Heat Stress on Turf

How does temperature affect cool season turfgrass?

The following temperatures are critical to cool season turfgrass:

90°F Shoot growth ceases.
77°F Root growth ceases.
70°F Maximum temperature for root growth of any consequence.
70°F Time to plant grasses in late summer.
60-75°F Optimum temperature for shoot growth.
50-65°F Optimum temperature for root growth.
40°F Shoot growth ceases.
33°F Root growth ceases.
20°F Low temperature kill possible if temperature subsequently drops rapidly below 20°F

So what is the most important thing to look at temperature wise for my turf in summer?

When soil temperatures reach 77-80°F in the crown region (first inch between blade and root), growth stops and then above 80, death begins to occur.

I don’t have a soil thermometer. How does the soil temperature compare to other temperatures in the month of August, usually the toughest month for cool season grass growth?

If the street temperature is 100°F, the turf surface is 75

If it is 89°F three inches above irrigated green turf, the surface temperature is 88°F, and the night surface temp is 76°F.

If brown, dormant turf temperature three inches above the surface is 95°F, then it is 126°F at the surface, and 79°F at night at the surface.
If bare soil is 91 F three inches above the surface, it is 102 F at the surface, and the night temperature is 78 at the surface.

If synthetic turf is 96 F three inches above the surface, it is 158 F at the surface, and 84 F at night at the surface.

**Does compacted soil make heat stress worse?**

Yes. Water is trapped in compacted soil and has difficulty moving to the surface where it can evaporate and reduce the soil's temperature. Thus trapped soil water can heat up more in compacted soil and begin to cook the turf’s roots under the surface.

**Can I do anything to reduce heat stress?**

Yes. If temperatures are 95 F or higher, or if there is high wind for more than half of the day, set the sprinkler system to go off multiple times between the hours of 11 AM and 2 PM to provide only a light sprinkling in addition to regularly scheduled watering.

These light sprinkles are designed to cool off the crown of the grass by evaporation in order to prevent “heatstroke” in the turf, which really means keeping the crown cool so no permanent damage occurs. Permanent damage means weed invasion, especially by late season crabgrass!

**My customer insists on light, frequent irrigation. Does this make the heat stress worse?**

Yes. If the turf was on a regimen of light frequent irrigation before heat stress hit then that means remaining functional roots are very short.

Once heat stress hits, the few roots that remain alive in the shallow moist zone created by light frequent irrigation then have to work twice as hard to take up enough water to supply the plant with water for growth and activity PLUS water to cool the plant off.

If the remaining roots cannot keep up, then heat damage will occur and the plant may die. This creates thin turf which means no shading of the soil and even hotter conditions.

**Can you give me a concrete example of how soil temperature could have impacted my turfgrass in the last couple of years?**

If we look at the soil temperatures at a two inch depth below turf in 2009, there were 57 days where the temp was 77 or exceeded 77. If we look at that as a percentage of the whole year, 365 days, that is 15% of the year. If we look at that as a percentage of the whole growing season March through November, 270 days, that is 21% of the whole growing season. If we look at it as a percentage of the season that visual complaints are made, May through September, or 154 days, then that is 37% of the "summer" season. This does not even take into account the days where root growth was not of any consequence because soil temperatures were between 70 and 77 F.
In 2010 out of 365 days, 73 days were or exceeded 77 degrees at a two inch depth, or 20% of the year. If we look at that as the whole growing season, 270 days, that shakes out to 27% or over a quarter of the entire growing season.

If we look at the 73 days out of the 154 days between May 1 and September 30, we are looking at 47% of the time leading to death and disrepair.

*Is there anything I can do to help my grass recover from an episode of heat stress?*

You could try kelp based amendments. Continue to keep mowing height at three inches. Overseed with tall fescue enhanced with endophytes. Tall fescue is the most heat tolerant of all cool season turfgrasses.