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(turfgrass talk)

Similar temperatures, but dissimilar sunshine

The grasses used on golf courses in China range from cool-season species such as creeping bentgrass and Kentucky bluegrass in the north, to a mix of cool-season and warm-season grasses in the middle of the country, to warm-season grasses such as bermudagrass and seashore paspalum in the south. These grasses are similar to those used in the United States as one moves from colder locations in the north to warmer locations in the south.

Golf course superintendents in China, especially in the regions where warm-season grasses are used, should be aware of a consistent difference between the climate in China and the climate in warm regions of the United States. I'm referring to the lower sunshine hours in Chinese locations compared with the higher sunshine hours in American locations having similar temperatures. This is important because of photosynthetically active radiation (PAR). The species and variety of grass used on a golf course, and also the maintenance work required to produce the desired playing surface, will be affected by temperature and by PAR.

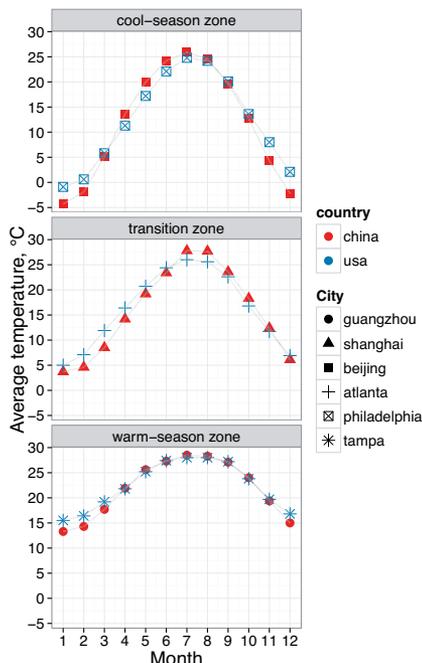


Figure 1

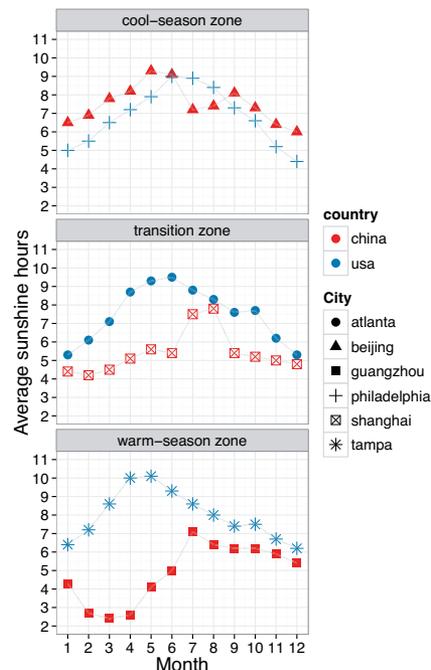


Figure 2

I looked up the climatological normal data — 30-year average monthly temperature and sunshine hours — for Beijing, Shanghai and Guangzhou. These data are available from the World Meteorological Organization, provided in an easily viewed format on the Hong Kong Observatory website (www.hko.gov.hk/wxinfo/climat/world/chi/world_climat_c.htm). Then I got the same data for American cities with similar temperatures. I selected Philadelphia as a representative cool-season location, with temperatures similar to those in Beijing. For Shanghai, a transition zone location where both cool- and warm-season grasses are used, I chose Atlanta as a place with comparable temperatures. For Guangzhou, where warm-season grasses are used, I chose Tampa. The monthly temperature normals are shown in Figure 1.

The temperatures are similar between these locations, but the sunshine hours, which are measured as the duration of time when the direct solar irradiance exceeds 120 watts per square meter, show a big difference in the transition zone and warm-season regions (Figure 2). In Guangzhou, there are fewer sunshine hours for every month of the year compared with Tampa. The same situation occurs in Shanghai, where the sunshine hours are lower for every month of the year compared with Atlanta. In the cool-season zone, comparing Beijing

and Philadelphia sunshine hours, this difference is no longer apparent, and Beijing actually has more sunshine hours compared with Philadelphia.

The sunshine hours are important because they can be used to estimate the daily light integral (DLI) and the PAR. The DLI units are moles of photons per square meter per day. Each sunshine hour is equivalent to about 5 moles of photons per square meter. Taking the month of May as an example, on a normal day in Guangzhou, there would be 4 hours of sunshine, in Tampa 10, in Shanghai 5.5, and in Atlanta 9. This gives an approximate DLI of 20 in Guangzhou, 50 in Tampa, 27.5 in Shanghai, and 45 in Atlanta. Bermudagrass grows best when the DLI is above 40. Based on my observations of other species used in southern China, seashore paspalum grows best when the DLI is above 30, and manilagrass (*Zoysia matrella*) grows best when the DLI is above 20. When the DLI is low, one can use more shade-tolerant species. One can also manage the turf to enhance performance in shade, which generally involves increasing the mowing height, reducing the quantity of nitrogen supplied to the turf and using plant growth regulators.

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