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Managing Sports Fields in Drought/Adverse Conditions

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According to the US Drought Monitor, at the end of July 2011, 99% of Texas is at one level of drought or another. This coupled with triple digit temperatures has placed a huge stress on available water supplies throughout the state of Texas. Most areas of the state have initiated restrictions on number of irrigations per week for turfgrass/landscape and in some cases water for outdoor use has been banned.

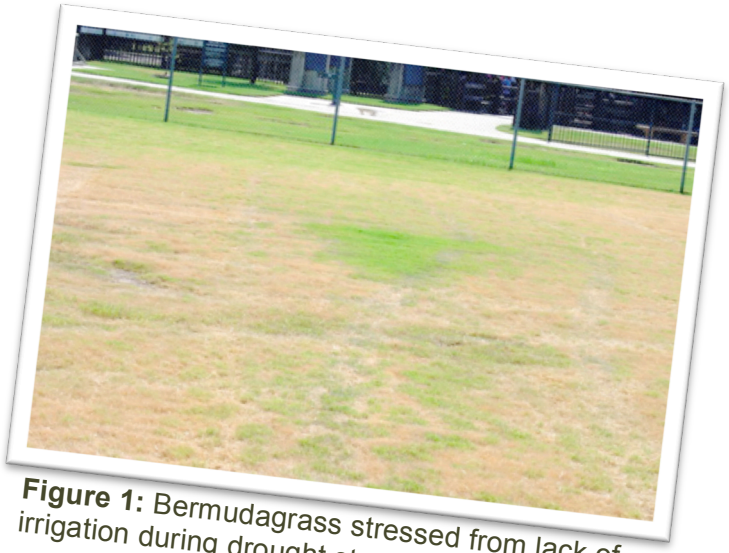

Figure 1: Bermudagrass stressed from lack of irrigation during drought stressed conditions

In the past few years, dealing with water restrictions for sports fields as well as other turfgrass sites has become a common event. Drier than normal weather conditions along with increased population growth in Texas over the past 10 years has created problems with water supplies in different areas of the state. It has become normal for many high schools, city parks and even colleges to have the amount of water available for their sports fields either severely reduced during summer months or in some cases completely turned off (**see Figure 1**). This article will discuss the different levels (stages) of water restrictions, managing sports fields to prepare them for drought/adverse weather conditions and discuss how to properly manage a sports field during drought conditions.

Understanding water restriction regulations can often be very confusing. In Texas, water allocations are controlled by different water districts throughout the state. These water districts will sell a certain amount of water each year to its different constituents in the water district such as cities. The amount of water provided to each constituent is usually

based on previous usage (averages) along with predicted growth demands. The water district is usually the authority that determines when the different stages (levels) of water restrictions will occur, which is based on water availability. Note, in some cases the cities will determine their own water restriction guidelines in order to conserve available water. The cities will determine how they will meet the reduced available water by restricting the number of days individuals can water and the time of day they can water. Generally, it is the water districts determination as to when the water restrictions will be removed. It is important to understand the different levels of water restrictions in your area and what they mean. Outlined below is a list of the different stages of water restrictions used in Texas. While these stages or level of water restriction may vary in different areas of the state, level of water restrictions are pretty similar.

Stage 1: Mild (voluntary restrictions).

1. Stage 1 is strictly a voluntary restriction on outdoor use of water.
2. The purpose of Stage 1 is to raise the public's awareness of a water shortage problem.
3. In some cases, cities may restrict the amount of water available for outdoor use to government facilities.

Stage 2: Moderate (mandatory restrictions).

1. The goal of stage 2 —restrictions is to reach a 2% reduction in water use.
2. Generally, watering is limited to after 6:00 pm in the evening and before 8:00 am in the morning.
3. Cities will also generally limit irrigation to twice per week during stage 2.

Stage 3: Severe (mandatory restrictions).

1. The goal of stage 3 is to reduce water use by 5%.
2. Generally, irrigation is limited to one time per week.
3. As in stage 2, hours for irrigation are limited to after 6:00 pm and before 8: 00 am.
4. In stage 3, hand watering of landscapes is still allowed.

Stage 4: Emergency (mandatory restrictions).

1. The goal of stage 4 restrictions is to reduce water use by 10%.
2. Basically, all outdoor use of water is prohibited.
3. In some cases, the use of hand watering for foundations is still allowed.

Understanding these different stages of water restriction will allow the sports field manager to best determine the level of management practices to use on their fields. During stage 1 and 2 restrictions, continue to use best management practices such as fertilization, mowing, irrigation and aerification to produce as healthy a stand of turfgrass as possible for the field. This is the time to prepare the turfgrass on the sports fields to better survive an extended restriction of water for use on their fields. If stage 3 restriction is imposed, then reduce the amount of fertilization, especially nitrogen for the turfgrass. Forcing excess growth during drought conditions will only make the situation worse. Slightly raise the height of mowing during stage 3 to help relieve some of the stress on the grass. However, always stay within the range of recommended mowing height for the particular turfgrass being grown on the sports field. Do not mow fields if grass is showing signs of moisture stress. As long as adequate soil moisture is still available, continue to aerify the fields at normally scheduled times for aerification. Apply herbicides for weed control with caution during stage 3, since turfgrasses under moisture stress are more subject to injury from herbicide applications. At stage 4, then discontinue the application of any fertilizer to the fields unless adequate rainfall occurs. Also, discontinue mowing the fields at the stage 4 level of water restrictions. Turfgrass injury can occur when fields are being mowed during extended drought conditions.

As long as adequate moisture is available, continue to fertilize the fields with recommended rates of nitrogen. **Table 1** contains the recommended rates of nitrogen for the different turfgrasses used on sports fields in high schools and city parks. Once water restrictions are imposed, then consider reducing the amount of nitrogen on the fields and if water is totally cut off, then discontinue the application of nitrogen to the fields. It is important to use soil testing to make sure all other essential nutrients are available for healthy plant growth, especially potassium. Potassium is a key nutrient in stress tolerances such as drought. Turfgrass plants low in potassium will not be able to survive drought conditions as well as plants containing adequate levels of potassium.

Table 1. Recommended Rates of Nitrogen for Turfgrasses Grown on Sports Fields

Turfgrass	Nitrogen Lbs. N/1,000 sq.ft./year
Common bermudagrass	5 to 6
Hybrid bermudagrass	6 to 8
Zoysiagrass	3 to 4
Seashore paspalum	2 to 3
Kentucky bluegrass	3 to 6
Tall fescue	4 to 7

While all cultural practices are important in producing a dense, healthy stand of turfgrass on sports fields, mowing is one of the most important (see **Figure 2**). As long as supplemental irrigation is available, continue to mow the field at the recommended height and frequency for the turfgrass on your field. See **Table 2** for recommended mowing height of different turfgrasses used for sports fields. The key is to mow often enough so that you never remove more than 30 to 40% of the leaf blade. Removal of excess leaf tissue will place an additional stress on the turfgrass. Once supplemental irrigation is restricted, then raise the height of cut on the field to the upper end of the recommended mowing height for the type of turfgrass on your field. For example, the recommended mowing height for hybrid bermudagrass is 0.5 to 1.0 inch. During water restrictions, raise the height of cut to 1.0 to 1.5 inches. Mowing the hybrid bermudagrass at 2 to 3 inches will not save water and this height of cut will produce a thin, open stand of bermudagrass that is easily worn out once play starts on the field. Keep mower blades sharpened to provide a good clean cut of leaf tissue. Dull mower blades will shred or tear end of the leaf blades, thus adding an additional stress to the turfgrass plants.

Figure 2: Proper mowing is one of the key cultural practices in developing a dense, healthy stand of turfgrass on a sports field. The healthier the turfgrass, the better able it can survive extended drought conditions.

Table 2. Recommended Mowing Height for Turfgrasses Used on Sports Fields

Turfgrass	Mowing Height (inches)
Common bermudagrass	1.0 to 1.5
Hybrid bermudagrass	0.5 to 1.0
Zoysiagrass	0.75 to 1.5
SeaShore paspalum	0.5 to 1.0
Kentucky bluegrass	1.5 to 2.5
Tall fescue	1.5 to 3.0

Figure 3: Conduct irrigation audit to make sure irrigation system is working as efficiently as possible. Darker green bermudagrass was due to irrigation head not rotating.

As long as water is not restricted, continue to irrigate fields deeply and as infrequently as possible. Deep, infrequent watering will encourage a deeper more extensive root system. Frequency of irrigation and amount of supplemental water applied per irrigation cycle will be determined by soil type, turfgrass, irrigation system and use of the field. It is important to run an irrigation audit on the irrigation system to insure that supplemental water is being applied as uniformly as possible and that you are only applying the necessary amount of water required for healthy plant growth (**see Figure 3**). Most water restrictions allow a once per week schedule for irrigation. A once per week irrigation schedule makes it difficult to apply enough water on one field, but makes it impossible to apply enough water when you are talking about watering large sports field complexes that cover 30 to 40 acres. During 2006, many city parks and school districts were able to lobby for a variance on these large complexes with the water authorities by showing that they had conducted an irrigation audit on their systems and that they were only applying the necessary amount of water needed for their fields. A considerable amount of irrigation water is lost through run-off, especially on fields with a crown. To help reduce water loss from run-off, use the cycle and soak method for irrigating the fields. For this to work, you must first observe the different zones

Figure 4: During severe drought conditions either discontinue watering areas not in play or water occasionally to keep grass alive.

to see how long it takes before run-off starts occurring. Then monitor the site to see how long it takes for the water to soak into the soil profile. If run-off occurs in 15 minutes, then set the station to run for 15 minutes and then come back later and apply a second application of 15 minutes. If you need more water, then do a third cycle at 15 minutes. Note, there will be limitations to this cycle and soak method if you can only water your fields once per week and you have multiply fields at the complex. Another way to save water during extended drought periods is to only water areas of a large complex that are in play (see **Figure 4**).

Aerification is an important tool that can be used to prevent or control soil compaction on sports fields. As long as adequate soil moisture is available, continue to aerify your sports fields on your regular scheduled basis. However, once irrigation is restricted or completely eliminated, then discontinue aerifying the fields.

One of the most difficult things to manage during drought conditions is field use. While managing field use is an extremely difficult job, if the drought continues and supplemental irrigation is severely reduced or eliminated, then restricting the amount of play (events) on your sports fields will become critical. Continued use, especially excess use, of sports fields during drought conditions will result in the loss of turfgrass on these fields. The amount of turfgrass loss will be determined by the amount of play as well as the length of the drought conditions. Individuals in charge of scheduling play on your sports fields need to be fully aware of this potential loss as well as understand the cost involved in reestablishing turfgrass back on the fields once the drought is over. Another issue that needs to be fully considered is player safety. The majority of sports fields at city parks and school districts are constructed using native soils that are often high in clay and/or silt content. Once these fields become dry, not only do they become very hard, but they also tend to form cracks in the playing surface (see **Figure 5**). Hard, compacted surfaces increase potential for player injury, especially head injuries, while cracked soils increase the potential for ankle and knee injuries to the players.

While using the practices outlined above may not prevent the loss of turfgrass on your sports fields during extended drought conditions, if watering is eliminated, they will provide the best possible chance for keeping as much turfgrass alive as possible during the drought conditions.

Figure 5: Cracking of soils during drought conditions. This creates unsafe playing conditions for players.

Key steps for managing sports fields during drought conditions:

1. Do an irrigation audit on your irrigation system to make sure it is operating as efficiently as possible. Fix any problems that are noticed during the audit. Use the cycle and soak method to reduce loss of water from surface run-off.
2. Reduce fertilizer applications, especially nitrogen during drought conditions. If stage 4 is imposed, discontinue application of any fertilizer.
3. Raise mowing height during drought conditions and if stage 4 is initiated, discontinue mowing the fields.
4. Restrict use of the fields. Eliminating or reducing use of fields may mean revenue loss, which is tough to do. However, in the long run how much will it cost in loss revenue and expense to redo the field if the grass dies from over use in drought conditions.
5. Do not allow unofficial play on the field(s). This may mean having cities pass an ordinance to fine individuals who use the field without permission.
6. Apply herbicides with caution. If moisture is available, then it is possible to apply some weed control. However, in stage 4, discontinue use of herbicides.
7. Monitor turfgrass for any insect and/or disease problems. There are very few diseases or insects that will occur in these conditions, but it can happen. If disease/insect activity is present during drought and you do not control them, the loss of turfgrass on the fields will be increased.
8. Get to know the water district personal that supply water to your district. Let them know what you are doing to conserve water, (audits, fixing irrigation problems, etc.).

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