CATEGORY 6

Right-of-Way Pest Control

Supplement

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Acknowledgments

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Utilizing Soft Water for Herbicide and Pesticide Mixing

How Hard Water Forms

All water falling to the earth as rain is soft, as it contains no hard minerals such as calcium, iron, or magnesium, among others. Once the rainwater reaches the earth, the water percolates into and through soil and rock, where it picks up tiny particles of the hard minerals. The water may travel for only short distances beneath the surface, or it may travel many miles through the passages in the soil and rock substrate, picking up more minerals as it moves.

The water may remain beneath the surface as ground water or make its way back to the surface to become part of a spring, a creek, a river, or lake. These are the sources from which most water is pulled for municipal water suppliers to treat and distribute to their customers.

Water from wells usually contains rather high levels of hard minerals due to travelling underground. Lake and stream water may have somewhat lower levels of those minerals, but still are likely to be in the moderate range of the hardness scale.

Importance of Using Soft Water in Mixing

The water to be used for mixing with herbicides and other pesticides for the purpose of spraying should be free of all these minerals.

If hard water is used in the mixing process, those hard minerals in the water will attach to the molecules of herbicide or pesticide as they are added to the mixing tank. That bond is unbreakable and cannot be reversed. Once those bonds have been made between the hard minerals and the herbicide molecules, that active ingredient of herbicide is not available to function, and that batch of spray mix will not have an effective outcome.

In order to become softened, the water must either:

1. Pass through a device which filters out the hard minerals **or**
2. Be treated with a chemical to make the minerals inactive

Most water softening devices use the chemical activity of ionic bonds to physically remove the calcium, iron, magnesium, etc. from the water. The charged ions of either sodium salt or potassium salt bond to the hard minerals as the water supply passes through a filter. The filter is a tank which holds thousands of grains of silicone, all chemically charged to attract and hold any hard minerals in the water. The salt ions bond to and hold those minerals in the filter.

Integrated Vegetation Management (IVM)

Integrated Vegetation Management uses a combination of several control measures to achieve results rather than only one control measure. The goal is not to eliminate unwanted species, but to maintain the population at or below an acceptable level.

Since there are many species of weeds with varied life cycles, no single IVM program is best under all circumstances. Develop an IVM program using the best combination of control methods for your needs through testing different control methods each season and keeping those that are most effective against the weed population. Using a variety of weed control tools reduces the reliance on any single method and the chance of weeds adapting to your management strategy.

Chemical controls are used extensively and are very effective. Various chemical controls with very effective results are available on the market to help manage populations of weeds.

Non-chemical vegetation controls can be used exclusively or integrated with chemical controls. Successful non-chemical control is best achieved through the integrated approach based on the biology of the target species. Non-chemical control should always be considered as a valuable tool in order to lessen environmental impacts associated with the use of chemical methods.

Mechanical control may be the method most utilized in the vegetation management industry. This includes such means as mowers, chainsaws, chipping, trimming, and cutting.

Cultural control is the planting of seeds appropriate for a desired outcome. Site assessment is important in making decisions on what seeds to sow.

Biological control is implementing the use of parasites, predators, or pathogens which inflict physical damage or disease on the target species.Biological control reduces weed density but does not eliminate the target weed. The effect of biocontrol agents is limited to the target weed and perhaps a few of its close relatives. Biological controls can be a very productive tool in an IVM program.

Resistance

Genetic variability allows some individual plants to survive diverse environmental factors and management tactics. A population of weeds with a genetic feature that allows it to survive a selection pressure is called a "biotype".

Individual plants with a gene that makes them resistant to an herbicide can survive the herbicide application and produce viable seed. This allows the resistant population of weeds to grow.

Rotating herbicides with different modes of action and application times will help delay weed adaptation and reduce the chance of resistance to any one mode of action developing.

Calibration

Calibration is the process of measuring and adjusting the amount of chemical a piece of spray equipment delivers to a target area.

In most applications, herbicides or plant growth regulators are applied at a rate expressed in "units per acre." The unit may be pints, quarts, gallons, ounces, or pounds – per acre.

Units To Know

- Gallon
- Quart
- Pint
- Ounce
- 1 lb = 16 oz (dry)
- 1 acre = 43,560 sq. ft.
- 1 mile = 5,280 ft.
- 1-mile-long X 8ft. wide = 1 acre

Basic Calibration

1. Spray an acre of area at a given speed, pressure and nozzle size. Measure the amount of water needed to refill the tank to the original level.
2. The quantity of water needed to refill is your sprayer's output per acre. Read the chemical label to find the appropriate amount of chemical to apply per acre.
3. Combine those two quantities to get your calibration expressed in "unit of pesticide per quantity of water."

Example: 2 quarts of 2,4-D per 50 gallons of water.

Calibrating equipment by test spraying less than a full acre

Calculate percentage of acre sprayed. Multiply area by percentage to equal 1 full acre. Multiply quantity of water by same percentage to find the amount of water sprayed per acre. It will be expressed in gallons/acre.

Calibrating equipment based on using the equation: 1 acre = 1-mile-long X 8 feet wide

1. Fill the spray tank to desired level – not fewer than 100 gallons. More water will allow for more accurate calibration.
2. Set up area to test spray, using only water. Run tests to determine consistent coverage width and speed. Remember: spray widths in increments of 8 feet work well for calibration calculation. You may adjust the pressure to attain the desired spray width to fit your needs.
3. Take sprayer on test run along spray route. The route should be free of obstacles such as intersecting roads where you would have to shut off the sprayer.
4. Spray 1 mile. Remember: 1-mile-long X 8 feet wide = 1 acre. If the spray width is 16 feet, each mile sprayed would amount to 2 acres in area.
5. After determining your sprayer's rate of application in gallons per acre (GPA) you must then measure your spray tank to establish how many acres the tank can treat.
6. Add the appropriate amount of herbicide to the tank based on number of acres to be treated.

Risk Assessment

Prior to any herbicide applications, an assessment should be made by comparing the perceived benefits of spraying the intended targets **against** the risks of possible negative effects or outcomes. If benefits outweigh the risks, you may proceed with the application. If the risks outweigh the benefits, the application should be abandoned.

Risk assessments of your spray operation should be ongoing throughout your day as the operation moves from one location to another because the situation and environmental circumstances change. Constantly be aware of changing weather conditions, targets, non-targets, protected areas, schools, wineries, and neighbors' property, among other factors.

Target Identification

Having the ability to identify the targeted plant species is critical when performing selective herbicide spraying. This ability or knowledge is gained through studying ID sources and follow-up observations during field visits including training instruction from knowledgeable veteran applicators and vegetation managers.

Proper identification of the spray targets is part of the spray operation and is required of applicators by the Department of Agriculture in order to be certified as an operator. Your spray record for each spray operation requires you to list those target species intended for control. Plant identification skills are achieved through ongoing training and practice in the field. Increased practice will improve that skill, and you will gain respect in your field through your knowledge.

Timing of Application

The label of the herbicide will include information on the stage of target plant development at which you will likely see the most effect from the chemical. Too often, target plants go unseen or unidentified until they are too far into their life cycle for an herbicide to be effective. (Example: teasels, thistles, and Johnson grass should be sprayed before they "bolt" in order to see the best results from the herbicide application.)

Proper timing of an herbicide application in relation to the life cycle of the target, along with the ability to identify the target plant, is critical to the control expected from a solid vegetation management program.

Soil Erosion

One of the pieces of collateral damage sometimes seen following the use of herbicides is the process of soil erosion. The application of non-selective herbicides, such as glyphosate, result in the destruction of most living plants it contacts. This opens the soil surface and exposes it to the erosive actions of rain and wind. Maintaining bare ground can be difficult and expensive, and may result in infestation by an unwanted or invasive plant species.

Consider alternatives to bare ground. The proper use of selective herbicides may give you a better result by allowing desirable species to survive and killing the unwanted species. This may be effective in areas such as guardrails, where spraying with glyphosate does not allow any plants to grow and hold the soil. Over time this results in loss of soil and could affect the safety of the guardrail.

In conjunction with selective herbicides, the use of plant growth regulators, PGRs, may help keep plant height to a minimum thereby reducing the need for mowing. This practice can be beneficial not only under guardrails but also along the mainline to aid in retention of lines of sight for safety.

Pollinators and the Environment

The application of pesticides has come under scrutiny as a possible cause of the decline in overall numbers of some key pollinator species. All operators and vegetation managers should be vigilant in their efforts to be responsible with all aspects of handling and applying pesticides.

Thousands of species of pollinators are at work in our world, carrying pollen from the male part of the flowers to the female part of flowers. This movement of pollen must occur for the plant to become fertilized and produce fruits, berries, vegetables, nuts, and for young plants to carry on the species.

The supermarkets we all shop at have extensive displays of produce, most of it available year-round. Many of those fruits, berries, and vegetables, and other food products from them are made possible by the work of the pollinator species – the bees, butterflies, moths, hummingbirds, etc. These species are the key component in the pollination process of those plants which produce these foods. If pollinator species did not exist, those produce displays would be much smaller with reduced selection of foods for human consumption. Without the help of pollinators, our selections in the produce isle may be reduced to only some citrus, root products like potatoes and radishes, and other products from plants which pollinate by wind. The same would be seen in the dairy isle where there may be as much as 50% reduction in items available. Alcoholic beverages such as wines, tequila, and others rely on plants to produce the fruits, berries, or nuts required to make that end product.

Be responsible in your work as you make decisions and assessments regarding the use of pesticides. We all live in and share this world together. It is very important to the betterment of this world to do our best to be good stewards of the land, water and living things.

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