SELECTING TURFGRASS FOR PEST RESISTANCE AND STRESS TOLERANCE

BY **KEVIN N. MORRIS**

The National Turfgrass Evaluation Program (NTEP) tests hundreds of commercially available cultivars and experimental entries of turfgrass annually. Researchers conduct these tests at universities in 40 states and a few Canadian provinces. Data from each year is summarized and published on our website (www.ntep.org) and also in CD format. With data from more than 600 turfgrasses and 20 species published each year and a final report containing a summary of 4-5 years of data at the completion of each trial, the task of selecting the best turfgrass for your situation can be daunting and confusing. Here I will give some suggestions and guidelines on how to locate those cultivars with the best pest resistance and stress tolerance.

First, go to the website and read the disclaimer at the bottom of that page, then click to enter. This will take you to our main page (www.ntep.org/contents2.shtml). To find a grass species, simply click on the link in the yellow box "All NTEP Reports - Select a Turfgrass Species." This is where you will begin the process of identifying pest and stress tolerant grasses.

For these examples, I will be using the most recent Final Report for a species, i.e. summarized data from 4-5 years of a completed trial. Using data from annual progress reports is also useful but remember that the data only represents one growing season and conditions and cultivar performance can and often do vary from one season to another. Also, I will show three different methods you can use to identify pest and stress resistant grasses. That is not to say that these methods are foolproof or the only way to make sensible cultivar decisions. My intention here is to give some guidance on using the data correctly and the statistical values given, but also to make you think about the characteristics that are important in cultivars you want to purchase.

LSD values

Before starting the process, I must explain the statistical information you will need to use and understand (on a very basic level). When reviewing data from any NTEP table, there are two statistical values at the bottom of each column of data. The first, "LSD Value" (Least Significant Difference), is the statistic you will need to use for this exercise. LSD Value is a statistical tool used to determine if the difference in cultivars is real or just happened by chance. To determine if a statistical difference exists among two cultivars, subtract the entry with the smaller value from the entry with the larger value. If the difference between the two numbers is not larger than the LSD Value that is at the bottom of that column, then no statistical difference exists between these two entries for that particular characteristic. For example:

Figure 1. Turfgrass Quality
Entry A 6.0
Entry B 5.5
LSD Value 0.6

Entry A has a mean turfgrass quality rating of 6.0, Entry B has a turfgrass quality rating of 5.5 and the LSD Value is 0.6. In this case, no statistical difference exists between Entry A and B for turfgrass quality. Please keep in mind, however, that you must use this LSD Value for each table and each year as variety performance can vary greatly depending on the location, the trait you are interested in, the month and year.

Now let's continue with three methods of identifying outstanding pest and stress tolerant cultivars:

My first example uses the 1995 National Kentucky Bluegrass Test, 1996-2000 data, which lists cultivar performance based on data from several important diseases, drought, and billbugs. You can list several cultivars of interest, find the data for each of these pests or stresses and determine the cultivars that are in the top statis-

tical grouping (not statistically different from the entry at the top) using the LSD Value. Each cultivar in the top group then gets a "+" for that characteristic. If one of the listed cultivars was not in the top statistical group (for example, "America" and "Apollo" for melting out disease), then that column is left blank for that cultivar. Thus you have a graphic representation of the performance of several cultivars, based on their reaction to several stresses. For you, the end user, you would need to choose the characteristics you feel are important and include those in your table.

In another example, see turfgrass quality ratings from the 1996 National Tall Fescue Test, 1997-2001 data. Here you can compare the entries in the top statistical group under high irrigation (irrigated to prevent stress or dormancy) versus low irrigation (irrigated only during severe drought or no supplemental irrigation) and also drought recovery data collected at two locations. This would document cultivars that have performed well at several locations and under two different irrigation regimes. Under the high irrigation regime, only three cultivars were in the top statistical group. This is due to the high number of locations (18) that will usually result in a lower LSD Value, compared to only four locations for the low irrigation regime (higher LSD Value). For your use, this method may help you identify those entries that will perform equally well under different management regimes.

My final method involves only disease resistance but can be performed using any combination of characteristics. In this example, use 1995-98 data from the 1994 National Perennial Ryegrass Test and choose five important diseases to consider. Then identify the highest-ranking cultivar in the data for each disease and include each (see "Perennial Ryegrass - Disease Reaction"). For instance, "Brightstar II" had the highest rating for leaf spot, "Laredo" had the highest rating for dollar spot, etc. Then using the LSD Value for each column, you can identify those cultivars that had a statistically lower rating than the top entry for each disease. The result is a method to review the disease performance of several top entries and how those grasses react to other diseases. For instance, "Top Gun" and "Achiever" were statistically lower in only one disease (leaf spot), while "Brightstar II," "Laredo," and "Chaparral" were statistically lower in two diseases. This may be important if your goal is best overall disease resistance. However, if leaf spot resistance is your main concern, Brightstar II is statistically better than the other four grasses in this table and may be your best choice.

In summary, there are many ways to interpret cultivar data and I have only presented three here. However, hopefully, this will lead you to investigate further pest and stress resistance of grasses and the best cultivars for your use. ST

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