AN INDEPENDENT NEWSLETTER FOR COOL SEASON TURF MANAGERS

Turf Grass TRENDS

Issue #5

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How to use National Turfgrass Evaluation Program results

by Kevin Morris, NTEP National Director

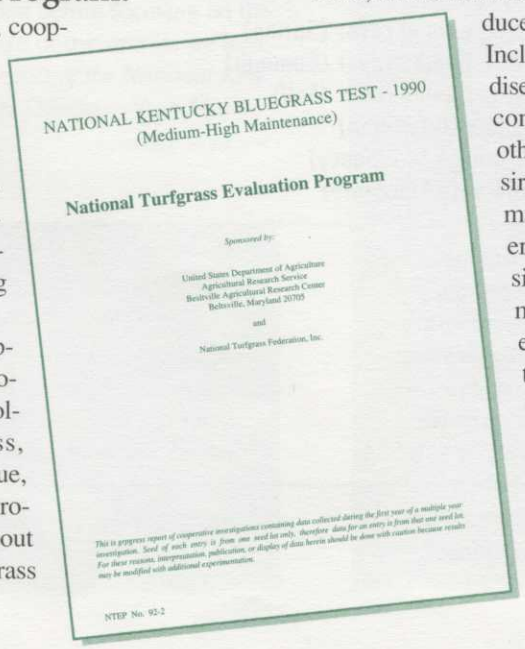
ONE OF THE MOST IMPORTANT decisions that turfgrass manager's must make is: which grass seed species and varieties to purchase and plant? A well-thought out and well-researched grass seed buying decision can dramatically improve the quality of a turf site, while reducing the time and expense of managing it. An ill-prepared buying decision can be a management disaster that haunts you, and those who follow you, for decades.

Unlike many decisions that a turfgrass manager must make, using incomplete and conflicting data, there is plenty of excellent, readily available hard information on which to base seed-buying decisions. The best source of this test data is the National Turfgrass Evaluation Program (NTEP).

What is the National Turfgrass Evaluation Program?

NTEP IS A NON-PROFIT, cooperative effort between the U.S. Dept. of Agriculture's Beltsville Agricultural Research Center and the National Turfgrass Federation, Inc. Its goal is to coordinate and standardize the testing and evaluation of existing and promising new turfgrass varieties.

NTEP releases annual updates of the results of their ongoing evaluation programs for cool-season grasses: bluegrass, ryegrass, fine fescue, tall fescue, and bentgrass. These reports provide a wealth of information about many of the varieties of turfgrass that are currently available and that may be available in the future.


NATIONAL KENTUCKY BLUEGRASS TEST - 1990
(Medium-High Maintenance)

National Turfgrass Evaluation Program

Sponsored by:

United States Department of Agriculture
Agricultural Research Service
Beltsville Agricultural Research Center
Beltsville, Maryland 20705

and

National Turfgrass Federation, Inc.

This is progress report of cooperative investigations containing data collected during the first year of a multiple year investigation. Seed of each entry is from one seed lot only, therefore data for an entry is from that one seed lot. For these reasons, interpretation, publication, or display of data herein should be done with caution because results may be modified with additional experimentation.

NTEP No. 92-2

The problem that confronts turf managers is that, unless you read the actual reports, the NTEP information seen in advertising is so heavily edited that it is difficult to decide whether one is buying a source of satisfaction or a source of trouble for years to come.

How should turfgrass managers proceed?

THE INFORMATION THAT SEED-SELLERS do provide in advertising can be helpful in making a good seed buying decision, if you use that information as the first step in a process. Since the information is readily available, gather as much of it as you can on all the species and varieties that apply to your situation—and ones about which initially you have no interest. The broader and deeper the scope of information that you gather, the better. Make a list of seed-sellers and the species and varieties they offer. Also, keep in mind that, if no local seller is available, most seed-growers will sell direct.

Next, list the attributes that you want to introduce to the sites you manage. Include color, leaf structure, disease and insect resistance, competitiveness and any other factor that may be desirable. Compare the information that you have gathered against this list of desirable attributes. Keep in mind, rarely will one variety have all of these attributes, so it may be necessary to use mixtures of two or more varieties or species—to obtain all of the characteristics that you need.

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An overview of NTEP reports

BEFORE PLOWING INTO THE DATA provided by NTEP Progress Reports, turf managers should orient themselves to how the reports are generally organized.

This overview is based on the *National Kentucky Bluegrass Report-1990 (Medium–High Maintenance) 1991 Progress Report*. Reports on other species of turfgrass do vary somewhat, but all the reports are generally organized in the same way.

After briefly explaining NTEP, the reports list the locations that submitted data and the code used to refer to each location, for example "KY1" means site number 1 in Kentucky.

The reports also provide a list of the cultivar entries and their respective sponsors.

NTEP REPORT CONTENTS

General subject	Table	Specific subjects
Test locations and practices	A	Test locations for the year, site descriptions and management practices used. *Catagories:* Location, Soil texture, Soil pH, Soil Phosphorous lbs./acre), Soil Potassium (lbs./acre), Nitrogen (lbs./1M ft.^{2}), Sun or shade, Mowing height (inches), Irrigation practiced
	B	Locations & data collected by month
Quality ratings	1	Mean quality ratings of Kentucky Bluegrass cultivars at 17 locations in the United States and Canada. Quality is ranked from one to nine with nine representing ideal turf. This table also indicates which cultivars are currently commercially available.
	2	Mean quality ratings for each month
	3	Ranking of mean quality ratings
Visual characteristices	4	Spring green-up ratings
	5	Genetic color ratings
	6	Leaf texture ratings
	7	Winter color ratings
Field growth performance	8	Seedling vigor ratings
	9	Spring density ratings
	10	Summer density ratings
	11	Fall density ratings
	12	Percent living ground cover (Spring)
	13	Percent living ground cover (Summer)
	14	Percent living ground cover (Fall)
	15	Drought tolerance (wilting)
	16	Drought tolerance (dormancy)
	17	Drought tolerance (recovery)
Disease resistance	18	Leaf Spot ratings
	19	Stem Rust ratings
	20	Dollar Spot ratings
	21	Pythium Blight ratings
	22	Leaf Rust ratings
	23	Stripe Rust ratings
	24	Necrotic Ring Spot ratings
Miscellaneous	25	Sod strength ratings
	26	Poa Annua ratings

NTEP continued from page 1

Narrow the field

AS YOU COMPARE your list of desirable attributes against the list of available grass seed, narrow the field down to two or three promising species—with a group of 5–10 varieties for each species. Deciding whether to use a mixture of two or more species or to use one or more varieties within a species depends on what your goals are for the sites you manage. For example:

- IF YOU ARE SEEDING INTO DORMANT TURF for winter color, then your choices are usually limited to ryegrasses.
- IF YOU ARE SEEDING A BARE SITE or renovating an older site, then choosing two or more varieties within a species is often the best course of action, assuming uniform growing conditions at the site.
- WHERE VARIABLE GROWING CONDITIONS exist, a mixture of two or more species is often the best approach. Frequently, the use of more than one properly selected variety or species will broaden the genetic base of a turf stand, and improve its ability to withstand differing environmental conditions.

Acquire the current NTEP Progress Reports

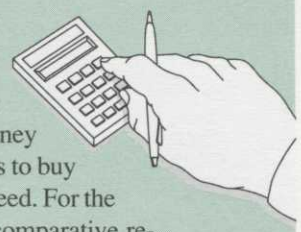
ONCE YOU HAVE PARED DOWN your initial list of possible species and varieties, contact NTEP and request copies of the current test results for those species. When the reports arrive take some time to orient yourself to how the information is provided. In short, get a feel for the forest before focusing on the individual trees. For the sake of this article, we have used the *1991 Progress Report of the National Kentucky Bluegrass Test -1990 (Medium-High Maintenance).*

– *continued on page 4*

Obtaining NTEP Progress Reports

National Turfgrass Evaluation Program progress reports can be obtained by writing: Kevin Morris, National Director, National Turfgrass Evaluation Program, BARC-West, Bldg. 001, Room 333, Beltsville, Maryland 20705

LSD: How big a difference is big enough?



Seed producers or sellers spend substantial sums of money trying to influence turf managers to buy their particular variety of grass seed. For the past eight years or so, quoting comparative research test data has been one of the most popular features of ads for turfgrass seed—even if the data only show that one variety is two or three tenths of a point better than competing varieties. Seed-producers that participate in NTEP are allowed to use the data produced by it in their advertising, but is two or three tenths of a point a big enough difference on which to base a buying decision?

When considering the NTEP data tables, there is a figure that needs special attention at the bottom of each numerical column—the LSD value. This LSD value, or least significant difference, is a tool for statistical analysis, which is used where one member of a group is compared to all the other members of that group. In the NTEP reports, it is used to determine if the difference in cultivars represented by the data is a real difference or just the illusion of one.

This LSD value, or least significant difference, is a tool for statistical analysis, which is used where one member of a group is compared to all the other members of that group.

When raw data, based on an "interpreted" standard, is produced by assigning a value to a characteristic, there is always a possibility of mistakes—especially since the assignment of perceived values is less precise than values that represent simple measurements. The LSD values for all of the tables are produced by a formula, and are given to clarify the margin of error created by this imprecision.

To determine if a statistically significant difference exists between two varieties, subtract the lesser value from the greater value and compare it to the LSD value. If the difference is greater than the LSD value, then the difference is significant—and indicates that the variety with the greater rating is a better variety. If the difference is less than the LSD value, then the difference is not significant—and falls within the realm of rating error. ■

Format of NTEP "quality ratings" tables

TABLE 1

MEAN TURFGRASS QUALITY RATINGS OF KENTUCKY BLUEGRASS CULTIVARS GROWN UNDER HIGH MAINTENANCE AT SEVENTEEN LOCATIONS IN THE U.S. AND CANADA
1991 DATA
TURFGRASS QUALITY RATINGS 1-9; 9=IDEAL TURF

NAME	CO1	IA1	ID2	IL2	KY1	NJ1	OH1	OR2	RI1	UB1	VA1	WA1	MEAN
* MIDNIGHT	8.0	7.1	7.9	5.3	6.7	6.7	6.7	4.7	4.0	7.7	5.4	6.2	6.2
* UNIQUE (PST-C-76)	9.0	6.8	6.4	6.3	6.4	6.3	6.3	6.3	4.9	7.1	4.3	4.7	6.2
LSD value	1.2	0.8	1.1	1.3	1.0	1.0	1.1	1.1	1.4	0.5	0.9	1.2	0.3

This table is only a selection made by TGT from the actual NTEP chart (pp 6-8) which contains 125 varieties tested and 17 locations.

TABLE 2

MEAN TURFGRASS QUALITY RATINGS OF KENTUCKY BLUEGRASS FOR EACH MONTH GROWN UNDER HIGH MAINTENANCE AT SEVENTEEN LOCATIONS IN THE U.S. AND CANADA
1991 DATA
TURFGRASS QUALITY RATINGS 1-9; 9=IDEAL TURF: MONTHS

NAME	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
MIDNIGHT	5.3	5.7	5.2	5.2	6.4	6.4	6.3	6.3	6.3	6.6	5.9	5.0	6.2
* UNIQUE (PST-C-76)	6.3	6.7	6.3	5.6	6.2	6.3	6.4	6.3	6.4	6.5	5.5	5.2	6.2
LSD value	1.5	1.3	1.1	0.8	0.6	0.6	0.6	0.6	0.7	0.7	0.7	1.1	0.5

This table is only a selection made by TGT from the actual NTEP chart (pp 9-11) which contains 125 varieties tested and 17 locations.

TABLE 3

RANKING OF MEAN TURFGRASS QUALITY RATINGS OF KENTUCKY BLUEGRASS CULTIVARS UNDER HIGH MAINTENANCE AT SEVENTEEN LOCATIONS IN THE U.S. AND CANADA
1991 DATA
QUALITY RATINGS; 1=HIGHEST MEAN: STATE LOCATIONS REPORTING

NAME	CO1	IA1	ID2	IL2	KY1	NJ1	OH1	OR2	RI1	UB1	VA1	WA1	MEAN
MIDNIGHT	83.5	37.5	4.0	33.0	5.0	2.0	45.5	102.0	59.5	1.0	54.5	82.0	1.0
* UNIQUE (PST-C-76)	9.5	79.5	62.5	45.5	11.5	5.0	77.0	9.0	9.0	19.0	92.5	117.5	2.0

This table is only a selection made by TGT from the actual NTEP chart (pp 12-14) which contains 125 varieties tested and 17 locations.

How to identify the NTEP results that are relevent to your needs

1. Examine the table of "Locations Submitting Data"(NTEP, page 1) and mark the locations that most closely approximate the climate of your location.
2. Then look at "Locations, Site Descriptions and Management Practices" (NTEP, Table A, page 3), and, using your marked-up list of "Locations Submitting Data", choose the sites whose description and management practices most closely parallel your site's description and management practices as well.
3. Use this refined list of locations as the basic criteria for identifying the data that you should use to make your seed-buying decisions.

After this, to complete your seed selection process, you can use the Sample Turfgrass Seed Evaluation Form on page 7 as a guide. To develop your own seed evaluation data, use the blank form inserted into this issue.

Tables 1–3: Quality ratings Check these tables first

USE THE DATA CONTAINED in the three "Turfgrass Quality Ratings" tables (see above sample tables) to establish a short list of candidates from each location.

- **Entry #1:** Using Table 3, develop a short list of the best varieties for the selected locations. If you have a particular concern about quality during certain times of the year, check how the varieties performed monthly by referring to Table 2. Add or delete varietes from your list in Entry #1 accordingly.
- **Entry #2:** Using Table 1, enter the ratings values for each variety for each site.
- **Entry #3:** Combine the three lists into one, in descending order. (In the sample worksheet, applying the LSD to the top entry results in a list where the top ten entries are statistically the same and the four remaining entries are significantly less.)

Format of NTEP "visual characteristics" tables

TABLE 4

SPRING GREENUP RATINGS OF KENTUCKY BLUEGRASS CULTIVARS
GROWN UNDER HIGH MAINTENANCE
1991 DATA
SPRING GREENUP RATINGS 1-9; 9=COMPLETELY GREEN 1/

NAME	NJ1	NJ3	MEAN
GINGER	9.0	5.3	7.2
WASHINGTON	6.7	6.7	6.7
CARDIFF	6.3	7.0	6.7
CYTHIA	5.3	8.0	6.7
LSD value	1.2	1.5	0.9

This table is only a selection made by TGT
from the actual NTEP chart (pp 15-16) which contains 125 varieties tested

TABLE 5

GENETIC COLOR RATINGS OF KENTUCKY BLUEGRASS CULTIVARS
GROWN UNDER HIGH MAINTENANCE
1991 DATA
GENETIC COLOR RATINGS 1-9; 9=DARK GREEN 1/

NAME	CO1	NJ1	MEAN
MIDNIGHT	6.0	8.3	7.2
BA 74-114	5.3	8.0	7.0
OPAL	5.3	8.0	6.9
BA 77-279	5.0	7.7	6.9
LSD value	1.3	0.9	0.5

This table is only a selection made by TGT
from the actual NTEP chart (pp 17-19) which contains 125 varieties tested

TABLE 6

LEAF TEXTURE RATINGS OF KENTUCKY BLUEGRASS CULTIVARS
GROWN UNDER HIGH MAINTENANCE
1991 DATA
LEAF TEXTURE RATINGS 1-9; 9=VERY FINE

NAME	NJ3	MEAN
BARBLUE	7.0	7.0
EVB 13.863	7.0	7.0
LIMOUSINE	7.0	7.0
WW AG 508	7.0	7.0
LSD value	0.9	0.9

This table is only a selection made by TGT
from the actual NTEP chart (pp 20-21) which contains 125 varieties tested

TABLE 7

WINTER COLOR RATINGS OF KENTUCKY BLUEGRASS CULTIVARS
GROWN UNDER HIGH MAINTENANCE
1991 DATA
WINTER COLOR RATINGS 1-9; 9=COMPLETE COLOR RETENTION

NAME	NJ3	OR9	MEAN
SR 2000	4.3	8.0	6.2
BLACKSBURG	4.0	8.0	6.0
BARBLUE	4.7	7.0	5.8
GEORGETOWN	4.7	7.0	5.8
LSD value	1.0	1.6	0.9

This table is only a selection made by TGT
from the actual NTEP chart (pp 22-23) which contains 125 varieties tested

Tables 4–7: Visual characteristics Reducing the list of possible varieties

THE GROUP OF TABLES that deal with "Visual Characteristics" can be used to further adjust your list. The tables for spring green-up, genetic color, leaf texture, and winter color can be used to more closely reflect the characteristics you want for your sites.

- **Entry #4:** Using Tables 4 and 5, enter values from each table for each variety.
- **Entry #5:** Average the spring and genetic color ratings and list in descending order.

Tables 8–17: Field performance Refining the list

USE THE TABLES on "Field Performance" characteristics to develop a list of variety choices. These characteristics include seedling vigor, density (spring, summer and fall), percent living cover (spring, summer and fall), and drought tolerance (wilting, dormancy and recovery).

- **Entry #6:** Develop an alphabetical list of the selected varieties with their assigned ratings for seedling vigor and summer density.
- **Entry #7:** Average the seedling vigor and summer density ratings and list in descending order.

– continued on page 6

Format of NTEP "field performance" tables

TABLE 8

SEEDLING VIGOR RATINGS OF KENTUCKY BLUEGRASS CULTIVARS
GROWN UNDER HIGH MAINTENANCE
1991 DATA
SEEDLING VIGOR RATINGS 1-9; 9=MAXIMUM VIGOR

NAME	C01	NJ1	MEAN
BANFF	6.3	8.3	7.7
FREEDOM	6.7	8.3	7.6
KENBLUE	6.7	8.0	7.4
PSU-151	6.0	8.0	7.3
LSD value	1.9	1.2	0.7

This table is only a selection made by TGT
from the actual NTEP chart (pp 24-26) which contains 125 varieties tested.

TABLE 9

SPRING DENSITY RATINGS OF KENTUCKY BLUEGRASS CULTIVARS
GROWN UNDER HIGH MAINTENANCE
1991 DATA
DENSITY RATINGS 1-9; 9=MAXIMUM DENSITY

NAME	NJ3	ON1	MEAN
SILVIA	7.0	4.3	5.7
BARSWEET	7.5	3.3	5.4
SUFFOLK	6.7	3.7	5.2
ALPINE	6.7	3.7	5.2
LSD value	1.4	1.5	1.0

This table is only a selection made by TGT
from the actual NTEP chart (pp 27-28) which contains 125 varieties tested.

Format of NTEP "disease resistance" tables

TABLE 18

LEAF SPOT RATINGS OF KENTUCKY BLUEGRASS
CULTIVARS GROWN UNDER HIGH MAINTENANCE
1991 DATA
LEAF SPOT RATINGS 1-9; 9=NO DISEASE

NAME	0R9	MEAN
BLACKSBURG	8.3	8.3
J-335	8.3	8.3
LSD value	1.5	1.5

This table is only a selection made by TGT
from the actual NTEP chart (pp 45-46) which contains 125 varieties tested

TABLE 20

DOLLAR SPOT RATINGS OF KENTUCKY BLUEGRASS
CULTIVARS GROWN UNDER HIGH MAINTENANCE
1991 DATA
DOLLAR SPOT RATINGS 1-9; 9=NO DISEASE

NAME	RI1	MEAN
MINSTREL	8.7	8.7
BA 73-366	8.3	8.3
LSD value	0.9	0.9

This table is only a selection made by TGT
from the actual NTEP chart (pp 49-50) which contains 125 varieties tested

TABLE 19: STEM RUST RATINGS; TABLE 21: PYTHIUM BLIGHT RATINGS,
TABLE 22: LEAF RUST; TABLE 23: STRIPE RUST; TABLE 24: NECROTIC RING SPOT

Tables 18–24: Disease resistance Providing a third measurement

USE THE TABLES ON Specific Diseases to develop information aimed at your supplemental management needs. The diseases covered include Leaf Spot, Rust (stem, leaf and stripe), Dollar Spot, Pythium, and Necrotic Ring Spot.

- **Entry #8:** Make an alphabetical list of selected varieties—with their assigned ratings for Leaf Spot, Dollar Spot and Pythium Blight resistance—or whichever diseases are important for your particular needs.
- **Entry #9:** Average the Leaf Spot, Dollar Spot and Pythium Blight ratings and list in descending order.

Look at all three average ratings

- **Entry #10:** When you look at all three of the averages for color, seedling & density and disease resistance, a picture begins to appear.
- **Entry #11:** Average the color, density and disease resistance ratings and list in descending order.

This final list assumes that the three areas of evaluation—color, density and disease resistance—are equal in value to you as a turfgrass manager.

- **Entry#12:** If you value disease resistance more than color and density (i.e., by a factor of two), then the resulting list will be more oriented to the best disease resistant varieties. If color is twice as important as the other two, then the final list will be more oriented toward varieties with good color. How the final list of varieties appears is a function of how much importance that you assign to each category.

Compare the first list with the final list

- **Entry #13:** If you compare the first list, based on site quality ratings, with the final list, based on color, density and disease resistance, the difference is quite striking.

In the sample worksheet, a variety like Cynthia has risen from near the top to the top, Midnight has risen from near the bottom to tie for the top, while Barmax has plunged to the bottom. When you apply the LSD for the final list to the top entry in that list, you end up with a list of thirteen varieties that are not statistically different from each other and one variety that is different.

Making the buying decision has become more logical

THIS RATHER INVOLVED PROCESS does not make your seed-buying decisions easier, rather it makes them more informed. The questions of who to buy the seed from and in what form to buy the seed (i.e. multiple, single variety purchases or mixtures of different species or varieties) are still a function of who is selling the selected varieties in your area, can they mix and bag custom blends, and will they accept or purchase (for sale or blending) varieties that they do not normally stock.

Cost is not, and should not, be a factor in the seed-buying decision!

THE COST DIFFERENCE between a common variety of bluegrass and a named variety usually is usually no more than $1.00 to $1.50 per 1,000 ft.^{2}. And in the case of Tall Fescues and Ryegrasses the cost difference can be as little as $.10 to $.20 per 1,000 ft.^{2}. A decision to use one variety over another based on cost is at best short-sighted and at worst a management nightmare. Considered and informed seed-buying decisions always pay off in lowered management input and cost—and increased customer satisfaction. ■

Background for entries 1–3: *Our sample sites are in southeastern Pennsylvania. The use is for renovating full sun lawns with histories of disease problems. The selected reporting sites are: New Jersey 1(NJ1), Ohio 1(OH1), and Maryland (UB1).*

Background for entries 4–5: *Since most of the sites in this sample evaluation are residential, the desired characteristics are early spring green-up and good genetic color. Leaf texture and winter color are not as important.*

Background for entries 6–7: *Continuing the previous example, good seedling establishment and overall summer performance are important in a residential situation.*

Background for entries 8–9: *Continuing the previous example, Leaf Spot, Dollar Spot and Pythium Blight are diseases that have proven to be a problem at this site and resistance to these diseases is very important.*

Sample Turfgrass Seed Evaluation Worksheet

PRELIMINARY SELECTION: Quality Ratings

#1: Compile short list using quality ratings (Table 3) for the selected sites:

	New Jersey	Ohio	Maryland
1.	Midnight	Plantini	Midnight
2.	Barblue	Barmax	Glade
3.	Blacksburg	Ram-1	Cynthia
4.	Unique	Suffolk	Minstrel
5.	Preakness	Monopoly	Cardiff

#2: Enter rating values for each variety at each site (Table 1):

New Jersey	Rate	Ohio	Rate	Maryland	Rate
Midnight	6.7	Plantini	7.8	Midnight	7.7
Barblue	6.5	Barmax	7.5	Glade	7.6
Blacksburg	6.4	Ram-1	7.3	Cynthia	7.5
Unique	6.3	Suffolk	7.3	Minstrel	7.5
Preakness	6.3	Monopoly	7.3	Cardiff	7.4
LSD	1.0	LSD	1.1	LSD	0.5

#3: Combine the short lists into one, in descending order of their ratings:

Variety	Rating
Plantini	7.8
Glade	7.6
Barmax	7.5
Cynthia	7.5
Minstrel	7.5
Cardiff	7.4
Ram-1	7.3
Suffolk	7.3
Monopoly	7.3
Midnight	7.2*
Barblue	6.5
Blacksburg	6.4
Unique	6.3
Preakness	6.3
LSD	0.9*

* average

REFINING SELECTIONS: Visual Characteristics

#4: Using Tables 4 through 7, list alphabetically and enter values:

Variety	Spring	Genetic *
Barblue	6.7	5.8
Barmax	2.7	5.0
Blacksburg	5.3	7.9
Cardiff	6.3	7.0
Cynthia	6.3	6.9
Glade	3.3	7.0
Midnight	3.3	8.2
Minstrel	6.0	7.7
Monopoly	4.0	5.0
Plantini	4.3	6.9
Preakness	5.7	7.0
Ram-1	5.0	7.2
Suffolk	4.7	5.5
Unique	4.0	7.2
LSD	1.2	0.8*

* average

#5: Combine the values, and list in descending order of average spring and genetic color ratings:

Variety	Color (average)
Minstrel	6.9
Cardiff	6.7
Blacksburg	6.6
Preakness	6.4
Barblue	6.3
Cynthia	6.1
Ram-1	6.1
Midnight	5.8
Unique	5.6
Plantini	5.6
Glade	5.2
Suffolk	5.1
Monopoly	4.5
Barmax	3.9
LSD	1.0*

* average

FIELD PERFORMANCE

#6: Using Tables 8–11, enter ratings for seedling vigor and summer density and list alphabetically:

Variety	Seedling	Summer Density
Barblue	7.0	5.7
Barmax	8.7	7.7
Blacksburg	3.7	5.0
Cardiff	7.0	6.0
Cynthia	7.7	7.0
Glade	7.7	6.7
Midnight	7.3	6.3
Minstrel	6.7	7.7
Monopoly	8.3	6.7
Plantini	8.3	7.7
Preakness	7.3	6.7
Ram-1	6.7	7.0
Suffolk	8.7	7.3
Unique	6.0	6.0
LSD Value	1.2	1.2

#7: List the same varieties by descending order of the average seedling vigor and summer density:

Variety	Seedling & Density*
Barmax	8.2
Plantini	8.0
Suffolk	8.0
Monopoly	7.5
Cynthia	7.4
Glade	7.2
Preakness	7.0
Ram-1	6.9
Midnight	6.8
Minstrel	6.7
Cardiff	6.5
Barblue	6.4
Unique	6.0
Blacksburg	4.4
LSD	1.2*

* average

DISEASE RESISTANCE

#8: Using Tables 3 and 4, list alphabetically and enter values:

Variety	Leaf Spot	Dollar Spot	Pythium
Barblue	5.3	5.0	5.0
Barmax	5.3	2.3	6.7
Blacksburg	8.3	2.0	6.3
Cardiff	6.3	5.3	5.0
Cynthia	6.3	7.0	6.0
Glade	3.0	7.7	5.0
Midnight	5.7	8.0	8.0
Minstrel	7.0	4.3	3.3
Monopoly	4.3	6.3	4.0
Plantini	4.7	4.0	5.3
Preakness	5.0	7.7	4.7
Ram-1	4.3	8.0	7.0
Suffolk	4.3	8.7	5.3
Unique	6.3	6.0	4.7
LSD	1.5	1.4	1.9

#9: Using the information in #8, calculate average ratings (by adding the three values for each variety and then dividing by three) and then list in descending order:

Variety	Disease Resistance *
Midnight	7.3
Ram-1	6.8
Cynthia	6.1
Suffolk	6.1
Preakness	5.8
Unique	5.7
Blacksburg	5.6
Cardiff	5.6
Glade	5.3
Barblue	5.1
Minstrel	4.9
Monopoly	4.9
Barmax	4.8
Plantini	4.7
LSD	1.6*

* average

CONCLUSIONS

#10: Enter averages for color (from #5), density (from #6) and disease resistance (from #9):

Variety	Color	Variety	Density	Variety	Disease
Minstrel	6.9	Barmax	8.2	Midnight	7.3
Cardiff	6.7	Plantini	8.0	Ram-1	6.8
Blacksburg	6.6	Suffolk	8.0	Cynthia	6.1
Preakness	6.3	Monopoly	7.5	Suffolk	6.1
Barblue	6.1	Cynthia	7.4	Preakness	5.8
Cynthia	6.1	Glade	7.2	Unique	5.7
Ram-1	5.8	Preakness	7.0	Blacksburg	5.6
Midnight	5.6	Ram-1	6.9	Cardiff	5.6
Unique	5.6	Midnight	6.8	Glade	5.3
Plantini	5.2	Minstrel	6.7	Barblue	5.1
Glade	5.1	Cardiff	6.5	Minstrel	4.9
Suffolk	4.5	Barblue	6.4	Monopoly	4.9
Monopoly	3.9	Unique	6.0	Barmax	4.8
Barmax	3.9	Blacksburg	4.4	Plantini	4.7
LSD	1.0	LSD	1.2	LSD	1.6

#11: Using the information in #10, average together values for color, density and disease resistance, and then list in descending order:

Variety	Rating*
Cynthia	6.6
Midnight	6.6
Ram-1	6.5
Suffolk	6.5
Blacksburg	6.3
Minstrel	6.2
Cardiff	6.0
Plantini	6.0
Glade	6.0
Barblue	5.9
Preakness	5.7
Unique	5.6
Monopoly	5.5
Barmax	4.5
LSD	1.3*

*average

#12: If color, density and disease resistance are not of equal value to you, weight the values to reflect your priorities; for example, if disease resistance is twice as important to you, double its value, and average the results. Then list in descending order:

Midnight	6.8
Ram-1	6.6
Cynthia	6.4
Preakness	6.2
Suffolk	6.2
Cardiff	6.1
Minstrel	5.9
Unique	5.8
Barblue	5.7
Plantini	5.7
Glade	5.7
Blacksburg	5.6
Barmax	5.4
Monopoly	5.3
LSD	1.4

OPTIONAL COMPARISON

#13: To see the difference between your initial selections and your final selections, list values from #3 and #11 in descending order:

First compiled list		Final compiled list	
Variety	Rating	Variety	Rating*
Plantini	7.8	Cynthia	6.6
Glade	7.6	Midnight	6.6
Barmax	7.5	Ram-1	6.5
Cynthia	7.5	Suffolk	6.5
Minstrel	7.5	Blacksburg	6.3
Cardiff	7.4	Minstrel	6.2
Ram-1	7.3	Cardiff	6.0
Suffolk	7.3	Plantini	6.0
Monopoly	7.3	Glade	6.0
Midnight	7.2*	Barblue	5.9
Barblue	6.5	Preakness	5.7
Blacksburg	6.4	Unique	5.6
Unique	6.3	Monopoly	5.5
Preakness	6.3	Barmax	4.5
LSD	0.9*	LSD	1.3*

* average

Why using NTEP reports is worth the effort

by Christopher Sann

DO NOT KID YOURSELF. Selecting a top quality turfgrass seed variety is not an easy job. Anyone who has gone through the time-consuming practice of using the NTEP Progress Reports to help determine the best varieties for their particular circumstances knows: the process can be tedious. So, asking the obvious, is all that work worth the effort?

Having used the NTEP and locally produced reports for the last ten years to make varietal choices, the answer to that question is an unqualified yes! The work that it takes to select a top-rated turfgrass variety for your particular problems pays dividends in the short-term and excellent benefits for the long-term.

To illustrate these advantages, I have selected a series of comparisons between well-known common varieties and older hybrid varieties and the lesser-known, newer hybrid varieties of bluegrass that are currently testing at higher levels of performance.

NTEP 1991 Kentucky Bluegrass Report (Medium/High Maintenance)
Table 1 - Turfgrass Quality

Variety	Mean Rank	% Increase
Midnight	6.2	52
Suffolk	6.0	47
Nassau	5.6	37
Touchdown	5.5	34
Merit	5.4	32
Kenblue	4.6	12
Merion	4.2	3
S. D. Cert.	4.1	0

▲ With South Dakota Certified (common) as the base, the other common variety (Kenblue) and a first generation hybrid (Merion) show little difference in overall quality. The older hybrids (Nassau, Touchdown and Merit) show considerable improvement in overall quality over the common varieties, but the newest hybrids (Midnight and Suffolk) show the best increase in quality.

Table 2: Genetic Color

Variety	Mean Rate	% Increase
Midnight	7.1	58
Blacksburg	6.8	51
Eclipse	6.3	40
Challenger	6.0	33
A-34	5.0	11
Kenblue	4.6	2
S.D. Cert.	4.5	0

▲ With South Dakota Certified (common) as the base, the other common variety (Kenblue) and an early hybrid (A-34) show little increase in color. The later hybrids (Eclipse and Challenger) show significant increases in color, and the latest hybrids show even more increase in color. This 50% increase in color can translate into a substantial reduction in the yearly amount of fertilizer applied.

Table 3: Leaf Spot

Variety	Mean Rate	% Increase
Blacksburg	8.3	830
Cobalt	7.7	770
Touchdown	5.3	530
Merit	4.3	430
Baron	4.0	400
Kenblue	1.7	70
S.D. Cert.	1.0	0

▲ With South Dakota Certified (common) as the base, the common varieties (Kenblue and South Dakota Certified) show very poor resistance to Leaf Spot. The early hybrids (Touchdown, Merit and Baron) show substantial improvements of 400% to 500% over the common varieties in Leaf Spot resistance. The latest hybrids (Blacksburg and Cobalt) show an almost 100% increase in quality over the early hybrids. This could translate into an almost complete elimination of fungicide applications for Leaf Spot.

Table 4: Pythium

Variety	Mean Rate	% Increase
Midnight	8.0	248
Cobalt	6.3	174
Eclipse	5.0	118
Nassau	5.0	118
Baron	4.7	104
S.D. Cert.	4.0	74
Ginger	2.3	0

▲ With Ginger (a common variety) as the base, the common varieties (S.D. Certified and Ginger) show only slight resistance to Pythium. The early hybrids (Eclipse, Nassau and Baron) show only slight improvements over the common varieties in Pythium resistance. The newer hybrids (Midnight and Cobalt) show a 47–110% increase in quality over the early hybrids. This tremendous increase in resistance to Pythium could translate into the possible elimination of preventive fungicide applications, or their use only when the weather dictates.

– continued on page 10

REGULATORY WATCH

Court rules against OSHA

A federal court has rejected the U.S. Dept. of Labor's attempt to speed up restriction of over 400 toxic workplace chemicals. The court ruled that OSHA's attempt to set general limits was laudable, but flawed, and that—even though the chemical by chemical approach has been slow—that approach would stand.

Entotech/Mycogen lawsuit settled

Entotech, Inc. and Mycogen, Inc. have settled a lawsuit that arose out of a claim of patent infringement and interference by Entotech against Mycogen. The suit revolved around the patent rights for *Bacillus thuringiensis*, a now widely used biological control for beetles. Six of the patents and all the associated rights were assigned to Entotect.

Why granular Triumph isn't available

In the article on "Grub control: old standbys and new directions" *(TGT July, 1992)*, publisher Christopher Sann made a statement concerning Ciba-Geigy's product Triumph, a major product repackager's concern about Triumph relatively high oral toxicity, and the repackager's failure to offer Triumph in a granular formulation. Technically, the statement was correct, but it conveyed the wrong impression.

In a phone conversation with Dr. Douglas Houseworth of Ciba-Geigy, we learned that the company has been attempting to get a granular formulation of Triumph registered with the E.P.A. for the past three years. First the E.P.A. refused to grant registration to a granular formulation, citing an estimated increased danger to birds. When extensive testing showed that Triumph does not pose an increased threat to avian populations, the E.P.A. switched arguments and again refused to grant Triumph registration for a granular formulation—this time citing the potential for toxic exposure to children playing on treated turf. The E.P.A.'s argument was based on an older study that reported that children playing outside eat enough thatch and dirt that, when combined with the Triumph's long residual, could lead to possible poisionings.

Despite indications that this new E.P.A. policy is incorrect, Ciba-Geigy has decided to suspend further pursuit of the required registration since they are unable to test children and disprove the "new" E.P.A. argument. We want to thank Dr. Houseworth for being helpful and forthright in discussing the facts concerning the possible granular formulation of Triumph. ■

Not a complete show, just a glimpse

OBVIOUSLY, SEED-PRODUCERS have been developing new varieties that represent real improvements. The above examples are not a complete listing of all of the advantages of choosing a newer turfgrass variety over a common or better known, older variety, but it is representative. These tables reflect only a portion of the data collected for the 1991 Kentucky Bluegrass Progress Report. The same kind of analysis can be performed on the other species progress reports, and it will yield essentially the same results.

Doing the work of choosing the best new variety to meet the specific requirements of your turfgrass sites can:

- REDUCE THE AMOUNT OF FERTILIZER required per year,
- REDUCE THE NUMBER AND AMOUNT of preventive fungicide applications,
- INCREASE THE AMOUNT of live turf cover,
- AND IN GENERAL RAISE the overall quality of the turf stand.

The bottomline is that using NTEP's treasure-house of information can eliminate hours and hours of avoidable field work resulting from less rigorous seed-buying decisions. ■

LETTERS TO THE EDITOR

READERS WHO WISH TO COMMENT on any aspect of the articles, news items, or commentaries published in *Turf Grass Trends*, or on any issues or concerns raised by them, should do so by writing to:

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Soil

A biological resource worth managing

by Dr. Eric B. Nelson
Dept. of Plant Pathology, Cornell University

FOR SOME turfgrass managers, soil is simply the "dirt" that holds plants in the Earth and keeps them from falling over. For the more advanced turfgrass manager, soil is usually held in higher esteem than dirt. Soil is considered by these turfgrass managers as the life-supporting matrix of the higher plant, since everyone knows that dirt is simply the "stuff" that accumulates under fingernails after a hard day's work.

Turfgrass managers who acknowledge that plants are anchored in soil, instead of in dirt, might generally admit that, for the most part, their understanding of soil is poor at best. Everyone knows what soil looks like, but they are not quite sure where it actually comes from or why it is sometimes black, sometimes brown, and sometimes red. Even though most people would admit that soil has a pleasant and somewhat fragrant odor, most are really not sure why soil smells as it does. They may that soil is a nutrient-holding material important in the health of plants, although the exact manner in which this can be is sometimes obscure.

Certainly, most know that living things, such as worms and insects, can also reside in the soil, but they're just not quite sure where in the soil they live or what they live on. In fact, I might be safe in assuming that few turfgrass managers consider soil as something that should be managed as prudently as the turf growing on top. However, it is becoming clear that the management of the soil, in particular its biological components, is perhaps as important as the management of the plant itself—for the long-term productivity of a turfgrass stand.

So, how can we manage the biological components of soil? To a large degree, turfgrass managers already manage certain biological components of the soil. Pathogens and some insect pests are routinely managed, since their activities are readily observed, and they are generally harmful to a turfgrass stand. However, it is the group of organisms whose activities are not readily apparent that we must learn to manage. These include the microorganisms that affect nutrient availability to the plants, those that directly enhance plant growth through the production of plant hormones, those that suppress the activities of pathogens and reduce disease development, and those that reduce the build-up of thatch. Additionally, there are organisms that affect the efficacy and mobility of pesticides in turfgrass soils, as well as many organisms whose activities are not clearly defined, but are an important part of the turfgrass ecosystem.

In coming issues of *Turf Grass Trends*, I plan to explore some of the important attributes and activities of soil microorganisms—in the hope that our readers will gain a renewed awareness of soil and the importance of proper soil and microbial management to the health of a turfgrass planting. ■

Next month: *What is soil anyway?*

Pesticidal bacteria can be programmed to self-destruct

GX BIOSYSTEMS APS HAS FOUND A WAY to limit the life span of genetically engineered bacteria, which are used as bio-pesticides. A "suicide gene" is inserted into the bacteria's' DNA structures, which triggers the production of fatal toxic chemicals when the "pesticide" job is complete. This technological breakthrough may help to reduce the fears of scientists and regulators, some of whom have resisted the release of genetically engineered bacteria.

. . . others feed on pesticide residues

PESTICIDE MANUFACTURERS, MIXERS and applicators may have another new friend in their efforts to eliminate possible pollution from pesticide containers, sprayer rinses and unused mixtures. University of Idaho researchers have found that dried forms of two bacteria are effective at breaking down parathion and 2,4-D into harmless compounds of carbon dioxide and water—at field sites where they have been used.

This technology could help to eliminate the need to store equipment rinses and unused pesticide mixtures. If the range of pesticides that can be broken down can be expanded, then the necessity of burying pesticide residues in landfills could be greatly reduced.

Israeli's works on genetic approach to nitrogen uptake

SCIENTISTS IN ISRAEL have been able to improve the efficiency of cultivated varieties of wheat to uptake nitrogen. By transferring genes from wild wheat into domestic varieties, they have improved nitrogen uptake by as much as 30%. This improved uptake significantly reduces the amount of nitrogen in the soil that could leach into the ground water. In a related project, Israeli scientists are studying bacteria that are able the produce ammonia, a nitrogen source in fertilizers, from the air.

Pesticide theft increases in California—and elsewhere?

IT HAS BEEN SAID that California leads the country. If so, turf managers need to consider increasing security on their storage of pesticides. Recently, it was reported that $63,000 worth of pesticides were stolen from a Sonoma County agricultural service. Officials reported that thefts of pesticides averaging $30,000–60,000 have been on the rise over the past three years.

Study links soil moisture, fertility, and leaf production

WORK DONE in the northern Great Plains has demonstrated a relationship between soil fertility, available soil moisture, and plant production. When soil fertility was maintained at high levels, each inch of available soil moisture resulted in an increase in plant growth of up to 5% over soils where soil fertility was allowed to decrease. Although these studies were done on agricultural crops, they have direct benefits for turf managers.

Turf has been shown to be the second most efficient means of capturing soil moisture, primarily because of the dense, filter-like effects of the leaf cover. Allowing soil fertility levels to decline has a snowball effect on leaf cover. As fertility declines less leaf structure is produced—thereby reducing the turf's ability to efficiently capture moisture. As the ability to capture soil moisture declines, efforts to increase soil fertility become more difficult.

Canadian study shows benefit of using balanced fertilizers

LONG-TERM STUDIES IN CANADA have shown that using unbalanced fertilizers reduces plant growth and reduces Nitrogen efficiency. The tests showed that applying nitrogen and potassium at the same time increased plant growth by 20% over just applying nitrogen by itself. Also, application of potassium increased nitrogen efficiencies by 12%. ■

COMING ATTRACTIONS

The next issue of *Turf Grass Trends* will feature in-depth articles on:

- **Soil Testing**—a tool to enhance turfgrass performance
- **What is soil anyway?**
- **PLUS** our regular updates on the latest research findings, regulatory actions, and timely tipes on improving your turf management practices.

Subsequent issues will include articles on:

- A COMPREHENSIVE SURVEY OF ENVIRONMENTAL REGULATORY ISSUES
- SITE SURVEYS—A MANAGEMENT TOOL