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ON-SITE TESTING OF BENTGRASS AND BERMUDAGRASS CULTIVARS FOR GOLF COURSE PUTTING GREENS

INTRODUCTION

There is growing interest within the golfing industry to develop on-site testing of turfgrass cultivars. This concept is not new, but has not been a common practice in recent years. Therefore, the Golf Course Superintendents Association of America (GCSAA), United States Golf Association Green Section (USGA), and the National Turfgrass Evaluation Program (NTEP) have agreed to revitalize on-site testing of turfgrass cultivars on golf courses, particularly on putting greens. This project conducts evaluations of new bentgrass and bermudagrass cultivars on USGA specification putting greens constructed at golf courses across the country. This on-site testing program is designed to provide scientific information of a more applied nature about putting green turfgrass cultivar performance.

Information from this project is valuable to the golfing industry. These studies will determine the adaptation of grasses for golf course use. In addition, information obtained from on-site testing will be of particular value to plant breeders, researchers, extension educators, USGA agronomists, golf course architects, and superintendents, who need to select the best adapted putting green cultivars for a particular regional climate.

A five-person committee composed of Dr. Jeff Nus, GCSAA Research Director; Dr. Mike Kenna, USGA Research Director; Mr. James Moore, USGA Construction Education Coordinator, Mr. Kevin Morris, NTEP Executive Director; and Dr. Bob Shearman, NTEP Special Projects Coordinator determined the trial site locations and the trial specifics. Input from golf course superintendents, USGA agronomists and turfgrass researchers assisted the committee members' decision making process.

Location & Number of Trial Sites

These cultivar evaluation trials are jointly sponsored and supported by the GCSAA, USGA-Green Section, and NTEP. The USGA funded the construction of USGA specification greens for the trials. Trial sites are located on golf courses near a land grant university with a turfgrass research program or in a major metropolitan area which is readily accessible to a university turfgrass scientist. Sixteen (16) regional evaluation trial sites have been established. Trials are located in: a) northern locations for bentgrasses, b) southern locations for bermudagrass, and c) transition zone locations for both species. Trials are located where golfers practice putting and/or chipping. Host clubs provide daily maintenance of the putting green site at their own expense.

Trial Specifics

The NTEP functions as the coordinating agent for the cultivar trials. These trials are five years in duration. Trials are conducted under mutually agreed upon guidelines, procedures, and funding outlined in a research agreement agreed to and signed by the appropriate representatives of GCSAA, USGA, and NTEP and each research cooperator (i.e. university turfgrass researcher). Trials are conducted at each location under the leadership of the assigned research cooperator. These persons are responsible for establishing and conducting the trial, and collecting and transferring the data to NTEP according to the research agreement.

Trials are maintained by the golf course superintendent at each location using management procedures common to their golf course, the geographical area and in consultation with the research cooperator. No special management practices are prescribed as these trials are intended to receive real-world golf course conditions and stresses.

ON-SITE TESTING (continued)

These trials are conducted principally with commercially available, named cultivars. Experimental lines that will be commercially available in the near future (i.e. before the end of the test cycle) were also included in these trials at the sponsoring company's discretion.

The NTEP administers the program and its funding, sets the advisory committee and gathers their input and recommendations for each species trial. The NTEP organizes and distributes the seed and vegetative materials which constitute the entries for each trial location. The NTEP provides the maintenance and data collection protocols to each site; collects, analyzes and disseminates the performance data in annual and final reports; and conducts an annual site visit for each trial.

For more information or additional copies of reports, please contact:

Kevin Morris, Executive Director
National Turfgrass Evaluation Program
Beltsville Agricultural Research Center-West
Building 003 Room 217
Beltsville, Maryland 20705 USA

NTEP reports can also be found on the World Wide Web at <http://www.ntep.org>

ON-SITE PUTTING GREEN TEST LOCATIONS

Golf Course	Location	Superintendent	Research Cooperator
<i>Bentgrass only</i>			
Crystal Springs Golf Course	Burlingame, California	Ray Davies	Dr. Ali Harivandi, California Cooperative Extension
Fox Hollow at Lakewood	Lakewood, Colorado	Bruce Nelson	Dr. Tony Koski, Colorado State University
Lassing Point Golf Course	Florence, Kentucky	Jerry Coldiron	Dr. A. J. Powell, University of Kentucky
North Shore Country Club	Glenview, Illinois	Dan Dinelli	Dr. Tom Voigt, University of Illinois
Purdue University Kampen Course	West Lafayette, Indiana	Jim Scott	Dr. Zac Reicher, Purdue University
Snoqualmie Ridge C. C.	Snoqualmie, Washington	Tom Wolff	Dr. Gwen Stahnke, Washington State University
Westchester Country Club	Rye, New York	Joe Alonzi	Dr. James Murphy, Rutgers University
Westwood Golf Course	Vienna, Virginia	Walter Montross	Dr. David Chalmers, Virginia Tech University
 <i>Bentgrass and Bermudagrass</i>			
Bent Tree Country Club	Dallas, Texas	Keith Ihms	Dr. Milt Engelke, Texas A&M University
Country Club of Birmingham	Birmingham, Alabama	Lee McLemore	Dr. Elizabeth Guertal, Auburn University
Country Club of Green Valley	Green Valley, Arizona	Mike Bates	Dr. David Kopec, University of Arizona
The Missouri Bluffs	St. Charles, Missouri	Alan Zelko	Dr. Barb Corwin, University of Missouri
SCGA Members Club	Murrieta, California	John Martinez	Dr. Robert Green, University of California-Riverside
 <i>Bermudagrass only</i>			
Country Club of Mobile	Mobile, Alabama	Ron Wright	Dr. Bryan Unruh, University of Florida
Jupiter Island Club	Hobe Sound, Florida	Rob Kloska	Dr. John Cisar, University of Florida
Lakeside Country Club	Houston, Texas	Mike Sandburg	Dr. Richard White, Texas A&M University

USGA/GCSAA/NTEP ON-SITE BERMUDAGRASS TEST

Entries and Sponsors

Entry No.	Name	Sponsor
1	MS-Supreme	Mississippi State University
2	TifEagle	Georgia Seed Development Commission
3	Mini-Verde	Turfgrass America
4	Tifdwarf	Standard Entry
5	Champion	Coastal Turf, Inc.
6	Tifgreen	Standard Entry
7	Floradwarf	Florida Turfgrass Foundation

TABLE 1A. 2001 MANAGEMENT - ON-SITE BERMUDAGRASS TEST AT BIRMINGHAM, AL (COUNTRY CLUB OF BIRMINGHAM)

ESTABLISHMENT		FERTILIZATION			HERBICIDES		
Planting date	11-Jun-98	Date(s)	Product	Rate (lbs./M)	Date(s)	Product	Rate (oz./M)
Problems during	None	March, April, May	26-0-22 (Nutralene+KNO ₃)	0.5 lb. N	March, May, July	Bensulide	
FACTORS OF PLAY		June, July	Anderson's (22-0-22)	0.5 lb. N			
		June, July	K ₂ SO ₄ (0-0-24)	1 lb. K ₂ O			
		March-November	20-5-20 ProSol foliar	1/16 lb. N			
Date opened for play	July of 1998. Open year				INSECTICIDES		
Date closed for play	round				Date(s)	Product	Rate (oz./M)
Type of spikes allowed	softspikes						
Uses of green	chipping, bunker practice				for cutworms,	Talstar	
MOWING					armyworms and a few		
					mole crickets		
Initial height	0.25"	FUNGICIDES					
Current height	0.125-0.150"	Date(s)	Product	Rate (oz./M)			
Frequency	6-7 days/week				OTHER PRODUCTS		
Type of mower	Toro 800 walk				Date(s)	Product	Rate (oz./M)
Rollers used		Fungicides are sprayed	Alliette	4			
Groomers used	6-7 days/week	biweekly in summer	Banol	2	None		
		depending on weather	Subdue Maxx	1			
		conditions. Big	Dithane	4			
CULTIVATION		problem with pythium	Daconil Ultrex	4-8 oz.			
Aerification - dates	5/8" hollow - June. 1/4"	so Alliette, Banol,	Heritage	0.4			
Aerification - type	hollow tine- July & August.	Subdue, and Heritage	Consys	4			
	Graden - Sept. 1.	are rotated and sprayed	Terrazole	6			
		on a two weeks			NOTES/COMMENTS		
Verticutting	Lightly verticut every 3	schedule.			Overseeded with Poa trivialis and covered when temperatures dropped below 24 degrees. Areas of green that get the most splash from bunkers are healthier. No discernable layer underneath. Weekly topdressing would probably be better.		
	weeks or so.						
Dates of topdressing	Heavy after aerifications,						
	Lightly bi-weekly						
Other cultural practices	Rolling as needed						

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TABLE 1B.

MEAN TURFGRASS QUALITY AND OTHER RATINGS OF BERMUDAGRASS CULTIVARS
 IN THE 1998 USGA/GCSAA/NTEP ON-SITE BERMUDAGRASS TEST
 AT BIRMINGHAM, AL (COUNTRY CLUB OF BIRMINGHAM) 1/
 2001 DATA

TURFGRASS QUALITY AND OTHER RATINGS 1-9; 9=BEST 2/

NAME	GENETIC COLOR	POA TRIVIALIS SPRING GREENUP	DENSITY MAY	COLOR MAY	COLOR JUNE	COLOR AUGUST	COLOR SEPTEMBER	COLOR OCTOBER	QUALITY RATINGS						
									MAY	JUN	JUL	AUG	SEP	OCT	MEAN
MINI-VERDE	7.3	3.0	6.0	5.0	7.0	7.0	6.0	3.3	3.7	5.7	6.3	7.7	6.0	4.0	5.6
TIFEAGLE	6.0	2.3	6.0	4.7	6.7	6.0	5.7	3.7	3.7	5.7	6.0	6.7	5.7	4.3	5.3
FLORADWARF	6.7	2.7	5.0	4.7	6.3	5.0	4.7	2.7	4.3	5.7	5.7	7.0	5.3	3.0	5.2
TIFDWARF	5.3	3.0	5.7	5.3	6.3	4.3	4.3	4.0	4.3	6.0	5.7	6.7	4.0	4.0	5.1
MS-SUPREME	5.0	3.0	6.3	4.7	5.3	4.3	4.3	3.0	4.0	5.0	5.0	7.0	5.0	2.7	4.8
CHAMPION	5.3	2.7	5.7	3.3	5.7	4.7	4.7	3.3	3.3	5.3	5.3	6.0	4.7	3.7	4.7
TIFGREEN	3.3	3.0	6.0	3.3	3.0	2.0	2.7	5.0	2.0	4.0	3.3	5.7	3.7	5.3	4.0
LSD VALUE	1.0	2.2	1.7	2.4	0.9	1.6	1.1	1.1	2.8	1.8	0.8	1.5	1.0	1.4	0.7
C.V. (%)	11.0	28.9	12.1	24.4	9.8	19.6	14.0	16.4	33.7	15.3	8.8	10.6	11.3	19.3	7.7

1/ TO DETERMINE STATISTICAL DIFFERENCES AMONG ENTRIES, SUBTRACT ONE ENTRY'S MEAN FROM ANOTHER ENTRY'S MEAN.
 STATISTICAL DIFFERENCES OCCUR WHEN THIS VALUE IS LARGER THAN THE CORRESPONDING LSD VALUE (LSD 0.05).

2/ C.V. (COEFFICIENT OF VARIATION) INDICATES THE PERCENT VARIATION OF THE MEAN IN EACH COLUMN.

TABLE 2A. 2001 MANAGEMENT - ON-SITE BERMUDAGRASS TEST AT MOBILE, AL (COUNTRY CLUB OF MOBILE)

ESTABLISHMENT		FERTILIZATION			HERBICIDES		
Planting date	18-Jun-98	Date(s)	Product	Rate (lbs./M)	Date(s)	Product	Rate (oz./M)
Problems during	None						
	1 lb. N/M, amend soil with Ca as needed. Topdress & roll until smooth surface was attained		1 lb. Of N per month 1/2 lb. Of P per month 2 lbs. Of K per month		None		
			Spray minors and wetting agent monthly rates for fertilizer cut by 1/2 in Winter				
FACTORS OF PLAY							
Date opened for play	always open	FUNGICIDES			INSECTICIDES		
Date closed for play		Date(s)	Product	Rate (oz./M)	Date(s)	Product	Rate (oz./M)
Type of spikes allowed	softspikes						
Uses of green	putting, chipping,		Chipco top choice in June for mole crickets			None	
			Everything else as needed				
MOWING							
Initial height	0.250"						
Current height	0.135"						
Frequency	7 days/week						
Type of mower	Jacobsen 22" walkers				OTHER PRODUCTS		
Rollers used	No				Date(s)	Product	Rate (oz./M)
Groomers used	No						
CULTIVATION		NOTES/COMMENTS			every 2 weeks in Summer	Primo	2 oz./K
Aerification - dates	May and August	The green was not overseeded in Winter 2001-20. Some differences in cold tolerance and greenup were noted. Some varieties (Tifgreen and Floradwarf) are almost completely overtaken by surrounding varieties.					
Aerification - type	1/2" Hollow Tines						
Verticutting	Verticut as needed - about 6 times per growing season						
Dates of topdressing	Topdress every Monday lightly. Primo at 2 oz./M every 2 weeks in Summer.						
Other cultural practices	Brushing after topdressing						

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TABLE 2B.

MEAN TURFGRASS QUALITY AND OTHER RATINGS OF BERMUDAGRASS CULTIVARS
 IN THE 1998 USGA/GCSAA/NTEP ON-SITE BERMUDAGRASS TEST
 AT MOBILE, AL (COUNTRY CLUB OF MOBILE) 1/
 2001 DATA

TURFGRASS QUALITY AND OTHER RATINGS 1-9; 9=BEST 2/

NAME	GENETIC COLOR	LEAF TEXTURE	DOLLAR SPOT	QUALITY RATINGS								MEAN
				MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	
MINI-VERDE	7.5	9	4.3	7.3	7.3	6.8	6.0	6.5	7.8	7.8	8.0	7.2
TIFEAGLE	6.5	9	4.0	7.3	7.3	6.8	6.3	6.8	7.3	8.0	8.0	7.2
CHAMPION	7.3	9	3.8	7.3	7.3	6.5	5.8	6.8	7.5	7.5	7.5	7.0
TIFDWARF	7.0	7	5.8	7.3	7.3	6.5	6.5	6.8	7.0	7.3	7.3	7.0
FLORADWARF	6.8	9	5.0	7.3	7.8	6.0	4.8	5.5	6.0	5.5	6.0	6.1
MS-SUPREME	5.8	9	6.0	7.3	6.8	5.8	4.8	5.5	5.0	7.0	6.8	6.1
TIFGREEN	3.5	6	5.8	7.0	7.0	6.0	4.3	3.8	3.5	3.0	4.3	4.8
LSD VALUE	1.2	0	2.7	1.4	1.2	1.4	2.2	1.1	1.3	1.3	0.7	0.6
C.V. (%)	13.5	0	28.7	7.9	8.2	10.8	21.9	13.4	14.8	13.7	7.4	7.2

1/ TO DETERMINE STATISTICAL DIFFERENCES AMONG ENTRIES, SUBTRACT ONE ENTRY'S MEAN FROM ANOTHER ENTRY'S MEAN.
 STATISTICAL DIFFERENCES OCCUR WHEN THIS VALUE IS LARGER THAN THE CORRESPONDING LSD VALUE (LSD 0.05).

2/ C.V. (COEFFICIENT OF VARIATION) INDICATES THE PERCENT VARIATION OF THE MEAN IN EACH COLUMN.

TABLE 3A. 2001 MANAGEMENT - ON-SITE BERMUDAGRASS TEST AT GREEN VALLEY, AZ (COUNTRY CLUB OF GREEN VALLEY)

ESTABLISHMENT		FERTILIZATION			HERBICIDES		
Planting date	July 1998	Date(s)	Product	Rate (lbs./M)	Date(s)	Product	Rate (oz./M)
Problems during	Established from plugs only - 40 per plot	May 11-Jun	20-10-5-Micros Florantine Slo-Release and ammonium nitrate	0.75 lb. N 1.5 lbs.	Roundup applied when bermuda was dormant in March to control poa annua.		
FACTORS OF PLAY		18-Jun	10-6-4	0.5 lb. N 3 oz. Ferromec/M	INSECTICIDES		
Date opened for play	Open year round	13-Aug	Calcium nitrate	0.4 lb. N	Date(s)		
Date closed for play		31-Aug	20-10-5	1.0 lb. N	Product		
Type of spikes allowed	soft spikes only		and 4 oz. Ferromec		Rate (oz./M)		
Uses of green	putting				None		
MOWING							
Initial height	5/32"				OTHER PRODUCTS		
Current height	5/32"				Date(s)		
Frequency	6X/week				Product		
Type of mower	22" walker				Rate (oz./M)		
Rollers used	Shallow wiehle (round)				Florantine Root enhancer applied six times year at 1x rate.		
Groomers used							
CULTIVATION		FUNGICIDES					
Aerification - dates	May and July	Date(s)	Product	Rate (oz./M)	NOTES/COMMENTS		
Aerification - type	2 solid tine aerifications	None					
Verticutting	same as aerifications; plus lite verticutting twice in June, once in July and Aug.						
Dates of topdressing	5/18, 6/11, 7/20, 8/10						
Other cultural practices	only brush in sand						

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TABLE 3B.

MEAN TURFGRASS QUALITY AND OTHER RATINGS OF BERMUDAGRASS CULTIVARS
 IN THE 1998 USGA/GCSAA/NTEP ON-SITE BERMUDAGRASS TEST
 AT GREEN VALLEY, AZ (COUNTRY CLUB OF GREEN VALLEY) 1/
 2001 DATA

TURFGRASS QUALITY AND OTHER RATINGS 1-9; 9=BEST 2/
 TURFGRASS STIMPMETER READINGS MEASURED IN INCHES
 THATCH MEASUREMENTS IN MILLIMETERS

NAME	DENSITY	DENSITY	DENSITY	PERCENT LIVING COVER RATINGS			FROST TOLERANCE	THATCH	FALL	FALL	FALL	STIMPMETER READINGS		
	SPRING	SUMMER	FALL	SPRING	SUMMER	FALL			COLOR	COLOR	COLOR	SPRING	SUMMER	FALL
TIFGREEN	6.7	6.7	6.7	78.3	89.3	83.3	7.3	20.3	8.0	6.7	5.3	100.0	112.7	117.3
FLORADWARF	7.7	6.0	6.3	83.3	86.7	85.0	8.0	13.0	7.3	5.3	6.0	97.0	110.3	117.0
TIFDWARF	8.0	8.0	8.0	88.3	93.3	88.3	7.0	20.3	5.0	5.0	5.3	110.0	117.7	119.3
TIFEAGLE	7.0	7.7	8.3	91.3	96.0	92.7	8.0	26.0	5.3	6.0	5.0	108.3	110.0	106.7
MS-SUPREME	6.7	7.3	7.3	78.3	81.7	87.3	7.3	18.0	5.0	4.7	3.7	109.7	111.0	110.3
MINI-VERDE	6.7	8.3	8.3	88.3	96.3	88.3	7.0	26.7	5.0	5.0	5.0	116.7	114.0	111.0
CHAMPION	6.0	7.0	8.0	91.3	94.7	86.7	3.3	22.0	4.0	2.7	2.3	126.7	136.3	139.7
LSD VALUE	1.8	0.6	1.6	16.4	9.0	15.9	2.3	8.1	1.1	2.0	1.2	7.6	9.6	16.2
C.V. (%)	11.7	4.9	10.5	8.6	5.1	7.2	17.9	19.9	11.3	20.7	14.4	4.1	4.7	7.3

TABLE 3B.
(CONT'D)

MEAN TURFGRASS QUALITY AND OTHER RATINGS OF BERMUDAGRASS CULTIVARS
 IN THE 1998 USGA/GCSAA/NTEP ON-SITE BERMUDAGRASS TEST
 AT GREEN VALLEY, AZ (COUNTRY CLUB OF GREEN VALLEY) 1/
 2001 DATA

TURFGRASS QUALITY AND OTHER RATINGS 1-9; 9=BEST 2/
 TURFGRASS STIMPMETER READINGS MEASURED IN INCHES
 THATCH MEASUREMENTS IN MILLIMETERS

NAME	GENETIC COLOR	SPRING GREENUP	LEAF TEXTURE	QUALITY RATINGS									MEAN
				APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV		
TIFGREEN	7.0	7.3	6.3	5.0	6.0	7.0	7.3	7.7	8.3	8.3	6.7	7.0	
FLORADWARF	5.7	6.3	5.7	6.0	6.3	6.0	6.0	5.0	6.7	8.0	6.7	6.3	
TIFDWARF	6.0	8.3	7.7	5.0	6.3	7.3	9.0	6.7	3.7	5.3	5.7	6.1	
TIFEAGLE	6.0	4.7	7.7	4.0	5.0	6.3	7.0	7.0	5.3	5.7	7.0	5.9	
MS-SUPREME	5.3	7.0	7.3	4.3	5.0	5.7	5.3	6.3	4.7	5.0	5.0	5.2	
MINI-VERDE	5.7	5.3	8.0	3.3	4.0	5.3	5.7	6.7	4.0	5.3	5.3	5.0	
CHAMPION	4.3	4.0	7.7	3.0	4.0	4.7	4.3	5.3	3.3	4.0	2.0	3.8	
LSD VALUE	1.1	2.7	1.0	1.1	1.4	1.7	1.4	1.7	1.5	1.3	2.4	0.7	
C.V. (%)	10.6	22.3	7.6	14.7	14.2	14.5	12.3	13.3	17.2	12.4	23.6	7.4	

1/ TO DETERMINE STATISTICAL DIFFERENCES AMONG ENTRIES, SUBTRACT ONE ENTRY'S MEAN FROM ANOTHER ENTRY'S MEAN. STATISTICAL DIFFERENCES OCCUR WHEN THIS VALUE IS LARGER THAN THE CORRESPONDING LSD VALUE (LSD 0.05).

2/ C.V. (COEFFICIENT OF VARIATION) INDICATES THE PERCENT VARIATION OF THE MEAN IN EACH COLUMN.

TABLE 4A. 2001 MANAGEMENT - ON-SITE BERMUDAGRASS TEST AT MURRIETA, CA (SCGA MEMBERS CLUB)

ESTABLISHMENT		FUNGICIDES		
Planting date	29-May-98	Date(s)	Product	Rate (oz./M)
Problems during	None	18-Jul	Alliette	4
		18-Jul	Fore (WP)	8
FACTORS OF PLAY		30-Jul	Daconil WS	2
		25-Aug	Subdue Maxx	1
Date opened for play		25-Aug	Fore (WP)	8
Date closed for play				
Type of spikes allowed	Softspikes only			
Uses of green	putting, chipping, target. Heavy use PPG.			
MOWING		HERBICIDES		
Initial height	0.125"	Date(s)	Product	Rate (oz./M)
Current height	0.125"			
Frequency	7 days/week	None		
Type of mower	Triplex - GKV			
Rollers used	Groomers used approximate 4 days/week.			
Groomers used	Rollers used 1-2 times per month.	INSECTICIDES		
CULTIVATION		Date(s)	Product	Rate (oz./M)
Aerification - dates	3/12, 10/9	02-Jul	Merit (75 WSP)	0.19
Aerification - type	5/8" hollow tine	14-Sep	Tempo 20 WP	5 grams/1000
Verticutting	2-3 times/month depending upon thatch except Nov.-May.			
Dates of topdressing	Heavy topdressing w/USGA spec. sand on 3/14, 10/10, following aerification. Light topdressing w/#30 silica sand monthly except Nov.-Mar.	OTHER PRODUCTS		
		Date(s)	Product	Rate (oz./M)
		None		
Other cultural practices	Heavy brushing in Mar., Oct. Rolled for special tournament events which were 1-2 times/month. Flushed with 6" of irrigation water once every 3 weeks from June-Oct. to lower high E.C. (100% reclaimed irrigation use in 2001)			
			NOTES/COMMENTS	
			No overseeding this Fall.	

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TABLE 4B. MEAN TURFGRASS QUALITY AND OTHER RATINGS OF BERMUDAGRASS CULTIVARS
 IN THE 1998 USGA/GCSAA/NTEP ON-SITE BERMUDAGRASS TEST
 AT MURRIETA, CA (SCGA MEMBERS CLUB) 1/
 2001 DATA

TURFGRASS QUALITY AND OTHER RATINGS 1-9; 9=BEST 2/
 TURFGRASS STIMPMETER READINGS MEASURED IN INCHES

NAME	GENETIC COLOR	LEAF TEXTURE	STIMPMETER READINGS		QUALITY RATINGS				
			SEPT.21	SEPT.24	JUN	JUL	AUG	SEP	MEAN
CHAMPION	7.3	7.0	96.7	111.0	6	7.7	7.3	8.0	7.3
MS-SUPREME	7.3	7.0	100.0	108.3	6	8.0	7.0	8.0	7.3
MINI-VERDE	7.3	7.0	97.0	107.0	6	7.7	7.3	7.7	7.2
TIFEAGLE	7.3	7.0	103.7	118.7	6	7.3	7.3	7.3	7.0
FLORADWARF	6.3	7.0	104.3	114.7	6	7.0	7.0	7.0	6.8
TIFDWARF	7.3	6.7	106.0	106.3	6	7.0	7.0	7.0	6.8
TIFGREEN	6.7	6.0	102.0	110.7	6	7.0	7.0	7.0	6.8
LSD VALUE	1.0	0.4	10.4	17.9	0	0.8	1.0	0.6	0.4
C.V. (%)	6.9	3.2	4.6	6.7	0	5.4	5.7	4.5	3.0

1/ TO DETERMINE STATISTICAL DIFFERENCES AMONG ENTRIES, SUBTRACT ONE ENTRY'S MEAN FROM ANOTHER ENTRY'S MEAN.
 STATISTICAL DIFFERENCES OCCUR WHEN THIS VALUE IS LARGER THAN THE CORRESPONDING LSD VALUE (LSD 0.05).

2/ C.V. (COEFFICIENT OF VARIATION) INDICATES THE PERCENT VARIATION OF THE MEAN IN EACH COLUMN.

TABLE 5A. 2001 MANAGEMENT - ON-SITE BERMUDAGRASS TEST AT HOBE SOUND, FL (THE JUPITER ISLAND CLUB)

ESTABLISHMENT		FERTILIZATION			HERBICIDES		
Planting date		Date(s)	Product	Rate (lbs./M)	Date(s)	Product	Rate (oz./M)
Problems during		Greens Foliar Program (weekly spray)			None		
FACTORS OF PLAY		Week 1					
Date opened for play		Garys Greens	18-3-4	0.23 lb. N			
Date closed for play	None	P. K. Plus.	3-21-18	0.13 lb. P			
Type of spikes allowed	softspikes	Ultra Plex	5-0-3	2.5 gal. Micro's	INSECTICIDES		
Uses of green	chipping	Week 1			Date(s)	Product	Rate (oz./M)
		Garys Greens	18-3-4	0.23 lb. N			
		P. K. Plus.	3-21-18	0.27 lb. P			
			8-0-4	0.05 lb. N	None		
MOWING		Granular Applications					
Initial height	0.125"						
Current height	0.125"	Year round 0-0-30 once per month at 1.5 lbs. K/1000.					
Frequency	daily	Immediately after aerification 12-0-20, 75%					
Type of mower	Jacobsen PGM	Nitroform, 25% Nutralene at 1 lb. Per 1000.					
Rollers used	None	Supplemented with Itarrells 13-4-13 during summer					
Groomers used	brushes used on front of mower	when needed			Date(s)	Product	Rate (oz./M)
CULTIVATION		OTHER PRODUCTS					
		None					
		FUNGICIDES					
Aerification - dates	hollow tines May-Aug; solid Sep	Date(s)	Product	Rate (oz./M)			
Aerification - type	& Dec; water inject Jan-Mar.						
Verticutting	deep - Jan May Jun Aug; Light - 1X/month Apr-Nov.	Heritage at recommended rate - 4 times last year					
Dates of topdressing	3 times/month in Jun-Sep. once per month in Oct-Nov. light dusting in Jan.-March.						
Other cultural practices	Brushing as needed	NOTES/COMMENTS					

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TABLE 5B.

MEAN TURFGRASS QUALITY AND OTHER RATINGS OF BERMUDAGRASS CULTIVARS
 IN THE 1998 USGA/GCSAA/NTEP ON-SITE BERMUDAGRASS TEST
 AT HOBE SOUND, FL (THE JUPITER ISLAND CLUB) 1/
 2001 DATA

TURFGRASS QUALITY AND OTHER RATINGS 1-9; 9=BEST 2/

NAME	DENSITY	DENSITY	WINTER	THATCH	COLOR	COLOR	COLOR	SHOOT 3/ COUNTS	STIMPMETER READINGS	QUALITY RATINGS							
	SPRING	FALL	COLOR		SEPTEMBER	NOVEMBER	DECEMBER	APRIL		JAN	FEB	MAR	MAY	SEP	NOV	DEC	MEAN
MINI-VERDE	7.7	8.0	8.0	4.0	9.0	8.0	8.0	337.0	107.3	9.0	8.3	8.7	7.3	8.7	7.7	7.7	8.2
TIFEAGLE	7.7	8.0	7.7	4.0	8.0	8.0	7.7	401.0	112.7	9.0	8.7	8.7	8.0	8.0	7.7	7.3	8.2
TIFDWARF	7.3	8.3	5.3	4.0	8.3	8.3	5.3	258.0	113.7	7.3	7.7	7.3	7.3	8.7	8.3	6.3	7.6
CHAMPION	7.7	7.0	7.7	4.0	7.7	7.7	7.7	434.0	113.7	8.3	8.3	8.0	6.7	7.3	6.7	7.3	7.5
FLORADWARF	7.7	7.3	7.0	4.0	7.7	7.7	7.0	382.0	120.3	8.0	8.0	7.7	7.0	7.3	7.0	7.0	7.4
MS-SUPREME	7.3	5.3	5.7	4.0	7.0	6.3	6.0	366.7	113.7	7.3	7.7	7.3	7.7	7.3	5.3	6.0	7.0
TIFGREEN	5.3	5.0	3.3	3.3	6.3	6.0	3.0	292.7	117.0	5.7	6.0	6.3	6.7	6.7	5.3	3.3	5.7
LSD VALUE	1.0	1.0	0.8	0.4	0.8	0.8	0.5	103.9	6.7	0.8	1.1	1.1	1.4	0.9	1.2	0.7	0.5
C.V. (%)	8.0	8.2	7.4	5.6	6.1	6.0	5.2	15.2	3.0	5.9	7.7	7.5	8.6	6.6	10.1	7.1	4.1

1/ TO DETERMINE STATISTICAL DIFFERENCES AMONG ENTRIES, SUBTRACT ONE ENTRY'S MEAN FROM ANOTHER ENTRY'S MEAN.
 STATISTICAL DIFFERENCES OCCUR WHEN THIS VALUE IS LARGER THAN THE CORRESPONDING LSD VALUE (LSD 0.05).

2/ C.V. (COEFFICIENT OF VARIATION) INDICATES THE PERCENT VARIATION OF THE MEAN IN EACH COLUMN.

3/ A TWO INCH DIAMETER CORE WAS TAKEN FROM EACH PLOT AND COUNTED ALL SHOOTS WITHIN THAT AREA.

TABLE 6A. 2001 MANAGEMENT - ON-SITE BERMUDAGRASS TEST AT DALLAS, TX (BENT TREE COUNTRY CLUB)

ESTABLISHMENT		FERTILIZATION				FUNGICIDES		
Planting date	08-Jun-98	Date(s)	Product	Rate (lbs./M)	Date(s)	Product	Rate (oz./M)	
Problems during	Extremely hot and dry	Granular Fertilizer Applications			Heritage apps in Spring (April/May) and Fall (Sept/Oct)			
FACTORS OF PLAY		March	Par Ex 16-0-24	1 lb. N				
		May	Par Ex 16-0-24	1 lb. N				
Date opened for play	open every day except	June	Polyon 0-0-46	1 lb. K	HERBICIDES			
Date closed for play	Monday when club closed	June	Country club 16-4-8	1 lb. N				
Type of spikes allowed	Softspikes	July	Polyon 0-0-46	1 lb. K	Date(s)	Product	Rate (oz./M)	
Uses of green	Chipping and Putting	August	Scotts 18-9-18	0.5 lb. N	None			
		September	Scotts 13-2-26	0.5 lb. N				
MOWING		October	Polyon 0-0-46	1 lb. K				
		October	Milorganite 6-2-0	1 lb. N				
Initial height		December	Polyon 0-0-32	1 lb. K	INSECTICIDES			
Current height	0.125"	Total - Granular app. 5.0 lbs. N, 3.6 lbs. P, 9.2 lbs. K						
Frequency	6 days/week				Date(s)	Product	Rate (oz./M)	
Type of mower	Toro walker	Foliar Fertilizer Applications			Conserve GC apps 1 week prior to each star tine cultivation			
Rollers used		Every two weeks (March-Sept.) - 14 Applications						
Groomers used	Solid rollers with brush, daily in May-Sept, weekly other months when not dormant.	Each Floratine app. consisted of			0.15 lb. N	OTHER PRODUCTS		
					0.08 lb. P			
					0.15 lb. K	Date(s)	Product	Rate (oz./M)
CULTIVATION		Total - Foliar app.			2.1 lbs. N, 1.2 lbs. P, 2.1 lbs. K	None		
Aerification - dates	June and September							
Aerification - type	Star tine							
Verticutting	Weekly April-September							
Dates of topdressing	Weekly April-September							
Other cultural practices		Total Fertilizer app.	7.1 lbs. N, 4.8 lbs. P, 11.3 lbs. K	NOTES/COMMENTS				
Green not overseeded and covered if forecast below 20 or to remain below 32 for excess of 24 hours. Covered 1 time in December of 01.								

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TABLE 6B.

MEAN TURFGRASS QUALITY AND OTHER RATINGS OF BERMUDAGRASS CULTIVARS
 IN THE 1998 USGA/GCSAA/NTEP ON-SITE BERMUDAGRASS TEST
 AT DALLAS, TX (BENT TREE COUNTRY CLUB) 1/
 2001 DATA

TURFGRASS QUALITY AND OTHER RATINGS 1-9; 9=BEST 2/

NAME	GENETIC COLOR	SPRING GREENUP	LEAF TEXTURE	DENSITY SPRING	DENSITY SUMMER	DENSITY FALL	FALL COLOR	QUALITY RATINGS												
							NOVEMBER	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
MINI-VERDE	7.0	7.0	8.0	6.7	6.7	7.7	6.0	4.7	7.0	7.7	6.3	6.3	6.3	6.0	7.7	7.7	7.0	6.0	5.0	6.5
TIFEAGLE	6.7	6.0	7.3	6.7	6.7	7.7	6.0	4.3	7.0	6.7	6.0	6.0	6.3	6.0	7.3	6.7	7.3	6.0	5.0	6.2
CHAMPION	6.3	5.0	8.0	6.7	6.0	8.0	6.0	3.7	6.7	6.0	5.3	5.7	5.0	5.0	7.3	7.0	6.7	5.7	5.0	5.8
MS-SUPREME	6.3	5.7	7.7	6.3	6.0	7.7	6.0	4.0	6.3	6.0	5.3	6.0	5.7	5.7	6.7	7.0	6.7	5.3	5.0	5.8
FLORADWARF	6.7	4.3	7.3	6.0	6.0	7.3	5.3	5.0	5.7	4.3	4.7	4.3	4.7	5.0	6.7	7.0	6.7	6.0	5.0	5.4
TIFDWARF	6.7	3.0	7.7	5.0	6.0	6.7	4.7	6.3	5.3	3.7	3.7	4.3	5.0	5.7	6.7	6.0	6.0	5.0	4.7	5.2
TIFGREEN	6.7	2.3	7.7	5.0	6.0	6.3	5.3	5.7	5.0	2.7	4.0	3.7	4.7	5.3	6.0	5.7	5.7	4.7	4.3	4.8
LSD VALUE	1.3	1.7	1.3	1.2	0.6	0.6	1.1	1.4	0.8	1.9	1.9	1.4	1.2	1.2	1.0	1.5	0.9	0.7	0.6	0.4
C.V. (%)	8.0	20.4	6.8	10.2	5.2	5.0	9.4	15.5	7.3	20.2	18.7	14.4	11.6	9.5	7.3	10.5	6.9	7.2	6.1	4.0

1/ TO DETERMINE STATISTICAL DIFFERENCES AMONG ENTRIES, SUBTRACT ONE ENTRY'S MEAN FROM ANOTHER ENTRY'S MEAN.
 STATISTICAL DIFFERENCES OCCUR WHEN THIS VALUE IS LARGER THAN THE CORRESPONDING LSD VALUE (LSD 0.05).

2/ C.V. (COEFFICIENT OF VARIATION) INDICATES THE PERCENT VARIATION OF THE MEAN IN EACH COLUMN.

TABLE 7.

MEAN TURFGRASS QUALITY AND OTHER RATINGS OF BERMUDAGRASS CULTIVARS
 IN THE 1998 USGA/GCSAA/NTEP ON-SITE BERMUDAGRASS TEST
 AT HOUSTON, TX (LAKESIDE COUNTRY CLUB) 1/
 2001 DATA

TURFGRASS QUALITY AND OTHER RATINGS 1-9; 9=BEST 2/
 TURFGRASS STIMPMETER READINGS MEASURED IN INCHES

NAME	GENETIC COLOR	PERCENT LIVING COVER		STIMPMETER READINGS	QUALITY RATINGS											
		SPRING	SUMMER	AUGUST	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	MEAN
MS-SUPREME	6.3	81.7	86.7	115.0	5.0	5.7	6.3	6.3	6.0	5.3	6.0	6.0	6.7	4.7	4.7	5.7
MINI-VERDE	7.0	76.7	91.7	110.3	4.3	6.0	6.0	5.0	5.3	5.7	6.3	6.0	6.7	5.0	5.0	5.6
CHAMPION	5.0	81.7	91.7	115.3	4.3	5.0	5.3	5.3	5.3	5.7	6.3	7.0	5.0	4.3	4.3	5.4
FLORADWARF	5.7	73.3	91.7	111.3	5.3	6.3	5.7	4.3	4.0	5.0	4.7	4.7	5.0	4.3	4.3	4.9
TIFDWARF	6.3	41.7	78.3	124.3	5.0	5.7	5.0	3.7	3.3	4.7	5.0	5.3	5.3	4.3	4.3	4.7
TIFEAGLE	5.0	56.7	73.3	119.0	4.7	5.7	5.0	4.0	2.7	3.3	4.7	5.3	6.3	4.0	4.3	4.5
TIFGREEN	3.0	58.3	61.7	116.3	5.0	5.0	5.3	4.3	3.0	1.7	2.3	2.0	2.0	1.0	2.7	3.1
LSD VALUE	0.7	23.3	13.3	21.3	1.9	2.0	2.1	3.0	4.7	2.8	1.6	1.6	2.2	0.9	1.1	1.5
C.V. (%)	7.3	18.3	9.1	7.5	15.7	15.0	15.6	28.1	47.5	31.0	18.0	17.4	21.7	13.0	13.5	15.6

1/ TO DETERMINE STATISTICAL DIFFERENCES AMONG ENTRIES, SUBTRACT ONE ENTRY'S MEAN FROM ANOTHER ENTRY'S MEAN.
 STATISTICAL DIFFERENCES OCCUR WHEN THIS VALUE IS LARGER THAN THE CORRESPONDING LSD VALUE (LSD 0.05).

2/ C.V. (COEFFICIENT OF VARIATION) INDICATES THE PERCENT VARIATION OF THE MEAN IN EACH COLUMN.