A PRACTICAL RESEARCH DIGEST FOR TURF MANAGERS

TURFGRASS TRENDS

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Inconsistent Weather Wreaks Havoc on Turf

This was an odd year for weather. Some areas were drier than usual, while others were wetter. This led to a number of problems for turf managers. Depending on the geography and rainfall, anthracnose, curvularia blight, gray leaf spot, microdochium patch, rhizoctonia blight and take-all root rot were rampant. However, there are cultural changes a manager can make to offset some of the curve balls thrown by Mother Nature.

The articles below take a look at typical situations in the Southwest and the Midwest this year, where Mother Nature threw even more curve balls than usual.

WEATHER **TEXAS**

Dry Winter, Wet Summer Caused Problems for Superintendents in Texas

By James McAfee

One of the old sayings in Texas is, "If you don't like the weather, just hang around a while because it will change."

The fall and early winter months for 2001-2002 in the state were dry, with temperatures above normal. This was followed by freezing temperatures that occurred in late February to early March. Next, for spring and early summer, the temperatures turned cool, and we received record rainfall in some areas of the state. In fact, by midsummer many areas of northeast Texas had already exceeded the average rainfall for the entire season, and temperatures remained well below normal. Rainfall continued in many areas of the state throughout the summer months, which is unusual for Texas.

While these weather conditions were welcomed by some individuals, because of lower water bills and reduced air-conditioning costs, these unusual weather patterns created numerous problems for superintendents.

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WEATHER **MIDWEST**

Abnormal Reversal of Conditions Led to More Disease in Midwest

By Karl Danneberger

For most of the Midwest, this was the year of extremes. Cool temperatures and wet conditions characterized the spring weather while the summer was the exact opposite: hot and dry.

In April, rainfall was 1 to 4 inches above the normal average, while average temperatures were two to five degrees below normal for much of the area.

This trend continued in May, with rainfall amounts of 6 to 10 inches above normal monthly averages while temperatures were close to normal.

June was a transition month, with the first part of the month receiving relatively high amounts of rainfall and normal temperatures, while the last half of the month saw a lack of rainfall and higher temperatures.

July and August had precipitation amounts half the normal rainfall expected, while average temperatures were five to eight degrees higher than

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One of the major problems associated with the unusual weather was increased weed invasion, particularly the grassy weeds such as crabgrass and dallisgrass. Besides increased weed problems, several turfgrass disease problems such as take-all root rot, rhizoctonia blight, curvularia blight and gray leaf spot in St. Augustinegrass were a more active in 2002.

Weed infestation

By the end of August, our office had received numerous phone calls from superintendents complaining about the large number of weeds on their properties. Most were inquiring as to what they could do in late August to September to remove unsightly weeds. While the arsenicals herbicides such as MSMA and DSMA can still be used at this time of the year for control of grassy weeds in warm-season turfgrasses such as bermudagrass and zoysiagrass, I generally discourage individuals from making MSMA/DSMA treatments in the fall. Control is harder to obtain because of the maturity of grassy weeds and, while the herbicides are selective, they do affect the growth and development of the warm-season turfgrasses going into the fall period.

My general response was to encourage the callers to live with these weeds for the rest of the season and then, most importantly, determine what led to such large populations of grassy weeds in 2002. Then, in future years when similar spring and early summer weather patterns occur, they can adjust their herbicide program to achieve a higher percent of control.

While there can be several reasons for above-normal weed populations, I believe the main culprit in 2002 was the unusual weather patterns, particularly above average rainfall in the spring and early summer months and below normal average temperatures which occurred until mid to late June.

In late May through mid-June, nighttime temperatures remained in the high 50 degrees F to low 60 degrees F range and the daytime temperatures were in the high 70 degrees F to low 80 degrees F range. Normally by the end of May, this area of the state will have mid to high 70 degrees F nighttime temperatures and mid to high 80 degrees F daytime temperatures. Freezing temperatures occurred in late February to early March, which were followed by below normal temperatures and excess rainfall.

This resulted in a slow, delayed spring transition for our warm-season turfgrasses such as bermudagrass and St. Augustinegrass. By the time warm-season turfgrasses were actively growing in late June to early July, grassy weeds such as crabgrass, goosegrass and particularly dallisgrass had already become well-established in many golf courses.

Loss of some turfgrasses because of late freezes along with the slow development of the warm-season turfgrasses in the spring and summer of 2002 gave the weeds an opportunity to become well-established before the warm-season turfgrasses finally could form dense, actively growing turf.

In north Texas, late February to early March is generally regarded as the ideal time to apply pre-emergent herbicides for the control of summer annual grassy weeds such as crabgrass, barnyardgrass and goosegrass.

While some companies will make a second application in late spring, superintendents generally make one pre-emergent herbicide application in the spring for the control of summer annual grassy weeds.

In years such as 2002, where excess rainfall occurs in the spring and early summer months, the pre-emergent herbicide applications made in late January to early February start breaking down in the soil well before the turfgrasses are actively growing.

For many of these turfgrass sites, individuals managing these areas continued to make supplemental applications of irrigation even after high rainfall. This just adds to the problem of early breakdown by some of the pre-emergent herbicides. Continued rainfall throughout the summer months provided excellent conditions for continued germination and growth for many of the annual grassy weeds.

MSMA/DSMA

While it's normally recommended to start making postemergent applications of MSMA and/or DSMA for the control of grassy weeds in mid to late May for northern Texas, the below-normal temperatures in 2002 were still too cool for good activity with these products.

For the arsenicals to be effective, temperatures need to be in at least the mid to high

80 degrees F range. Unfortunately, many individuals only looked at their calendars in 2002 and did not pay attention to the weather conditions. As a result, they started making their MSMA/DSMA treatments in early to mid-May as usual. Under ideal weather conditions, two to three applications of MSMA or DSMA should provide effective control of most grassy weeds.

However, when these products are applied below the required temperatures for good activity, it make take any where from three, four or even more applications to achieve effective control. These extra applications are not only costly, but can affect the normal growth and development of the warm-season turfgrasses at this time of the year. Even if good control is obtained in late spring to early summer months, the continued rainfall that occurred in 2002 helped more annual grassy weeds invade the turfgrass sites by mid to late summer months.

In years such as 2002, it will probably be necessary to schedule more than one series of postemergent applications for grassy weed control.

Companies contracting for weed control applications should build into their chemical budgets the possibility of having to make more than one series of applications for grassy weed control during years such as 2002. Also, in years where below normal temperatures occur in late spring and early summer, it will be best to delay the postemergent grassy weed control applications until the weather has become hot enough for good control to occur.

Overseeding factors

Another factor that contributed to the large number of grassy weeds in late summer 2002 is the practice of overseeding warm-season turfgrasses with a cool-season turfgrass such as perennial ryegrass.

This has been a common practice for golf courses in the South for many years. With below-normal temperatures and above-average rainfall for the spring and summer months of 2002, the perennial ryegrasses did not start to die off until late July to early August.

Once the ryegrasses did die in late summer, this left thin open areas in the warm-season turf which provided ideal conditions for increased germination and growth of annual grassy weeds such as crabgrass.

In discussions with superintendents, this had to be one of the worst years for transition from the perennial ryegrass to the warm-season turfgrasses. Again, this slow transitioning of the ryegrass, along with the loss of warm-season turfgrasses, provided an ideal environment for the invasion of weeds, particularly the grassy weeds.

In years like 2002, it may be necessary to start forcing out the overseeded ryegrass in late spring to early summer to provide the warm-season turf a chance to form a dense, healthy stand of turfgrass.

Heightened disease problems

While the unusual weather conditions in 2002 had a major influence on weed populations in turfgrass, it also contributed to an increase in several turfgrass disease problems, such as take-all root rot, rhizoctonia blight, curvularia blight and gray leaf spot in St. Augustinegrass.

Of these three major disease problems, take-all root rot was the most active disease problem in St. Augustinegrass in the spring and summer of 2002. While the pathogen causing the disease has been identified in most warm-season turfgrasses in Texas, it has especially become a major problem in St. Augustinegrass throughout Texas.

According to Dr. Phil Colbaugh, experiment station plant pathologist at Texas A&M/Dallas, this pathogen is commonly found affecting the root system of our warm-season turfgrasses. The activity of this particular disease is greatly enhanced by prolonged periods of rainfall and/or excess supplemental irrigation in the spring and early summer months.

Take-all root rot is most active in the fall and spring months when soil temperatures are in the 60 degrees F to 65 degrees F range. However, above ground symptoms for this disease may not appear until summer months when the weather becomes hot and dry. The continuous heavy rainfall in late spring and early summer months of 2002 provided excellent growing conditions for this particular turfgrass pathogen, and its affects on St. Augustinegrass along the Gulf Coast were devastating.

Activity of the pathogen is also closely associated with stress problems such as hot, dry weather, excess nitrogen fertilizer, excess herbicide applications, thatch, soil compaction and excessive shade problems.

In a recent survey, St. Augustinegrass infected with St. Augustinegrass Decline (SAD) was also more susceptible to take-all root rot activity. The unusual weather pattern that occurred in the winter of 2001 and through the spring and summer of 2002 no doubt enhanced the activity of the disease.

The winter months for 2001-2002 were dry with mild temperatures until late February and early March. Then in late February to early March, northern Texas was hit with several hard freezes, followed by continuous rain for the rest of the spring months and early summer months. These late winter freezes no doubt caused some damage to the St. Augustinegrass, particularly if it had not been watered during the winter months. Applications of excessive nitrogen fertilizer in the spring months to force recovery of damaged areas most likely added to the stress.

Also, applications of pre-emergent and postemergent herbicides to control weeds in these already thinned areas added to the additional stress to the turfgrass plants.

Initial symptoms for take-all root rot are yellowing of the St. Augustinegrass leaf blades in early spring. This yellowing is often mistaken for iron chlorosis, which is a common problem for St. Augustinegrass in Texas. However, applications of iron to these lawns will not correct yellowing problems caused by take-all root rot. As the turfgrass plants become stressed, patches of dead grass start to appear. These patches, which range in size from 1 foot to 2 feet and up to 5 feet to 6 feet, generally appear in the late summer months during the hot, dry weather conditions.

Close examination of the St. Augustinegrass plants will usually reveal plants with short, rotted black roots. In some cases, infected stolons will also have lesions on them. In severe conditions the stolons may become rotted.

Generally, the application of fungicides to control take-all root rot have not been effective. Fungicides listed for the control of this particular pathogen include azoxystrobin, myclobutanil, propiconazole, thiophanate methyl and triadimefon. In fungicide trials for take-all root rot in Texas, fall application of azoxystrobin provided the most effective control. These fungicides appear to work best as a preventive program applied in late fall and early spring.

Fungicides applied as a curative for take-all root rot have generally given little control. Starting in 1999, we evaluated several organic topdressing products for control of take-all root rot in St. Augustinegrass. Of the six different treatments used in our first trial, a composted cow manure product provided good to excellent recovery of areas in St. Augustinegrass.

Further trials in subsequent years continued to demonstrate good turf growth in response to the composted cow manure product. However, disease control of take-all root rot was best obtained using a peat-moss material. Use of acid topdressing to reduce pH of the exposed stolon layer appears to be an effective way to control this disease.

While excess rainfall cannot be prevented in some years, it is possible to control other factors which may enhance this disease during these high rainfall periods. When weather conditions happen such as in the spring of 2002, avoid applications of high rates of nitrogen fertilizers. Apply light rates of a fertilizer containing nitrogen and potassium in the same ratio such as a 1-0-1.

Use an acidifying nitrogen source such as ammonium sulfate when possible. Application of lime products to areas affected with take-all root rot can enhance activity of this particular disease. Try to use acidifying type products whenever possible.

Also, avoid overapplication of herbicides on St. Augustinegrass. As a general rule, I have always recommended against the use of pre-emergent herbicides on St. Augustinegrass under stress in the spring months. Application of a pre-emergent herbicide to already stressed St. Augustinegrass can further weaken its root system.

Application of postemergent broadleaf herbicides to St. Augustinegrass during the spring transition can result in damage to St. Augustinegrass, particularly if it is already under stress.

Controlling thatch, alleviating soil compaction and reducing excess shade could also help prevent take-all root rot activity. If the turf has a history of take-all root rot problems, applying a preventive fungicide application in early fall and again in early spring when soil temperatures are in the 60 degrees F to 65 degrees F range could also lessen the activity of this pathogen.

Rhizoctonia blight

Take-all root rot in St. Augustinegrass is often mistaken for rhizoctonia blight. One of the easiest methods to distinguish the difference between these two common turfgrass diseases is to examine the affected leaves of the St. Augustinegrass.

The yellow to tan leaves of plants infected with rhizoctonia blight can easily be pulled from the stolons, while the leaves of plants affected with take-all root rot are still firmly attached to the stolons.

Secondly, roots of plants infected with brown patch generally remain white, while the roots of plants infected with take-all root rot are shortened, black and usually rotted.

Rhizoctonia blight is primarily a disease problem for warm-season turfgrasses in the fall when nighttime temperatures fall below 70 degrees F and daytime temperatures are in the low to mid 80 degrees F range. In springs such as 2002, when continuous rainfall and cooler than normal temperatures occur, this pathogen can become active on warm-season turfgrasses.

It should also be noted that brown patch is generally more active in the spring on buffalograss than in the fall. This is especially true if the buffalograss is fertilized with nitrogen in late winter to early spring. For buffalograss sites, it is always best to delay the spring application of nitrogen fertilizer until late spring to early summer to avoid encouraging brown patch activity, especially in years like 2002 when excess rainfall and below-normal temperatures occur.

While spring application of fungicides for brown patch are not normally required, superintendents need to be on the lookout for brown patch activity and treat affected turfgrass areas as soon as possible during extended wet, cool spring and early summer periods.

Fungicides labeled for brown patch include azoxystrobin, flutolanil, iprodione, myclobutanil, PCNB, propiconazole, thiophanate methyl and trifloxystrobin.

Gray leaf spot

A third disease which can become a serious problem, particularly in late spring to early summer months, is gray leaf spot.

While this pathogen is not nearly as widespread as take-all root rot and rhizoctonia blight, it can cause serious damage and/or loss of St. Augustinegrass in the late spring to early summer months when high humidity and mild temperatures occur.

In 2002, the continuous rainfall throughout the spring and summer months greatly enhanced the activity of this disease in St. Augustinegrass.

Application of a nitrogen containing fertilizer to St. Augustinegrass already infected with gray leaf spot will increase the activity of this pathogen.

In years such as 2002, closely monitor the St. Augustinegrass areas for gray leaf spot and delay spring application of nitrogen fertilizers until the disease is under control.

Fungicides labeled for the control of gray leaf spot include azoxystrobin, chlorothalonil, propiconazole and trifloxystrobin.

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TABLE 1

Texas rainfall

Days	Station	Rainfall
8	Comfort	32.00
5	Sisterdale	26.70
5	Campe Verde	21.45
6	Tarpley	20.56
9	Johnson City-SW	19.72
5	Boerne	19.44
9	Ballinger	17.82
9	Fredericksburg	17.74
4	Helotes	17.37
5	Fredericksburg	17.08
7	Johnson City-NW	16.70
9	San Antonio	16.48
5	Bulverde	16.25
9	Burnet	15.63
9	Round Mountain	14.77
9	Cypress Mill	14.62
9	Bertram	14.61
5	Abilene	13.97
9	Cypress Mill	13.39
8	San Antonio-NE	13.31
5	Kerrville	13.00
9	Marble Falls	12.99
9	Dripping Springs	12.96
9	Burnet-S	12.47
7	Spicewood	12.06

The National Weather Service's rainfall amounts (in inches) in Texas for the nine days starting June 29-July 8, 2002. Listed are only locations with a foot or more of rainfall; 77 more stations reported more than 6 inches.

DAYS = number of days of reported data for the stations. Some stations only report when rainfall occurs

TABLE 1

Precipitation ranks for the Midwest region, 2001-2002

Period	Rank
May	3rd driest
April-May	5th driest
March-May	5th driest
Feb-May	3rd driest
Jan-May	4th driest
Dec-May	6th driest
Nov-May	9th driest
Oct-May	6th driest
Sep-May	3rd driest
Aug-May	2nd driest
Jul-May	3rd driest
Jun-May	3rd driest

SOURCE: NATIONAL WEATHER SERVICE

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normal. These extremes led to conditions that made for a difficult year in turfgrass maintenance.

The cool, wet spring resulted in considerable top growth, which required frequent mowing. At the same time, the wet conditions made mowing difficult. Scalping was common on many turfgrass sites. Although top growth recovered, repeated scalping had the long-term affect of reducing root growth.

Root growth was also restricted in areas where extended periods of excessive moisture resulted in saturated or waterlogged soils.

Under these conditions root growth was inhibited, in effect reducing the potential water-absorbing capacity of the plant going into summer.

In addition to the difficulty in keeping things mowed, the potential for significant compaction and wear from equipment on wet soils was a concern. For example, on golf courses in areas that receive repeated traffic or wear like collars and greens surrounds (not to mention greens themselves), the potential for soil compaction was high.

Generally, turf thinning from soil compaction did not show until the occurrence of summer stress. Thus, once the rain stopped, many superintendents were out coring, quadratining or using a Hydroject to relieve compaction. Turf areas that were high in clay content were especially susceptible to compaction.

Although noticeable, damage to leaf blades is a minor concern. What is far more important as an indicator of the overall health of the turf is the status of the crown.

A variety of diseases occurred during the spring. In early to midspring microdochium patch was active. This disease, also known as pink snow mold, is generally easy to diagnose. When this disease occurs late in the spring, however, many turfgrass managers misdiagnose it as cool-temperature pythium.

Microdochium patch can produce streaking symptoms similar to what would be expected with pythium, especially in drainage areas. In most cases, however, if one suspected cool-temperature pythium blight, it was almost always microdochium patch in 2002.

Toward the middle to late spring, the wet conditions — with increasing temperature — resulted in dollar spot being active sooner than normally would be expected. Although this disease got off to an early start, once it got hot and dry the severity of this disease decreased compared to previous years.

Summer stress

As previously mentioned, temperatures above normal and drought conditions characterized the summer in the Midwest.

Although there were a number of problems associated with this past summer, I would like to highlight three. The first was anthracnose. Basal rot anthracnose occurred on greens that had previously been stressed, primarily by mowing greens intensively to achieve increased ball roll.

Anthracnose symptoms progress from small yellow patches to large blighted areas with a more orange appearance.

As the severity of the disease increases, large sections of the greens can decline rapidly. *Poa annua* greens were the most susceptible especially where wear was intensive or if the turf was growing under shaded conditions.

Greens that were under low fertility programs also appeared to be more susceptible to this disease. Creeping bentgrass was more tolerant to the disease, but under stress conditions anthracnose symptoms were expressed.

Tree removal

As greens are becoming more intensively managed, anthracnose will be a persistent problem. This year, many golf courses are contemplating initiating a tree removal program to help relieve the stress associated with shade and provide a better growing environment to help reduce the severity of anthracnose.

In a few situations, golf courses are converting *Poa annua* greens to creeping bentgrass. In these situations, knowing why *Poa annua* was there in the first place will help slow or prevent its colonization.

The dry conditions raised concern on the long-term effect on dormant Kentucky bluegrass. Dormancy is a mechanism that Kentucky bluegrass uses to avoid conditions where inadequate moisture is available for growth. The most noticeable aspect of dormancy is the brownish-tan color of the leaf blades.

Although noticeable, damage to leaf blades are a minor concern. What is far more important as an indicator of overall turf health is the status of the crown. If the crown is damaged, the plant will not recover. Conversely, healthy crowns will generate new leaves and stems with the arrival of moisture.

Research is not conclusive on how long Kentucky bluegrass can remain dormant, but the dormancy phase could last indefinitely as long as the crown is healthy. This year, once rain did arrive, Kentucky bluegrass that had received light applications of water 6 to 8 weeks into the drought recovered quickest.

Overwatering causes fairways so wet that golf ball will plug and have minimal roll.

The last major concern was irrigation practices on golf courses that either resulted in too much water or not enough during the latter half of the summer.

Irrigation issues

Nonirrigated areas on many golf courses, including roughs and green surrounds, became dry and hard. These conditions made a poorly struck golf shot even more errant.

In contrast, some fairways were overwatered because superintendents were trying to throw water into nonirrigated areas to prevent turf loss. The result was fairways that were so wet that golf balls would plug and have minimal roll.

These two contrasting conditions often occurred together on the same courses, causing complaints from golfers.

Although the contrast between the spring and summer seasons was striking, the problems associated with this year were often related. The wet springtime conditions restricted root growth in areas where either saturated or waterlogged conditions persisted.

A turf that has a shallow root system going into a hot, dry summer will be greatly affected. A shallow root system places turfgrass at a greater risk to moisture deficits and high soil temperatures.

As this year comes to a close, we can hope that next year will bring more moderate weather conditions.

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