

CLIMATIC ADAPTATION OF TURFGRASSES TO THE CHICAGO METROPOLITAN AREA

The persistence and quality of turfgrasses are determined by many genetic and environmental factors, including: the specific cultivars that comprise the plant community, cultural practices, traffic, soil conditions, and climate. Of these, usually the factor of greatest importance is climate. Within the continental United States, nearly all climatic groups are represented. The western half of the U.S. is predominantly dry with vast semi-arid (steppe) and arid (desert) regions. A thin belt along the Pacific coast has an oceanic-type climate which is temperate to the north and subtropical to the south. Close proximity to the Pacific ocean results in a buffering of diurnal and seasonal temperature variations; thus, western coastal areas are said to have oceanic climates while inland areas have continental climates with relatively large diurnal and seasonal variations in temperatures. In the eastern half of the U.S., a temperate-continental climate exists throughout the northern region, and a continental-subtropical climate occurs over much of the southern region. Exceptions include the southern tip of Florida, which is Tropical, and the upland areas associated with Appalachian Mountain range which have a more-or-less temperate climate.

The north central states occur within a temperate-continental climate; yet, comparisons of long-term temperature data show that wide variations in climatic conditions exist within this area. For example, St. Louis has average July and January temperatures of 78.6 and 31.3F., respectively, while Milwaukee's July and January temperatures averages are 69.9 and 19.4F., respectively. Some bermudagrasses and tall fescues persist fairly well in St. Louis, but are frequently winter-killed in Milwaukee. Conversely, annual bluegrass is more likely to survive summers in Milwaukee than in St. Louis. Sioux City has a span of 57.3F between average July and January temperatures while Detroit's is only 47.7F. Thus, some locations within the region are "more continental" than others due, in part, to their proximity to the great lakes.

Even within the Chicago metropolitan area, significant variations in seasonal temperature are evident from long-term climatic data. As one proceeds from Waukegan along the north shore of Lake Michigan, inland to Antioch, and then to Marengo, the July/January temperature averages expand from 71.9/22.5 to 72.2/21.5 to 72.7/20.5F. This is due to the "lake" effect; as one proceeds inland, July temperatures increase while January temperatures decrease even though the straight-line distance between Waukegan and Marengo is only forty miles. Forty-three miles south of Waukegan, Midway Airport, within the city of Chicago, has long-term July/January temperature averages of 74.7/24.3F. Argonne, located thirty miles to the west of Midway, has July/January temperatures of 72.9/22.2F. A recent climatological study comparing these two locations revealed an average temperature difference of 3.3F with ninety percent of the temperature values occurring with a range of 0 to more than 7F. The higher temperatures for Midway are explained by what is referred to as an "urban heat island" effect that more than compensates for the "lake" effect observed in the Waukegan-Marengo comparison.

Since temperature data accumulated by the weather bureau are taken at approximately five feet above ground, the actual temperatures at turf height are apt to be more extreme. Thus, small differences in weather bureau data usually reflect larger temperature differences at the surface and upper rhizosphere of turfgrass communities.

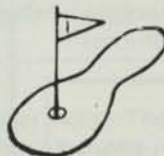
Within the Chicago Metropolitan area, there are over 200 golf courses. While this metropolitan area is geographically small, it encompasses a broad diversity of climatic conditions. Along the northshore, fairways and tees are more apt to be predominantly annual bluegrass, and this species is more likely to persist during the summer than in the city or in the western suburbs where summer temperatures are higher. Under the more-extreme temperatures occurring away from the Chicago north shore, Kentucky bluegrass and creeping bentgrass tend to be more competitive with annual bluegrass and, therefore, more persistent. Many major effects of these differences can be compensated for by adjustments in the turfgrass cultural program; however, minor effects are often cumulative over time, and, therefore, can be highly significant in terms of shifts in species composition, and overall persistence of the resultant turfgrass community.

In spring, 1979, we will be initiating a study at Glencoe to determine the cultural requirements of annual bluegrass. Based upon this work, specific fertilization and fungicide-treatment programs that are effective for sustaining annual bluegrass at north shore locations may be less-than-adequate for turfs at city and western suburb locations. Thus, we have initiated a similar study at Urbana where summer temperatures are appreciably higher than in the Chicago metropolitan area. Hopefully, comparative data taken at the two sites will yield information that will be of value to golf superintendents who must decide whether to sustain annual bluegrass, or attempt to control it.

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