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Water Management for the Home Lawn

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In today's society, water management decisions can no longer be based solely on agronomic needs. Water is a limited resource in Texas, and will become more limited as the population grows. If the problem is not addressed quickly, water-rationing programs will become common, and water prices will increase.

Fortunately for home lawns, homeowners can conserve a significant amount of water with no loss in turfgrass quality. How? Most homeowners drastically *over-water* their lawns. Over-watering can prove more harmful to lawn quality than under-watering.

This short publication is designed to help homeowners implement and manage an irrigation program that is water conserving in nature, but will still maintain high quality turf.

Water Supply and Conservation Education Programs

Factors Affecting Water Use

There are several factors that should be considered before establishing an irrigation program. Soil type, grass variety, level of management and environmental conditions all influence irrigation requirements.

Soil Type

Soil type can have a significant impact on irrigation scheduling. Of the three soil types (clay, loam, and sand), clay soils retain the most water following irrigation and thus need watering less often. However, water must be applied at lower rates over a longer period of time to properly wet a clay soil. This is due to the slow infiltration rates of water into clay soils. Sandy soils retain less water after irrigation than do clay soils, but little water is required to properly wet the soil profile. Therefore, irrigation time on sandy soils are normally much shorter but must be preformed more frequently than on clay soils. Loam soils fall between clay and sand soils in their water holding capacity. They hold a moderate amount of water following irrigation and require a moderate amount of water to properly wet the soil.

Water movement into some soils, especially the finer textured clays and loams, can be very slow. If a sprinkler head applies water faster than it can move down into the soil, significant water can be lost as run-off. To avoid this problem, use sprinklers with low application rates and/or irrigate to a point just before run-off, and then stop watering. Let the surface dry and then begin watering again. Repeat this process until the soil is wet to the desired depth.

Leaching loss can be a problem in some coarse-textured sands and loams. Both water and nutrients can be moved below the root zone where unavailable to the plant. Thus, watering to a depth significantly below the root zone should be avoided.

Grass Species

Using the appropriate grass can make water management much easier and less expensive. Species vary significantly in their water use rates and level of drought resistance (Table 1). Before establishing a new lawn, determine which grass species work best for your location. See Figure 1 for information about

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might be needed during dry period, to ensure the turf stays adequately hydrated.

Early morning is considered the best time to water. Wind and temperatures are low, and water pressure is usually good allowing irrigation to be applied uniformly with little evaporative loss. Watering late in the evening or at night maintains wet leaves for an extended period of time, significantly increasing the chance for disease. Mid-afternoon watering may lead to non-uniform distribution due to high wind speeds.

How Much to Water

It is recommended to thoroughly wet the soil to a depth of 6 inches each time you water. Applications that only wet a small portion of the soil profile produce weak, shallow-rooted turf that is highly susceptible to drought stress.

Soil characteristics, sprinkler type, and available water pressure determine how much water is needed to wet the soil to a depth of 6 inches and how long your sprinkler system will need to run to put out that amount of water. The following steps will help you determine how long to run your irrigation system.

- Set out 5-6 open-top cans randomly on the lawn (cans with short sides like tuna or cat food cans work best).
- Turn the sprinkler head or system on for 30 minutes.
- Measure and record the depth of water caught in each individual can.
- Calculate the average depth of water from all of the cans. For example you have used five cans in your yard. The amount of water found in the cans was as follows: 0.5"(1/2"), 0.4", 0.6", 0.4", 0.6". Add the depths together and then divide by the number of cans you used (5 in this case).

  0.5"+0.4"+0.6"+0.4"+0.6"= 2.5"¸ 5 cans = 0.5" of water in 30 minutes

- Use a garden spade or a soil probe to determine how deep the soil was wet during the 30-minute time period. Push the probe into the soil. It will easily push through the wet soil, but will become difficult when it reaches dry soil.
- Knowing how much water was applied in the 30-minute cycle and how deep that volume of water wet the soil, it is then easy to determine how long the sprinkler head must run to adequately wet the soil to a depth of 6 inches. (Example: The system put out .50 inches of water in 30 minutes wetting the soil to a depth of 3 inches. Therefore, 1 inch of water will need to be applied to wet the soil to a depth of 6 inches giving a run time of 1 hour.)

In some soils, especially heavy clay, it is difficult to irrigate to a depth a 6 inches. Never apply water to the point of run-off. If the sprinkler is applying water faster than the soil will absorb it, stop irrigating that area until the surface dries and then begin irrigating again. Water lost as run-off normally finds it's way to sidewalks or cement gutters both of which will never grow.

Checking Your Irrigation System

There are many different irrigation systems available to the homeowner. Whether an aboveground or underground system is utilized, it is important to make sure that it is working properly. A routine check should be made to ensure that water is being applied where it is needed, in the amount that it is needed, and in a uniform manner. Use the multiple open-top can method to check the distribution pattern and amount of water being applied, and then make any needed adjustments.

Sprinklers should never irrigate sidewalks, driveways, or streets. The appropriate water pressure for your sprinkler heads should be used to ensure water is applied as drops and not mist. Significant water can be lost as drift when water pressure is too high.

Figure 1. Areas of Adaptation for Turfgrasses in Texas

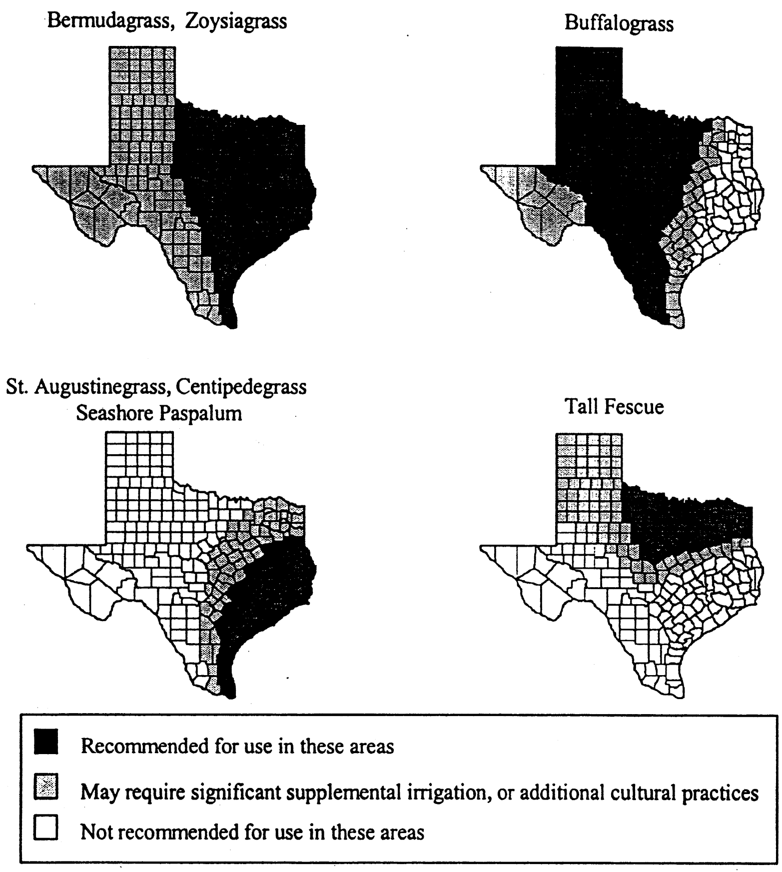

Table 3. Recommended mowing heights for common Texas turfgrass species

Grass species	Mowing Height (inches)
Buffalograss	2 - 3
Carpetgrass	1 - 2
Centipedegrass	1 - 2
St. Augustinegrass	1.5 - 3
Tall Fescue	2 - 3
Bluegrass	1 - 3
Zoysia	0.5 - 2
Common bermudagrass	1 - 2
Hybrid bermudagrass	0.5 - 1.5

into the soil to help improve soil structure and increase water infiltration rates. Contact your County Extension Agent for more information.

Environmental Conditions

Environmental conditions influence irrigation requirements. Low humidity, high temperatures, and/or high wind speeds can significantly increase water use rates. Under these conditions, water is quickly lost from the soil by transpiration and evaporation. In order to replace lost water, irrigation must be more frequent. Evapotranspiration rates are much lower when conditions are cool, humid, and/or still, significantly reducing the need for irrigation.

The time of year also impacts irrigation requirements. During the summer months, when temperatures are high, and days are long, supplemental irrigation requirements are high. During late fall, winter, and early spring, temperatures are cool, days are short and rain events are frequent, and thus irrigation requirements are low.

When to Water

Irrigation frequency depends on all the factors previously mentioned. Due to the unpredictable nature of weather, home-owners must be prepared to adjust their irrigation frequency accordingly. Do not get locked into one preset irrigation schedule. The "water and wait" approach is the recommended method. Irrigate deeply. Then, wait until the grass begins to show signs of drought stress before watering again. Symptoms of drought stress include grass leaves turning a dull, bluish color, leaf blades rolling or folding, and footprints persisting for an extended period of time after walking across the lawn. To time watering properly, look for the area of the lawn that exhibits water stress first. Irrigate the entire lawn when that area begins to show symptoms. Depending on environmental conditions, a lawn that is watered using a deep, infrequent irrigation should be able to go 5 to 8 days between watering. If the lawn has a very deep, extensive root system, time between irrigation might be longer. However, if soil is very shallow (less than 5 inches), irrigation will have to be more frequent.

Supplemental water requirements are lower during late fall, winter, and early spring. During these months, rainfall is normally high, and evapotranspiration rates low. Warm season grasses may be dormant, but they still require some water. Supplemental irrigation your specific location or contact your County Extension Agent for more information.

Management Practices

Fertilization, mowing, thatch, and soil compaction all influence the water requirements of your lawn.

The goal of a good fertiliztion program should be to provide all essential nutrients to the lawn in amounts it requires. Proper fertilization helps promote optimum shoot and root development. The deeper a plant's root system, the better able it is to utilize water held deep in the soil, reducing the need for supplemental irrigation. Fertility programs that supply excess nutrients, especially nitrogen, promote shoot growth at the expense of root development. The resulting lawn has a short, weak root system. Nutrient deficiencies, are equally as bad. Both root and shoot development decrease and the turf becomes more susceptible to stresses such as disease, insects, weed infestation, and drought. Therefore, moderation should be practiced when developing a fertility program.

Mowing frequency should be determined using the "1/3" rule. No more than 1/3 of the leaf area should be removed at any one time. Frequent mowing leads to a thicker, denser turf. The higher the density, the lower the evaporative water loss from the soil. Also, dense turfgrass is more competitive against weed invasion.

Thatch, the layer of non-decomposed organic matter found between the soil surface and the base of the leaves, can slow water movement into the soil and lead to run-off. Thatch accumulation results from heavy fertilization, improper mowing, and over watering. Topdressing, verticle mowing and aerification can be utilized during low stress periods to help control thatch development.

Soil compaction limits both water and air movement into the soil profile, and thus reduces shoot and root development. Aerification of compacted soils once or twice a year helps break up compacted layers and significantly increases air exchange and water infiltration rates.

Water Quality

Water quality can influence irrigation requirements of a lawn. In some areas of the state, irrigation water is high in salts. In these locations, turfgrass species with known salt tolerance (Seashore *Paspalum*), Bermuda-grass, and Zoysia) should be utilized in conjunction with deep infrequent irrigation. Light, frequent applications of water high in salt may lead to salt accumulation in the soil. If soil contains high levels of sodium salts, soil structure is reduced, and with it, water infiltration rates. Also, soils high in salt can increase the level of drought stress placed on the turf. Depending on soil type, gypsum can be incorporated

Table 2. Yearly nitrogen fertilizer requirements for common Texas turfgrass

Grass species	Maintenance Needs Lbs. of N/1000 sq. ft./year
Buffalograss	0 - 1
Carpetgrass	1 - 2
Centipedegrass	1 - 2
St. Augustinegrass	2 - 3
Tall Fescue	2 - 3
Bluegrass	2 - 4
Zoysia	2 - 4
Common bermudagrass	2 - 5
Hybrid bermudagrass	3 - 5

Table 1. Drought tolerance of the common southern turfgrass species

Excellent	Good	Fair	Poor
Buffalograss	Bermudagrass	St. Augustinegrass	*Zoysia Matrella*
	Zoysia Japonica	Centipedegrass	Kentucky Bluegrass
		Seashore *Paspalum*	Ryegrass
		Tall Fescue	