

Protecting the Environment

Using Integrated Weed Management in Lawns

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There are more than 2 million acres of lawns in Texas and nearly 1.9 million acres of maintained turf in parks, golf courses and other public places. To control weeds in lawns, approximately 50 percent of homeowners use herbicides.

The use of herbicides increases as the public use of an area increases. An average of 59 percent of all turf areas are treated with some amount of weed control chemical. As much as 87 percent of school yard and turf areas and 97 percent of golf courses are treated with herbicides.

Herbicides are tools used to create beautiful landscapes. Herbicide use on lawns and ornamental plants keeps them free of weeds, creates an aesthetically pleasing area and maximizes plant growth. These tools, however, should be used in a balanced pest management program.

Herbicides, used unwisely or indiscriminately, add to environmental pollution. Herbicides will leach and/or runoff, especially if overwatering or excessive rainfall immediately follows application. Surface water can become contaminated with turfgrass

herbicides that are easily dissolved in water and used near hard surfaces such as streets, sidewalks, parking lots and driveways. Because excess water cannot soak into the ground, it accumulates and rushes into storm sewers and waterways as runoff. Storm drains, common in urban areas, carry water directly to the nearest stream. The water does not go through any treatment process.

To reduce the risk of surface and groundwater contamination, herbicide users should follow the principles of Integrated Pest Management (IPM) for weed control. The goal of IPM is to decrease dependence on chemicals by increasing the use of cultural, mechanical and biological control measures. IPM measures enable the turfgrass manager or homeowner to maintain vigorous, attractive turf, to protect the soil, and to preserve the purity of ground and surface water.

How can IPM help?

It is the responsibility of every herbicide user, whether an agricultural producer or urban homeowner, to prevent water pollution by herbicides. There are many things that homeowners can do to prevent pollution. Begin with maintaining a thick, healthy lawn

that prevents erosion and weed invasion. This practice also helps moderate summer heat, improves soil structure, and increases water infiltration while adding organic matter to the soil. Organic matter in the soil helps hold nutrients and herbicides near the soil surface where they are most effective. A healthy, vigorous stand of grass can outcompete most weeds, and also tolerates some damage from fungi and insects.

Integrated Pest (Weed) Management measures include a number of common sense, practical approaches to achieve economical and effective weed control with the least risk to the environment. By balancing the use of herbicides with other control tactics, IPM programs reduce reliance on herbicides. The best IPM measure to prevent groundwater contamination and to reduce runoff in urban areas is to maintain a dense, healthy turf. To accomplish this, the following turfgrass management practices are recommended.

REMINDER — Be water friendly and earth smart by reducing the potential for herbicide runoff in urban areas.

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Use prevention techniques: When purchasing lawn seed, buy seed that is free of weed seed as indicated on the label. When installing turfgrass sod, do not purchase sod that has weeds or other undesirable turf species growing in it. When buying topsoil to spread prior to lawn establishment or for leveling purposes in established lawns, receive assurance from the supplier that the soil is relatively free of weed seed and nutsedge tubers.

Plant adapted turfgrass varieties: Plant the best adapted variety and type of turfgrass for the area. Mow established turfgrasses at heights and frequencies recommended for the variety to increase turf density and vigor and to reduce weed and disease problems. This also helps keep herbicide-treated soil in place and increases water infiltration.

Follow recommended fertility practices: Moderate fertilization based on grass species, environmental conditions, mowing practices and turf use is critical. Both too much or too little fertility weakens the turf and allows weeds, diseases and insects to move in. Use a good slow-release fertilizer or organic program to keep the fertility level uniform. To determine fertilization requirements, a good soil test is needed. Contact the county Extension office for proper soil test sampling procedures. Samples can be submitted to the Soil, Water, and Forage Testing Laboratory at Texas A&M University or another soil testing laboratory.

Conserve water: Watering practices have a significant impact on weed populations and pest activity. Infrequent deep watering encourages the development of a strong, deep root system and stronger turf. Excessive watering can result in runoff of herbicides in surface water.

Aerate the soil: Aeration of the turf helps water penetrate to the proper depth and helps encourage a deep root system. Aeration can be done with mechanical or manual tools. Aeration also promotes beneficial soil microbial activity, which in turn builds a healthier growing medium for the turf.

Aeration and cultural practices such as vertical mowing and top-dressing help decrease thatch buildup. Thatch accumulation can increase insect and disease activity and reduce pesticide effectiveness. Aeration encourages herbicide infiltration with rainfall or irrigation water into the soil profile.

Manage insects and disease: Insects and diseases create weakened stands of turf and can cause death over large areas. This weakened and open condition invites weed germination and growth and also creates a situation where herbicide runoff can occur.

Employ mechanical measures: This includes some of the most common weed control activities such as mowing, hand pulling, hoeing and tilling. In extreme situations, whole sections of the lawn might need to be removed and resodded. Extensive soil conditioning is then possible before resodding. Basic, nonchemical approaches such as these have an obvious effect on reducing herbicides in the environment.

Spot treat with herbicides: Chemical treatment might be required if weeds reach a critical population. Use the least amount of herbicide over the smallest area that will effectively control the problem. Many herbicides available at lawn and garden stores are in ready-to-spray formulations. Read

the labels carefully; the herbicide might be selective and only control broadleaf or grass weeds or it might be nonselective and kill what-ever it contacts. A spot treatment will minimize the amount of product used and reduce the risk of runoff.

What are some considerations when using herbicides?

If the use of a herbicide on a broadcast basis is necessary, there are many points to consider.

Choose the correct herbicide: Is a herbicide application really needed? Is the weed problem likely to persist and cause more problems or will it die out after a short time? Should a preemergence (preventative) weed treatment be used or should herbicides be applied after a weed problem develops? Consider the answers to these questions before choosing a herbicide. Also, consider what weeds have been present in the past, study recommendation books and labels, and seek advice from an expert in the field.

Apply it properly: Herbicides often are overapplied in urban areas because the actual amount needed was not calculated or the application equipment was not calibrated. Over-application



A soil test helps determine fertilization requirements.

can cause damage to trees and other desirable plants.

Always read and fol-

low label instructions before applying any pesticide. Read the label carefully, making sure that all directions and warnings are understood before use, and then follow all label directions. Rinse empty herbicide containers at least three times and put the rinsate back into the spray solution. Do not use a herbicide unless it is registered for use on the specific type of turf-grass.

Be sure application equipment is properly calibrated and in good working condition before use. Do not mix or apply more than the amount needed. If possible, leave an untreated strip next to curbs, driveways, and sidewalks and use other weed control methods in these areas. This will keep the herbicide away from areas prone to runoff. Do not apply a preemergence herbicide when heavy rains that might cause runoff are forecast. Also, do not apply postemergence materials in windy conditions that would cause them to drift onto sensitive plants or sensitive runoff areas.

REMINDER — Before mixing or spraying any herbicide **READ THE LABEL**, obtain any personal protective equipment (PPE) required, and wear the PPE during the application.

Water after application: The amount and intensity of rainfall or irrigation after a herbicide application is important in preventing runoff. Runoff from the first heavy rainfall after application can carry the herbicide directly into storm drains emptying into lakes, rivers or streams. Watch the weather. Postemergence herbicide applications should be made at least 24 hours before a rain or irrigation. A slow, gentle $\frac{1}{2}$ inch rainfall after application of a preemergence herbicide is ideal if all the rain water soaks into the soil without forming puddles. If

A ready-to-spray herbicide is excellent for spot treatments.

no rain is in the forecast, water the treated area with $\frac{1}{2}$ inch of slow sprinkler irrigation to dissolve the herbicide and move it into the soil profile. Normal wetting and drying cycles generally will keep the herbicide in the top 1 to 6 inches of the soil profile. Never apply water to the point of runoff. Water as infrequently as possible, but try to wet the soil to a depth of 4 to 6 inches when water is applied. To check on the amount applied, collect water in a pie pan or rain gauge placed within the area being watered. It takes approximately $\frac{1}{2}$ to 1 inch of applied water to wet the soil 4 to 6 inches deep, depending on the soil texture.

Clean up property and equipment: Do not apply or spill the herbicide material on the driveway, sidewalk, curb or street. If a dry herbicide formulation is spilled, sweep it up immediately. If a liquid herbicide formulation is spilled, first absorb it with soil, pet litter or other inert absorbent then sweep it up and dispose at an appropriate site. Do not wash spills into the streets and storm drains.

Following an application, it is important to properly clean the equipment. Equipment rinse water can be sprayed over the area just treated. Never empty residues onto bare ground. This will concentrate the herbicide in the soil. Never pour rinsate, unused herbicide concentrate, or mixtures into storm drains, sewers, onto the driveway or down the sink. This can contaminate water supplies. Dispose of leftover concentrate and containers according to state and local regulations or at household hazardous waste collection sites.



Are calculations and calibration necessary?

Yes, they are absolutely necessary! Begin by determining the area to be treated. Use a tape measure and measure the length and width of the lawn to determine the area in square feet. If the lawn is irregular, sketch it out and divide it into smaller blocks. After the area to be treated is determined, check the recommendation on the label to calculate how much herbicide is needed.

Use the following examples to determine how to calculate herbicide requirements. In these examples, the lawn is divided into three rectangular sections of a) 20 ft. X 100 ft., b) 50 ft. X 20 ft. and c) 50 ft. X 35 ft. Lawn area is determined to be 2,000, 1,000 and 1,750 square feet, respectively.

Example 1. Calculate use of dry formulations (granules) of herbicides or dry weed and feed mixtures: The product label recommends applying 3 pounds on each 1,000 square feet of lawn.

- Divide the actual area to be treated by 1,000 to determine the relative area.
- Multiply the relative area by the recommended label rate (i.e., 3 lbs. per 1,000 sq. ft.).

Use an accurate scale to weigh out each amount, then spread it evenly over each separate area. The material must be spread uniformly. Apply one-

Table 1. Dry formulations.

Area to be treated	Relative area	Relative area X label rate
2,000	2	6 lbs.
1,000	1	3 lbs.
1,750	1.75	5.35 lbs.

half of the material with a granular applicator moving one direction over the area. Then spread the other half across the same area, moving at right angles to the first pass. After applying a granular material, use a slow sprinkler irrigation over the treated area to activate the herbicide. Note that although a large amount of material is weighed, there is very little active ingredient present. The high level of inert ingredient makes it easier to spread the material uniformly.

Example 2. Calculate use of liquid formulations mixed with water and sprayed: Postemergence herbicides usually are formulated as liquids. A product that contains 2 pounds active ingredient per gallon might be labeled to apply 2 fluid ounces mixed in 1 gallon of water per 1,000 square feet.

- Divide the actual area to be treated by 1,000 to determine the relative area.
- Multiply the relative area by the label recommended rate per 1,000 sq. ft. (i.e., 2 fl. oz.).
- Multiply relative area by gallons of water per 1,000 sq. ft. (i.e., 1 gallon per 1,000 sq. ft.).

Dry spreaders or sprayers can be used to apply herbicides.

Table 2. Liquid formulations mixed with water.

Area to be treated	Relative area	Herbicide	Spray Water
		Relative area X label rate (X 2 oz./1,000 sq. ft.)	Relative area X labeled gallons (X 1 gal./1,000 sq. ft.)
2,000	2	4 oz.	2 gallons
1,000	1	2 oz.	1 gallon
1,750	1.75	3.5 oz.	1.75 gallons

There are 4 quarts, 8 pints or 16 cups in a gallon. There are 2 tablespoons or 6 teaspoons in an ounce.

If recommended on the herbicide label, mix 1 to 3 teaspoons of surfactant with each gallon of water to ensure that the herbicide is taken in by the weed. However, be aware that adding surfactant can also increase the chance of damage to the turfgrass. A surfactant, similar to liquid dish soap, causes water to spread over the leaf surface and softens the wax coating, enabling the weed to take in the herbicide more readily. Apply the mixture uniformly with a well maintained sprayer to the premeasured area. Practice the application with clean water before applying the herbicide mix.

There are many application devices used to apply herbicides. Refer to specific application instructions on the herbicide product or on the applicator itself to ensure thorough and uniform coverage. Most application errors are caused by not calibrating equipment.

For additional information, refer to Extension publications that discuss calibration of specific application devices (*Sprayer Calibration for Turfgrass*, L-5331, and *Spreader Calibration for Turfgrass*, L-5330). Contact the area Extension turf specialists, Texas A&M University Department of Soil and Crop Science's Web site at <http://soil-testing.tamu.edu> or the county offices of the Texas AgriLife Extension Service.

WARNING — Any container or measuring utensil used to measure and/or mix herbicides must not be used for any other purpose.



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