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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 distribute 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 001 Room 245
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
Bentgrass only			
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. Clark Throssell, 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
Bentgrass and Bermudagrass			
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	Mike Vogt	Dr. John Dunn, University of Missouri
SCGA Members Club	Murrieta, California	John Martinez	Dr. Robert Green, University of California-Riverside
Bermudagrass only			
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. 1999 MANAGEMENT - ON-SITE BERMUDAGRASS TEST AT BIRMINGHAM, AL (COUNTRY CLUB OF BIRMINGHAM)

ESTABLISHMENT

Planting date	11-Jun-98
Problems during	None

FACTORS OF PLAY

Date opened for play	July of 1998
Date closed for play	
Type of spikes allowed	softspikes
Uses of green	chipping, bunker practice

MOWING

Initial height	0.25"
Current height	0.14"
Frequency	6-7 days/week
Type of mower	walking
Rollers used	
Groomers used	6-7 days/week

CULTIVATION

Aerfication - dates	1" deep - early May, 1/2 " hollow tine -early July, 5/8 " hollow tine - late Aug.
Aerification - type	hydroject - bi-weekly From April to Oct.
Verticutting	Lightly every two weeks-June-Sept.
Dates of topdressing	Heavy after aerifications, Lightly bi-weekly
Other cultural practices	Rolling as needed

FERTILIZATION

Date(s)	Product	Rate (lbs./M)
March, April, June-Sept.	26-0-22 (Methylene Urea + KNO3)	1/2 lb. N
April, May, Aug.	12-2-12 (Natural Organic + Methylene Urea)	0.6 lb. N
March-November	20-5-20 (ProSol foliar)	1/32 to 1/10 lb N bi-weekly

FUNGICIDES

Date(s)	Product	Rate (oz./M)
Sprayed bi-weekly in Summer	Consyst	4 oz./1000 sq.ft.

HERBICIDES

Date(s)	Product	Rate (oz./M)
March, May, July	Bensulide	

INSECTICIDES

Date(s)	Product	Rate (oz./M)
As needed in Summer for cutworms and army worms	Talstar	

OTHER PRODUCTS

Date(s)	Product	Rate (oz./M)
None		

NOTES/COMMENTS

Overseeded with Poa trivialis and covered when temperatures dropped below 24 degrees

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/ 1999 DATA

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

NAME	GENETIC COLOR	SPRING GREENUP	COLOR OCTOBER	OVERSEEDING QUALITY NOVEMBER	OVERSEEDING QUALITY DECEMBER	STIMPMETER READINGS	QUALITY RATINGS MAY	JUN	JUL	AUG	SEP	OCT	MEAN
MINI-VERDE	6.7	6.3	5.7	7.3	8.7	105.0	6.0	6.3	6.3	6.7	5.0	5.3	5.9
TIFEAGLE	6.3	6.7	4.7	7.3	8.3	102.7	6.3	6.0	6.0	6.3	5.3	5.3	5.9
CHAMPION	6.0	6.0	5.0	6.7	8.0	105.0	6.0	6.0	5.3	6.0	5.7	5.7	5.8
MS-SUPREME	5.0	6.7	5.0	7.3	8.3	107.3	6.0	6.0	5.0	5.7	5.3	5.0	5.5
TIFDWARF	4.3	7.0	6.0	6.3	7.7	105.3	7.0	5.7	4.7	5.7	5.0	5.0	5.5
FLORADWARF	6.7	6.3	6.0	5.7	7.3	106.7	6.7	5.3	6.0	5.3	4.7	4.3	5.4
TIFGREEN	2.0	5.7	3.0	4.7	6.3	103.3	5.7	4.7	2.0	2.0	3.7	3.3	3.6
LSD VALUE	1.0	1.0	0.9	0.9	1.8	-	1.0	1.3	0.5	1.1	1.2	1.1	0.3
C.V. (%)	11.8	7.4	10.3	7.9	10.9	3.6	7.7	10.9	6.6	11.9	12.6	12.6	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 2A. 1999 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	Summer Winter		1 lb. N & 2 lbs. K 1/2 lb. N & 1 lb. K per Month - split into two apps. 14 days apart.	None		
FACTORS OF PLAY							
Date opened for play	Open all year		Calcium & Minors	As needed			
Date closed for play	not closed				INSECTICIDES		
Type of spikes allowed	softspikes						
Uses of green	putting, chipping,				Date(s)	Product	Rate (oz./M)
					None		
MOWING							
		FUNGICIDES					
Initial height	1/4"						
Current height	5/32"	Date(s)	Product	Rate (oz./M)			
Frequency	7 days/week						
Type of mower	walking			As needed -	OTHER PRODUCTS		
Rollers used	weekly during Summer season			preventative			
Groomers used				during overseed	Date(s)	Product	Rate (oz./M)
CULTIVATION						Primo	2 oz./Acre bi-weekly in July & Aug.
Aerfication - dates	June & Aug.14						
Aerification - type	Core						
Verticutting	bi-weekly during growing season & topdressed lightly between verticutings		NOTES/COMMENTS				Aquafer Wetting agent
Dates of topdressing	Every other week in season - as needed during Winter		Overseeded plots on Oct. 18 with Poa trivialis at 8 lbs/1000 sq.ft.				
Other cultural practices	Rolled weekly and brushed						

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/ 1999 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 FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	MEAN
CHAMPION	7.8	9	134.3	8.0	8.3	8.8	8.0	8.5	9.0	7.8	8.0	8.3	8.3
MINI-VERDE	8.5	9	114.3	8.0	8.3	8.8	7.8	8.3	9.0	8.0	8.0	8.0	8.2
FLORADWARF	7.0	9	125.8	8.0	8.3	8.5	7.5	7.5	9.0	7.3	7.5	8.0	7.9
TIFEAGLE	8.3	9	121.3	7.8	8.0	7.8	7.8	8.0	8.3	7.0	8.0	7.5	7.8
MS-SUPREME	6.8	9	125.3	7.3	8.0	8.0	7.5	7.5	8.0	7.0	7.3	7.5	7.6
TIFDWARF	7.3	9	116.8	7.0	7.3	7.3	7.0	6.8	7.3	7.0	7.8	7.3	7.2
TIFGREEN	5.8	7	116.0	6.5	7.0	7.0	6.8	5.5	4.8	5.3	6.3	5.3	6.0
LSD VALUE	0.6	0	18.5	0.5	0.7	0.8	1.1	1.0	0.6	0.4	0.7	1.2	0.4
C.V. (%)	6.3	0	8.2	4.8	6.1	6.7	8.4	9.6	5.4	4.2	6.5	10.6	3.5

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. 1999 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	April	15-15-15	2 lbs. N	None		
		May	21-7-14	1.5 lbs.			
		May	14-0-8	0.25 lbs.			
		June	33-0-0	0.8 lbs.			
FACTORS OF PLAY		June	0-0-37	0.25 lbs.	INSECTICIDES		
		July	15-5-8	1.25 lbs.			
Date opened for play	open year round	August	21-7-14	1 lbs.	Date(s)	Product	Rate (oz./M)
Date closed for play		September	34-0-0	0.5 lbs.			
Type of spikes allowed	soft spikes only				April	Crusade	1x label rate
Uses of green							
MOWING							
Initial height	5/32"						
Current height	5/32"				OTHER PRODUCTS		
Frequency	6X/week						
Type of mower	22" walker				Date(s)	Product	Rate (oz./M)
Rollers used	Shallow wheilie						
Groomers used	(round)				May	Ferromec	4
					June	Ferromec	4
CULTIVATION		FUNGICIDES			August	Ferromec	4
Aerfication - dates	None	Date(s)	Product	Rate (oz./M)			
Aerification - type							
Verticutting		None			NOTES/COMMENTS		
Dates of topdressing	6/5, 10/22						
Other cultural practices	Only to brush in sand. Rolled once in May				Not overseeded due to location/elevation site		

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/ 1999 DATA

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

NAME	GENETIC COLOR	SPRING GREENUP	LEAF TEXTURE	DENSITY SPRING	DENSITY SUMMER	DENSITY FALL	STIMPMETER READINGS			QUALITY RATINGS							
							JUNE	AUGUST	OCTOBER	MAY	JUN	JUL	AUG	SEP	OCT	NOV	MEAN
TIFEAGLE	7.3	7.3	7.7	6.7	8.3	8.7	94.3	97.0	100.7	6.0	6.7	7.0	8.7	7.7	7.0	6.7	7.1
MINI-VERDE	7.0	7.7	8.0	7.7	8.0	8.7	97.3	103.3	101.0	4.7	6.0	7.0	8.7	8.3	7.0	6.0	6.8
TIFDWARF	6.3	6.7	7.0	7.0	6.7	7.7	96.3	99.3	102.3	7.0	6.3	5.7	7.3	7.0	6.0	6.3	6.5
CHAMPION	6.7	7.0	8.0	7.3	7.7	7.7	97.3	101.0	103.0	4.7	6.3	7.0	8.3	7.3	5.3	5.0	6.3
MS-SUPREME	6.0	6.7	7.3	6.7	7.0	8.3	93.3	96.7	99.7	4.3	5.3	6.0	7.3	7.0	5.7	6.7	6.0
TIFGREEN	6.7	7.0	6.3	6.0	6.3	6.3	96.3	98.7	103.3	5.0	5.0	4.7	7.7	6.7	5.7	6.3	5.9
FLORADWARF	5.0	5.0	5.7	4.3	4.7	6.0	93.0	95.7	99.7	3.7	4.0	4.0	4.7	5.0	6.7	7.3	5.0
LSD VALUE	0.8	1.0	0.8	0.7	0.7	0.9	-	-	-	1.7	1.4	1.2	1.0	0.9	0.9	-	0.8
C.V. (%)	7.3	8.5	6.2	6.4	6.0	6.9	3.1	4.3	2.5	17.6	12.8	11.8	7.7	7.7	7.9	18.3	7.1

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.

TABLE 4A. 1999 MANAGEMENT - ON-SITE BERMUDAGRASS TEST AT MURRIETA, CA (SCGA MEMBERS CLUB)

ESTABLISHMENT

Planting date	29-May-98
Problems during	None

FACTORS OF PLAY

Date opened for play	opened on July
Date closed for play	
Type of spikes allowed	Metal spikes, Softspikes
Uses of green	Putting, Chipping

MOWING

Initial height	1/2"
Current height	3/25"
Frequency	Daily
Type of mower	triplex
Rollers used	Jacobsen Greensking V -
Groomers used	triplex attachments for groomers and rollers

CULTIVATION

Aerfication - dates	Sept. 16
Aerification - type	1/4" solid tine - follwed by topdressing (USGA spec.)
Verticutting	monthly on July, August, September, October
Dates of topdressing	light to moderate - monthly in July, August, September, October
Other cultural practices	rolled and brushed for tournament dates

FUNGICIDES

Date(s)	Product	Rate (oz./M)
5-Aug	Alliette	4
	Fore (WP)	8
14-Sep	Alliette	4
	Fore (WP)	8

HERBICIDES

Date(s)	Product	Rate (oz./M)
None		

INSECTICIDES

Date(s)	Product	Rate (oz./M)
12-Jul	Merit (75 WSP)	0.19

OTHER PRODUCTS

Date(s)	Product	Rate (oz./M)
None		

NOTES/COMMENTS

-Very high traffic practice green
-Plots are doing very well
-Green is flushed monthly w/ 6"water due to high salts
-Green is irrigated to prevent stress

TABLE 4A. (CONT'D) 1999 MANAGEMENT - ON-SITE BERMUDAGRASS TEST AT MURRIETA, CA (SCGA MEMBERS CLUB)

FERTILIZATION			FERTILIZATION		
Date(s)	Product	Rate (lbs./M)	Date(s)	Product	Rate (lbs./M)
15-Mar	Best 10-4-16	1 lbs. N	10-Jun	Nutriculture 24-0-0	0.07 lbs. N
2-Apr	Nutriculture 20-20-20	0.06 lbs. N		Turf Partners 1-0-23	0.14 lbs. K
	Nutriculture 24-0-0	0.07 lbs. N		Turf Partners (w/8% chelated Fe)	
5-Apr	Best 10-4-16	0.5 lbs. N	21-Jun	Turf Partners 1-0-23	0.07 lbs. K
8-Apr	Turf Partners 1-0-0 (w/8% Ca)			Nutriculture 24-0-0	0.07 lbs. N
	Turf Partners 1-0-23	0.07 lbs. K	22-Jun	Pursell 0-0-46	2.6 lbs. K
	Nutriculture 28-8-18	0.08 lbs. N	25-Jun	Turf Partners - Gypsum	
	Nutriculture 24-0-0	0.07 lbs. N	3-Jul	Best 18-3-18 (Polyon)	1 lbs. N
12-Apr	Best 18-3-18 (Polyon)	0.50 lbs. N	6-Jul	Turf Partners 1-0-23	0.07 lbs. K
23-Apr	Nutriculture 28-8-18	0.08 lbs. N		Nutriculture 24-0-0	0.07 lbs. N
	Turf Partners - Eco-Mag		21-Jul	Pac. Ag. & Turf 0-0-25	0.08 lbs. K
	Crown Tech. (FeSO4)			Nutriculture 24-0-0	0.10 lbs. N
24-Apr	Turf Partners - Gypsum		16-Aug	Pac. Ag. & Turf 0-0-25	0.08 lbs. K
28-Apr	Nutriculture 28-8-18	0.08 lbs. N		Nutriculture 24-0-0	0.07 lbs. N
	Turf Partners 1-0-23	0.07 lbs. K	19-Aug	Turf Partners 1-0-23	0.07 lbs. K
	Turf Partners - Eco-Mag			Nutriculture 28-8-18	0.08 lbs. N
	Promot			Sequestar - 13% Fe	
	Crown Tech. (FeSO4)		7-Sep	Turf Partners 1-0-23	0.07 lbs. K
3-May	Nutriculture 24-0-0	0.07 lbs. N		K-power 13.75-0-46	0.13lbs. K
4-May	Best 18-3-18 (Polyon)	0.53 lbs. N	14-Sep	Turf Partners 1-0-0-8Ca	
10-May	Nutriculture 28-8-18	0.08 lbs. N		Turf Partners 1-0-23	0.07 lbs. K
	Crown Tech. (FeSO4)			Nutriculture 24-0-0	0.07 lbs. N
	Turf Partners 1-0-23	0.04 lbs. K	20-Sep	Best 10-4-16	0.35 lbs. N
	Turf Partners - Eco-Mag		4-Oct	Best 10-4-16	0.26 lbs. N
21-May	Nutriculture 20-20-20	0.06 lbs. N	25-Oct	Turf Partners 1-0-23	0.10 lbs. K
	Turf Partners 1-0-23	0.04 lbs. K		Nutriculture 28-8-18	0.08 lbs. N
	Crown Tech. (FeSO4)		19-Nov	K-power 13.75-0-46	0.13lbs. K
27-May	Nutriculture 28-8-18	0.08 lbs. N		Turf Partners 1-0-0-8Ca	
	Crown Tech. (FeSO4)			Turf Partners 1-0-23	0.07 lbs. K
31-May	Nutriculture 28-8-18	0.08 lbs. N		Crown Tech. (FeSO4)	
	Nutriculture 24-0-0	0.07 lbs. N			
				TOTAL - 1999	5.71 lbs. N
					3.53 lbs. P
					9.83 lbs. K

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/
1999 DATA

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

NAME	GENETIC COLOR	LEAF TEXTURE	STIMPMETER READINGS OCT.1	STIMPMETER READINGS OCT.31	QUALITY RATINGS AUG	QUALITY RATINGS SEP	QUALITY RATINGS OCT	QUALITY RATINGS MEAN
MS-SUPREME	8.0	7.0	99.3	105.3	6.7	7.0	8.0	7.2
MINI-VERDE	7.7	6.7	99.7	104.3	6.3	6.7	7.7	6.9
CHAMPION	7.3	7.0	96.7	108.7	6.0	6.7	7.0	6.6
TIFEAGLE	7.3	6.3	100.3	115.0	5.7	6.3	7.3	6.4
TIFGREEN	6.0	5.7	98.0	108.7	5.0	6.3	7.0	6.1
FLORADWARF	6.0	6.3	109.3	107.3	5.3	6.0	6.0	5.8
TIFDWARF	6.0	5.0	99.0	104.7	5.0	6.0	6.0	5.7
LSD VALUE	0.6	0.6	13.4	-	0.9	1.0	0.5	0.5
C.V. (%)	4.8	5.7	5.8	5.6	8.2	6.9	4.2	4.6

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.

TABLE 5A. 1999 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			Granular: 13-4-13 and 0-0-30		None		
		Summer	0-0-30	5 lbs./month			
FACTORS OF PLAY		Summer	13-4-13	1 lb. N/ month			
Date opened for play		Foliar: Coron 28-0-0, Monopotassium Phosphate,					
Date closed for play		Roots 1-2-3			INSECTICIDES		
Type of spikes allowed	softspikes	Winter		3/4 lb. N/month			
Uses of green	chipping, short game area	Summer		1/2 lb. N/month	Date(s)	Product	Rate (oz./M)
					None		
MOWING							
Initial height	0.18"						
Current height	0.10"						
Frequency	7 days/week	FUNGICIDES					
Type of mower					OTHER PRODUCTS		
Rollers used	None	Date(s)	Product	Rate (oz./M)			
Groomers used					Date(s)	Product	Rate (oz./M)
			Fungicides have been used on a				
CULTIVATION			curative program.		None		
Aerfication - dates	Aerified (2x)- hollow tines.						
Aerification - type	Hydroject -1x/month						
Verticutting	2 times last season with Ren-o-thin (2 directions)				NOTES/COMMENTS		
Dates of topdressing	walk topdress with LESCO rotary spreader weekly during season. use pull behind spread biweekly during the Winter season				Irrigation as needed with heavy application every 4-6 days		
Other cultural practices	None						

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/ 1999 DATA

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

NAME	GENETIC COLOR	LEAF TEXTURE	DENSITY FALL	THATCH MEASUREMENTS	COLOR DECEMBER	STIMPMETER READINGS MARCH	STIMPMETER READINGS DECEMBER	QUALITY RATINGS JAN	FEB	MAR	APR	MAY	JUL	SEP	DEC	MEAN
CHAMPION	8.0	8.0	8.3	10.3	9.0	131.3	110.0	8.7	8.0	8.3	8.3	7.7	8.3	9.0	8.7	8.4
MINI-VERDE	8.0	8.7	9.0	11.0	8.3	126.0	98.3	8.0	8.0	9.0	7.7	7.3	8.3	9.0	8.0	8.2
TIFEAGLE	6.3	7.7	8.3	9.3	8.3	130.0	107.3	8.0	7.7	8.0	8.0	7.0	8.0	9.0	8.3	8.0
MS-SUPREME	6.3	6.7	6.3	11.0	8.3	123.3	114.0	7.0	7.3	7.3	7.7	7.7	7.7	8.7	7.7	7.6
TIFDWARF	6.7	6.0	5.3	10.0	9.0	124.7	114.0	5.7	6.0	7.3	7.0	7.0	8.0	9.0	8.3	7.3
FLORADWARF	6.3	7.3	6.3	10.3	9.0	143.3	114.0	6.7	6.3	6.3	6.3	6.3	7.3	9.0	8.3	7.1
TIFGREEN	3.3	4.3	3.7	11.0	6.0	124.7	120.7	3.7	4.7	5.3	6.7	7.0	7.3	6.7	5.3	5.8
LSD VALUE	1.0	1.4	0.9	-	0.6	11.7	23.4	1.2	1.2	0.7	1.5	-	-	0.5	1.4	0.7
C.V. (%)	9.5	11.6	8.4	23.5	4.6	4.7	9.1	10.9	10.1	5.7	9.9	11.9	8.9	3.3	9.6	5.3

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 6A. 1999 MANAGEMENT - ON-SITE BERMUDAGRASS TEST AT DALLAS, TX (BENT TREE COUNTRY CLUB)

ESTABLISHMENT		FERTILIZATION			FUNGICIDES		
Planting date	8-Jun-98	Date(s)	Product	Rate (lbs./M)	Date(s)	Product	Rate (oz./M)
Problems during	Extremely hot and dry	Granular Fertilizer Applications			None		
FACTORS OF PLAY		20-Mar	Par Ex 16-0-24	1 lb. N			
		10-May	Par Ex 16-0-24	1 lb. N			
Date opened for play		21-Jun	Polyon 0-0-46	1 lb. K	HERBICIDES		
Date closed for play		28-Jun	Country club 16-4-8	1 lb. N			
Type of spikes allowed		14-Jul	Polyon 0-0-46	1 lb. K	Date(s)	Product	Rate (oz./M)
Uses of green		2-Aug	Scotts 18-9-18	0.5 lb. N			
		20-Sep	Scotts 13-2-26	0.5 lb. N	None		
MOWING		25-Oct	Polyon 0-0-46	1 lb. K			
			Milorganite 6-2-0	1 lb. N			
Initial height		1-Dec	Polyon 0-0-32	1 lb. K			
Current height					INSECTICIDES		
		Total - Granular app.	5.0 lbs. N,	3.6 lbs. P, 9.2 lbs. K			
Frequency							
Type of mower					Date(s)	Product	Rate (oz./M)
Rollers used							
Groomers used		Liquid (Foliar) Fertilizer Applications			None		
CULTIVATION		Every two weeks (March-Sept.) - 14 Applications					
Aerfication - dates		Each Floratine app. consisted of		0.15 lb. N	OTHER PRODUCTS		
Aerification - type				0.08 lb. P			
Verticutting				0.15 lb. K	Date(s)	Product	Rate (oz./M)
Dates of topdressing		Total - Foliar app.	2.1 lbs. N,	1.2 lbs. P, 2.1 lbs. K	None		
Other cultural practices							
		Total Fertilizer app.	7.1 lbs. N,	4.8 lbs. P, 11.3 lbs. K			
					NOTES/COMMENTS		

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/ 1999 DATA

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

NAME	GENCR	GREEN	TEXLTEU ARFE	DESNP SRII TNYG	DESNU SMIM TEYR	OCT OOLB OERR	NOV CE OM LB OE RR	DEC CE OM LB OE RR	FEB CR OU LA OR RY	CM OA LR OC RH	C O LM OA RY	C OJ LU ON RE	C OL LU OL RY	FDEB IA TR YY	DEE SA IR TC YH	DEA SP IR TI YL	DOORC MT AO NB CE YR	QUALITY RATINGS JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	OCT	MEAN
MINI-VERDE	8.7	8.3	3.3	8.0	8.0	3.3	5.0	3.0	7.3	8.0	8.7	8.0	7.3	7.7	6.3	8.0	5.7	5.0	8.0	8.0	7.7	9.0	7.7	7.0	8.0	7.3	7.5
CHAMPION	8.3	8.3	3.7	7.7	7.3	2.3	5.0	2.3	7.3	7.7	8.0	6.7	6.7	6.7	5.7	7.7	5.3	5.0	6.7	7.7	7.0	7.7	7.0	6.0	6.0	7.0	6.7
FLORADWARF	6.7	8.3	3.3	7.3	7.0	2.0	3.3	2.0	7.0	7.0	6.3	6.0	6.7	6.7	5.7	7.7	6.0	5.3	7.3	7.3	6.7	7.0	6.7	6.3	6.7	6.7	6.7
MS-SUPREME	6.0	8.0	3.0	7.0	6.7	1.3	4.0	1.7	6.0	7.0	5.3	5.0	6.3	6.3	6.3	7.3	5.7	5.7	6.3	7.3	7.0	8.0	7.3	6.3	6.3	5.7	6.7
TIFEAGLE	7.7	8.3	4.0	8.0	7.3	2.3	4.3	2.3	7.0	7.7	8.0	7.0	6.3	7.0	6.3	7.0	5.0	5.0	6.7	8.0	6.7	7.7	7.0	5.7	7.0	6.7	6.7
TIFDWARF	8.3	6.0	4.0	5.7	5.3	4.3	4.7	4.3	6.3	8.0	7.7	5.7	6.7	4.7	5.0	6.3	7.3	4.0	4.3	5.7	5.7	6.3	4.7	6.0	7.7	6.7	5.7
TIFGREEN	6.7	4.3	4.0	4.0	4.3	3.7	5.3	3.0	5.0	5.7	5.0	4.7	6.3	3.0	4.7	5.0	7.7	3.0	2.0	3.7	5.3	5.3	4.0	5.3	7.3	6.0	4.7
LSD VALUE	1.3	0.7	0.8	1.2	0.8	1.7	-	2.1	1.3	0.6	0.9	0.6	-	1.1	1.7	1.0	2.4	1.2	1.0	0.9	1.2	0.8	1.0	-	1.8	-	0.4
C.V. (%)	9.4	5.7	11.0	10.3	6.9	31.9	23.1	37.5	10.5	5.2	7.7	6.2	13.8	11.1	13.8	8.0	18.7	13.8	9.9	8.0	9.6	6.5	9.1	18.1	11.9	20.2	3.7

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 7A. 1999 MANAGEMENT - ON-SITE BERMUDAGRASS TEST AT HOUSTON, TX (LAKESIDE COUNTRY CLUB)

ESTABLISHMENT		FERTILIZATION			HERBICIDES		
Planting date	16-Jun-98	Date(s)	Product	Rate (lbs./M)	Date(s)	Product	Rate (oz./M)
Problems during	None						
		4-Jan	Milorganite 6-4-0	0.7 lb. N	None		
		25-Jan	Andersons 18-6-15	0.6 lb. N			
FACTORS OF PLAY		2/2, 3/22	Agriplex Micro-mix 0-4-4	2.0 oz./M			
		3/19, 4/19	Best 16-8-8	1 lb. N			
Date opened for play		5/5, 5/17	HHI 15-4-7	0.5 lb. N			
Date closed for play		11-May	Ferromec 15-0-0	5 oz./M	INSECTICIDES		
Type of spikes allowed	softspikes	1-Jun	Agriplex Micro-mix 0-4-4	2.0 oz./M			
Uses of green	Putting/Chipping	21-Jun	Best 16-8-8	0.75 lb. N	Date(s)	Product	Rate (oz./M)
		23-Jun	Agriplex Micro-mix 0-4-4	2.0 oz./M			
		7/19, 8/2	Anderson 22-0-22	0.5 lb. N	22-Feb	Scimitar	7
MOWING		20-Sep	HHI 15-4-7	0.75 lb. N			
		11-Oct	Agriplex Micro-mix 0-4-4	2.0 oz./M			
Initial height	3/16"	22-Nov	Andersons 10-20-20	0.5 lb. N			
Current height	9/64"	29-Nov	Agriplex Micro-mix 0-4-4	2.0 oz./M			
Frequency	7 days/week	6-Dec	Andersons 10-20-20	0.75 lb. N			
Type of mower	walking	21-Dec	Milorganite 6-4-0	0.5 lb. N			
Rollers used	Toro Triplex - weekly	27-Dec	Andersons 10-20-20	0.75 lb. N	OTHER PRODUCTS		
Groomers used	None						
		FUNGICIDES			Date(s)	Product	Rate (oz./M)
CULTIVATION							
		Date(s)	Product	Rate (oz./M)	None		
Aerfication - dates	April 5 - solid 1/4"						
	Sept.7 - 1/2" hollow	22-Feb	Daconil	5			
		22-Mar	Daconil	5	NOTES/COMMENTS		
Aerification - type	Water injection monthly	11-May	Subdue	1			
	May-Sept.		Fore	6	Overseeded on		
		1-Jun	Heritage	0.4	10/25/99 with 12 lb.		
Verticutting	None	28-Jun	Fore	6	and on 11/25 with 2		
Dates of topdressing	Dusting weekly	6-Aug	Prostar	6	lbs of Sabre II poa		
Other cultural practices	Brush green monthly	11-Oct	Subdue Maxx	1	trivialis per 1000		
		29-Nov	Fore	6	sq.ft.		

TABLE 7B. 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/
1999 DATA

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

NAME	GENETIC COLOR	SPRING GREENUP	LEAF TEXTURE	STIMPMETER READINGS			QUALITY RATINGS												
				MAY	AUGUST	OCTOBER	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
MINI-VERDE	6.7	5.3	6.3	116.7	112.7	121.0	6.7	7.3	6.7	7.0	7.0	6.7	6.3	7.3	6.3	5.3	5.3	5.0	6.4
MS-SUPREME	6.3	4.3	6.3	104.0	97.0	110.3	6.7	6.7	7.3	6.7	6.7	6.7	6.3	6.0	6.0	4.7	4.3	4.7	6.1
CHAMPION	6.0	3.7	6.3	113.7	109.3	114.7	6.3	6.3	7.0	6.0	6.7	6.0	6.3	6.0	6.0	5.7	5.0	4.7	6.0
TIFEAGLE	7.3	4.0	6.7	107.7	105.0	110.7	6.7	6.3	5.7	6.0	6.0	6.7	6.7	7.3	6.3	5.3	4.0	4.7	6.0
FLORADWARF	6.3	4.0	6.3	106.0	105.7	105.7	5.3	5.3	5.3	5.7	6.7	6.3	6.3	5.7	6.0	5.0	4.0	4.3	5.5
TIFDWARF	5.7	5.7	5.0	120.3	112.7	125.7	5.3	6.0	6.0	5.7	5.7	5.0	5.3	4.7	5.0	4.3	4.0	4.7	5.1
TIFGREEN	1.3	3.0	1.7	109.7	107.7	108.7	3.3	3.3	2.3	2.7	4.0	1.3	1.7	1.7	2.3	2.3	2.0	3.7	2.6
LSD VALUE	1.0	-	0.8	10.0	15.4	10.9	0.9	1.0	1.8	0.7	0.7	1.1	1.0	1.4	1.0	1.7	1.4	1.0	0.6
C.V. (%)	11.1	35.3	8.7	4.6	6.5	5.1	9.7	10.0	17.4	7.2	6.7	12.0	11.2	14.6	10.6	18.9	18.2	10.6	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.