as "any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest. It can also include substances intended as plant regulators, defoliants, or desiccants and any nitrogen stabilizer" (EPA, *"What is a Pesticide?"*).

Pest: The United States Department of Agriculture (USDA) defines a pest as "any organisms (including plants and animals) that pose health, environmental, economic, or aesthetic risks. An organism that is a pest in one environment may be benign or beneficial in others" (USDA, *"Integrated Pest Management"*).

Herbicide: A chemical or chemical mix used to control or suppress unwanted plants. While herbicides are pesticides, pesticides also include insecticides, fungicides, rodenticides, etc.

Control: A term often used interchangeably with "plant kill." For example, after an herbicide application, one could expect __% control or apparent plant kill.

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Suppression: When an herbicide does not kill (or control) the entire plant but top-kills the plant or temporarily delays growth.

Herbicide Label: The label on the herbicide container or packaging, also found online, outlines the legal information behind the use and precautions associated with that herbicide. Sometimes there are "supplemental labels" that have additional uses for the herbicide, typically allowed for a predetermined period of time. Labels can be specific to certain states and can be searched online at the *CDMS website*.

LABEL TERMS

The pesticide label includes all the regulatory and safety information to use an herbicide appropriately. Always read the entire label before purchasing or applying an herbicide.

Active Ingredient: The chemical(s) in herbicide products that kills or controls plants.

Common Name: The shortened version of the active ingredient's chemical name. While people often refer to specific product names, referring to the common name allows for the easy comparison of generic herbicides with the same active ingredients as a name brand.

Product Name: The trade name or name brand of the herbicide product. For example, Roundup PowerMAX is a product name with the common name glyphosate.

Generic Herbicide: This is often not the original herbicide product name released on the market, as some companies may produce replicas of the original, name-brand herbicides after the patent has expired (often 20 years or so).

Use Rate: The amount of herbicide needed to control a particular plant, found either on the herbicide label or in research-based publications. The herbicide use rate will be specific to the plant species and possibly the application timing. The use rate may be given as the amount of product per acre (e.g., 32 oz/acre) or the percentage for individual plant treatments (e.g., 1% in solution).

Acid Equivalent: This refers to the amount of active ingredient that is the parent acid or could be converted into the parent acid of an herbicide. The percent of the active ingredient in a container is often compared to other generic options when the acid equivalents should be compared instead. The percent of active ingredient(s) relative to "other" ingredients in the container could vary depending on what else is in there, which is why comparing the acid equivalents (or true amount of parent

acid herbicide) is more reliable. If included, acid equivalents are found on the container's front label, just under the percent compositions.

Use Site: Where the herbicide can be legally applied. This information is usually found on the top of the label, underneath the logo(s). Active ingredients may be sold under different trade names for completely different use sites. Examples of potential use sites include rangeland and permanent grass pastures, rights-of-way, non-hayed perennial grasslands managed as rangeland, and Conservation Reserve Program (CRP) acres.

Buffers/Downwind Adjustments: The amount of area to remain unsprayed either on the downwind property/field boundary or near label-defined areas, such as external fence lines or shared bodies of water. These adjustments help to reduce the likelihood of pesticides drifting outside of the spray area.

Personal Protective Equipment (PPE): Equipment worn to minimize exposure to pesticides. The herbicide label will dictate exactly what PPE is required by law, though you may want to add additional PPE for added safety and cleanliness. Examples of PPE include nitrile gloves, N95 masks, chemical-proof aprons, and goggles/eye protection. All of the range and pasture herbicides require long pants, long-sleeve shirts, closed-toe shoes, and socks as a minimum.

Toxicity Signal Words: The pesticide label will have a large signal word to alert the user to any toxicity characteristics that need to be known. "CAUTION" is lower in toxicity, though this does not mean it is "safe." The potential human acute toxicity increases with the words "WARNING," "DANGER," and "DANGER–POISON."

HERBICIDE CHARACTERISTICS

Understanding how herbicides work, their physical properties, and safety information are important to handling and applying herbicides properly.

Safety Data Sheet (SDS): The International Hazard Communication Standard mandates that chemical manufacturers provide a safety data sheet outlining a chemical's properties, health and safety information, and storing and use information. It is best to have the SDS printed and readily available for all chemicals in use. The SDS was previously called—and is sometimes still referred to as—Material Safety Data Sheets (MSDS) and are available online along with product labels.

Formulation: Rangeland herbicides on the market are not usually pure herbicide molecules but are typically combined with salts, solvents, or surfactants to make a formulation that can be combined with a carrier, such as water or diesel. Most commonly used herbicides are solutions that dissolve in water, but there are also other types of products, including dry flowables, wettable powders, and even some granules.

Mode of Action: The way the herbicide acts on the plant at the tissue or cellular level to affect normal plant growth and development. Some common modes of action include growth regulators, amino acid synthesis inhibitors, seedling growth inhibitors, photosynthesis inhibitors, etc. Using products with different modes of action over time may help reduce herbicide resistance in plants.

APPLICATION TERMS

Various terminology is used to describe the application, or spraying, of herbicides. These terms are important for using herbicides in their intended way and applying them successfully!

Pesticide Applicator License: Pesticides in Texas are regulated through the Department of Agriculture (TDA). Anyone may apply non-restricted herbicides if they are following the label requirements. To apply restricted-use or state-limited-use herbicides, the applicator needs to have a Pesticide Applicator License and maintain it by acquiring the required number of continuing education units. Licenses may be for private applicators (applying on their own or managed property), commercial applicators (applying on others' property for compensation), or non-commercial/non-commercial political applicators (typically applies as a job duty or government worker). For information on license types and how to obtain a license, visit the *"Outdoor Pesticide Licenses"* section of the TDA's website.

Continuing Education Units (CEUs): Pesticide applicators in Texas must receive continuing education to meet license requirements. Currently, 15 CEUs are needed every 3 years for private applicators, and 5 CEUs are needed every year for commercial/non-commercial applicators. CEUs can be obtained by contacting your local county Extension office for events, which can be found on the *AgriLife county offices webpage*. Online courses are also available through *AgriLife Learn*. Always keep a copy of CEU certificates for your records.

Target Plant: The herbicide application is applied to control the target plant(s) and to reduce the effect on desirable, non-target plant species. The specific target plant does not have to be listed on the label to apply the product lawfully, but the herbicide does have to be applied at the appropriate use site.

Individual Plant Treatment (IPT): The application of herbicides through the leaf (foliar), stem (basal), or cut stump method to single plants as opposed to a broadcast method. The herbicide mix is typically applied with a hand-wand sprayer. IPT rates are given as percentages (e.g., 1%).

Broadcast Treatment: The application of herbicides in a swath or larger area by either ground broadcast (boom or boomless nozzles) or aerial broadcast (helicopter or airplane) as opposed to an individual plant treatment (IPT) method. Broadcast rates are given as an amount of herbicide per acre (e.g., 32 oz/acre).

Spray Volume per Acre: The amount of herbicide mix applied per acre to control the target plant(s). For example, 20 gallons of herbicide mix per acre (20 gal/ac). The spray volume desired may vary but can often be found on the label and is usually somewhere between 10 to 30 gallons of mix per acre. For broadcast applications, the spray nozzles and the speed the sprayer equipment is driven will determine the amount of spray volume applied.

Calibration: The process of determining how much spray mix volume comes from the spray equipment per acre to apply accurate rates of the chemical. Calibration also includes making sure that the output from each spray nozzle is consistent on a spray boom. Calibration trials are performed with plain water.

Application Timing: The season, growth stage of the target plant, weather conditions, or other criteria that ideally need to be met to get the best control (plant kill) with the herbicide application.

Adjuvant: An additional substance added to herbicide mixes to improve the herbicidal activity or application effectiveness. Most adjuvants are surfactants or crop oil concentrates. Though only a small amount is typically added to the herbicide mix, they can greatly increase the effectiveness of the application. Herbicide labels often dictate what adjuvants are best to mix with a given herbicide.

Non-ionic Surfactant (NIS): A common type of surfactant used in herbicide mixes to reduce the surface tension of the spray droplets on plant leaves and increase herbicide absorption.

Cut Stump Treatment: An individual plant treatment (IPT) method used on most hardwood species. The tree is cut off as flat and close to the ground as possible. The remaining stem and the cut stump surface are sprayed immediately after cutting with the recommended herbicide mix. This treatment method can be done at any time of the year.

Foliar (leaf) Applications: Individual plant treatments (IPT) or broadcast applications where a plant species' specific chemical mix (with a water carrier) is sprayed on all the leaves of the target plants. Application timing is critical for optimal control (plant kill). For example, healthy, mature green leaves actively conducting photosynthesis and transporting carbohydrates to the plants' roots are necessary for optimal control.

Basal (stem) Applications: An individual plant treatment (IPT) method used on most hardwood species. Each basal stem of the plant is sprayed with the recommended chemical mix 12 to 18 inches high and down to the ground. This treatment method can be done any time of the year, though it may work best when the tree is actively growing.

RESOURCES

These web-based resources are available as a quick reference to help decide the best herbicide method to meet rangeland and pasture management goals.

- *CDMS Herbicide Label Search*
- *REPK-PU-010: Chemical Weed and Brush Control Suggestions for Rangelands*
- *SCSC-PU-170: Quick Reference for Common Rangeland and Pasture Herbicides*
- *RWFM-PU-075: Broadcast Sprayer Calibration Guide*
- *Forage Fax website with timely forage and pasture information*

Brush Busters Individual Plant Treatment Herbicide Control Options

- *RWFM-PU-055: How to Master Cedar*
- *RWFM-PU-063: How to Avoid Lumps When Treating Cut Stumps*
- *RWFM-PU-076: How to Take the Green out of Greenbriar*
- *RWFM-PU-123: How to Control Honey Locust*
- *RWFM-PU-112: How to Beat Huisache*
- *RWFM-PU-064: How to Control Macartney Rose*
- *RWFM-PU-099: How to Beat Mesquite*
- *RWFM-PU-376: How to Brush Off Minor Species*
- *RWFM-PU-100: How to Control Prickly Pear and Other Cacti*
- *RWFM-PU-062: How to Take Out Tallow Trees*
- *RWFM-PU-375: How to Tame Texas Persimmon*
- *RWFM-PU-106: How to Take the Luck Out of Controlling Yucca*
- *RWFM-PU-067: Brush Busters Mixing Guide*

Brush Busters Cost Calculator for Individual Plant Treatment Projects

- *Brush Busters Cost Calculator App for Apple*
- *Brush Busters Cost Calculator App for Android*

Weed Busters Plant Treatment Herbicide Control Options

- *RWFM-PU-072: How to Control Common (Annual) Broomweed*
- *RWFM-PU-073: How to Get Drummond's and Common Goldenweed*
- *RWFM-PU-074: How to Neutralize Silverleaf Nightshade*
- *RWFM-PU-077: How to Pound Threadleaf Groundsel*
- *RWFM-PU-078: How to Sweep Out Perennial Broomweed*
- *RWFM-PU-081: How to Take the Sting Out of Texas Bullnettle*
- *RWFM-PU-082: How to Take the Kick Out of Western Horsenettle*

THE NEXT STEPS

Now that you have become familiar with basic herbicide terms, herbicide characteristics, and some of the resources available to you, what are the next steps?

Determine how often you may be applying herbicides that are restricted use or state limited use. It may be worth getting a pesticide applicator license if you find them necessary on a regular basis. More information can be located on the TDA's website under *"Outdoor Pesticide Licenses."*

Give yourself enough time to go through all the steps necessary to obtain a license. Remember to maintain it by obtaining the required continuing education units (CEUs) and keeping records of applications made. Record-keeping forms can be found on the *AgriLife Agricultural and Environmental Safety Unit's website*.

Otherwise, you may consider using non-restricted herbicides or hiring a commercial applicator when necessary.

TAKE-HOME MESSAGE

This article is a primer on rangeland and pasture herbicide basics. Using herbicides according to the label is important for maintaining their availability in the market and keeping applicators and our environment healthy.